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The Journal of the
TEXTILE INSTITUTE

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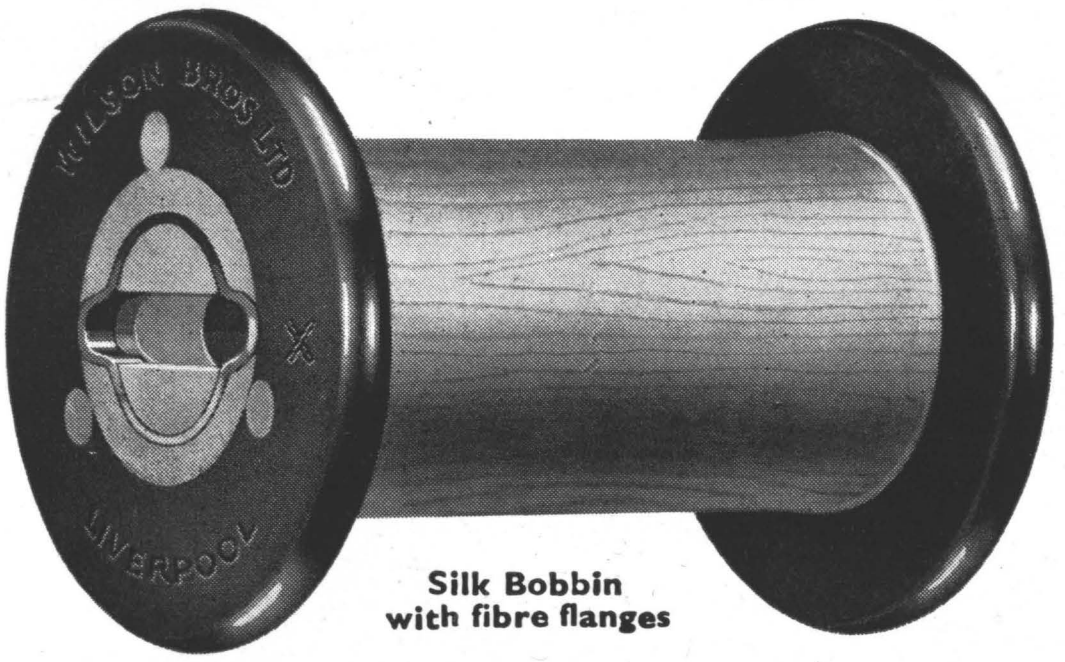

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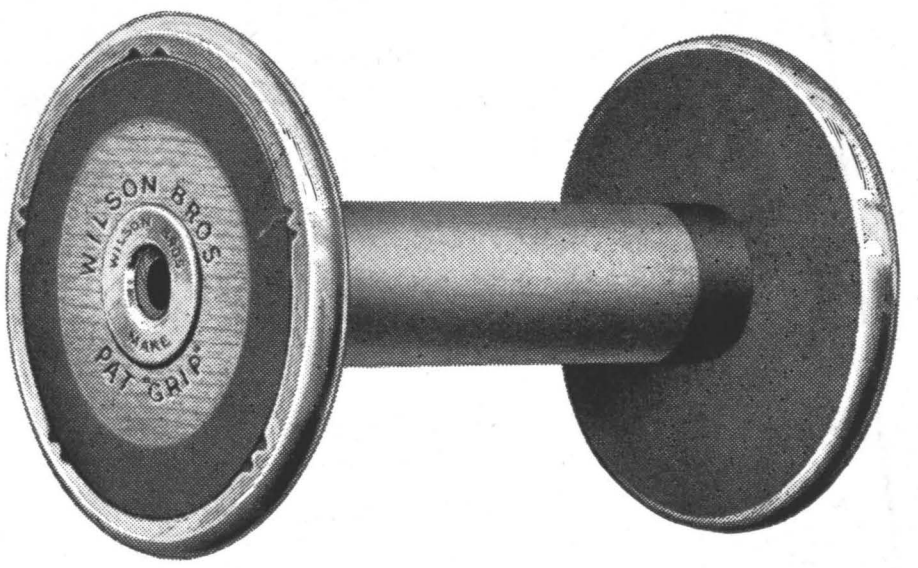

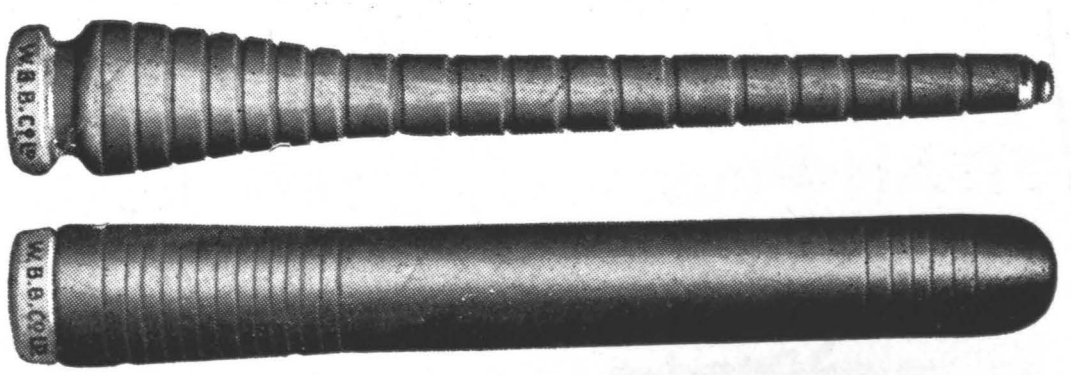

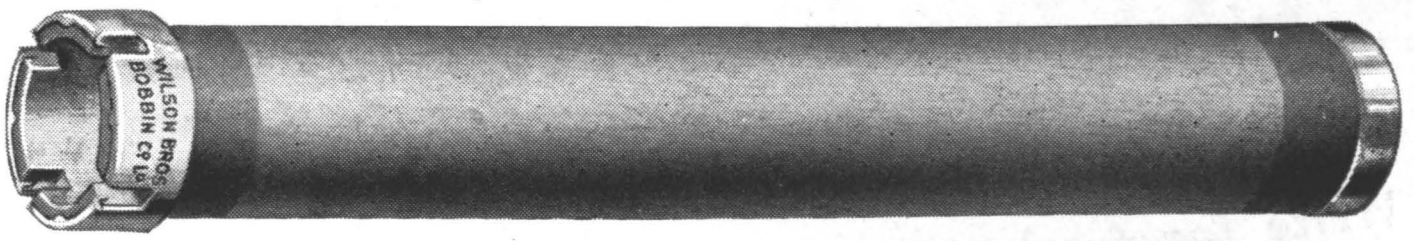

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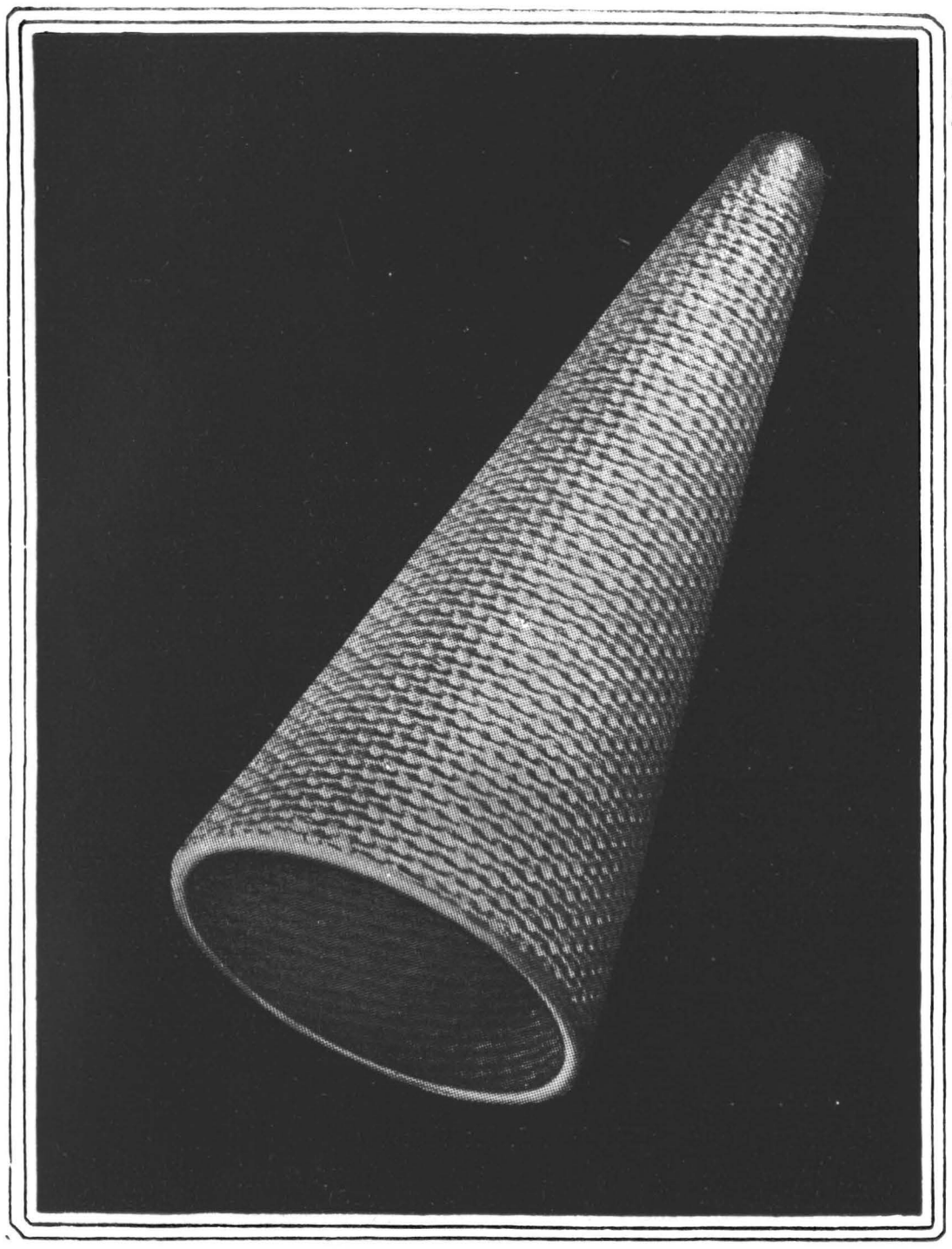

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NOTICES: INSTITUTE MEETINGS

Tuesday 6th July.	*Manchester*—3 p.m. Meeting of Publications Committe, at Institute.
Wednesday 14th July	*Manchester*—3 p.m. Meeting of Selection Committee, at Institute.
Wednesday 21st July	*Manchester*—3 p.m. Meeting of Council, preceded by Meeting of Finance and General Purposes Committee, at Institute.

Textile Institute Annual Conference, 1937

Prince of Wales Hotel, Southport,

June 9th to 11th inclusive.

Papers and Discussion on: **"The Serviceability of Fabrics for Clothing Purposes."**

Mather Lecture: **"Agriculture as a potential source of Raw Materials for Industry?"**

The July issue of this **Journal** will contain the above in full and any extra copies of the issue required should be ordered at once. Special prices will be quoted to Members and Students. Address all enquiries to:—

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THE JOURNAL OF THE TEXTILE INSTITUTE

Vol. XXVIII JUNE 1937 No. 6

PROCEEDINGS

"SERVICEABILITY OF FABRICS FOR CLOTHING PURPOSES"

Annual Conference of the Institute, Southport, 9th, 10th and 11th, June, 1937.

The Conference for 1937 was held at the Prince of Wales Hotel, Southport. Members with their wives, relatives and friends began to assemble during the afternoon of Wednesday, 9th June. A Conference office had been opened in the Hotel from which each arrival secured advance copies of the contributions to the Discussions of Thursday and Friday, badges, and other information relating to the event. An Exhibition, to which fuller reference will be found on a subsequent page, was set out in the Assembly room of the Hotel and early-on visitors began to inspect the Exhibits.

The Conference may actually be said to have commenced with a reception and dance at the Floral Hall on the Promenade on the Wednesday evening. The President, Mr. John Crompton, and Mrs. Crompton welcomed those attending and one side of the large Hall had been set aside for the Institute party. Those who wished joined the dancers on the floor and refreshments were provided by the Corporation. The Mayor of Southport (Councillor H. W. Barber, J.P.) arrived during the evening and was introduced to the President and many of the members present. No speeches were included in the programme which was purely one of dances and this afforded excellent opportunity for members to get together in conversation and to establish the atmosphere of unity of purpose so essential to the success of a Conference.

Thursday, 10th June. First Conference Session.

The proceedings were opened on Thursday morning in the Banquet Hall under the guidance of the President. The Mayor was present and welcomed the Institute to Southport. He commented on the excellent weather in which the event had been begun and hoped those present would believe Southport deserved its claim to be called "Sunny Southport." He made reference to various aspects of the Institute's work, noticing its Competitions, Scholarships and interest in Research. Expressing the view that all these activities were calculated to be of benefit to the Textile Industries. Councillor Barber hoped everyone in attendance would enjoy their stay in Southport and re-visit the resort at not too distant a date.

Mr. Crompton thanked the Mayor not only for being present to welcome the Institute that morning but for the entertainment that had been provided at the Floral Hall the previous evening. He made reference to the direct link between the prosperity of seaside resorts such as Southport and the general prosperity of the Industries from which visitors came, and expressed the hope that Southport's prosperity would march in step with that of Lancashire and other textile centres. Mr. Crompton then asked Mr. F. Schofield of the College of Technology, Manchester, to take the Chair and open the serious business of the Conference.

Mr. Schofield did so, and after some introductory remarks called upon Mr. C. M. Whittaker of Courtaulds Ltd. to open the Discussion. Mr. Whittaker referred in general terms to various aspects of the subject of serviceability of fabrics emphasising some of the points he had included in a paper* that had been set up in type and distributed in advance to all in attendance. Other speakers, some of whom had previously supplied written contributions* to the discussion, also took part in the animated and interesting discussion which followed. Mr. Whittaker replied to points raised and the session was brought to a close by the coming of lunch time.

The Thursday afternoon was left free, so far as organised excursions were concerned. The Conference committee felt that Southport, of itself, offered sufficient attractions to content the members and this proved to be an accurate estimate. Visits to the Aquarium and to an Exhibition of Alpine plants proved attractive and, though not too hot, the weather continued bright and sunny.

Conference Banquet, Thursday Evening, 10th June.

This is now an item of real importance in the Conference programme. It offers an opportunity to invite representatives of other Societies and Organisations to join with Institute members, thus emphasizing the policy of the Institute in securing co-operation in pursuit of its objects. The speech from the principal guest at the Banquet has been looked upon as an occasion when an authoritative view of the Institute's work from someone looking at it from the outside can be secured. This was the object in the invitation to Sir Frederick Marquis, Managing Director of Lewis's Ltd. to be chief guest on this occasion. Apart from this, it must also be pointed out that Sir Frederick is President of the Drapers' Chamber of Trade, whose hospitality at the London Conference last year will not soon be forgotten. In a very attractive and polished speech Sir Frederick proposed the Toast " The Textile Institute," and in a humorous introduction expressed some wonderment as to why he had been invited to the place he then occupied as proposer of that toast. He surmised that he might perhaps be regarded as an exhibit and thought that though he could not come up to any expectation that he would speak with the tongues of men or of angels he might at any rate be expected to speak as one who knew all about the profits. Profits, he believed, had been a sight for sore eyes in the Textile industry.

Sir Frederick next made reference to the general question of the relationship of the retail buyer and the manufacturer in regard to prices. He said that the distributor did not want to keep down prices at a level at which the producer could not make a profit, a reasonable profit. His buyers were instructed not to place orders which would not give the manufacturer a reasonable profit. As between the manufacturer and the distributor he was certain no good could come from mutual condemnation. They had, in some way or other to get together and he could not but wish that the Industry generally would read the Institute's charter again. In technical matters a very high pitch of efficiency had been reached ; the *Journal* published by the Institute was first class. The standard of technical education in textiles was an object lesson to all and in original research the Industry lead the world.

The fundamental issue as he saw it, continued Sir Frederick, was to get together in regard to standards. This co-operation had been achieved in the building trade, in the engineering trade and in the chemical industry. In other countries textile standardisation matters were also being tackled. But in this country, and particularly in regard to the finished article, the public were left in complete ignorance. The retail trade, he reminded them, perhaps in a misguided fashion had made an effort and had produced definitions and attempted

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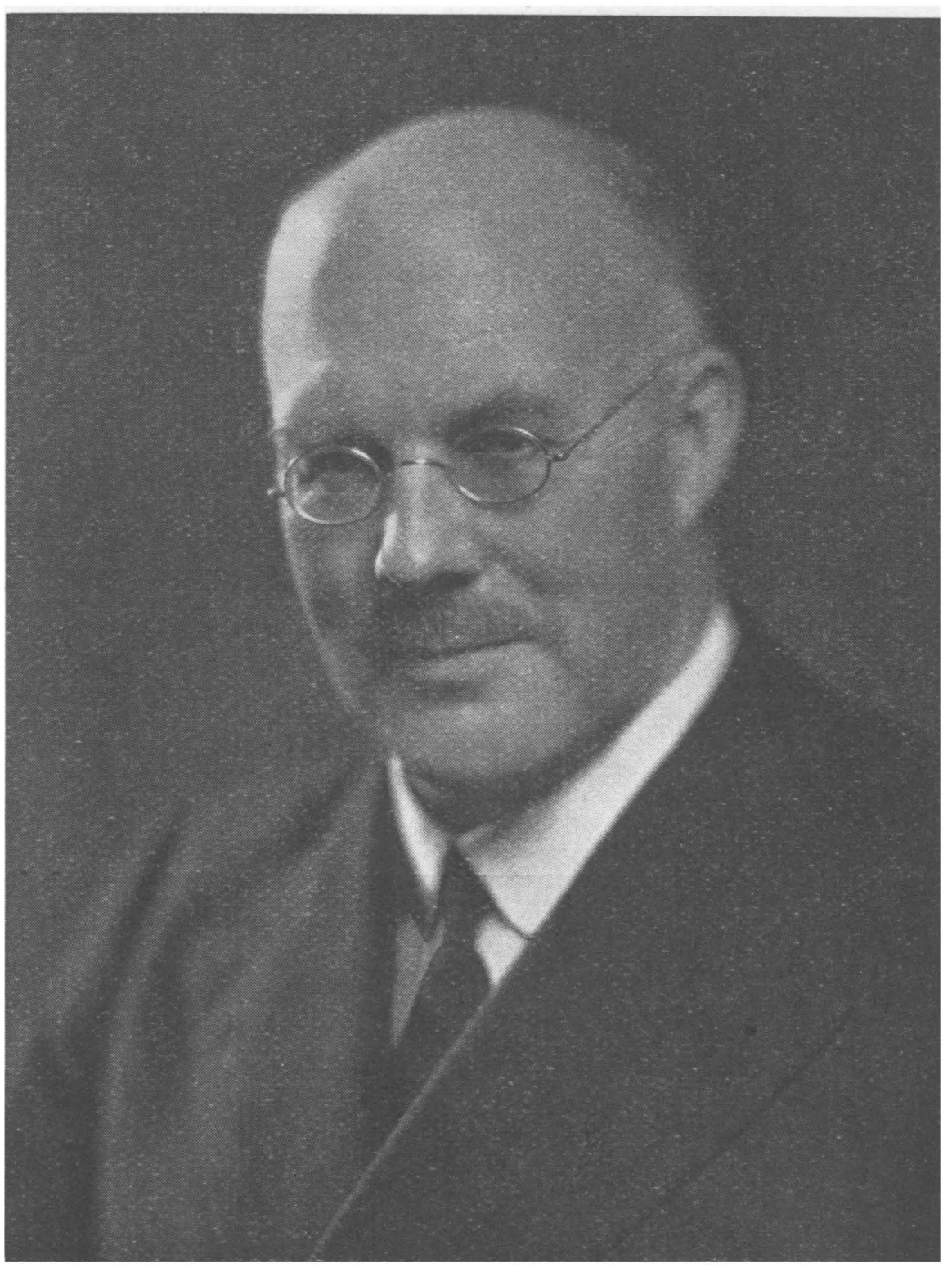
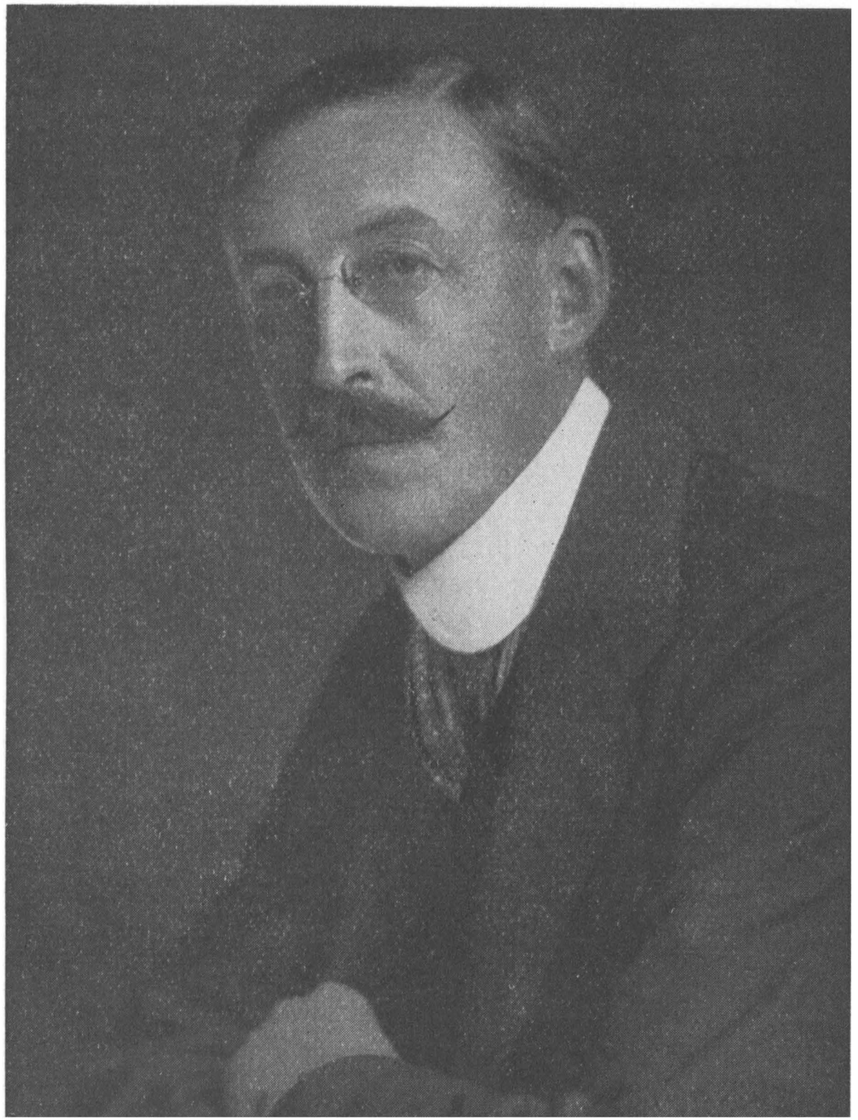
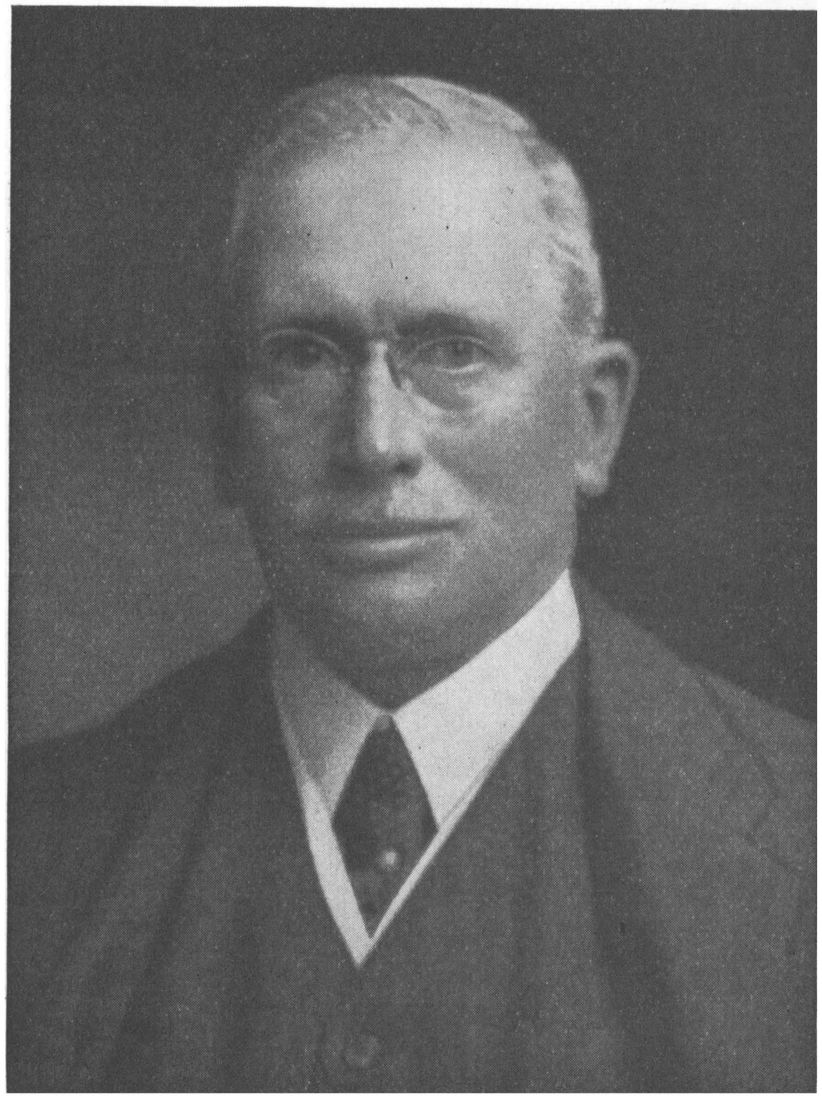
* This paper with other contributions to the Discussion will be printed in full in the July issue of this *Journal*.



Sir HAROLD HARTLEY
who delivered the " Mather " Lecture,



Mr. W. H. WEBB
who received the Institute Medal.



Mr. JOHN EMSLEY
who received the Institute Medal.

some standards. He ought perhaps to be glad this had been done but he would have preferred to have seen such work as the outcome of a co-operative effort on the part of manufacturers and distributors. He pointed out that both these great sections of the textile industries had to live together and that both were trying to get a living by serving the public. He was sure they would make a better living by a better understanding of each other's problems.

Mr. John Crompton, the President, responding to the toast, thanked Sir Frederick for the kind things he had said about the Institute. He assured him that the Institute would use every endeavour to secure all-round co-operation in those matters to which reference had been made and which came within the purview of the Institute. He asked Sir Frederick to believe that the Institute did not confine membership to the production end and its meetings provided opportunity for the presentation of more than the producer's point of view. Mr. Crompton complimented Sir Frederick upon the broad outlook he had manifested in regard to employment conditions and expressed the wish that other employers would emulate this example. On Standardisation problems he said that everything that the Institute could properly do was to be undertaken and he felt from his own observation of that morning's discussion that the right men were available, fully capable of giving the best advice in all matters affecting quality and serviceability.

Awards of the Institute Medal.

The next event in the after-dinner programme was the presentation of the Institute Medal to Mr John Emsley of Bradford, and Mr. W. H. Webb of Randalstown. Introducing Mr. Emsley to the President for this award, Mr. J. H. Bates of Wakefield said :—

" May it please you, Sir, It is my privilege to present to you, John Emsley, a Citizen, and a Justice of the Peace for the City of Bradford.

" Beginning in life with few material advantages, but endowed by nature with health and strength of body and mind and through the influence and guidance of a good Christian Mother, he has made for himself a position and a name, which are respected and honoured for tenacity of purpose, firmness of principle, business integrity, and he is second to none in the place which gave him birth.

" He is Principal and Governing Director of five great Industrial Wool Textile Concerns, which altogether employ 3,000 people ;

" A Local Director of the Union Bank of Manchester ;

" A Member of the Council of the Bradford Chamber of Commerce, for two years its President, and now its Treasurer ; Chairman of its Manufacturers' Section, the Chamber's Representative on the Local Employment Committee, and at one time a Member of the Advisory Committee of the Board of Trade.

" The Textile Institute of which he was President for four years, elected him its First Fellow in recognition of the Charter which it obtained largely through the influence and perseverance of John Emsley.

" In 1913/14 he was President of the Bradford Textile Society.

" During the War he was Vice-Chairman, in Bradford, of the Lord Derby Scheme, also Military Representative, and since then Chairman of the King's Roll Committee.

" In Social Life he has been President of the Bradford Cricket Club, the Automobile Club, and Toc H ; he is also a prominent Member of the Rotary Club.

" He has taken an active part in Religious work, and has been connected with the Wesleyan Church throughout his life.

" In Politics he is a Liberal, and for five years he acted as President of the Bradford Liberal Federation.

" He is a Member of three London City Guilds, viz :—The Woolmen's, the Weavers, and the Clothworkers Companies.

" I commend John Emsley, as a fit and proper person to receive at your hands, the greatest honour that the Textile Institute can bestow upon one of its most distinguished Members."

Mr. Crompton, handing the medal to Mr. Emsley, said it gave him great pleasure to do so not only because of his long friendship with Mr. Emsley but also because as Chairman of Council he had been associated with him during the time that efforts were being made to secure the Royal Charter.

Mr. Frank Nasmith, Hon. Secretary of the Institute, who presented Mr. W. H. Webb for the Medal, said it was unfortunte that Mr. Webb was in the United States and could not be there to receive the award personally. It was still more unfortunate that a representative of Mr. Webb's firm, who had been deputed to attend in his stead, had been called away unavoidably and that in consequence no one could actually receive the medal on Mr. Webb's behalf. He proposed, therefore, with the President's consent, to take it himself and make subsequent arrangements for it to be handed to Mr. Webb on his return from America. Addressing the President in regard to Mr. Webb, he then said :—

" Mr. President, I present to you William Hubert Webb, a Fellow and a Foundation Member of this Institute, as a worthy recipient of the Textile Institute Medal. The Medal is an award in recognition of distinguished services to the textile industry and particularly to the Institute and its work. The claims of Mr. Webb are remarkably strong in both connections. In his capacity of Chairman of the Old Bleach Linen Co. Ltd., he has demonstrated a subtlety in publicity methods which has even taught a great deal to the past masters of trumpet blowing in the United States of America. His quiet effective and artistic methods weaned the housewife from her use of table mats to table linen.

" His great work for the Linen Industry, extending over many years, is recorded in the offices he has held. He is an Ex-President of the Irish Linen Society, Ex-President of the Belfast Linen Merchants Association, and Ex-President of the Belfast Chamber of Commerce. He took a prominent part in organising the first Irish Linen Guild and was one of the chief movers when the Irish Linen Research Institute started at Lamberg, Co. Antrim. He is still an active member of the Council of that Institute and also of various Committees. During the War he was a member of the Flax Control Board. With all his manifold activities he has still found time to play an extremely active part in the advancement of the interests of the Textile Institute through its North of Ireland Section. He has been Chairman of this Section since 1926. His attendance at its meetings has been practically 100 per cent., and his sage counsel has been invaluable. He is ever conscious of the need to foster the young people of Industry, and was personally noted at Cambridge addressing the Drapers Summer School on the Flax and Linen Industry.

" He is a Deputy-Lieutenant for Co. Antrim. He has not sacrificed exercise to the calls of business and public work. No doubt his dexterity and the concentration, so highly essential, which enabled him some years ago to secure the Irish Amateur Golf Championship on two occasions, has in later life taught him how to shoot straight to his objective without wasting any strokes.

" Mr. President, I present to you William Hubert Webb, having, I hope, convinced you that he is undoubtedly worthy to receive the Medal which we guard so jealously."

The Toast of " The Guests " was proposed by Mr. George Haigh of Bradford and responded to by Councillor H. W. Barber, J.P., Mayor of Southport. Dancing followed the conclusion of the speeches.

Second Conference Session: Friday, 11th June.

This session commenced on Friday morning at 10 o'clock and the Chair was occupied by Mr. B. H. Wilsdon, Director of Research of the Wool Industries Research Association. He called upon Dr. F. T. Peirce of the British Cotton Industry Research Association who had contributed an introductory paper* on wear-testing. Other contributions* to a very general and earnest discussion were made by over thirty speakers and every evidence was there of the great interest taken in the subject as well as of the breadth of the field of work in this subject.

The "Mather" Lecture, Friday, 11th June.

This lecture,* inaugurated in memory of Sir William Mather, a past President of the Institute, was delivered by Sir Harold Hartley, C.B.E., F.R.S., M.C., Vice-President and Director of Scientific Research of the London, Midland and Scottish Railway Company. Sir Harold's subject was "Agriculture as a potential source of Raw Materials for Industry?" The Chair was occupied by Principal B. Mouat Jones, D.S.O., of the College of Technology, Manchester, who introduced the lecturer as an old personal friend and one outstandingly qualified to present such a subject. The lecture was illustrated by slides and at the conclusion a unanimous vote of thanks was accorded to Sir Harold Hartley on the proposal of Mr. S. E. Ward of Nottingham, seconded by Mr. Frank Nasmith.

Members present then had afternoon tea as guests of the Council.

Exhibition of Testing Apparatus.

During the Conference period an Exhibition of Wear Testing apparatus and of samples, diagrams, etc., bearing on the Serviceability of fabrics, was open in the Assembly Room of the Hotel. The Exhibition aimed at providing illustration of the tests applied to textile materials in attempts to evaluate their "performance" values. The testing of fabrics for durability or resistance to wear has been the subject of considerable investigation and the exhibits collected on this occasion for the first time were indicative of the variety and ingenuity of the devices planned to carry out "wear" tests. Exhibitors were :—

The British Cotton Industry Research Association, who showed a series of photographs and apparatus for testing stiffness, thickness, function and brittleness ;

The British Launderers' Research Association, who showed garments and portions of garments to illustrate types of failure and of shrinkage ;

The Department of Textile Industries, Leeds University, who showed a wear-testing or rubbing machine ;

J. H. Lester, Esq., of Tootal Broadhurst Lee Co., Manchester, who showed a ring-wear testing machine ;

The Linen Industry Research Association, who showed a Cloth wear testing machine, a photometer for the measurement of lustre, an apparatus for testing the resistance of linen shoe fabrics to repeated creasing, and apparatus for measuring the fastness to rubbing of dyed materials ;

The College of Technology, Manchester, who showed a wear testing instrument ;

The University of Nottingham, who showed an abrasion testing machine ;

The Wool Industries Research Association, who showed a wear testing machine ; and examples indicative of fastness testing, shrinkage measurement, and detergent efficiency ; and

Messrs. H. E. Messmer, London, who showed an example of the Schopper abrasion tester.

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* To appear in full in the July issue of this *Journal.*

Irish Section

CO-OPERATION BETWEEN THE TEXTILE AND LAUNDRY INDUSTRIES

By F. Courtney Harwood, B.Sc., F.I.C., M.I.Chem.E.
Director of Research, British Launderers' Research Association.

A paper given to the Irish Section of the Textile Institute at Belfast on March 18th, 1937.

This lecture is an endeavour to describe the efforts which have been and are being made in the laundry industry to place processes and investigations on a fundamentally sound, scientific basis, to indicate the kinds of faults that arise, and to suggest that co-operation along those lines which have already been adopted in part, will go a long way to remove a certain spirit of *laissez-faire* and even of animosity, which may have existed in past years between the textile industry as a whole, and the laundry industry. All sections of industry have a common goal—to give satisfactory service to the general public—and that goal, I am sure, can be won only by united and co-operative efforts.

The laundry industry, although a very old one, was not organised until 1886, when the National Launderers' Association was formed in London. This Association suffered several changes of name, similar Associations were formed in other parts of the country, and eventually in 1920, the National Federation of Launderers, Ltd., came into being. Owing to the enlarged scope of its work and its increasing prestige, this body with the permission of the Board of Trade, changed its name to the Institution of British Launderers, Ltd. last year.

During the past few decades, when the trade body has been increasing in prestige, there has been considerable re-organisation, rapid expansion, and, in some directions, almost incredible progress within the trade itself. Old-fashioned, badly ventilated laundries are dying out, giving place to large, well-planned and airy factories wherein the comfort of the workers is of prime importance. Coincident with the developments thus briefly outlined, laundering has become more scientific, particularly on the process side. In this evolution, the British Launderers' Research Association has played an important part.

The British Launderers' Research Association is one of a group of industrial research associations formed under the ægis of the Department of Scientific and Industrial Research at the end of the war, and is constituted in exactly the same manner as the Linen Research Association. It was formed in 1921, when work was commenced in a small temporary laboratory. The total income for the first financial year of the Association was approximately £5,000. For the current year, it is estimated that it will exceed £10,000. The original Articles of Association limited membership to commercial launderers and dry cleaners; an alteration effected last year now permits of other classes of membership; viz :—manufacturers, processors and distributors of textiles, manufacturers of laundry machinery and materials and laundries owned by public bodies, hospitals and institutions. This admission of members of the textile industry, is a big step forward towards co-operation.

The permanent laboratory was ready for occupation in 1923 and an experimental laundry was added in 1926. A bungalow on a freehold site adjoining the laboratory was purchased and occupied in 1933, whilst an upper storey was added to the original building, and opened on December 1st, 1936. Thus since 1923 the available floor space has been increased from 1,600 sq. ft. to nearly 8,000 sq. ft.

The staff now number more than 40 in comparison with the total of 11 who were employed when the laboratories at Hendon were first occupied. There is now excellent accommodation for conducting fundamental research work and for

carrying out *ad hoc* investigations arising out of queries which are constantly submitted by members.

Research.

The B.L.R.A. at the beginning of its existence commenced investigating each section of laundry processes, in the belief that satisfactory laundering stood for the complete removal of dirt from the articles to be washed with minimum wear of the fabrics. Methods of measuring the colour and of observing the efficiency of cleansing of washed articles were instituted. Research on the washing process, assisted by these methods of measurement, has resulted in the establishment of what is known as the " Graded Wash Process "—a washing process designed to cleanse articles as thoroughly as possible and at the same time to maintain their original strength and colour.

The research work now in progress includes studies of the fundamentals of detergency, i.e., the physical properties of soap and alkaline solutions as well as those of the new detergents known as sulphonated fatty alcohols. It is hoped that this work will lead to a clearer understanding of the particular functions of alkalinity, temperature and the individual soaps, etc., used. The particular needs of wool washing are being investigated by a special enquiry into the behaviour of wool under conditions likely to be met with in washing.

Engineering.

Apart from the research laboratories, there is a well-equipped engineering shop. Here, and in the experimental laundry, the performance and design of laundry plant are studied. Routine work consists of the examination of various plant and apparatus submitted for test by manufacturers. The study of plant performance frequently leads to the suggestion for some advantageous modification or to the design of special apparatus. One of the most striking examples of this advantage is undoubtedly the invention by the B.L.R.A. of the Interrupter Gear. This is a fitting which is attached to a washing machine and provides for the introduction of certain periods of rest during the actual washing process. It is particularly applicable to the washing of woollens and to fragile articles such as damasks and silks. Practical experience has shown that the Interrupter Gear is of great assistance in prolonging the life of goods. The research work at present in progress, includes a study of mixing in washing machines, the investigation of the effect of acceleration on the rate of extraction by hydros and a method of rinsing in the hydro-extractor.

Experimental Laundry.

Fundamental research is nearly always commenced in the laboratory, as many detailed and accurately controlled experiments are generally necessary before the final method of investigation can be selected. It is also obviously cheaper.

In due course the work is transferred to the experimental laundry which is equipped with full size laundry plant. Here the results of research can be tested out and the close proximity to the laboratories themselves ensures that the trials carried out are always scientifically controlled whilst the commercial conditions under which the laundry operates ensure that the practical requirements of any new method will not be overlooked.

Moreover, certain lines of research can be pursued directly in the laundry. The examination of the performance of laundry plant is always in hand. New models and new inventions are often submitted for test by manufacturers and the Association is thus able to keep its members informed upon these matters. New processes can be tried out, new methods of finishing tested and the results of analysis of laundry materials can be amplified by test in the laundry. Although all the preliminary large scale work is carried out in the experimental laundry, trials in the laundries of members of the Association are suggested if it is thought that advantage will thereby be gained.

Analytical and Consulting Department.

In order to be able to advise members on the application of research to their individual requirements it is frequently necessary first to obtain full information as to the composition of all or some of the materials which they use. For this reason alone the equipment of the Analytical Department would have become a necessity. Apart from this however, the research work itself often involves analyses and gradually, as the work of the Association has increased, the services of the Analytical Department, which consists of both chemical and textile laboratories, has become more and more valuable.

Chemical Laboratory.

In this laboratory the analysis of substances used in the laundry can be undertaken. For instance should a member require advice on the softening of his water supply, it is obviously necessary first to know the composition of the water in order that the correct method of treatment may be determined and the examination carried out is therefore arranged to cover all points which may need to be taken into consideration. Alkalies, bleaches, blues, soaps, soap powders, spirit soaps, starches, etc., can also be examined in this laboratory.

The Textile Laboratory.

This department undertakes the examination of damaged and otherwise faulty fabrics, each query being thoroughly investigated and a report of the examination issued. If the results of such an investigation indicate that the fault is due to the use of an unsatisfactory washing process, it is recommended that the process be tested by means of our test piece service. In this way it is possible to ascertain accurately the effect of the process and suggest suitable modifications. On the other hand, if there is indication that the defect is due to a fault of manufacture, communication with the manufacturer concerned is established according to the circumstances, and an effort is made to persuade him either to withdraw the faulty fabric from the market or to replace the article.

The special test pieces mentioned above are also supplied for treatment with any particular classification of work. The examination of the test piece on its return to the laboratory, gives an accurate indication of the effects of that particular process, and it is possible to determine if the member's process is satisfactory, and if not, to suggest such modifications as may be necessary.

More recently the work of the Textile Laboratory has been extended to include " launderability " or " shrinkage " tests on samples of new fabrics. By testing such fabrics under controlled conditions the extent of shrinkage can be determined. The suitability of the fabric to undergo treatment by a normal process or by special treatment is then found. This is a service which is helpful not only to launderers but also to manufacturers and distributors of textiles, many of whom now make a point of submitting samples of new fabrics for launderability tests before they are placed upon the market.

Development work.

Having brought certain pieces of research work to a successful conclusion, and issued the results to members in the form of reports, attempts are made to help members to put these results into practice by sending an experienced member of the staff to their laundries. The Development Officers as they are called, examine and test the processes and methods in use, and their observations and advice are communicated to members both verbally and subsequently in writing. The Development Officer is always ready and anxious to discuss individual problems with the laundry member and can also show, by practical demonstration, how helpful tests can be carried out by the member himself. This development work is a very valuable feature, since it serves to bring the results of the laboratory right into the laundry.

Further, there is the very important co-operation with the Textile Research Associations. Publications are exchanged and problems of mutual interest are

discussed. Joint investigations are also undertaken, such as the work at present in progress in collaboration with the Wool Industries Research Association on the question of wool shrinkage, and also on the fastness of dyed wool to washing. This should show that the British Launderers' Research Association is trying to make laundering a science, as well as an art. A short description of what happens to garments when they reach the modern laundry will now be given.

Modern Laundering.

The garments are first sorted and checked in order to see that every article in the bundle or hamper bears the correct mark. The various articles are then divided into groups, such as sheets, socks, table-linen, wool goods, silks, coloured goods, and so on. For each group there is a particularly specialized washing process. This point cannot be too strongly emphasized. The processes are chosen so as to be suitable for the textile material from which the articles are manufactured and so that they shall be adequate for removing the soiling matter without undue damage to the fabric.

Having been washed, the goods are placed in the perforated cage of a centrifugal hydro-extractor. They are not put through a wringer or mangle. From the hydro-extractor, the goods are taken in a damp condition and are ready for ironing. Flat work, such as sheets, or table-linen passes through large ironing machines termed calenders. These consist of a curved, polished steel bed, heated by steam, and a heated revolving cylinder, covered with felt and sheeting, which just fits the bed and whose weight is supported by bearings at each end. Thus the pressure on the bed can be adjusted to what is necessary to produce a perfectly finished article. In the calender, the equivalent of the ironing board with its blanket and sheeting, moves, whilst the polished steel part, corresponding to the hand-iron, is stationary. Calenders may be fitted with one, two, four, six or eight rollers. Shirts, white coats and the like are finished on specially made steam heated presses, collars are handled in a special department, fine silk articles and finery are hand-ironed. In the finishing department, therefore, each fabric and garment is given the most suitable finishing treatment.

The finished goods are then examined by the packing department, are re-sorted into groups according to the laundry mark, checked against the customer's laundry list, and finally packed into hamper or parcel, ready for delivery.

The Wash House.

It is in the wash-house that the most important parts of the laundering process take place. When talking of commercial laundries people often say, " Oh—I do not send my linen to a laundry—they use chemicals." Of course they use chemicals—and so does every one who uses soap, soda, water, blue and the various washing powders which are on the market. The laundry's chief chemicals are water, soap, and soda. For stained table-linen and the like, sodium hypochlorite is used to remove the stains—but it is used under carefully controlled conditions, which cannot be said of some proprietary products which are available for home use. It is also important to remember that the treatment which a fabric or an article receives during finishing or during its preparation for the market, has an important bearing on its subsequent life, particularly during laundering.

Water, the main raw material, is softened by having the lime salts removed from the town or corporation supply. If goods are washed with soap in hard water, lime soap is deposited in the fibres of the fabric and takes traces of fine soiling matter with it. That is why goods which are washed at home in hard water, gradually go very grey. Here is the first point I want to make therefore, regarding the modern wash-house—soft water is used, and is considered of paramount importance.

The washing processes which have been designed by the Research Association, are based on scientific principles. The following typical white work process for the washing of sheets, is an example of the type of process called the " Graded Wash." The load of sheets is placed inside the washing machine, which consists of an inner, perforated cylinder which revolves inside the outer casing which contains the washing liquid. In this first operation called the breakdown, cold soft water, to which has been added just an ounce or two of soda, is used : the temperature is gradually raised to 90° F., and this first operation serves to wet out the clothes, to remove loose soiling matter and to neutralise any acid soiling matter. The water is then run out of the machine and a fresh charge of clean soft water is run in. To this is added a good soap solution and a little soda. The temperature is gradually raised to 120° F. The control of the temperature prevents the coagulation of albuminous matter before it has been removed from the goods and the good lather which must be present takes away the larger dirt particles in suspension. After 10 minutes, this soapy liquor is run off, a fresh charge of warm soft water is put into the machine and more soap and soda are added in different proportions, the temperature being raised to 140° F.

Again, this soapy liquor is discharged into the drain and hot soft water is run into the machine with soap and soda solutions. This time, the amount of soda present is greater than the amount of soap, and the temperature is raised to the boil. This procedure is necessary in order to remove the yellowish patches which otherwise remain in the centres of sheets, pillow-slips, etc., due to exudations from the body, and also to remove very fine particles of soiling matter which are ingrained in the fibres.

After the boil liquor has been discharged, the load of goods receives four separate rinsings with soft water. The first two rinsings are really hot, at a temperature of 180° F., the third is warm and the last cold. Thus from the foregoing, you will see that the graded wash provides for eight complete changes of soft water, including three washes in soapy solutions.

The process thus outlined is a typical one for white work and is modified to suit different classes of white fabrics. For instance, stained table-linen needs treatment with sodium hypochlorite. This stain removal is carefully controlled. It is carried out in the second wash, in the presence of the soap : the temperature is not allowed to rise above 140° F., and the amount of chlorine from the sodium hypochlorite, is never allowed to exceed 5 grains per gallon. By this means, undue attack on the cellulose is obviated.

Print shirts are treated slightly differently. They are not actually boiled, the temperature not being raised above 190° F., and the alkalinity of the soap liquor is kept lower : but to assist removal of the dirt ingrained at the neckband and the cuffs, a sulphonated fatty alcohol is used with the soap. This has absolutely no effect on the textile fibres, but is an excellent penetrating agent and so assists the soap in removing the dirt. Used by itself, it does not suspend soiling matter as adequately as soap. The use of these sulphonated products does away with the necessity for scrubbing the neckbands, and cuffs.

Coloured goods are divided into several classes. Sometimes dyes are so loose that they will run in cold soft water, and it is sometimes necessary for the launderer to immerse such loosely-dyed articles in a solution of common salt, and to wash them therein using a sulphonated fatty alcohol only, as the detergent.

Coloured bordered table linen is not bleached with sodium hypochlorite, but with sodium perborate, using only 2 to 6 ounces for every 100 lbs. dry weight of tablecloths. The use of perborate in this instance is based on scientific principles. The type of colour used for dyeing the yarns forming the coloured borders is a vat dye. When there is a trace of a reducing agent present in the boil liquor, such for instance as a trace of old starch, then the vat dye becomes reduced, and in this condition, is soluble, and tends to mark off on to the undyed portions

of the tablecloth. The presence of sodium perborate not only removes tea and coffee stains, but prevents the reduction of the vat dye and so keeps it in its insoluble condition.

Different problems arise with woollen goods owing to the nature of the wool itself. Wool naturally tends to felt unless it has received treatment to render it " unshrinkable." To minimise felting, the launderer gives wool goods as gentle a process as possible, consistent with adequate cleansing. Thus the temperature of the washing liquor is never raised above 100° F., and mechanical action is cut down to a minimum. This can be done by fitting a B.L.R.A. interrupter gear to the washing machine. When this gear is in operation, the machine will rotate for 15 seconds and rest for 75 seconds, with the goods immersed in the detergent solution. Soiled woollens are given two washes, one of 10 minutes and one of 6 minutes, and the washes are followed by 2 or 3 rinses, also with the motion interrupted. Goods made from untreated wool will tend to felt under any washing conditions, if they are at all soiled, because when they are hand-washed, some rubbing is generally necessary, and this in itself will cause felting.

The other difficulty with which the launderer has to contend is loss of stretch on wetting out, due to an excessive amount of " boarding-out " during manufacture. In this case, too, the launderer is generally blamed for having " shrunk " the garments, whereas he cannot be held responsible for diminution in size in this connection, provided he has used a satisfactory woollen washing process.

In linen and cotton goods, the shrinkage problem is different. The shrinkage which often occurs in linen or cotton goods is directly due to recovery of the material from the stretching which has taken place during manufacture.

Damages which occur during laundering can be attributed to three causes :—

(1) Faults in the laundering process.
(2) Faults in manufacture.
(3) Misuse or accident during wear or use.

The various types of fault are frequently brought to the notice of our fabrics department. The reports, which are issued to members, are quite impartial and unbiassed, and if the fault in the article has developed as a result of incorrect laundering treatment, the blame is placed on the launderer.

For determining whether or not a laundering process is at fault, special test pieces of fabric, tarantulle, wool, striped shirting, etc., of known characteristics are used. An appropriate test piece is sent to the member's laundry, where it is washed 20 times with loads of goods. After the 20th wash, the test piece is returned to the laboratory and examined for chemical damage, loss of cotton material, loss of colour, loading, etc., etc., and from the analytical results, it can be determined just in what way the process falls short of the ideal.

In the course of the lecture slides illustrating the types of fault that are encountered in laundering work were shown.

Yorkshire Section

CONSIDERATIONS AFFECTING THE DESIGN AND CONSTRUCTION OF FABRICS FOR LADIES' WEAR

By T. Bellwood, A.T.I.

A paper given to the Yorkshire Section of the Textile Institute on Jan. 28th, 1937, at the Midland Hotel, Bradford.

Few people realise, when looking at the displays of fashionable fabrics, how many factors enter into the design and construction of the cloths. It is the object of this short paper to review some of the considerations which the designer and producer must bear in mind.

The influence of national events is almost too obvious to need comment. After the death of the late King George V there was a big demand for fabrics

in black, grey and other sombre shades. Designers were provided with plenty of scope for tasteful fabrics in black and grey, and grey and mauve shades. The Coronation has produced extensive demands for special fabrics in the colours of the national flag and designers have been busy with patterns incorporating red, white and blue and tones derived from them.

The weather and its vagaries influence fabric design to a marked extent. The light weight fabrics demanded in the recent warm summers have had to give place to the heavier cloths more serviceable in the average wetter and cooler seasons.

The expensive designs emanating from the Paris Salons exercise an influence upon the design of far cheaper lines. Frequently these exclusive cloths incorporate ideas which, though produced in an entirely different way, are very effective in the cheaper ranges of cloths. A good example was provided a few seasons ago. A Paris fashion house produced a design embodying beads stitched on to the cloth at regular intervals. The idea suggested to a clever designer the possibility of producing the effect in another way. Warp or weft threads were floated in a pre-determined way. They were cut before the scouring and subsequent processes, during which the loose ends rolled up and felted into the bead-like formation.

Other influences upon the design of fabrics which have their fleeting hour of popularity may be traced to the moving pictures and the artistes who star in them. These examples of factors which influence design are perhaps sufficient to show that the cloth constructor who would have his creations enjoy popularity must be quick to perceive the direct and indirect bearings of events of all types upon fabric design.

So far the factors dealt with have been of relatively minor significance or else their influence has been exerted over a short period only. The prices of raw materials exert a greater and more permanent effect on design. It must be admitted that the price is a factor of predominating importance, for it has a highly restrictive effect in every respect. The prices of raw materials have been rising for some time. This movement brings in its train a very varied assortment of problems for both designer and producer. Whatever ideas the designer may have and whatever novelties in design, colour or finish he may be able to introduce, the fact remains that the prices of the raw materials are the governing factors and that they alone practically decide at what figure a cloth can be sold.

The desire for change is one of the fundamental elements in the subject of fashion. When crisp, rough handling fabrics have had a run of popularity there is usually a reaction in favour of smooth supple cloths. In rough fabrics the coarser types of wool can be employed with advantage, but for smooth face finished cloths the finer grades of wool are essential. An example is thus provided of influencing factors coming into opposition and even nullifying one another. The rising prices of raw materials are putting difficulties in the path of the designer striving to provide the face cloths of smooth handle for which the demand has appeared. The cloths of rough appearance may therefore enjoy a partially continued popularity because the smooth ones cannot be produced at competitive prices.

It is interesting to consider the position of the designer and manufacturer beginning the construction of new ranges of patterns, say for the winter season. The discussion will proceed mainly from the point of view of the producer of woollen fabrics suitable for mantlings, etc. Consideration must first be given to the prices at which various customers have placed substantial orders in the immediate past. A very broad review of the changes in prices of the raw materials will determine at once whether it is possible to accept orders at these old prices or not, and in the latter case, what increases are inevitable. Having thus roughly settled the prices at which it is thought the cloths can be sold,

the blends are planned and the costs of specimen blends are worked out. This process is a more comprehensive one than is usually realized because woollen fabrics frequently incorporate mohair, cashmere and other hairs, feathers, and synthetic filaments. These are then considered with regard to the standard ranges of the producing firm, cloths which are made every season and differ only slightly in design. In many cases, in order to produce the fabrics at the prices ruling in a previous season, thicker yarns of lower quality fibre would have to be used. If the weights were to be kept the same, the setting would have to be altered and the designs would automatically become unsuitable for relatively loose cloths of spongy handle would result instead of fabrics of firm solid handle.

At this stage a number of new factors would have to be taken into account. The substitution of a lower quality of wool for a fine one would, in many cases, preclude the application of the same type of finish. In fact it results virtually in a cloth of entirely different character, demanding totally different treatment. Sometimes, if dark shades were required, it is possible to use dark coloured mungo or shoddy, which are cheaper than the same qualities in light shades. Further examples of such factors could easily be found.

For mixture yarns the component shades must be decided in order that the materials may be dyed preparatory to the putting down of the blend. It is impossible to define what constitutes an ideal range of shades for any fabric, since no two persons' ideas coincide. Black, various shades of grey, and " naturals " can generally be safely included in every range of mixture yarns for ladies' fabrics. In determining colour effects a balance round the base hue or colour appears to be necessary. Fancy yarns find wide application in the construction of woollen fabrics. The large variety of fibres now available makes possible a most extensive range of fancy yarns, both for piece dyed and for mixture fabrics.

When the yarns have been produced the next step is the designing of the cloths. Like the price of the raw materials the designing is a factor of major importance and one with which it is difficult to deal in general terms. Excessive ornamentation is quite as serious an error as undue plainness. If the fibre is to be the effective element in a cloth, the design should be the vehicle to display the fibre. In an emphatic design, yarns of strong character create harsh contrast. The experienced designer knows that certain weaves are frequently used and are always popular and he will make use of one or more from this class in every range. As with the handle of cloth there is usually a reaction in favour of neat small all-over effects after large well marked patterns have been the vogue. Design is very closely interwoven with finish and the type of finish which is to be fashionable will exert no small effect upon the designs. It is also intimately connected with the materials of which the yarns are composed.

Further instances of the bearings of different factors are provided by the consideration of a few designs for a velour finished fabric. One of the yarns in the quality employed may contain fibro or viscose staple fibre. Made up in plain weave, broken twill or other similar design, dependent to some extent on the counts of the yarn, the fabric when finished will not possess any pronounced weave effect. Its appeal will rather be due to the synthetic fibre element, which does not take the dyestuffs when the fabric is piece dyed. In such constructions the weave is a constructive rather than a decorative element. Plain diagonal or neat rib style may be similarly used. Yarns containing feathers or mohair may be used in like fashion, the actual design of the cloth being used as an unobstrusive background against which to display the effect fibres.

Styles for tweeds would naturally be different in character from those suitable for velours. It may be decided to incorporate a knop yarn overcheck with a herringbone design, the colour of the checking for each ground shade being chosen so as to preserve a balance of contrast in colour and tone. A range could be built up using knop, slub and gimp yarns in all over effects.

This part of the subject could be extended indefinitely. In these ways series of patterns from which customers may choose are brought into being.

Popular types of cloth sometimes entail difficult problems for the designer and tax the mill equipment to the utmost. An example is provided by cloths of open setting in which thick yarns with low twist are employed. Very careful attention must be given to the weave in order that the cloth may have the requisite strength. The limitations of the looms as regards figuring capacity are thus frequently emphasized. Automatic looms may also impose restrictions in cloth construction.

With the operations of dyeing and finishing it may be thought that the work of the designer and the producer of fabrics is completed. Generally this is so but it is not always the case if ranges of new seasons' patterns form the work in hand. Frequently the merchant would prefer a given pattern in a different colour or with a finish of different type.

A subject such as this could easily be treated in a long series of papers far more adequately and completely than in a single short one. Yet enough may have been written to show how numerous are the factors which must be considered. In addition they interact in a complicated way and it may be said that there is not one single process in the long chain which may not modify radically the character of the cloth.

Midland Section

DEVELOPMENTS IN THE KNITTING INDUSTRY

By W. E. Boswell, F.T.I.

Abstract of lecture given at University College, Nottingham, to the Midland Section of the Textile Institute, on March 11th.

Mr. Boswell observed that developments have taken place in every phase of the industry. The spinner has evolved new yarns, and better methods of winding have been thought out. The builder of knitting machines has made the machines more productive and adaptable. Many machines have been re-designed in the light of past experience and new methods of oiling and the enclosing of many parts have made them easier to maintain.

Some of these developments may be considered in brief detail. Wool yarns have not shown many changes, though the fancy variety, such as knop and slub have been used in greater quantities for outerwear fabrics. Wool yarns with a silk fleck are being worked at present for men's pull-overs, ladies' coats, etc. Twistless rayon yarns are being used in the warp knitting trade. Some of these are really twistless, and care must be taken to control ballooning in the warping operations. Others have a small amount of twist to allow them to be warped more easily. These twistless rayon yarns also work well on the bearded needle circular machines, the fabrics having a very full handle.

Staple fibre rayon yarns are being used in increasing quantities, an admixture of 50 per cent. wool, good quality wool for outerwear, cross-bred wool for footwear, proving very popular. Counts of this type of yarn are available up to 40's cotton size. Staple fibre rayon and cotton yarns are used for underwear fabrics, a popular mixture having 75 per cent. or 80 per cent. rayon. Viscose staple fibre twisted with an acetate continuous filament yarn is used in the warp trade to obtain a mixture stripe. When used with stripes of solid viscose alternating with stripes of acetate this gives very nice effects.

Coarse filament denier staple fibre yarns are suitable for use on circular rib jacquard machines for pull-overs, etc., this yarn giving a fabric of good appearance without the weight associated with the heavier continuous filament yarns.

Rubber yarns have not increased in use to any large extent. A new yarn made by spinning latex and viscose solution together is available and it is claimed that this yarn is very regular and has a long life.

Winding

Developments in this direction give increased speed of winding. Attention has been given to the building of the yarn on the bottle bobbin to give an improved off-wind. The bobbins on some of the new machines are arranged horizontally, and the bobbins are held by bearings at each end, spindles being dispensed with. The bearings are movable on slides to take different sizes of bobbins. The new cone winding machines show revolutionary changes, the use of the rotary traverse roll drive for the cone eliminates the use of thread-guides and cams, reducing noise, and building cones of uniform density with the minimum amount of chafing on the yarn. Tensions and slub-catchers are self threading. Enclosed mechanism and centralized oiling reduce maintenance time and costs considerably. The fact that the winding machine builder is alive to the requirements of the manufacturer is shown by the efforts made to provide new packages designed to prevent the trapping of silk and rayon during the knitting processes.

Knitting Machines

Single unit machines for fashioned footwear in fine gauges make the stocking in one piece, and will probably very largely replace the method at present used where two machines, a legger and a footer are required to make a stocking. The French type of foot is made on the single unit machine, and many of the improvements thought out for this machine are being incorporated in the machines using the two machine method. Improvements on fashioned hose machines include an anti-rebound mechanism, rollers on cams, ball bearings, shorter needles with consequent reduced movements on the levers, hooked knocking-over bits to reduce the risk of loading-up on the needles, and improved welt bars where the needle head can bury itself in a trick so that touch will tell when the points are covering correctly. Safe knitting speeds are from 75 to 80 courses per minute on a 15-inch head machine. It is gratifying to note that the British builders of this type of machine are keeping pace with these developments. A few of the features of their machines are ten thread carriers with the attachment for making the three carrier work required on pure silk hose, splicing carriers that can be racked over either one or two needle spaces when making spliced ankle and foot and easy access to all working parts.

Seamless Hose

Gauges in these hose keep pace with those of the fashioned variety, 340 and 360 needles in a $3\frac{1}{2}$-inch diameter cylinder corresponding to the popular 42 and 45 gauge fashioned hose. The needles are made with finer hooks to allow a small stitch to be made. Attachments, added to cope with the changing fashions, are disappearing in favour of pattern drums, controlling the needles through the medium of jacks, for the making of the patterned spliced ankle and foot, fish-net clocking, or all-over fish-net effects. Other features are square heels, to resemble the heel of the fashioned hose, gusset toes, giving more room in the toe, mock seams and mock fashion marks.

Ribbed hose and half-hose machines of the double cylinder type have been made more versatile, important developments including provision for the making of slack welts, two feed machines to increase production, five colour striping, plating patterns, draw threads to separate hose without cutting, rubber feeding for the rib-top, and true jacquard patterns in colour. The patterning capacity of the machines for the manufacture of the embroidered half-hose has been increased, and horizontal stripes can now be made along with the vertical elements of the design obtained by embroidery.

Warp Knitting

Knitting speeds have increased as the machine builders have adopted modern methods by using a shorter needle and inclining the needle to the presser, thus shortening the knitting movements. Modern speeds are 450 courses per minute on the narrow, and 350 on the wide looms.

More attention is being given to the use of three bars of threads and this, together with the use of a cut presser bar, gives a large range of fancy fabrics. A new feature is a tuck presser bar in small sections, enabling sections to be screwed on to a solid bar to give many combinations.

Sectional warping is being developed, and manufacturers are cautiously trying out this method which is certainly much quicker than the old one.

Direct warping is from creel to beam with stop motions for any broken ends. Counters show the length on the beam, and automatically stop the machine when a set length has been warped.

Circular Latch Needle Machines

New cam systems are in use on this type of machine. Simple alterations will allow either fish-net, float, tuck, or laid-in work to be made.

Patterning systems have been improved and pattern wheels are successful on machines as fine as 28 needles per inch. Rib patterning machines are improved, the making of garment lengths with rib border and draw-thread bringing the product of these machines nearer to that of the flat machine.

Larger pattern drums, more butts on the pattern jacks, and two-way racking of the drums increase the patterning scope tremendously. Selective transfer of the cylinder stitch to the dial needle gives garments with rib and plain stitch effects combined with open-work or lace stitch patterns.

Heavy tuck stitch fabrics, with the tucking on the cylinder needles, have been very popular both for underwear and outer-wear. Four feeder machines are being used for these, the needles tucking on three feeders and clearing on the fourth.

Flat-Knitting Machines

Double and treble cam systems have been further improved. Selective transfer of stitch can be made from one needle bed to the other, and new cam systems give tuck, laid-in, and other effects on one garment. Interchangeable needle beds, $4\frac{1}{2}$ to 10 gauge, solve the problem of the manufacturer requiring several gauges of fabric from a small plant of machines. Improved cam systems on flat pearl machines allowing roll and French welts, circular work and tuck stitches, give these machines much greater scope for original design.

Making-up

Increased speeds of stitching machines are achieved in this department due mainly to new designing, lighter parts more easily balanced, semi-automatic lubrication, shorter movements of the needle and loop forming parts. Old systems of lubrication by hand are being superseded by sump and wick method. Speeds of some overlock machines have been increased from 3,000 to 4,500, double chain-stitch flat bed machines from 3,200 to 4,300 stitches per minute. Speed of stitching must not be above the manageable limit of the operator; the high speeds serve for small stitch work and short bursts, but are not suitable for large stitch work.

Design

Fabric and garment designers are now indispensable to manufacturers, and people are being trained in the technical work relating to the knitting machine so that they understand stitch structure and the possibilities of the various types of machines.

Annual Meetings

Yorkshire Section

The Annual Meeting of the Section was held at the Midland Hotel, Bradford, on Thursday, 6th May, 1937, at 7.30 p.m. The Minutes of the previous meeting (23rd April, 1936) were read, approved, and signed.

The Chairman, Mr. G. Haigh, Bradford, briefly referred to the Papers delivered at various Section meetings throughout the past session, and expressed regret that attendance had not been greater. He reported that Mr. B. Musgrave had been appointed to represent the Section on the Federation of Textile Societies and Kindred Organisations, and asked for confirmation of this action. He urged upon Members the desirability of familiarising themselves with the facilities offered at Headquarters, and expressed his thanks to the Honorary Secretary and to officials of the Institute for help rendered him during his year of office.

The General Secretary read the names of the Committee whose term of office expired at this meeting, and who were eligible for re-election. He also intimated that a letter of resignation had been received from Mr. S. Saville. On the proposal of Mr. J. R. Emms, seconded by Mr. H. Binns, it was decided to recommend the following names to Council for appointment as the Section Committee :—A. Bailey, H. Binns, J. Dumville, J. R. Emms, G. Haigh, H. Haigh, J. R. Healey, N. C. Gee, E. T. Holdsworth, F. Kendall, S. Kershaw, W. Morley, H. Richardson, T. H. Robinson, W. S. Stansfield, E. A. Swift, D. Wilson.

The following officers were appointed for the ensuing year :—G. Haigh, Chairman ; E. T. Holdsworth, Vice-Chairman ; W. Garner, Hon. Secretary.

A unanimous vote of thanks to the Officers for their services during the past year was also recorded.

It was decided to leave the question of the appointment of the Emergency Committee to the discretion of the Section Committee.

It was also decided to circularise members of the Section with a view to ascertaining which was a suitable night for meetings, and whether any interest was shown in holding meetings outside Bradford.

London Section

The Fifteenth Annual Meeting of the London Section, held at the Hotel Victoria, Northumberland Avenue, London, W.C.2., at 6.30 p.m. on Wednesday, 28th April, 1937. The Minutes of the last Annual Meeting (2nd September, 1936) were read, approved and signed. The Committee's Report to Members of the Section for the past year was adopted.

The Hon. Secretary, Mr. A. R. Down, reported that nineteen nominations had been received. On the proposition of Mr. Carter, seconded by Mr. Scott, it was unanimously resolved to recommend the following to Council for election as the London Section Committee for 1937 :—Messrs. A. B. Ball, G. M. Canham, C. H. Colton, A. R. Down, A. E. Garrett, A. Gowie, F. C. Harwood, F. Henley, J. Howard, I.S.O., L. S. Irvine, A. Mason, W. H. Matthews, R. S. Meredith, P. J. Neate, T. C. Petrie, B. D. Porritt, G. A. Rushton, C. F. Sunderland, and A. Wigglesworth.

It was learned with considerable regret that owing to ill-health, Mr. L. J. Mills had decided not to seek re-election. The Hon. Secretary was requested to convey to Mr. Mills the meeting's regrets and also to express its keen appreciation of the many years of valuable service he had given so freely to the Section.

Pleasure was expressed that the Section expected to be able to revert to the full programme of Lectures, etc., for the next session. Satisfaction was also recorded that it was hoped to again issue the card giving the Section's activities for the coming session. It was felt that the cards were very good propaganda for the Institute. The syllabus was discussed at length and the Hon. Secretary was requested to bring the suggested subjects to the notice of the Lecture Sub-Committee.

The Chairman of the Section, Mr. T. C. Petrie, was heartily thanked for his unstinted efforts on behalf of the Institute in general and this Section in particular. The Hon. Secretary was also requested to convey the best thanks of the meeting to the Council of the Drapers' Chamber of Trade of Great Britain and Ireland, for their continued interest and great support, making special reference to the hospitality extended during the last Annual Conference of the Institute in London.

Midland Section

The Annual Meeting was held at Kings Head Hotel, Loughborough, on 7th May, 1937. Dr. E. Wildt presided over a small but very representative attendance. The Minutes of previous Annual Meeting were read and approved.

The Hon. Secretary, Mr. T. A. Purt, presented his Annual Report and stated that the Membership of the Section as at the 1st May, stood at 142, including 39 Associates and 8 Fellows. The following have been made Associates since the Last Annual Meeting :—G. Clarke, R. S. Harrison, H. B. Hopewell and M. F. Ward, while Dr. E. Wildt had been elected a Fellow.

For the first time since the inauguration of the Midlands Section, an increase in the Membership was not shown, but a number of Members had been transferred to other sections, otherwise there would have been a slight increase over last year.

The programme as originally arranged for the previous session was carried out in its entirety with the exception of the suggested Paper by Mr. H. A. Smith, on Modern Methods of Making Up. It was impossible to secure his services and a lecture by Mr. W. Hardacre, A.T.I. was arranged instead.

The Season was opened by a visit to the Leicester Textile Machinery, Accessories and Fabrics Exhibition, when we had the pleasure of a most interesting Paper by Mr. Frank Nasmith, F.T.I., the Hon. Secretary of the Institute.

The November visit to the L.M. & S. Research Dept. at Derby was a great success and very well attended. Gratitude was expressed to Mr. W. Pritchard and his assistants, for the excellent arrangements made on this occasion.

The Visit to Gerards Soap Works in December was most interesting and it was regretted that the attendance was so small but this was doubtless due to the inclement weather.

On December 11th the first Annual Dinner was held at Nottingham and considering the shortness of the notice given, this was carried off most successfully. The President, Mr. Turner, presided ; Mr. Frank Nasmith, the Hon. Sec., Mr. E. A. Swift (of the Yorkshire Section), and Mr. H. L. Robinson also attended. It was unanimously agreed to make this an Annual fixture with the date arranged at the beginning of the season and printed on the Programme.

Mr. W. Hardacre gave a very interesting paper in January, at Leicester, on " Developments in Fibro and Wool Yarns," to a well attended meeting, while in February a party of over 50 visited the British Bemberg Works at Doncaster. This was a record attendance for any Midlands Section Meeting.

Mr. Boswell's paper in March was a very fitting climax to a most successful season as he dealt very ably with his difficult subject, " Developments in the Knitting Industry," demonstrating his various points with an excellent display of samples.

At a Committee Meeting held in November it was unanimously decided to recommend Dr. Wildt's name to Council as Chairman of the Section Committee, which recommendation met with full approval.

The Hon. Secretary stated that Dr. Wildt had carried out the Chairmanship in a very efficient manner, and in addition to this office he spoke of the good work Dr. Wildt was doing on the Council, the Selection Committee and the Fabrics Competition Committee. Congratulations were extended on his election to Fellowship and also on his re-election to Council.

Thanks were extended to Mr. Chamberlain and other members of the Committee for the very valuable services rendered during the past season.

Although the existing Committee was considered rather large, it was decided that in view of the widely scattered section it was advisable to retain all the members, and it was agreed to recommend to Council that the Committee be re-elected *en bloc* with the inclusion of Mr. A. S. Greenwood, who had previously served on the Scottish Committee and was now resident in the Midlands.

Mr. T. A. Purt was re-elected Hon. Secretary and he was warmly thanked for his previous services.

Suggestions were made and discussed for the Programme for the coming session. It was decided that the second Annual Dinner be held in Nottingham, on Friday, December 10th, while final arrangement of other fixtures was referred to Committee.

Dr. Wildt welcomed Mr. W. Howarth to the meeting in his capacity of Member of the Council and Chairman of the Institute Development Committee, to which Mr. Howarth suitably responded.

The meeting concluded with a hearty vote of thanks to the Chairman, which was proposed by Mr. W. Howarth and seconded by Mr. A. S. Greenwood.

Scottish Section

The Annual Meeting of the Section was held in the North British Station Hotel, Edinburgh, on Saturday, 17th April, 1937, at 6 p.m., when Dr. A. W. Stevenson presided over a representative attendance of Members, including Mr. H. L. Robinson, General Secretary of the Institute.

After intimating apologies for absence, the Hon. Secretary read the Minutes of the previous Annual Meeting as printed in the *Journal* and already circulated to all members of the Section.

The Hon. Secretary then submitted a report of membership at 28th February, there being 87 Members, a decrease of one on the previous year. The distribution of membership remained very much the same as usual. There was also submitted a short financial statement, showing total expenditure of £7 10s. 2d., being at the rate of 1/8¾ per Member.

The Chairman reviewed the past session and referred to the fact that only one separate meeting of the Section was held, viz., at Galashiels on 26th March, 1936, when Mr. W. Wilkinson (Blackburn) gave an Address entitled : " Weaving Mechanism," illustrated by cinema film. On the afternoon of the same day, a visit was paid to the Works of Messrs. Gibson & Lumgair, at Selkirk, and the Committee took the opportunity of expressing appreciation of the facilities granted by that firm. There was also a public meeting at the Heriot-Watt College, Edinburgh, on 12th February, 1937, to which the attention of Members was officially drawn at that time, the subject being, " Air Conditioning in Industry." Three meetings of the Committee were held during the session, and the Chairman and Hon. Secretary had a meeting with officials of the Scottish Section of the Society of Dyers and Colourists on the subject of a Joint Conference with that body. In addition, through the Hon. Secretary and Members in Carlisle, interest has been maintained in the recently-formed Cumberland Textile Society. Arrangements had been made for a one-day Conference at Stirling on 22nd May, 1936, but owing to the poor response, this project had to be cancelled almost at the last minute.

The Chairman referred to the retirement of Mr. Athey, and said they were delighted to welcome his successor, Mr. Robinson, who was already well-known to Members in his previous capacity as Editor of the *Journal.* Mr. Robinson addressed the meeting, and mentioned the circumstances under which Mr. Athey had been obliged to relinquish his active work on behalf of the Institute. He also referred to the policy of Council in connection with the more important subjects under review.

The following Members were recommended to Council for election as Section Committee :—Messrs. J. P. Beveridge (Dunfermline), J. C. Campbell (Galashiels), W. Lockhart (Kirkcaldy), S. M. Roberts (Selkirk), A. W. Stevenson (Galashiels), W. Watson (Glasgow), W. H. Wilkinson (Edinburgh), and A. W. Blair (Glasgow).

The Hon. Secretary drew attention to the fact that Mr. H. B. Taylor, Secretary of the Cumberland Textile Society, was present at the meeting, and Mr. Taylor took the opportunity of referring to the work of that Society and to the success which it had achieved during the short time of its existence. A vote of thanks to the Hon. Secretary for his work during the session was accorded on the motion of Mr. J. P. Beveridge, and this terminated the proceedings.

Following the Annual Meeting recorded above, a further meeting was held at 7.30 p.m., when Mr. G. F. Sedgwick, H.M. Inspector of Factories, gave an Address dealing with " Accident Prevention," making particular reference to textile factories. Mr. Sedgwick, who was accompanied by two Assistant Inspectors, also dealt with the changes proposed in the new Factory Bill, and his remarks were followed with keen interest. The meeting was then thrown open for discussion, and after the Lecturer had replied to the various points raised, a hearty vote of thanks was accorded on the motion of Mr. W. H. Wilkinson.

Irish Section

The Eleventh Annual Meeting of the Irish Section was held at the College of Technology, Belfast, on Friday, 23rd April, 1937. Professor F. Bradbury was voted to the Chair.

The Minutes of the Tenth Annual Meeting (23rd June, 1936) were read, passed and signed.

The Hon. Secretary, in presenting his report, stated that during the Session, two meetings had been held, at which papers were contributed as follows :—

10th December, 1936 : " Some Effects of Warp Tension during Weaving," by H. Boffey, B.Sc.

18th March, 1937 : " Co-operation between the Textile and Laundry Industries," by F. Courtney Harwood, B.Sc., F.I.C., M.I.Chem.E.

The papers contributed were much appreciated, and there was a good attendance at each meeting. Mr. H. L. Robinson (General Secretary) and Mr. Kendall (Yorkshire Section) were in attendance at the March Meeting.

The Section Membership now stood at 36 as against 34 at last Annual Meeting.

It was decided that the Committee, etc., be recommended to Council for re-election as follows :—*Chairman,* Mr. W. H. Webb (Randalstown) ; *Hon. Secretary,* Mr. F. J. W. Shannon ; and *Committee,* Dr. W. H. Gibson, Professor Bradbury, Messrs. W. J. Cowden, J. Kirkwood and G. R. Beatty.

A discussion took place regarding Meetings for next Session, and it was decided to leave over arrangements so that enquiries might be made regarding suitable lectures.

NOTES AND ANNOUNCEMENTS

Annual Conference at Southport.

There would seem to be general agreement that the subject chosen for discussion at Southport was timely and of definite importance. Any anticipatory trepidation as to the initial stages of the discussion was soon dispelled. Thanks to the Chairman's efforts on Thursday morning and those of the introductory speaker, no lag in the proceedings occurred and a total of over twenty speakers during the first session was evidence of the interest aroused. The ball thus set rolling was helped onwards by the efforts of the Chairman and introductory speaker on the Friday morning. On this occasion over thirty speakers took part in the debate which only terminated with the advent of lunch-time. As perhaps time was not available for all who wished to speak, members are reminded that

contributions may be made in writing, and will be included in the final report of the Discussions, which will appear in full in the July issue.

Meetings of other Organisations.

Attention is drawn to the undermentioned events in the belief that members of the Institute will be interested.

The Fifty-sixth Annual Meeting of the Society of Chemical Industry will be held in Harrogate from July 5th to 9th inclusive. Questions ranging from the problems of alloy cast-irons to the utilisation of waste fruit will be discussed. Mr. A. Charley, of the Long Ashton Research Station, near Bristol, who has recently carried out pioneer research on the use of surplus fruit to make wines, spirits and liqueurs, will open a symposium on fruit juices. He will be followed by Mr. T. N. Morris, of the Low Temperature Research Station at Cambridge, who is concerned with the concentration of juices by freezing, and Mr. J. Arthur Reavell, will speak from the point of view of the chemical engineer. Dr. A. B. Everest will give latest information on the special properties of the new class of alloy cast-irons as material for chemical plant. The Society's presidential address will be delivered by Lord Leverhulme. An attractive programme of excursions covers such varied industries as cocoa and chocolate manufacture, oil and cake mills, clothing manufacture, and the making of solid drawn metal tubes. A visit has also been arranged to the Board of Green-keeping Research at Bingley, the research station of the British Golf Unions Advisory Council. A comprehensive series of experiments will be shown, dealing among other subjects, with the effects of worms, weeds and fertilisers. Full particulars regarding the Meeting may be obtained from Dr. A. L. Roberts, The University, Leeds.

The Seventh International Management Congress will be held next year (September, 1938), in Washington, D.C. Preparation for this event in Great Britain is in the hands of the British Management Council, upon which this Institute is represented by its Hon. Secretary, Mr. Frank Nasmith. It may be that members who will visit the States next year will like to take part in this event. In such instances, fuller information may be obtained from the Secretary, British Management Council, Armour House, St Martins-le-Grand, London, E.C.1.

TEXTILE INSTITUTE DIPLOMAS

Elections to Associateship have been completed as follows since the appearance of the previous list (May issue of this *Journal*) :—

ASSOCIATESHIP

CHARNOCK, Frederick Clement (Southport).
DANZIGER, Georg (Riga, Latvia).
DOWLING, Gilbert (Cawnpore, India).
DUNCAN, John Johnstone (Long Eaton, Notts.).

ASSOCIATESHIP OF THE TEXTILE INSTITUTE

Examination: Part I (Auxiliary Subjects)
Part II (General Textile Technology)

EXPLANATORY NOTES

For the information of textile students and others, the following notes in reference to the above-named Examination and to the requirements for election to the Associateship of the Institute are issued by the Diplomas Committee :—

(1) The requirements for election to the Associateship are set forth in printed Regulations, copies of which may be obtained on application to the Institute. The Regulations should be carefully studied by prospective applicants.

(2) Application for the Associateship (A.T.I.) is restricted to Members (Junior or Ordinary) of the Textile Institute of at least six months' standing at the time of the application.

(3) Institute Members applying for the Associateship must do so on the special Form provided and the application must be accompanied by a Registration Fee of 10/6, which amount is deducted from the Entrance Fee of Two Guineas on admission to the Associateship but is not returned in the event of unsuccessful application. On the Application Form, the statement of qualifications should be presented completely under the respective sections.

(4) The qualifications of each candidate for the award of the Associateship are considered in relation to the requirements set forth in the printed Regulations, and applications may be dealt with as follows :—

(*a*) Applicant exempted from Examination and recommended for election to Associateship ;

(*b*) Applicant referred to Examination, Part II (General Textile Technology) and exempted from Part I (Auxiliary Subjects) ;

(*c*) Applicant referred to Examination, Part I (Auxiliary Subjects) and Part II (General Textile Technology) ;

(*d*) Application declined.

(5) The Institute's Examination is not an examination the passing of which, in itself, secures admission to the Associateship. No person may sit for the Institute's Examination until his application for the Associateship has been considered by the Diplomas Committee and, as a result, he has been definitely referred to Examination.

(6) If referred to Part I and Part II, the applicant must pass both parts in order to complete the examination requirements. The applicant may take the complete Examination in one and the same year on the appointed dates in the month of May ; or, he may take each part separately in different years. In either case, a candidate will not be certified as having passed Part II until he has passed Part I.

(7) Applicants who have so far fulfilled the requirements of the Regulations as to be deemed worthy of reference to the Examination but have not yet complied with the requirements as to occupational experience and/or age (see Clauses 2 and 10 of the Regulations) may be referred to the Examination. Nevertheless, such applicants will be required to complete the qualifications before award of the Associateship can be granted.

(8) *Students in Technical Institutions should consult the Principal or the Head of the Textile Department before proceeding with an application.*

THE TEXTILE INSTITUTE

EXAMINATION PART II. GENERAL TEXTILE TECHNOLOGY

SECTIONS I AND V OF SYLLABUS

10 *a.m. to* 1 *p.m.—26th May,* 1937.

Candidates to answer THREE Questions in each Section

Section I—Fibres and their Production

(1) List, in the order of their importance, the chief wool producing countries of the world. Describe the characteristics of the chief trade types of British and foreign wools with reference to their industrial uses.

(2) Describe, by reference to the appearance under the microscope of a cross-section of a flax plant, the purposes of retting and scutching. Describe briefly how these operations are carried out ?

(3) Write a short essay on rayon staple fibre. Discuss the qualities of staple fibre which are important in its use in substituting or in mixing with other fibres.

(4) Describe the growth and structure of the cotton seed hair. Discuss the nature and consequences of immaturity in raw cotton.

Section V—Analysis and Testing of Raw Materials, Yarns and Fabrics

(1) You are asked to examine a dyed cotton curtain which shows considerable tendering after a long use. Give the possible causes of such tendering, and describe how you would ascertain which was responsible for the damage.

(2) How would you proceed to find the cause of an abrupt change of shade (*a*) in a dyed stocking knitted with gassed yarn? (*b*) in a dyed stocking knitted with gassed and mercerised yarn? Both yarns are a 100 per cent. cotton.

(3) What is meant by testing in controlled atmospheric conditions? What are the advantages and disadvantages of this method of testing?

(4) Describe methods of testing yarns for (*a*) count, (*b*) twist, (*c*) strength, and (*d*) elongation.

SECTIONS II, III AND IV OF SYLLABUS

2.30 p.m. to 5.30 p.m.—26th May, 1937.

Candidates to answer TWO Questions from each Section

Section II—Conversion of Fibres into Finished Yarns

(1) Ring spinning is to a greater or less extent replacing mule spinning for cotton and woollen yarns. Discuss this tendency in each case from the point of view of (*a*) economy of production, and (*b*) the character of the yarn produced.

(2) Write brief notes on:
- (i) The objects and consequences of wool scouring.
- (ii) Crêpe yarns.
- (iii) The special yarn requirements of the hosiery trade.

(3) State and account for the chief differences between three of the following:
- (i) English and Continental spun worsted yarns.
- (ii) Wet and dry spun flax yarns.
- (iii) Continental filament rayon and spun rayon.
- (iv) Condenser and ordinary cotton yarns.

(4) With the aid of diagrams show how yarn is twisted and tensioned for winding-on in any three of the following systems of spinning: (*a*) ring, (*b*) mule, (*c*) cap, and (*d*) flyer.

Section III—Conversion of Yarns into Fabrics, and Fabrics produced by Special Methods

(1) Why are warps sized? With the aid of a line diagram of a sizing and drying machine applicable to the type of yarn you have in mind, describe the process. What are likely to be the effects of defective sizing and drying on the yarn, on the weaving process, and in the cloth?

(2) What do you understand by the terms "drawing-in," and "twisting" when applied to the processes preparatory to weaving? What automatic means may be used to "draw" or "knot" threads in these processes.

(3) What is the difference between an ordinary power loom and an automatic weft supply loom ? By means of simple sketches show how the weft is replenished automatically during the weaving process.
(4) Write a descriptive account of the warp loom knitted fabric and compare it with the woven fabric and the plain weft knitted fabric.
(5) Describe the characteristics and purposes of lace fabrics.

Section IV—Conversion of Fabrics into Finished Materials

(1) In the treatment of cotton, wool or silk materials what do you consider to be the primary uses of acids, caustic alkalis, reducing and oxidising agents ?
Give the names of the chemical agents you would employ to demonstrate your answers ; indicate their actions in the processes and their effects on the materials.
(2) Through what circumstances are all-wool fabrics liable to be contaminated with vegetable matter ? Discuss the methods employed to prevent defects from this cause appearing in the finished cloth.
(3) Give one example each of a useful application of :—
(*a*) a sulphur dyestuff.
(*b*) a chrome mordant dyestuff.
(*c*) a basic dyestuff, to textile materials.
Describe briefly the procedure followed in the cases you mention.
(4) Describe the processes you would employ in the bleaching of a coloured stripe cotton poplin, assuming the coloured yarn to be dyed with fast-to-bleaching colours.

General Discussion on Lubrication and Lubricants, October 13th, 14th and 15th, 1937

In response to the invitation of the Institution of Mechanical Engineers the Council of the Textile Institute recently decided to co-operate in the General Discussion on Lubrication and Lubricants, to be held in London on October 13, 14, and 15th, 1937. Mr. Scott-Taggart was appointed to represent the Council.

The Executive Committee, after consultation with the co-operating Societies and Technical Institutions, has arranged for about 100 papers, which are divided into four groups :

I Journal and Thrust Bearings,
II Engine Lubrication,
III Industrial Applications,
IV Properties and Testing.

The importance of the subject is so obvious that it needs no emphasis. Research on lubrications in the past has been very extensive and considerable information may be found scattered in the technical literature. It is felt that the time is ripe for the preparation of a comprehensive review of the state of current knowledge. The subject is one of inherent difficulty and the fundamental characteristics of lubrication are imperfectly understood. In a general discussion there is an increased probability that the subject will be approached from every possible point of view. Correlation may thus be established between theory and practice.

In no branch of industry is lubrication of greater importance than in the production of textiles. Many different types of machines have to be run under very widely varying conditions. In the textile industries, therefore, it is possible that lubrication has to be studied and applied in a more general way than in other branches of industry.

Employment Register

The following announcements are taken from entries in our Register of Members whose services are on offer. Employers may obtain full particulars on application :—

No. 161—Desires position as Manager or Assistant Manager. Twenty-three years experience in furnishing fabrics. Conversant with all processes. Evening School lecturer in Textile Weaving and Designing. City and Guilds Certificates in Woollen and Worsted Weaving and Designing. A.T.I. Age 40 years.

No. 162—Young man, 27 years of age, desires position as Manager of Worsted Manufacturing concern. City and Guilds Certificate in Woollen and Worsted Weaving. Four years part-time lecturer on Weaving Mechanisms. Willing to go abroad. A.T.I.

No. 164—Desires position in any type of supervision, control or advisory work in textile machinery, weaving or merchanting. City and Guilds Certificate in Woollen and Worsted Finishing. Diploma of Bradford Technical College. Willing to go abroad. Age 32 years. A.T.I.

No. 165—Requires position as Technologist or Chemist-Dyer. Higher National Certificate in Chemistry and Dyeing. City and Guilds Certificates in Cotton, Wool and Silk Dyeing and in Woollen and Worsted Cloth Finishing. Three years experience as Chemist and Dyer. Age 24 years.

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Reviews

Modern Drafting in Cotton Spinning. By J. Noguera. Printed and published by Chorley & Pickersgill, Leeds (pp. 193, price 9/6).

The publication is a revised edition of the work of the Author, in 1934 (pp. 113), under the title of the " Theory and Practice of High Drafting in Cotton Spinning " to which has been added a considerable amount of valuable information relating to the drafting of cotton, and mixtures of fibres. In the preface the author states that he gratefully acknowledges the widespread interest which has called for the publication. In this respect there is no doubt that the subject of drafting cotton, with the effects, limitations and comparative costs, has received more serious consideration during the past 20 years, than any other operation in the whole of the spinning processes, with considerable benefit to the industry.

The subject matter is well arranged in order of development, and careful indexing adds to the value of the contents as a book of reference. Drafting cannot, however, be seriously considered in relation to the ultimate yarn efficiency, involving its quality and price, without full consideration being given to the characteristics of the material, and unfortunately there is very little consideration given to these. Approximately 70 per cent. of the contents definitely relates to the development, application, uses and effects of the various Casablancas devices, and excellent though these are, such a work is incomplete without more detailed consideration of other successful arrangements. Again in his preface, the author recognises this limitation and expresses his regrets that limited time has been to his disadvantage.

Referring to double feeds to speed frames, ring frames and mules, the statements that " these improve, or rather maintain somewhat the irregularity in weight per unit length " and " in this respect the doublings are often a real though quite indirect cause of unevenness in the final yarn " are contradictory. There can be no doubt that generally double feeds are beneficial in the resulting yarns.

The consideration of evenness in yarn is excellent, though the author has dealt only with the production of yarn from cotton with the maximum dispersion of staple lengths, and on this material alone he criticises the whole of the " ordinary roller systems." Given combed types of cotton, it is possible to produce excellent yarns by roller drafting, which are reasonably free from the thin places and clots depicted.

The author has very effectively and logically shown the limitation values of " doublings " in relation to yarn values, but taking his diagram Fig. 2 in relation to the possible chances of variations, his expressions are incorrect regarding the chances of percentage variations, which should be :—

18 chances of 0 per cent. variation.

16 chances of variation between + and — 12·5 per cent., not ± 6·25 per cent. variation.

2 chances of variation between + and — 25·0 per cent., not ± 12·5 per cent variation.

This variation grouping also affects the statements given later for 6^3, 6^4, 6^5 and 6^6 for an increasing number of slivers. There is much helpful fundamental treatment, of drafting in cotton spinning, but its value could have been increased with a little more consideration of drawing roller methods.

The section on drafting by rollers could have been made of much greater assistance by some discussion of the extensive treatment that has been applied to the second control rollers, by alterations in weight, settings, nature of the surfaces, and their relation to drawing.

The development of high drafting by the Casablancas system is lucidly dealt with, though when considering different systems for high drafting, the four lines of rollers and other systems receive very scant treatment. The four line roller systems and the one band drafting devices are producing excellent qualities of commercial yarns.

The outstanding feature of the work is that relating to the Casablancas systems of to-day. Here much useful information is available regarding this form of drafting on mules and ring frames, though in the former instance, for fine spinning mules on good cotton, it is questionable whether the advantages

gained warrant the cost of the change. The whole of the many modern refinements are closely examined and the reducing collectors for the elimination of fluff and fly-cotton give evidence of the care with which the drafting system has been developed.

In connection with the practical utilisation of the Casablancas system of drafting, very sound recommendations are offered to help spinners who desire to give consideration to its application, in the many different ways in which it can be introduced. As regards the economics of high drafting for spinning, the relative proportions of preparation machines necessary, according to the method of application and requirements, are given in detail. These proportions have been reduced to comparative percentages according to draft, count and machine, or machine spindles omitted, and should serve as a useful guide to those contemplating using the system. It is unfortunate that the usual error of grouping as a total, all the speed frame spindles, has been carried out on an equal cost basis for the percentage saving in preparation expenditure, which is definitely incorrect. The problem under consideration is that, based on an ordinary spinning mill, the speed frame spindles are shown as 100 per cent., then with differing drafts and a reduction in intermediate and slubbing spindles (roving spindles omitted) on high draft spinning, the reduced total spindles are taken in the total ordinary spindles basis as a percentage of the cost of preparation. This is incorrect as a roving spindle is considerably cheaper than a slubbing spindle but this is not taken into account. Therefore the percentage cost of preparation and saving in expenditure are incorrect as given. The same criticism applies to the comparison when all the three speed frame passages are retained, but with a reduction in the number of spindles in each passage. The percentage saving in expenditure can only be obtained by considering the current cost, or price paid, for each slubber, intermediate and roving spindle and they should not be grouped together to indicate that each spindle costs the same amount. This irregularity is proportionate preparation spindle percentage should also be considered in the comparison made later in a 60,000 spindle mill.

The consideration given to yarn produced by high drafting, as regards strength, quality, price of cotton, or cheaper processing which is left to the discretion of the spinner is very good, though it is not wise to make a fetish of strength alone, without considering, to some extent, the extensibility of the yarn.

Under the problem of yarn contraction, it would lead one to the conclusion that because the yarn contracts due to twist, after delivery by the rollers, that the diameter of the yarn increases with the contraction. This can hardly be the case, but that the yarn becomes more compact.

The matter relating to single process preparation and extended control is very topical and the latter of considerable importance to spinners who have to deal with the spinning of yarns from mixtures of fibres with extensive differences in staple lengths, similar to flax and cotton, wool and cotton or silk and cotton. Even here the nature of the surfaces of the fibres in contact would have a large share in the yarn efficiency.

Some useful practical information is to be gained from the section dealing with the twist in rovings, break drafts, diameters of front rollers, tensors and flick clearers.

The compound drafting system is clearly explained and worthy of further consideration by spinners of some types of cotton yarns. On the whole there is much that is good in the book, which should be useful to the person who is anxious to obtain a good knowledge of intense or high drafting.

There are a few simple errors which will, undoubtedly be read correctly by the reader, as for instance when reference is made to compound drafting—on easy threading—Fig. 62 is mentioned for reference, instead of Fig. 61.

H.B.

Patents for Inventions. By Reginald Haddan, Fellow of the Chartered Institute of Patent Agents. London, Sir Isaac Pitman & Sons, Ltd. (3/6 net.)

If it is agreed that those engaged in Industry should possess an elementary and superficial knowledge of Patent Law, then the present book can be wholeheartedly recommended. In concise but adequate form, Mr. Haddan

tells the layman all he requires to know of the fundamental laws—or regulations—relating to Patent Applications. But if there is one lesson to be learnt from this useful little work it is, that danger lies in advancing far into the complexities of the Patent Laws without a guiding hand ; in other words, the assistance and advice of a Patent Agent. Mr. Haddon, it will be noted, refers to the amendments to the Patents Acts which have " tended to destroy the local coherence of the Law as whole and rendered its employment difficult." Apart from the detail of the regularised and correct methods to be employed in order to secure a Patent, the author adds many words of advice which are valuable and indicate a very close knowledge, observation and record of the possible mistakes made by applicants, many of which may be fatal. It has been laid down that no Patent can be said to be really valid unless it has passed the test of a Hearing by the House of Lords. This being the case, although the inventor can learn quite a lot from such a book as Mr. Haddan's, his safest course, if his invention is one of moment, is to entrust its Patent safety to one versed in the ramifications of a very complex law. F.N.

Lancashire and the Future : The Present Position and Prospects of the Cotton Industry. June, 1937. Joint Committee of Cotton Trade Organisations, Midland Bank Building, Spring Gardens, Manchester, 2. (Price, 1/–, post free.)

It now appears to be generally admitted that no longer can questions of industrial economics and trade prosperity be linked with political theories in a few positive dogmatic sentences. Even when the broadest views are adopted and the discussions are world-wide rather than national, it seems impossible to assess completely the actions and reactions involved. In the past, at the height of her prosperity, Lancashire not only forged the weapons for her competitors of to-day, but also taught her rivals how to use them. That increased local production of cotton goods throughout the world was inevitable was obvious, and refusal to instruct the foreigner could have resulted in no more than slight postponement of the conditions now existing.

In " Lancashire and the Future," there is a wise concentration on the present position and future outlook. The assistance given by successive Governments to other branches of industry is compared with that given to the cotton trade. Lancashire must feel somewhat hurt that reorganisation is insisted upon before help can be given. There is considerable evidence that efficiency in the cotton trade in Lancashire compares favourably with that in all other parts of the world. The tremendous decline in Lancashire's trade is due rather to increased local production and low wages in other countries than to low efficiency.

Many of the enormous difficulties in the way of reorganisation are perhaps peculiar to Lancashire and to the structure of the industry. It is strongly urged that Government aid is necessary for the preservation of Lancashire's overseas markets, and that with this help a greater measure of confidence and security would obtain. If Lancashire is assisted as she feels she should be, the future is not without hope. Her retention of 30 per cent. of world trade by volume and 98 per cent. of the home market (with no special tariff advantage) is interpreted as an encouraging sign of the vitality of Britain's principal export industry. T.

Das Färben und Bleichen der Textilfasern in Apparaten. By Paul Weyrich. Julius Springer, Berlin, 1937. pp. viii and 347, with 153 figures. Price RM 27.)

The bleaching and dyeing of yarns in cop, cheese and on beam have never become in this country so important as in Germany and in other textile countries generally.

The term " Apparatefärberei " in its present connotation has no exact equivalent in English ; it may be translated approximately as pack dyeing, and consists essentially in maintaining the textile material in a stationary condition whilst the dye liquor is circulated through it.

A technical and historical examination of the preference in this country for methods of preparation based, for example, on warp dyeing, over those based upon cheese and beam dyeing should be both interesting and valuable, and

would doubtless be concerned in no small way with the influences exerted by our horizontal organisation in the textile industry, and by the continental vertical organisation, on industrial methods.

This book divides itself roughly into two halves, the first dealing with the dyeing and construction of plant for dyeing loose wool tops, wool yarn and cheeses, loose cotton, sliver, yarn in hank, cop, cheese and beam, and so on. The dyeing of artificial silk is unfortunately dismissed in two or three pages; a chapter on current developments in the dyeing of viscose rayon in cake form and the attempts made to dye it in cheese would have been very valuable.

The descriptions of different types of machines with a large number of excellent illustrations together give a very clear idea of the large range now available of machinery based upon the pack system of treatment, and it is equally clear that much of this machinery has reached a high level in engineering skill and efficiency. Not unnaturally most of the illustrations are of plant of German origin. There is an illustration on page 133 of a dyeing machine for cotton hank yarn of Italian origin, but there appears to be no example of English, Swiss, French or Belgian manufacture.

The second half of the book constitutes an excellent text-book on the dyeing of textile materials with an introduction to dyeing theories including an exposition of a conception of hydrogen ion concentration and the buffering of solutions. The author has not restricted himself to details of the methods of applying dyestuffs in pack machines, but deals in a most interesting way with the modern dyestuffs and auxiliary products, and collects in a convenient form a large amount of useful information, not easily obtainable, about the special properties of dyestuffs both in the dyeing process and in the dyed material including for example the work of Kayser, Ruperti, Löscher and others, on the after treatment of Naphthol AS combinations and their influences on light and rubbing fastness, and refers to the researches of English workers upon the tendering action of vat dyestuffs in air and in hypochlorite solutions.

The reviewer's impression of the book is that it is well informed, comprehensive and accurate and reaches the high standard characteristic of the best German handbooks in this branch of technology. F.S.

Venticinque Anni di Attività della R. Stazione Sperimentale per le Industrie della Carta e delle Fibre Tessili Vegetali. (Milan, 1936; 161 pages; Quarto).

This is a handsomely printed and illustrated record of the first twenty-five years' work of the Italian Research Station for the paper and vegetable fibre industries, compiled by its well-known director, Dr. Camillo Levi. An interesting account is given of investigations into the production of pulp and fibre in Italy and the final section describes the research institute and its equipment. There is an air of dignity and spaciousness about the administrative rooms, and the laboratories appear to be supplied with a wide range of testing machines. A novelty, from the British point of view, is a refrigeration plant utilising methyl chloride. The laboratories and workrooms are now being greatly extended—a fitting celebration of the close of 25 years of useful work. W.

Methods for the Detection of Toxic Gases in Industry. Leaflet No. 1. Hydrogen Sulphide (Department of Scientific and Industrial Research). Published by His Majesty's Stationery Office, 1937. Price 3/6 net).

In the foreword to this important publication, reference is made to Regulation 7 of the Chemical Works Regulations, 1922 (Section 79 of the Factory and Workshop Act, 1901). This insists on the testing by a responsible person of any vessel or place thought to contain a dangerous gas or fume, before it is entered by persons without approved breathing apparatus and life-belts. The production of the leaflet is the outcome of discussions between the Association of British Chemical Manufacturers and the Home Office. The Department of Scientific and Industrial Research arranged for a series of tests to be developed by the Chemical Defence Research Department.

The intensely poisonous character of sulphuretted hydrogen or hydrogen sulphide is emphasized. In concentrations above 1 in 1,000 by volume hydrogen sulphide causes immediate unconsciousness, resulting in death unless artificial respiration is immediately applied. At such concentrations it is nearly as

poisonous as hydrogen cyanide or prussic acid and may act with equal rapidity by paralysing the respiratory centre of the brain.

Of the four methods of detection considered that in which a known volume of the atmosphere is drawn through the test paper, has been adopted as being the most satisfactory from all points of view. Complete detailed instructions are given for carrying out the test, including the preparation of the lead acetate test papers. Drawings are given of the hand-pump attachment in which the test paper is clamped and the sizes of the essential parts of the pump are specified. Standard stains, with which the stain on the test paper is compared, are printed on a sheet carried in an envelope in the cover of the leaflet. From the intensity of the stain the concentration of hydrogen sulphide may be determined.

The series of leaflets of which this is the first to appear should be of great assistance to all engaged in those branches of industry to which the Chemical Works Regulations 1922 section of the Factory and Workshop Act apply. T.

Additions to Library

On the Warp Let-off Motion of the Loom. Y. Nogamy. (Nogamy Automatic Loom Works Ltd., Gohisco, Nagoya, Japan.)

Manual for the Dyeing of Cotton and other Vegetable Fibres, 1936. (I. G. Dyestuffs Ltd., 14 Bridge Street, Manchester, 3.)

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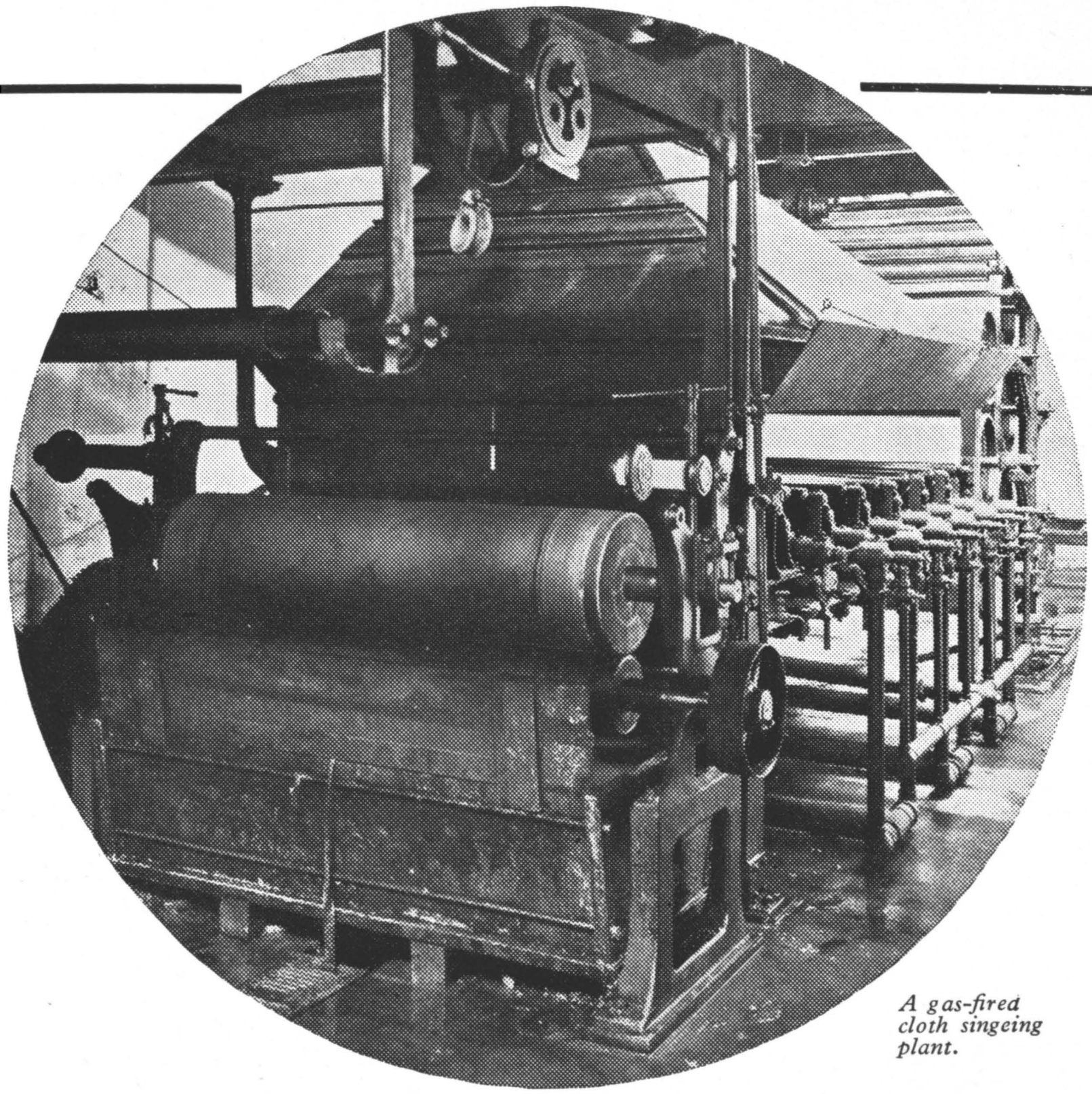

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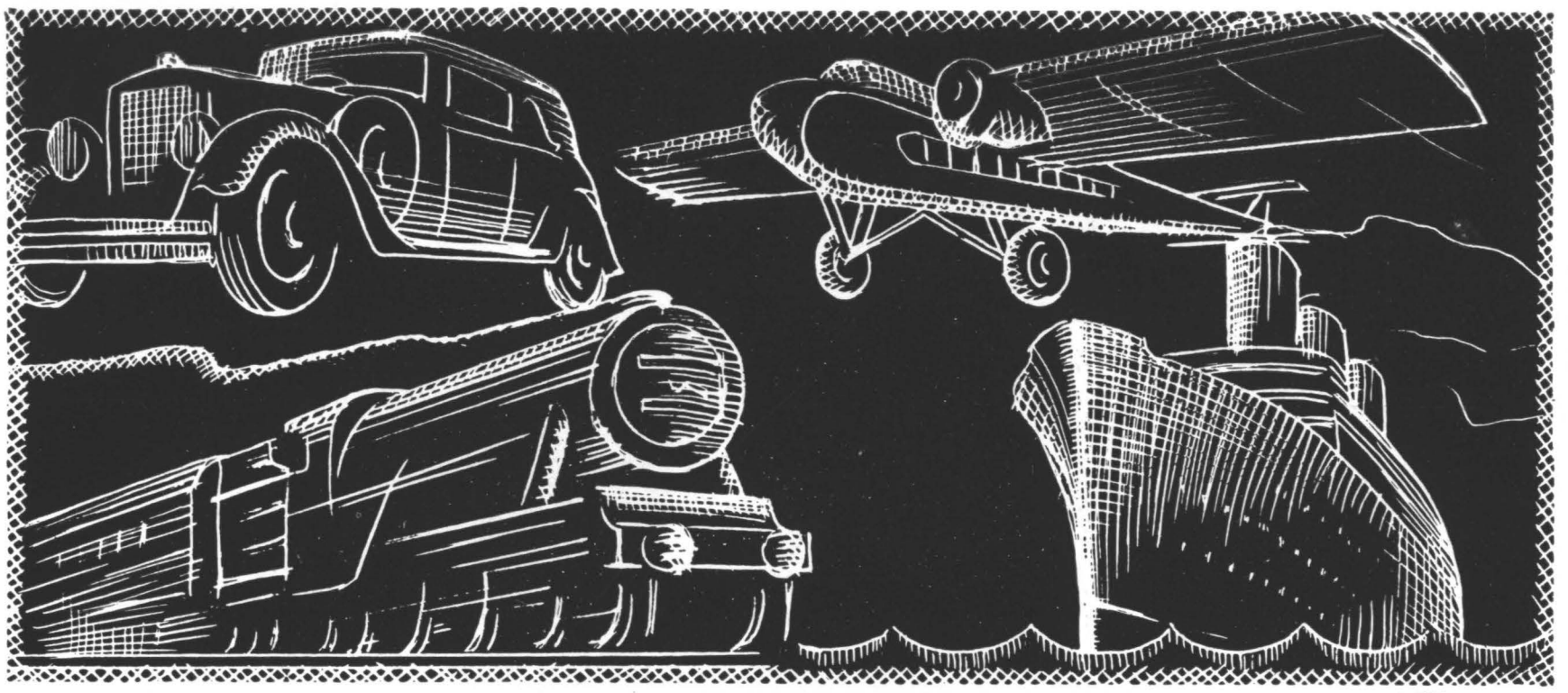

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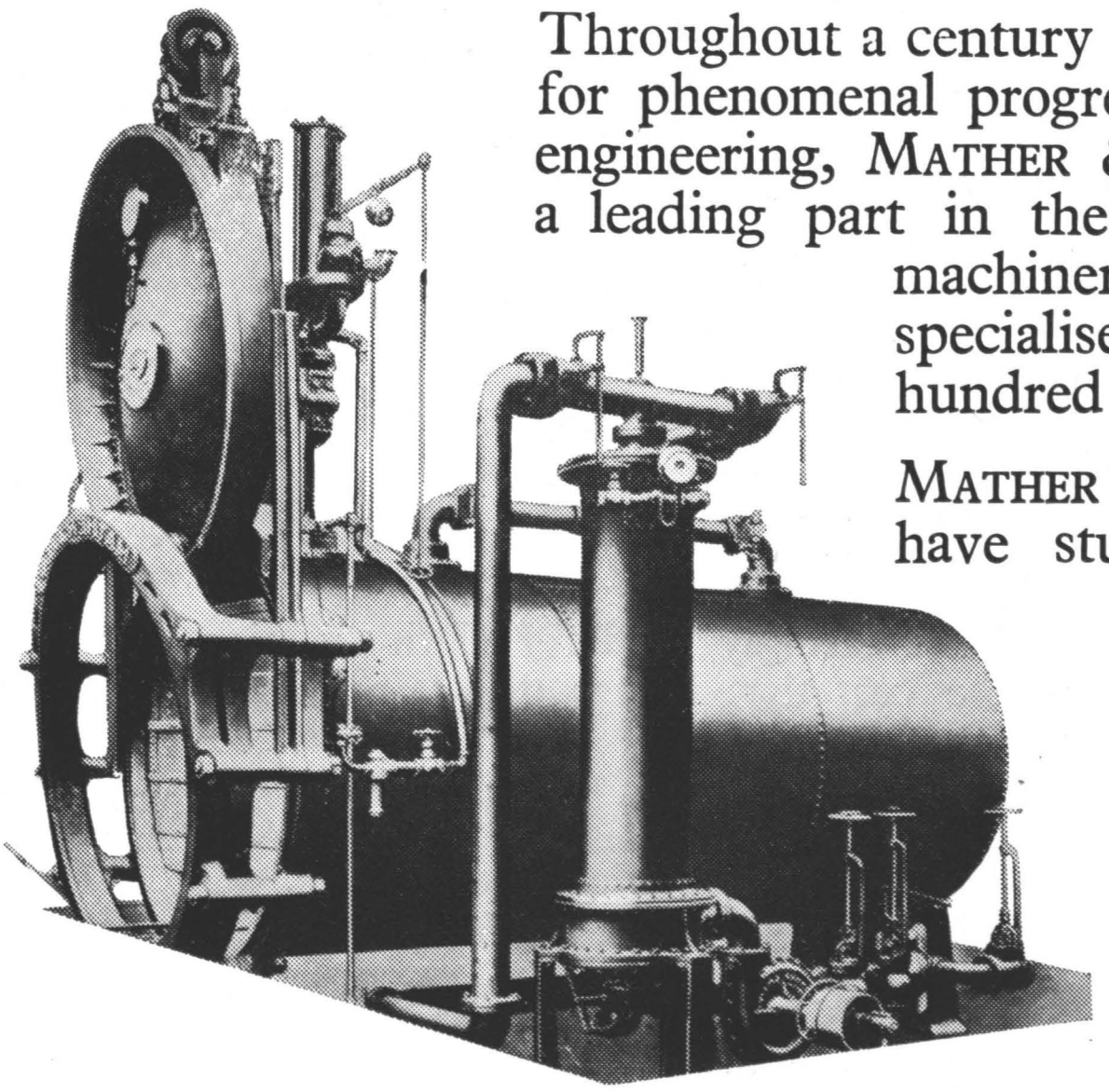

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THE JOURNAL OF THE
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11—STRENGTH, GRADE AND PRICE OF EGYPTIAN COTTONS

By H. A. HANCOCK, B.Sc.
(Spinning Technologist to the Ministry of Agriculture, Egypt)

SUMMARY

1. All the varieties composing the Egyptian crop are described, and their chief staple measurements and their yarn strength at a standard count are tabulated, from observed data on fully representative samples.
2. The causes and effects of " grade " are discussed, and it is shown that the percentage of taker-in waste is a good index to grade if the variety is known.
3. It is shown that there is a close relationship between the yarn strength at a given count and the spot price of all kinds of Egyptian cottons.

Many changes have taken place in the constitution of the Egyptian crop during the past ten or twenty years, and the time seems ripe for a review of the present situation. Since 1918, at least twenty different varieties of cotton have been at some time or other on offer at Alexandria, although many of them have had only a very brief existence. The effort of keeping up to date has apparently been too much for the reference books ; a Year Book published in 1936 refers to Sakel as a promising new variety : this was true twenty-five years ago, but may be regarded by now as a little too conservative. Actually, most of the new varieties have never reached a sufficiently large crop to cause much disturbance, and until recently Sakel and Ashmouni have usually accounted for about 90 per cent. of the total crop. Of recent years, Sakel has declined in favour of a new high yielding cotton called Giza 7 ; and by 1936 the " other varieties " had also been eliminated by this competition to such an extent that 99 per cent. of the crop was made up by the five main varieties remaining (Fig. 1).

Taken in their order of importance judged by acreage, the varieties at present cultivated are :

Uppers Ashmouni. The Ashmouni variety grown in Upper Egypt (i.e., south of Cairo) has maintained its type, apparently with only slight alteration, for three-quarters of a century ; in spite of all competition from the new cottons, 99 per cent of the cotton grown in Upper Egypt is Ashmouni. In 1925 the original Ashmouni seed was substituted by Giza 2, a Government selection from Ashmouni of slightly higher yield ; and in 1933 this was again substituted by Giza 19, a further Ashmouni selection of slightly higher yield and strength. The plant is vegetatively indistinguishable from the original, and is still known as Ashmouni. Uppers makes a good, clean, strong yarn, and is commonly spun into counts up to about 60's.

When Ashmouni is grown in the Delta its quality is slightly different, and it is distinguished by the name Zagora ; any variety grown in the Delta gives a coarser staple than if grown in Upper Egypt, but Ashmouni is the only variety so widely distributed as to call for separate names. Zagora was originally a variety propagated about 1917 by the late Mr. Nicholas Parachimonas, who named it after his birth-place, a village in Greece ; it was closely similar to Ashmouni, from which it was almost certainly a selection. Gradually the seed became replaced by Ashmouni, until by about 1930 none of the original seed remained, and all the cotton now grown under this name is really the Giza 2 and 19 strains of Ashmouni. The crop is of about the same staple length as Uppers but is somewhat coarser, and spins about 5 per cent. weaker yarn, being the weakest of the Egyptian

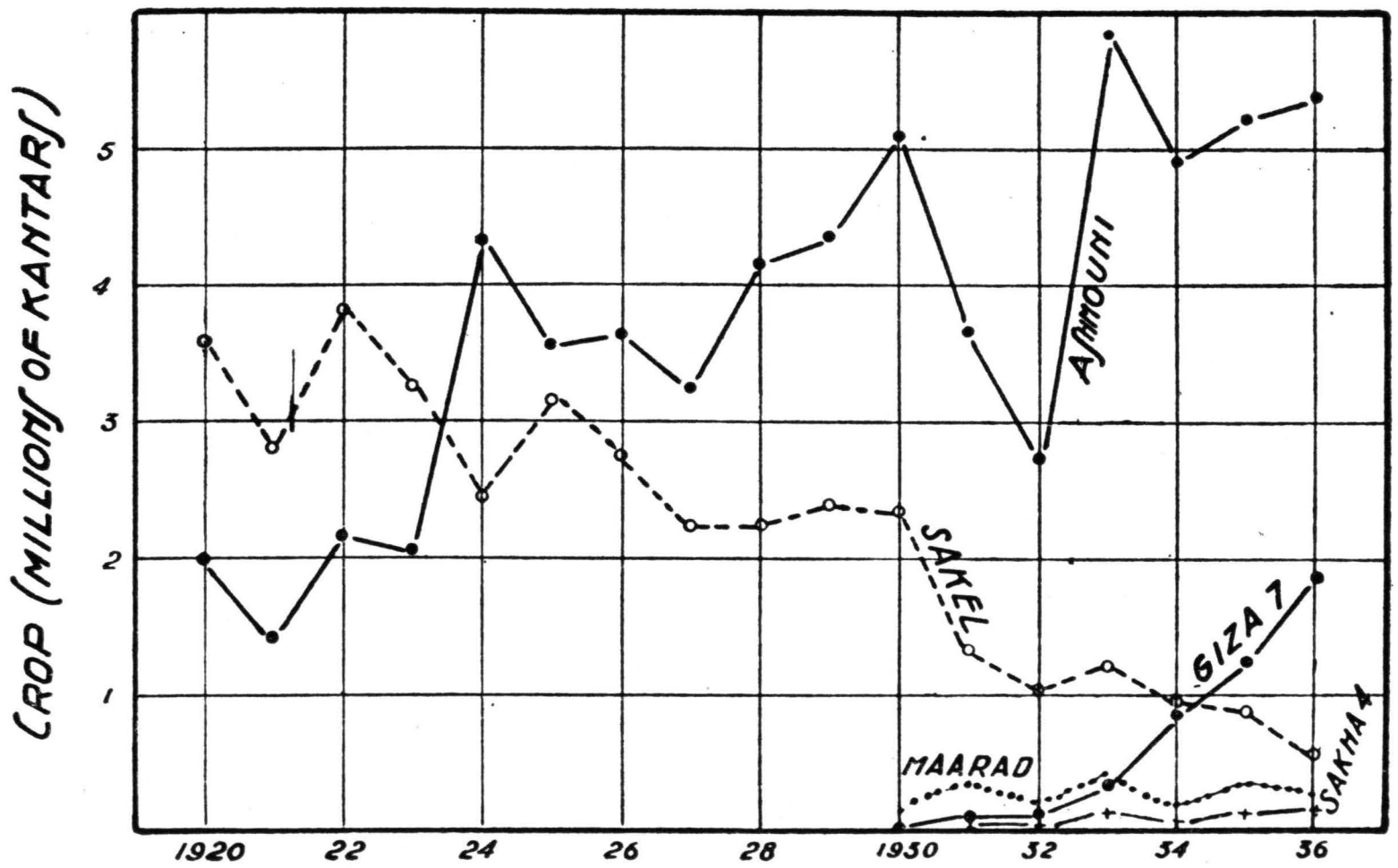

Fig. 1. Approximate crops from 1920-36 of the Egyptian varieties under cultivation in 1936.

cottons. Much of its cultivation is in the hands of small growers, and the crop as a whole tends to be of rather lower grade than the average.

Giza Seven. This variety was introduced by the Botanical Section of the Ministry of Agriculture, whose research laboratories are situated not far from the famous pyramids at Giza ; the place-name is subject to personal preference in its transliteration from Arabic characters, and it is also printed as Gizah, Gizeh, or Guizeh. Introduced in 1930, Giza 7 has rapidly come into favour with cultivators because of its good quality associated with high agricultural yield, and the crop is now about equal in volume to the Sakel crop of six years ago. The original plant was found in an Ashmouni field, and was possibly, in the first instance, a natural hybrid between Ashmouni and Sakel ; it is particularly remunerative in the Delta, and has a high degree of immunity to wilt disease. Although the cotton has a staple shorter and coarser than Sakel, it is peculiar in that it gives a yarn strength higher than would be expected from its staple measurements, and is not very much inferior to Sakel, particularly in the lower grades ; prior to the introduction of the law prohibiting mixing of varieties in Egypt, it was often accepted as Sakel. Although not as white as Sakha 4, Giza 7 is one of the lightest in shade of Egyptian cottons, and spins successfully up to 80's or 100's combed.

Sakel. A variety first introduced about 1910 by Mr. Jean Sakellarides, a Greek broker of Alexandria, who is reputed to have selected it from an odd handful of seed cotton which he noticed to possess long silky staple; yarn as fine as 200's has been spun from this cotton, which in the best examples has a length of staple about 1½ inches. The Sakel plant is said to have an affinity for the salty soils of the Northern Delta, and the crop was in both senses of the word the staple crop of the Delta for many years. The seed type has been twice replaced by slightly improved selections; by a pure strain selection known as No. 310 in 1925, and by a Botanical Section selection known as Sakha 7 in 1933. In both cases the plant was unchanged in appearance, and the name Sakel was retained. Unfortunately the type is very susceptible to wilt disease (*Fusarium*), and it does not appear possible for the breeders to select plants which are at once immune to wilt and yet true to type in other characters (but see Sakha 4, below); it is also late in maturing, and much of the crop is lost or damaged by the depredations of various plant pests. Sakel gives a yield about 40 per cent. less than Giza 7, and an increasing number of spinners are changing over to the cheaper variety. There appears little doubt that Sakel will shortly vanish altogether from the Egyptian market; the only question is how long the process will take—some authorities place the time as only three or four years distant.

It is sometimes asserted that Sakel has steadily deteriorated in quality since its introduction, but in good years the higher grades appear as good as ever they were. There is, however, reason to suppose that the Sakel sold now in low grades may be weaker than any Sakel sold 25 years ago, owing to the ravages of the pink boll worm; when Jean Sakellarides first produced his famous variety, the pink boll worm was just about to appear in Egypt.

Maarad. Selected and introduced by the Royal Agricultural Society from a Pima* parent, Maarad is distinctive in plant type and in lint from most other Egyptian cottons. The average staple is longer than Sakel, being a full 1¼ inches; the cotton is lustrous and of dark shade, but does not spin so strong a yarn. Maarad is in demand especially in Japan, and spins satisfactorily up to about 120's counts. This cotton is grown on a much smaller scale than the varieties previously mentioned, having remained steady at a production of about 5 per cent. of the whole Egyptian crop for some years past; it first appeared about 1926.

* Pima was derived from Mit Afifi seed introduced to Arizona from Egypt about 1900.

Sakha 4. This is a selection from Sakel which is immume to wilt disease, introduced by the Botanical Section of the Ministry of Agriculture in 1930 for this reason. Although the plant cannot be distinguished from Sakel, the lint is noticeably different, being much lighter in shade, more lustrous, and longer in staple; it appeals to the ginner because the seed cotton yields a high percentage of lint. Sakha 4 was immediately liked by the graders, but in spite of its qualities did not at first find favour with spinners because the yarn—however attractive—did not attain the strength expected from its staple; the crop has therefore remained of small volume, about equal to Maarad. In 1936 a substrain of Sakha 4 selected for hair-properties began to be substituted for the original seed, the name remaining unchanged; the new Sakha 4 is of slightly higher yield than the old, but is much superior in yarn strength, so that this variety may be expected to progress in the future. As will be seen from the spinning-tests recorded below, Sakha 4 in 1936 gave a higher yarn strength than Sakel, and has spun satisfactorily in

counts as fine as 150's. Being wilt immune and also being cultivated chiefly by the larger landowners, Sakha 4 is the highest grade crop grown in Egypt ; 62 per cent. of the 1935 crop was graded over " Good."

Fouadi. Named after H.M. the late King Fouad of Egypt, Fouadi was the latest of the cottons to be introduced by Parachimonas. It appeared about 1926, reached 50,000 acres in 1933, but is now losing ground, presumably to Giza 7 which it somewhat resembles. Other cottons produced by Parachimonas were Abassi (a very white cotton), Nubari and Pilion, all of which enjoyed some popularity but are now extinct.[1]

Giza 3. This super-Ashmouni type was propagated because of its ability to withstand boll-shedding at the high temperatures in the extreme south ; it has had only a limited appeal, and the crop has always been very small. What little there is of the variety is now losing ground to Giza 12, and it is likely to vanish altogether in the near future.

Two more Botanical Section varieties have sufficient promise to justify mention here, although both are as yet in their first year or two of commercial propagation :—

Giza 26. Originated from a cross between Sakel and an off-type Sea Island cotton. The plant resembles Maarad, as does the lint in that it is dark in shade and longer than Sakel ; but the cotton has the merit of producing the strongest yarn of any Egyptian variety. Its strength is at least 5 per cent.—10 per cent. greater than Sakel. The agricultural yield is higher than Sakel on present evidence, but, like Sakel, the plant is susceptible to wilt. The 1937 crop is estimated to be about a thousand bales. With the passing of the Sakel variety, therefore, two varieties become available to replace it even in the finest counts—Giza 26, which is of darker shade and much stronger ; and the improved Sakha 4, which is lighter in shade and of equal strength.

Giza 12. Originating in a cross between Sakel and Ashmouni, this cotton has proved itself the highest yielder of any variety grown in the Delta, and is, moreover, immune to wilt disease. It is one of the few varieties that show sign of any promise in Upper Egypt. The staple is longer, darker, and of rather lower spinning value than Giza 7, but has the desirable feature of being exceptionally free from nep during spinning ; it is much nearer to Giza 7 than to Ashmouni in spinning quality, although it has Ashmouni yield. About 5,000 bales were grown in 1936, and 15,000 are estimated for 1937.

YARN STRENGTH AND STAPLE CHARACTERS OF THE CHIEF VARIETIES

In describing Egyptian cottons it is as necessary to specify the grade as it is to name the variety. Grade dominates quality to such an extent that the lowest grades of Sakel are not much superior in carded yarn strength to the highest grades of Ashmouni. The order of the grade names in use is (from lowest quality to best) : Fair, Fully Fair, Good Fair, Fully Good Fair, Good, Fully Good, and Extra. In addition, half grades are designated, as e.g., G/FG (intermediate between Good and Fully Good) ; quarter grades are shown by a plus or minuss ign, e.g., Good plus a quarter ; and $\frac{1}{8}$th grades by the terms " strict " (equals $\frac{1}{8}$th grade high), and " about " (equals $\frac{1}{8}$th grade low). In order to give an idea of the relative values, the trend of prices for some of the Sakel grades in 1935–6 is shown in Fig. 2. The average grade of the whole crop is around FGF/F ; cotton graded below FGF is usually the crop of a second picking.

In addition to classification by grade, two types of staple are also recognised for each variety—" good " staple and " ordinary " staple ; these terms should not be confused with the grade descriptions, and are applied

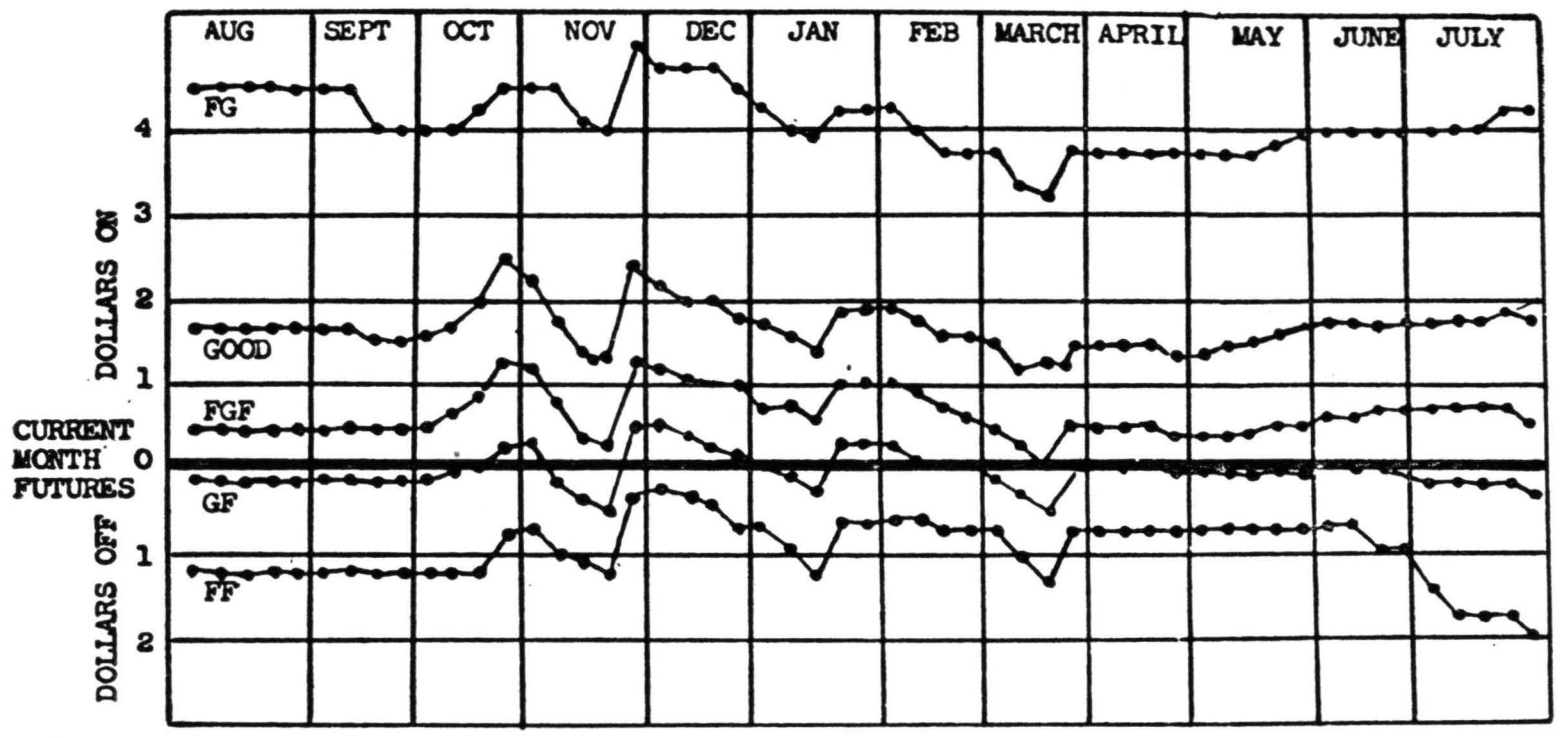

Fig. 2. Spot prices at Alexandria of five grades of Sakel, season 1935–36. (Two dollars at Alexandria are roughly equal to 1d. per lb. at Liverpool).

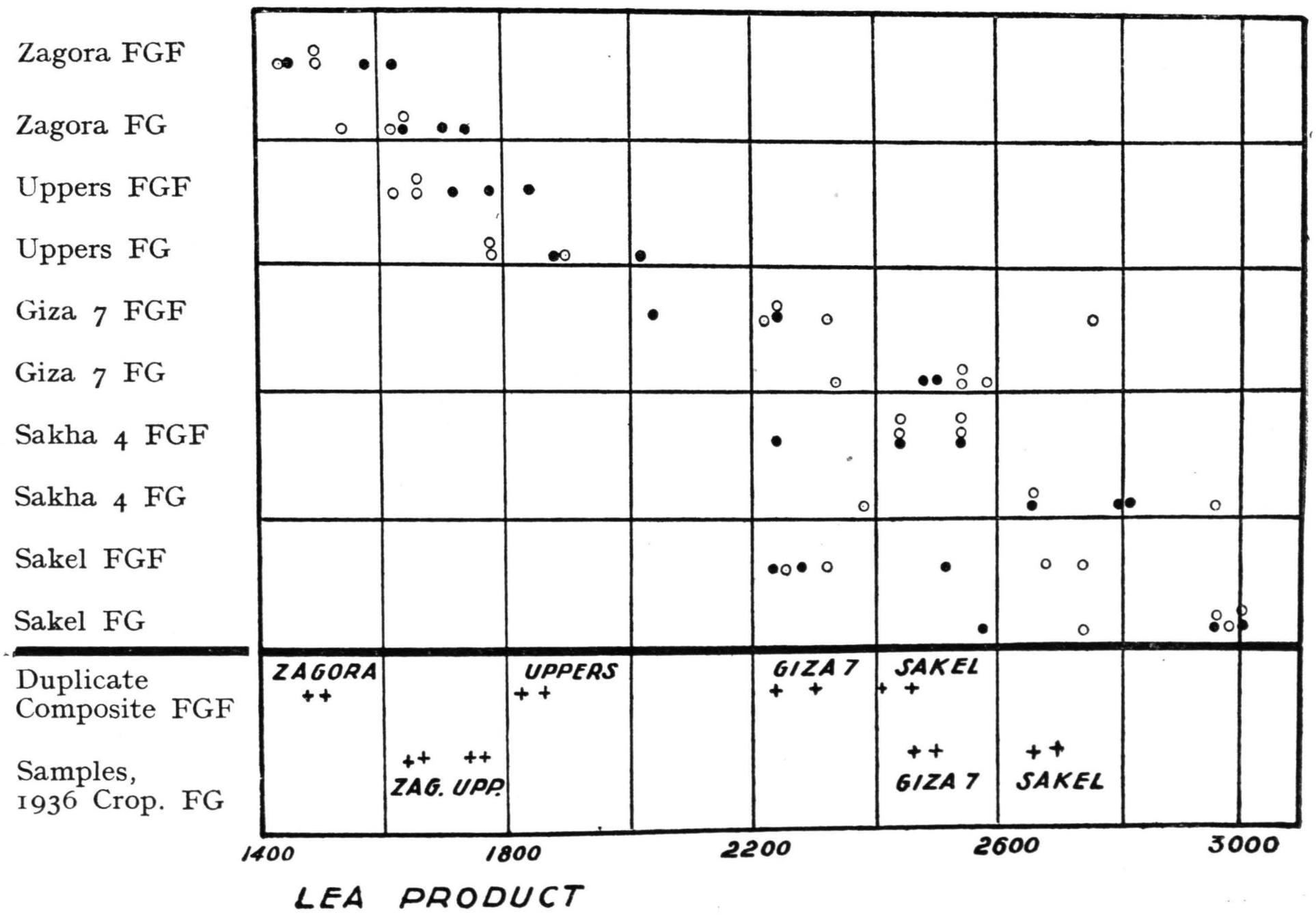

Fig. 3. Variability in strength (60's carded) between different deliveries of the same grade and variety ; each point is the mean of 24 lea tests, dots for 1934 crop, circles for 1935 crop. In 1936 two composite samples were made up from 15–25 different trade sources for testing purposes, and the variability was much reduced.

to cottons grown in the best and in the average districts respectively. The price difference between good and ordinary staple is small, being the equivalent of less than a quarter grade as a rule ; all the cottons for which test results are given here were of good staple.

Two grades in each variety have been selected for spinning-tests, namely Fully Good Fair (FGF) and Fully Good (FG); these represent cotton slightly below the average of the crop, and cotton near to the best of the crop. All cottons without exception were Alexandria graders' type samples, abstracted from bulk deliveries sold in the ordinary course of business to spinners all over the world; they are in no sense experimental growings.

In 1934, and again in 1935, three or four samples of each variety and grade were obtained from different merchants, and all were spun at around the same time in 1935, involving about 100 separate spinnings. It was found that samples nominally the same varied considerably, as shown in Fig. 3. In 1936 it was not found practicable to spin this number of samples, and in order to reduce the sampling error to reasonable proportions, composite samples were made up drawn from 15 to 25 different trade sources for each grade and variety. The sampling error was thus reduced to negligible proportions, and these testings may be regarded as truly representative of the crop for that year. All the spinning-tests are summarised in Table I; the card waste percentages are the sum of two cardings, and are discussed later.

Table I Summary of Spinning-Tests on the Commercial Crop of 1936
(Average of 1934 and 1935 Crops in brackets)

	Lea Product 60's carded 3·6 t.f.	Card Waste (taker-in) %	Staple Length 1/32nds inch	Hair Weight ·00mgm/cm	Spot Price $ per Kantar
Sakel					
FG	2675 (2880)	4·1 (3·9)	45 (46)	133 (136)	22·4 (19·2)
FGF	2430 (2430)	6·2 (6·4)	45 (45)	130 (134)	18·6 (15·7)
Sakha 4					
FG	2720 (2720)	4·4 (4·1)	46 (49)	130 (134)	21·2 (18·7)
FGF	2550 (2450)	5·7 (5·5)	45 (46)	123 (123)	17·7 (16·0)
Maarad					
FG	2530 (2620)	3·5 (3·3)	47 (49)	132 (134)	20·3 (18·0)
FGF	2345 (—)	5·4 (–)	45 (—)	124 (—)	17·6 (16·0)
Giza 7					
FG	2485 (2490)	4·7 (5·2)	43 (44)	146 (150)	18·6 (17·0)
FGF	2275 (2285)	7·4 (7·8)	42 (44)	138 (148)	15·1 (14·8)
Giza 12					
FG	2335 (2305)	5·0 (4·5)	44 (45)	145 (154)	17·2 (—)
FGF	2095 (2135)	7·4 (7·1)	44 (44)	135 (140)	14·1 (—)
Uppers					
FG	1745 (1860)	7·4 (6·4)	39 (40)	180 (184)	15·0 (14·8)
FGF	1830 (1710)	10·8 (10·0)	39 (39)	152 (179)	13·4 (13·4)
Zagora					
FG	1650 (1645)	6·8 (7·6)	40 (39)	184 (196)	14·7 (14·2)
FGF	1485 (1520)	9·6 (10·8)	39 (39)	180 (181)	13·3 (13·2)

Notes:

Staple length is determined from the Balls Sorter Diagram, and closely agrees with the estimates given by graders.

Spot prices are given in Alexandria dollars per Kantar of approx. 100 lbs.; the figure for 1936 crop is the first half of the season, i.e. from Sept. 1936 to Feb. 1937. To convert these figures approximately to pence per lb. at Liverpool, divide by two.

Many points of practical importance arise out of this series of tests, which is almost certainly unique; not only are the samples truly representative of their type, but the spinning conditions and counts spun are constant for all, and they are on a strictly comparable basis.[2]

Undoubtedly the most striking feature of the tests is the reduction of yarn strength shown in the lower grades; it is greatest with Sakel, and is much less with Sakha 4. At grade FGF, Sakha 4 is substantially stronger than Sakel, with Maarad and Giza 7 not far behind. Giza 7 FG sometimes sells at a lower basis than Sakel FGF; on these occasions a spinner substituting Giza 7 for Sakel obtains not only a stronger yarn, his cotton is also of better grade at the lower price. Giza 12 is seen to be much nearer to Giza 7 than it is to Ashmouni.

It is interesting to note that Ashmouni (Uppers and Zagora) stands clear away in all characters from the other Egyptian cottons. This is also found in plant breeding work; there is every conceivable gradation in staple from Giza 12, up to and well beyond Sakel; but the gap between Giza 12 and Ashmouni stands almost unbridged. A cotton appears to be either Ashmouni, or else something quite different.

An important feature of 1936 Uppers is disclosed; the Fully Good is rather weaker than in past years but Fully Good Fair is stronger, so that we have the unusual occurrence of the lower grade being the stronger cotton. The high strength of 1936 FGF Uppers arises from its low hair weight; July 1936 was exceptionally hot and the crop matured unusually early. How precisely the later picks alone were affected is not clear, but the result is unquestionably real, and was confirmed in duplicate spinnings. Other samples spun earlier in the season also showed the effect.

On the same strength scale, the new long stapled cotton named Giza 26, which has just begun to be propagated, gives a lea product well over 3,000 in grade Fully Good; it is thus far superior to Sakel or any other of the established varieties.

Fairly parallel strength results are obtained with all the cottons listed, whatever the counts or strength level to which they are spun, and whether they are twist or weft yarns, provided the cottons compared are treated identically; e.g., Sakha 4 is always stronger than Maarad, or Giza 12 than Uppers. This generalisation holds whether the cottons are carded or combed quality, but if combed, the waste percentage must be constant.[2]

The lea products given in the table may be used to estimate the yarn strength of any of the listed cottons spun in any yarn in any mill, provided that the lea product of *one* of the listed cottons spun under the particular conditions is known. Thus if a mill spinning a yarn of known lea product (P) from Giza 7 FG wished to estimate the lea product (X) of a yarn spun under the same conditions from Sakha 4 FGF, then sufficiently closely for many purposes

$$X = P \times 2550/2485$$

by simple proportion from the 1936 figures given in the table.

CAUSE AND EFFECTS OF LOW GRADE

One of the limiting factors to the yield is the prevalence of various plant pests, especially boll-worm, towards the end of the season. Even at the beginning of the season a small percentage of bolls is attacked, but at the end nearly all the bolls then maturing are in some way defective and it becomes no longer profitable to pick the cotton. Early on, when the attack is light,

only one loculus of the bolls may be actually infected; and although the remaining two loculi are frequently affected, producing short or thin walled cotton lacking in lustre, such cotton is not excessively weak and is usually unstained. As the season progresses, a larger proportion of damaged bolls occurs; more bolls with two and with three damaged loculi are found; a bigger proportion of weak, stained, immature cotton is included with the good cotton. Finally a black fungus appears which has further disastrous effects on the length and strength of the cotton in the damaged bolls, and completes the wreckage. By sorting out the damaged bolls, or by picking early, the cotton may be kept up at high grade, but it is not always economic to do so.

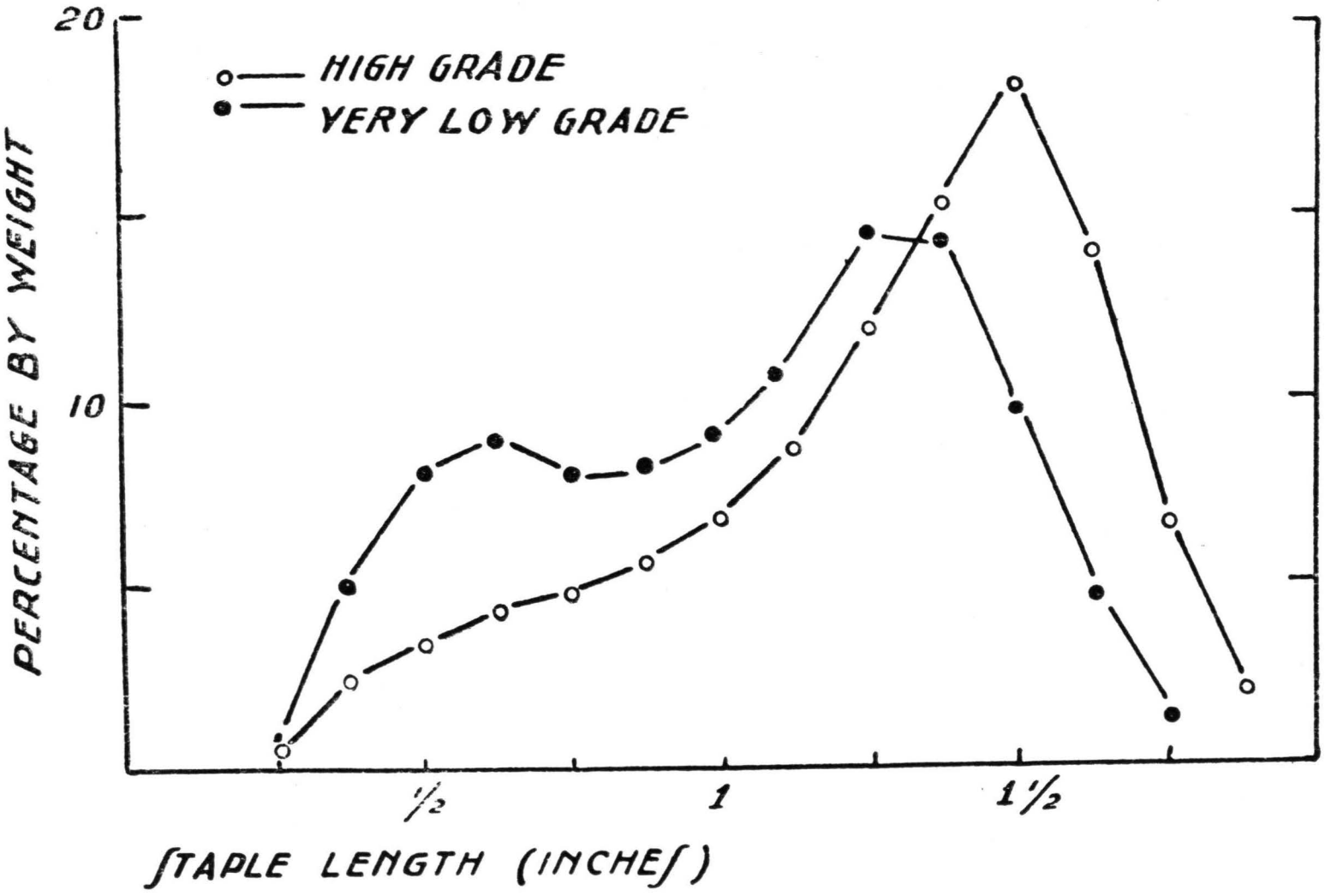

Fig. 4. Balls Sorter Diagrams for a high grade and a low grade Giza 26; the excess of short fibre, and the general reduction in staple length of the low grade is clearly shown. These samples are extreme cases, being the same as the highest and lowest points of Fig. 5.

The percentage of damaged bolls present is the essential factor determining the grade. A grader does not classify merely according to the amount of leaf and similar impurity present, he also considers the bloom or lustre, and the proportion of stained cotton. A genuine and typical FGF cotton cannot be formed by the addition of leaf, etc. to FG cotton; but it can be formed by the addition of cotton from damaged bolls to FG cotton. This circumstance throws light on the otherwise puzzling behaviour of low grades in carding.

It is found that low grades give high percentages of taker-in waste at the card, and in fact the percentage is a fair index to grade within a given variety; unfortunately the waste/grade relation varies from one variety to another, so that the grade can only be estimated from the waste when the variety is known (Table 1). This correlation might be thought surprising when it is remembered that most of the taker-in waste is cotton—the seed coat, leaf, sand, etc., amount to less than one third of the waste in many cases; moreover, if the cottons are carded a second time, the amount of waste is still inversely proportional to grade, although practically the whole of it is now

simply cotton. These observations confirm that low grade differs from high grade not merely in the amount of impurity present, the character of the staple is changed. It is changed by the increased proportion of short, broken, or immature hairs from the damaged bolls in lower grades, and this is the cotton making up a part of the taker-in waste. Similar remarks probably apply to the percentage of comber waste removed at constant settings.

Besides being short, much of the boll damaged cotton is immature, and it is the thin-walled and (so called) dead hairs which give rise to the commonest form of neps in yarn. It can hardly be doubted that the percentage of boll-damaged cotton (i.e. the grade) influences the " maturity coefficient " of Peirce and Lord ,[3] when the variety varies, the coefficient is presumably subject to similar limitations as is the percentage of taker-in waste, used as an index to grade. Methods of estimating the grade of cotton in a given yarn sample would seem to be well worth the trouble of seeking ; grade of cotton is usually ignored in yarn or cloth analysis, although the information is nearly as vital as the name of the variety, to a spinner wishing to match the material.

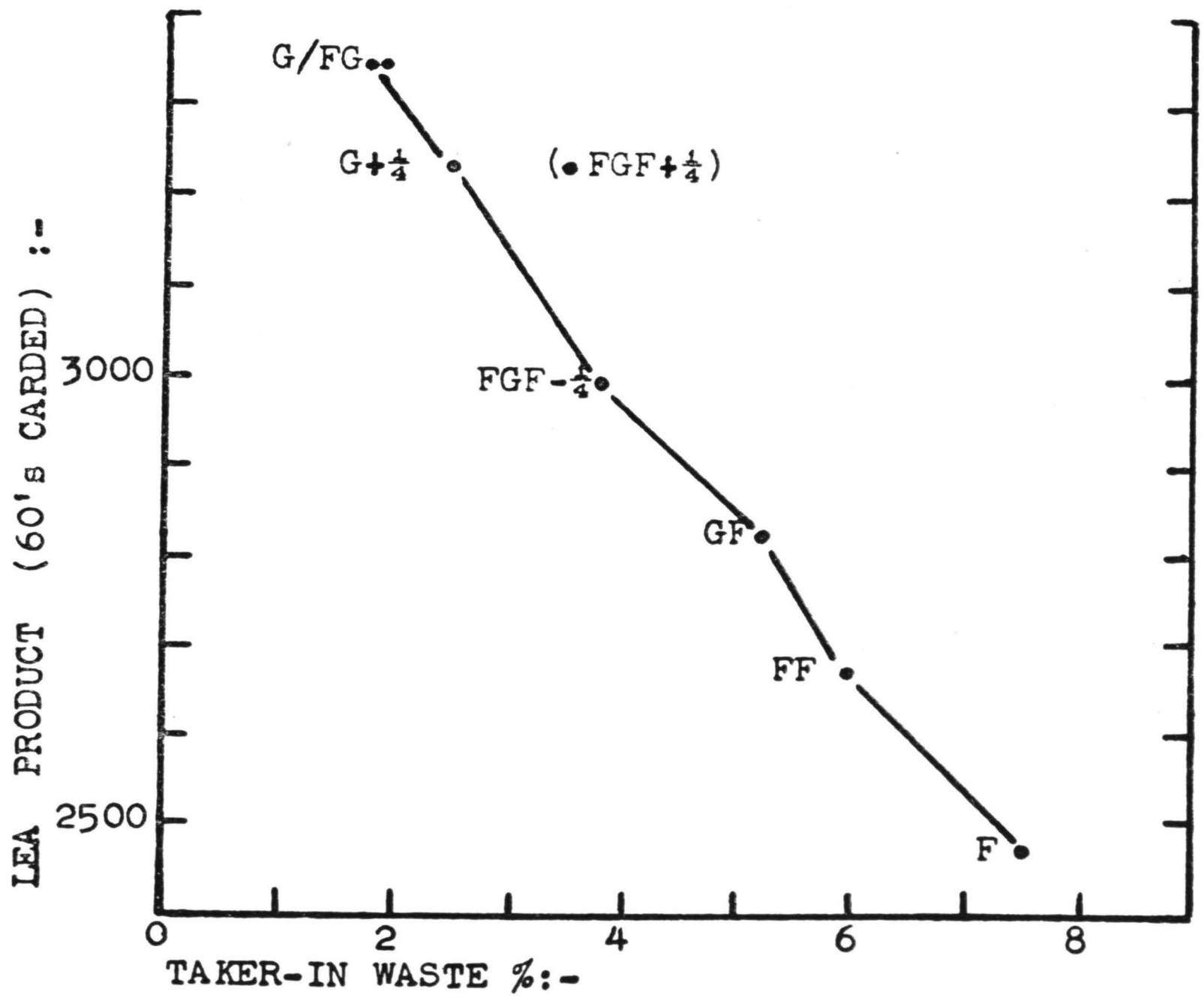

Fig. 5. Relation between yarn strength (60's carded) and percentage of taker-in waste for Giza 26. The grader's classification is given alongside each point. The lower grades contain a large percentage of boll damaged cotton, which weakens the yarn and increases the taker-in waste.

Since both graders and spinners normally base their estimation of staple length on the longer hairs only, lower grades are commonly recorded as being about equal in staple to higher trades. Although " wasty " staple can be recognised without the aid of instruments by a skilled classifier, it is only when the full distribution of staple length is displayed as in a sorter

diagram that the characteristic of low grade becomes clearly apparent; an increased proportion of short staple is invariably found (Fig. 4).

The association between low grade and irregularity of staple length has given rise to the belief that regularity of staple is an essential character to be selected for in plant breeding research. This impression is fallacious, for provided boll-damage does not enter into the story, such differences of staple length irregularity as are found between Egyptian varieties are of little importance, and many cottons are known which produce a good strong yarn in spite of irregularity of staple. It is the type of staple irregularity associated with the other defects of low grade cotton that causes objection. When the character of boll-damaged cotton is realised, it is no longer surprising to find that it causes weaker yarn (Fig. 5).

Even so brief a discussion on grade as this would be incomplete without a reference to the extraordinary skill of the Alexandria graders. These expert

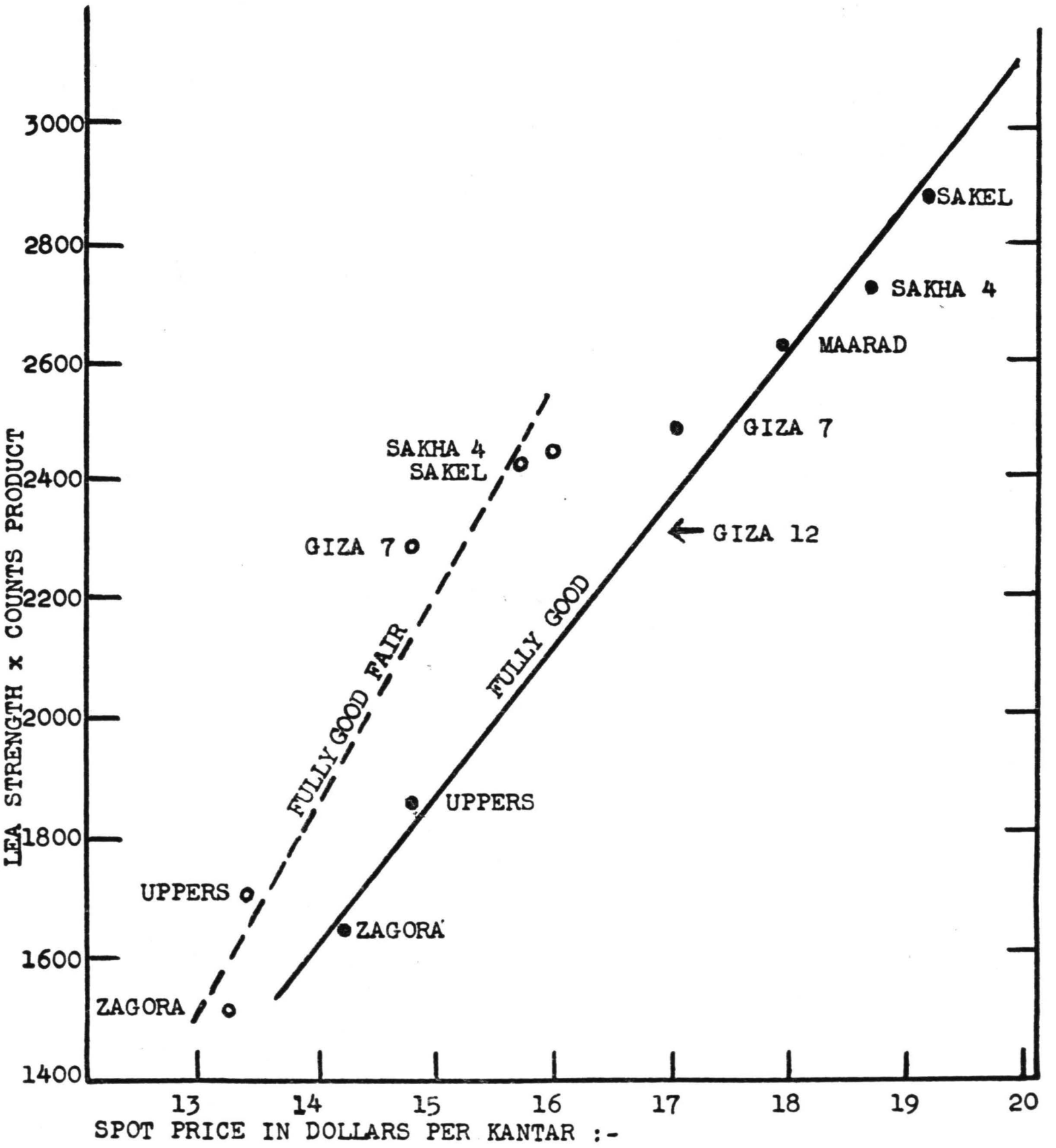

Fig. 6. Strength is Value. Price of raw cotton plotted against strength of 60's carded yarn spun the from it shows a straight-line relation at constant grade. The figures are average of the 1934 and 1935 crops. Giza 7 was cheaper during the period than would be expected from its yarn strength. Giza 12 was newly introduced and spot prices were not available; an estimate of the expected price can be made from the graph, since the strength is known. To convert Alexandria dollars to approx. pence per pound at Liverpool, divide by 2.

classers claim to distinguish between samples only one eighth of a grade apart ; in the case of FG Sakel for example, this represents the discrimination by hand and eye of a difference in taker-in waste amounting to only 0·12 per cent ; the difference in lea strength associated with this grade difference is half a pound at 60's. A newcomer to this industry can only look on with admiration. Although they may know little or nothing about spinning, and although they may be less successful in their estimation of yarn strength based on staple length, etc., yet from their consideration of bloom, leaf and stain, the graders arrive at the estimation of a complex quantity which is very much to the point as far as spinners are concerned.

YARN STRENGTH AND COTTON PRICE

The yarn strength of Egyptian varieties in grade Fully Good is found to be closely related to the spot price of the cotton at Alexandria, plus some basic amount dependent upon economic conditions. At a given grade, therefore, the spinner pays for yarn strength as recorded on his lea tester, and he evidently pays only surprisingly small premiums for lustre, colour, length of staple and so on. At lower grades there is a similar strength/price correlation, less precise and at a lower price level (Fig. 6). Owing to transient changes in supply and demand, and other causes, the price of a variety may for a time deviate substantially from that expected on merit, but in the long run strength is value.

Since strength is the essential characteristic of cotton textiles, the result is not unexpected ; but the closeness of the correlation is a striking testimonial to the versatility of the lea test, which is here used as the sole criterion of quality. The writer is not aware of any published justification showing that lea tests on yarns are a measure of any quality in a finished article ; probably it is sufficient justification that so many people use the test. Weavers commonly use it as a forecast of some quality they expect to get in their cloth ; spinners swear by it, and in fact for a given class and count of yarn the lea strength is usually used as a measure of yarn quality without reference to any other character. To the uninitiated eye the lea tester dial is a very ordinary scale graduated in pounds weight, but the weaver can see on it shillings per piece of cloth, and the spinner sees pence per pound of yarn, clearly marked ; my cotton growing friends now observe that this magic scale is really graduated in Egyptian characters, and that its translation reads—£ s. d. per bale of cotton !

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[2] Hancock, H. A. ; " A Spinning Procedure for Cotton Samples ; *J. Text. Inst.*,, 1937 **27** T161
[3] Peirce F. T. and Lord E. ; E.C.G.C. Conference on Cotton Growing Problems 1934, Report of Proceedings, p. 229.

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12—A COMPARATIVE EXAMINATION OF METHODS OF ANALYSIS OF WOOL FOR FIBRE DIAMETER AND LENGTH

Part I—Diameter Measurements in Wool Tops

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I. Introduction.

In 1931, accounts were published in this *Journal* by Barker & Winson[1,2,3] of the relationship between fibre diameter* and wool quality in combed tops. The method used consisted in the weighing of a counted number of fibres cut to a definite length. From several places along the top, small samples were taken between the thumb and finger and separated laterally from the top. A bundle of fibres of suitable size was then carefully parallelised and clamped into position on a special instrument designed for cutting a fixed length of fibre, the distance between the blades being less than the shortest fibre length present. Five-hundred fibres were counted out, cleaned, and their dry weight determined.

This method is slow and laborious. The straightening of every fibre in a bundle prior to cutting is a matter of extreme difficulty and there is a consequent uncertainty attaching to the value of the measured length for weighing.

There is a definite disadvantage also in the fact that a mean value only is obtained. A knowledge of the dispersion of the individual fibre measurements about the mean value is of importance not only in relation to the spinning power of the wool, but also as a means of assessing statistically the magnitude of the errors involved in measuring such a sample.

This disadvantage is also characteristic of Küsebauch's lanometer method in which the volume occupied by a given number of fibres is measured.

Serious errors can also arise in both these methods as a result of faulty sampling technique, which will introduce a lack of randomness into the selection of the fibres to be measured. This is dealt with fully in Section III.

A photographic method based on the measurement of fibre cross-sections which was used by Winson for some of the lower qualities, is also not very satisfactory. It is difficult to assess the effect on the size of the cross-section of all the various reagents and processes to which the wool is subjected before the final section is ready to be photographed. It was used because it was thought that discrepancies would arise between the results obtained for the lower qualities by the weight per unit length method and the actual measured diameter owing to the presence of large numbers of medullated fibres in these qualities.

II—The Adoption of Standard Methods of Measurement.

In recent years, a technical committee of the International Wool Textile Organisation has re-examined the whole question with the object of setting up standard methods of fibre measurement, and agreement has already been reached with regard to the method for fibre diameter.

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* The word "diameter" is used throughout the paper without any assumption of circularity. It seems to be less ambiguous than a reference, e.g. to "the fineness of a coarse fibre."

This method involves the measurement of the profiles of optically projected images of a large number of fibres at known magnification. It was agreed that the magnification should be 500 × and that the projected images of the fibres should be measured to the nearest 1 mm., i.e. to 2 microns.* A fibre, e.g. between 10·5 and 11·5 mm. on the screen would be classed 11 mm. or 22 microns.

It was also agreed that the fibres should be mounted in cedar wood oil, this having the useful effect of clearing the image of the fibre and showing up its edges as fine lines suitable for measurement. It has been previously shown by numerous workers that the cedar wood oil produces no swelling effect at all on the fibres.

In order to determine the most satisfactory and efficient method of sampling, it was agreed that each country represented should measure up four tops, to be supplied by the laboratories of the Leipziger Wollkämmerei, by a number of different sampling methods. The measurements carried out at Torridon on these tops and the conclusions based on a statistical analysis of the results are given in detail in Section VI. It can be stated here, however, that a very satisfactory sampling method for diameter has been evolved, the differences between the means of successive samples being only of the order to be expected from the actual distribution of diameters within the samples.

III—The Theoretical Basis of Correct Sampling.

The purpose of a sample is to provide information about the main bulk of material whose exact properties it is impossible to ascertain directly. This information may be either qualitative or quantitative. While we are concerned here with quantitative information only, such as, for example, the mean fibre diameter, it should be emphasised that the question of sound sampling is no less relevant to qualitative estimations of the type involved, say, in wool judging, where unrepresentative sampling may well lead to serious error.

Naturally, the estimates of the mean obtained from successive samples will differ among themselves, and from the true mean, owing to the range of individuals to be found within the sample, and also to unavoidable random errors in the method of measurement. We shall call these *controllable* variations, for by increasing the size of the sample indefinitely, the variation in the mean due to these causes can be brought within any desired limits.

In general, however, the variation between sample means will not be accounted for by this alone. The samples may have been selected from parts of the material whose true values differed significantly owing to lack of homogeneity. In such circumstances the material is said not to be statistically uniform, and care must be taken to distribute the selection of material for the sample over as much of the bulk as is practicable.

Another source of variation has to be considered. It is possible that the technique of selecting the sample, or of selecting individuals for measurement is fundamentally unsound in that the operations involved in the method are not properly under control. Erratic variations of an unpredictable character may be introduced, and valid results cannot be obtained from such samples. Moreover, a bias introduced by a fault of technique, or by the omission of some necessary precaution is doubly

* See Appendix I.

dangerous in that the results may present a specious regularity, and ordinary statistical tests will not avail to show up the error. On the other hand, the existence of a bias whose cause is known, such as for example the length bias (to be discussed later) is not in itself necessarily a drawback and may, in view of other considerations, lend added value to the sample.

The two main attributes of a wool top which it is necessary to measure are its mean fibre length and mean fibre diameter, and the same type of sample may not be equally suitable for both.

It is now recognised that there are two distinct types of sample which can be extracted from any longitudinal association of fibres of varying lengths. These types have been dealt with adequately by Townend[5] in this *Journal*, but may be briefly recapitulated here.

In one type of sample, the proportions of fibres of each length group present are the same as in the bulk of the wool, within the limits of random sampling error. Such a sample is called a " true sample " and in a worsted top is obtained by extracting all the fibres which end in the volume enclosed by two cross-sections of the top separated by a distance less than that of the shortest fibre length present. While this condition is theoretically satisfied by the common " worsted draw," it is not by any means easy to attain practically as will be shown in Part 3 of this paper.

In the second type of sample, the chance of a fibre being present in the sample is proportional to its length, as for instance, in the Wilkinson tuft (*see* Townend, *loc. cit.*). Such length biassed samples we propose to call " cross-sectional " samples, since in a top, all fibres crossing a given cross-section constitute a sample of this nature.

The advantages of length biassed samples for work on fibre breakage in processing was stressed by Townend (*loc. cit.*).

IV—Length-Diameter Correlation in Wool Tops.

In diameter measurement, the importance of length bias lies in the positive correlation between fibre length and diameter which persists in the top, although it is probably less marked than in the fleece. Contrary to prevalent opinion, this correlation is not very high, rarely exceeding 0·5 ; it is, however, significant, appearing on the average more marked in the coarser wools.

Table I. Correlation of Length and Diameter in British Selected Tops

Quality	Correlation of Length–Diameter r	No. of fibres in in Sample	1% Limits of r *
80	·26	280	·11—·40
70	·26	296	·11—·35
64	·24	554	·13—·34
60	·29	527	·18—·39
58	·41	668	·32—·49
56	·42	395	·31—·52
50	·43	327	·31—·54
48	·50	285	·38—·61
46	·49	454	·39—·58
44	·33	310	·19—·45
40	·43	336	·31—·54
36	·43	358	·31—·53

* This defines the range of values within which the true value of the length-diameter correlation for the given top may be expected to lie. See R. A. Fisher *Statistical Methods for Research Workers*, 5th edition.

Table I gives the correlation r of length with diameter in the range of selected tops measured by Barker & Winson. Scatter diagrams are also

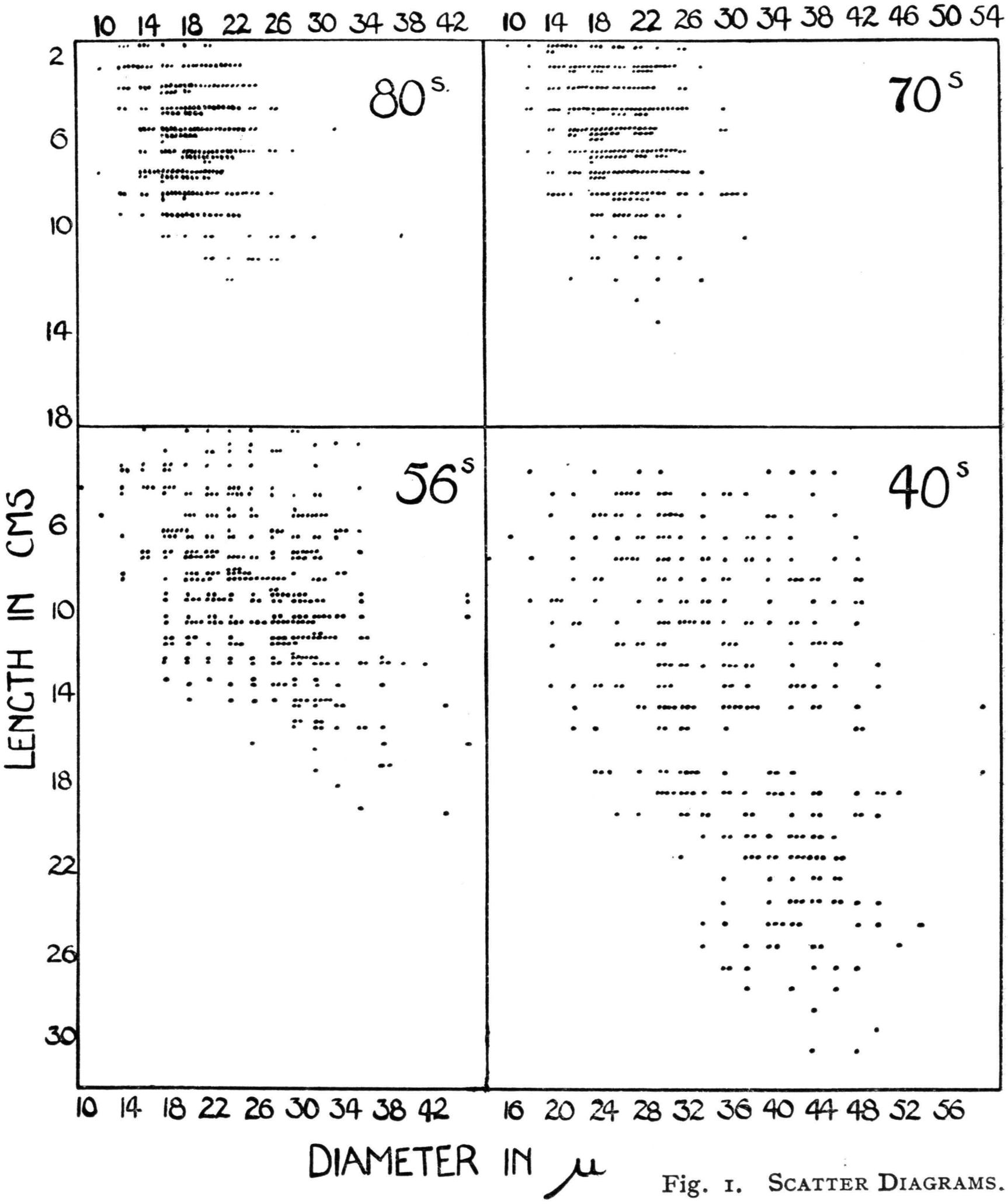

Fig. 1. SCATTER DIAGRAMS.

reproduced in Fig. 1. The diameter measurements were made on the comparator, an instrument in use previous to the establishment of the present method: it is unlikely, however, that the order of magnitude of the correlation is very different from that shown here.

Now it can be shown that if D_l is the mean diameter of a length biassed sample, and D_t that of a true sample, then the relation*

$$D_l = D_t + r\sigma_l\sigma_d/L_t$$

will be true on the average, L_t being the mean length of a true sample, and σ_l, σ_d, being the standard deviations of length and diameter in the true sample. Taking as reasonable values for a 60's top

$$r = 0{\cdot}3,\ \sigma_l = 3{\cdot}0 \text{ cm.},\ \sigma_d = 5{\cdot}7\mu,\ L_t = 7{\cdot}4 \text{ cm.}$$

then

$$r\sigma_l\sigma_d/L_t = 0{\cdot}3 \times 3{\cdot}0 \times 5{\cdot}7 \div 7{\cdot}4 = 0{\cdot}7\mu$$

$$\text{i.e. } D_t - D_l = 0{\cdot}7\mu$$

* See Appendix II.

In the example quoted this difference between mean diameters of the cross-sectional and true samples amounts to half a quality difference so that the effect of length bias on diameter measurements cannot be ignored.

The finger and thumb method of selecting bundles of fibres for measurement used by Winson (*loc. cit.*) falls between the true sample and the length biassed sample.

In such a case the length bias is difficult to estimate and may vary from sample to sample and from top to top, giving rise to inconsistent results. Such methods are best avoided.

V—Value of the Cross-sectional Sample.

The cross-sectional sample has a peculiar importance in the determination of the mean diameter of the fibres in a top for the following reason. The number of fibres which can be packed into a given cross-section, and the manner in which the fibres lie together, will depend on the distribution of fibre diameters over the cross-section of the top, sliver, or yarn, and this in fact is just what is given by the cross-sectional sample. Thus in its relation to spinning power and spinning limit count on which the present quality grades were originally based, the cross-sectional sample is of greater value than the true sample.

In other work, such as the evaluation of length-diameter correlations, it may still be necessary to use true samples.

VI—Investigation of Sampling Methods

The methods of sampling referred to in Section II which were recommended for investigation were as follows :

(a) The 2 cm. cut method.
(b) The worsted draw method.
(c) The Wilkinson tuft method.
(d) The " Dischka " 2 mm. cut method.

We shall proceed to examine these methods in detail and give the results of our own measurements.

(a) This method was advocated by some of the members of the Committee. A 2 cm. length is cut from the top and small samples selected from it with forceps. The fibres are then mounted on a slide in cedar wood oil and spread out so as to avoid any overlapping, at the same time keeping the fibres approximately parallel. Two hundred fibres are then measured, using the standard projection microscope system. Another slide is then taken and a further 200 fibres measured. It was suggested that these two samples would be sufficient if their means differed by less than one micron, but that if the difference was greater than this, a further 200 fibres should be measured.

In our own tests, six samples were taken up for the two coarse wools and four for each of the two fine wools, the results being given in Table II.

Table II

(All values in microns, each sample 200 fibres).

Top		New Zealand 5169	Monte Video 5182	Monte Video 5186	Australian 9535
Sample	1	29·84	26·19	21·25	18·32
	2	32·60	26·35	21·49	18·88
	3	31·80	25·07	21·09	18·56
	4	29·62	26·93	20·79	18·80
	5	30·93	26·22		
	6	30·63	27·21		
Mean ..	..	30·90	26·43	21·16	18·64

While for the two finer wools this method gives fairly good inter-sample agreement, with the coarser wools, the presence of uncontrollable variations between the means seems to be evident. Analyses of variance have been performed on each set of results, the following for the New Zealand 5169 top being typical :

	Sum of Squares.	Degrees of Freedom.	Variance.	Standard Deviation.
Between Samples	5·8039	5	1·1608	$S_1 = 1·08$
Within Samples	402·3513	1194	·3370	$S_2 = ·58$
$z = \log S_1 - \log S_2 = ·618$				

The above process compares the observed standard deviation between sample means with that which would be expected to arise from the variation within the samples. R. A. Fisher's table of z indicates that as large a value of z as ·618 would have been exceeded less than once in a hundred times had the variation between sample means arisen entirely on account of the variation within the sample. The existence of what we have called " uncontrollable variations " is thus definitely established and the grand mean of the samples cannot therefore be accepted with confidence.

This is largely due to the fact that the method gives neither a true sample nor a properly length biassed one. It is in fact almost identical with that used by Winson. This method of sample selection is especially dangerous if measurements are being made on a blended top. When a number of different qualities of wool are being gilled together, the fibres of each " end " retain their propinquity to a great extent in the drafted sliver, and the results cannot be representative unless a sample is taken across the whole of its cross-section.

Additional possibility of error lies in the fact that only a certain number of the fibres in any bundle was used for actual measurement, whereas, with either a length biassed or true sample, it is essential to measure all the fibres unless the selection of those to be measured can be made perfectly random by a thorough mixing process. With the method used, despite every precaution, it is impossible to avoid the preferential selection of the longer and thicker fibres, which was demonstrated by Townend.

(b) The Monte Video 5182 top was chosen for this test. Six separate draws were made in the usual way by squaring up the broken end of the top and then taking the draw. In each case, the fibres were laid on a slide, mounted in cedar wood oil, and measured along a line perpendicular to the length of the fibres and near the squared end of the draw, to ensure that the short fibres were not omitted.

The results are set out in Table III.

Table III. Monte Video Top 5182

(All values in microns.)

Draw.	1	2	3	4	5	6
Number of Fibres	298	371	321	619	318	407
Mean Diameter	27·00	27·48	27·06	26·30	26·98	27·40
Grand Mean ..	27·11					

As we have already noted, every fibre in the draw has to be measured to obtain consistent results. From a practical point of view, it is not easy to make a draw of less than about 500 fibres, and the presence of a large number of fibres on the slide, makes it difficult to be certain that every fibre has been measured. It has been mentioned that the selection of the worsted draw is a matter of great manipulative difficulty, if reasonable accuracy is required, and this difficulty alone is sufficient to make this type of sample unreliable for diameter measurements.

There is another disadvantage in the draw method of sampling. Measurements always tend to be made near the end of the fibre and thus any possible variation along the fibre is not taken into account.

(c) The Wilkinson tuft samples were selected in the manner described by Townend. Six samples of about 200 fibres were obtained from the top by inserting a needle and thread and capturing the fibres in a loop which was drawn tight. This method clearly leads to a cross-sectional sample, although it only selects one small portion of the whole cross-section and would, therefore be unreliable for blended tops as already noted. Great care was taken to comb out the short fibres not held in the loop of the thread. Attempts were made to lay the tuft directly on to the slide with the fibres parallel to the longer edge of the slide. When the thread had been removed, the fibres in the middle of the tuft were gently separated with dissecting needles, and after mounting in cedar wood oil, every fibre crossing a line across the middle of the tuft was measured. The results, however, were very unsatisfactory, and eventually it was found necessary to separate the fibres in a tuft into three or four length groups, measuring each lot in turn in the manner described above in order that no fibre should be omitted. The process was found in practice not to be unduly long, and the results obtained on six tufts are set out in Table IV.

Table IV. Monte Video 5182 Top
(All values in microns.)

Sample.	1	2	3	4	5	6
Number of Fibres	338	142	142	176	196	310
Mean Diameter	27·48	26·52	27·31	27·78	26·50	27·3
Grand Mean ..	27·22					

There are still fairly large differences between samples, but the results show a definite improvement on those obtained by the 2 cm. method (a) which is confirmed by an analysis of variance. The method has certain advantages in technique over the draw method (b) which it shares in some respects with the 2 cm. method. It is possible to take fewer fibres in each sample, and this not only leads to greater ease of manipulation, but makes it possible to take more samples, which can be taken from different positions along the top.

(d) A method originally suggested by Dr. Dischka to the International Wool Textile Organisation was modified very slightly, the following procedure being adopted. The top was compressed between two pieces of thin card and a clean cut made at right angles to its length by means of strong shears. A second cut was then made about 2 mm. further along the top, so that 2 mm. lengths of all the fibres in the cross-section at that point were obtained. These small lengths were shaken up in cedar wood oil in a small flask to

ensure thorough mixing of the fibres, the proportion of wool to oil being of the order 0·1 gm. of wool to 10 c.c. of oil. After the fibres had been allowed to settle, an aliquot part was removed on to a slide, the necessary mounting oil added, and the first 200 fibres measured. The following results were obtained from six samples taken in this way from the same mixture of fibres.

Table V. Monte Video 5182 Top

(All values in microns. Each sample 200 fibres.)

Sample.	1	2	3	4	5	6
Mean Diameter	27·48	26·97	27·69	26·89	27·54	27·46
Grand Mean ..	27·34					

In this case there seems to be no evidence of the existence of uncontrollable variations between the sample means, and this is confirmed by the following analysis of variance :—

	Sum of Squares.	Degree of Freedom.	Variance.	Standard Deviation.
Between Samples	·5559	5	·1112	S_1 = ·33
Within Samples ..	499·7602	1194	·2507	S_2 = ·50

The standard deviation between samples does not differ significantly from that which would be expected from the variation within the samples.

These results are typical of the high reproducibility which can be attained by the method. This might have been anticipated from the fact that any unevenness present across the width of the top has been eliminated by the process of mixing. Equally simply, any lack of homogeneity along the length of the top could be eliminated by making a series of cuts at intervals along the top and mixing all the cut fibres up together before measurement.

A point of importance is that by virtue of the mixing process, it is quite safe* to use as samples measurements of successive given numbers of fibres (say 200 or 300) as they appear in the field of view of the microscope : this is not true of the other methods. Another advantage of method (d) over methods (a), (b) and (c) lies in the fact that in the measurement of diameter, all parts of the length of the fibre are taken equally into consideration.

In view of its many advantages, the Dischka method has been provisionally adopted as standard at Torridon, and considerable experience with the method has proved beyond doubt that for speed and reproducibility it leaves little to be desired. In all cases, a number of sections taken at intervals along the top are mixed together before removing samples.

A modification of the method is also used for the sampling of yarn for fineness. The yarn is wound on to a hank in the usual way and a number of cuts taken across the whole of the cross section of the hank. For folded yarns it is advisable to make the cut lengths as small as possible (about 1 mm.) to ensure that the individual components and fibres separate out when the sample is shaken up in the oil.

VII—Experimental Features of the Standard Method.

There are a number of practical details which must be borne in mind by those intending to use the method, both as regards sampling and actual measurement.

* In this connection, however, see remarks under Section VII.

In the sampling method described, a concentration of 0·1 gm. of wool to about 10 c.c. of oil was recommended as suitable. This amount of wool corresponds to about six 2 mm. cuts from an average top. Although a certain degree of latitude is allowable, it is found in practice that if the concentration is very different from this, experimental difficulties are introduced. If there is too much wool, the pieces of fibre segregate together and the thorough mixing which is essential to good sampling becomes impossible. If there is too little wool some uncertainty is introduced into the selection of the small bunch of fibres to be measured from the settled layer at the bottom of the tube. It is necessary, of course, to take the sample to be measured from the whole depth of the settled layer.

For the actual measurement, it is necessary to have a microscope system in which focussing is brought about by movement of the slide stage relative to the objective in order to ensure constancy of magnification. An instrument has been designed at the Wool Industries Research Association especially for use with this method which incorporates this and other features.

The magnification should be checked repeatedly, and this operation is greatly facilitated if the thickness of the slide used is identical with that of the glass on which the standard engravings are made, so that eventually they are the same optical distance from the object lens.

It has been found that with insufficient care there is a tendency for the coarser fibres to be overlooked in measurement. Since the central cross-sections of these fibres are further from the surface of the slide, they do not come into focus as easily as the finer ones which constitute the bulk. The possibility of overlooking coarse fibres can be minimised by using a comparatively low power objective, with a consequent good depth of focus, and a high power eyepiece to obtain the necessary magnification. A high power objective with a small depth of focus definitely aggravates this trouble which can be quite serious, as will be seen from the following example.

An observer was asked to measure 200 fibres on a slide as quickly as possible ; his result gave a mean diameter of 22·94 μ, and standard deviation of 6·00 μ. He then repeated the measurements on the same slide, but doing it much more slowly and taking great care to ensure that every possible fibre in the field of view at any one time was brought into focus and measured ; his result now gave a mean diameter of 23·78 μ, and standard deviation of 6·79 μ. A comparison of these figures, confirmed by a study of the actual distribution curves shows that in the first case, a number of thick fibres have been omitted from measurement. Such a possibility must be carefully guarded against.

Uniformity of magnification over the field of view should be checked up, and if there is any distortion at the edges of the screen, this region should be excluded from use during measurement.

It is advisable also to traverse the whole width of the slide in any one measurement. After a very little practice, the density of the fibre pieces on the slide can be so judged that there are about 200–300 fibres in one complete traverse. If the number of fibres is much greater than this, there is considerable overlapping which increases the difficulty of measurement.

In all cases, the top is sampled under ordinary indoor room conditions of temperature and humidity. The effect of temperature alone on fibre diameter is negligible. The effect of hygrometric condition of the atmosphere

has been investigated by Hirst[6] who gives the following typical figures for the relation between relative humidity and wool fibre diameter.

R.H., per cent.	O. (dry)	63	74	78	84	100
Diameter ..	1·0	1·034	1·060	1·065	1·083	1·148

The average inside relative humidity is about 65 per cent. and a change from 60 per cent. to 70 per cent. which is about the extreme range in a normal room, would thus only produce an increase in diameter of 2 per cent. The actual differences caused by the normal variations of relative humidity are negligible compared with the standard error of the sample mean.

VIII—Variation in Mean Diameter along a Top.

A series of tests using the standard sampling and measuring methods, was carried out in order to ascertain the magnitude of the variation of mean diameter, if any, along the top. The New Zealand 5169 top was chosen as being most likely to show up any effect. Six cross-sections were chosen at intervals approximately 15 cm. apart, and four successive samples of 200 were measured at each cross-section. The means of all the samples are given in Table VI.

Table VI. New Zealand 5169 Top

(All values in microns.)

Sample.	Cut 1.	Cut 2.	Cut 3.	Cut 4.	Cut 5.	Cut 6.
1	31·75	31·62	31·84	30·37	30·68	31·36
2	31·97	31·83	32·36	30·91	31·52	32·09
3	32·15	30·78	31·82	32·75	32·40	31·35
4	31·98	32·19	31·21	32·16	30·83	31·58

The following analysis of variance was performed on the results :—

	Sum of Squares.	Degree of Freedom.	Variance.
Between Cuts	·2299	5	·04598
Within Cuts	452·1945	4794	·09433

In this case the variation between means of different cuts is actually smaller than would be expected from the variation within the cuts, showing that there is no significant lack of homogeneity along the top. Table VI also affords an interesting illustration of the kind of reproducibility possible with samples of only 200 when Dischka's method is employed.

IX—Treatment of Results.

(a) The spinning power of a top may reasonably be expected to depend not only on its mean fibre length and diameter, but also on the distribution of these attributes about the mean values. A qualitative estimation of this spread is provided by the frequency distribution curve, and a quantitative estimation by the standard deviation and possibly some other constant such as the " skewness " of the curve. The presence of a double peak or an abnormal number of extreme fibres in the frequency distribution curve will suggest the existence of blending in the top under examination, and this is almost invariably shown up also by a large value of the standard deviation compared with the measured values for the selected tops.

It has been suggested that instead of using the actual frequency distribution, the cumulative frequency or integral curve should be used, since the irregularities which inevitably appear in the frequency curve are smoothed out by the process of addition. While this may be so, there is no doubt that the curve so obtained will be insensitive not only to chance fluctuations of frequency, but to those real differences between distributions which are of interest to us. Thus for the purpose of visual comparison, it is preferable to use the frequency distribution. Until further experimental work has been done on the relationship between the distribution of fibre diameter and length and the spinning properties of the top, it is difficult to decide which constants of the distribution in addition to the mean and standard deviation would be of value. As the presence of a few abnormally thick or abnormally long fibres is known to cause trouble in spinning, it is thought that the skewness β,* might be a useful quantity to calculate. It had been provisionally decided by the International Wool Textile Organisation to calculate the percentage of fibres exceeding the mean $+6\,\mu$, but the usefulness of this rather arbitrary criterion has not been proved.

(b) The calculation of the standard deviation is also necessary to enable us to attach a standard error to the mean diameter, and to test the significance of differences in mean diameter between samples from two different tops.

Consider two tops having estimated mean diameters, $\bar{x}_1$, and $\bar{x}_2$, n fibres having been measured in each case, and having approximately the same standard deviation σ. Each mean has a standard error of $\sigma/\sqrt{n}$ and the difference $\bar{x}_1-\bar{x}_2$ has standard error $\sigma\sqrt{2/n}$.

If the two tops had the same true mean diameter, then $\bar{x}_1-\bar{x}_2$ would exceed 2·58† times this standard error only once in a hundred times by chance. Hence, if $\bar{x}_1-\bar{x}_2$ is as large as $2{\cdot}58\,\sigma\sqrt{2/n}$ it is considered unreasonable that the tops could have had the same true mean diameter, and they are taken to be significantly different.

By increasing n, the number of measurements taken, increasingly small differences in true mean diameter between tops can be shown up as significant. Considerations of time, however, require that n shall not be unduly large. Again, in discriminating between one top and another, differences in mean diameter below a certain limit, although perhaps statistically significant, are not such as to constitute a real difference in quality between the tops from a practical point of view. The number of measurements, n, therefore, should be chosen so that differences which are shown to be statistically significant should correspond as far as possible to real differences in spinning performance. This cannot be done until more is known about the influence of other factors besides fibre diameter on the spinning power of a given top. Provisionally, however, we can find an approximate basis for the limit of discrimination in the fact that differences of less than half the difference between the usual Bradford quality numbers are said not to be practically detectable : this implies that a difference of about 3 per cent. of the mean fibre diameter can be taken as the limit of discrimination.

Such a difference will coincide with that required for statistical significance provided

$$2{\cdot}58\sigma\sqrt{2/n} = {\cdot}03\bar{x}$$

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* A measure of the asymmetry of the curve derived from its second and third moments. See Tippett *The Methods of Statistics.*

† See Fisher, *Statistical Methods for Research Workers,* Chapter V.

Now the coefficient of variation of diameter for all qualities is fairly constant at about 25 per cent., so that taking $\sigma/x = 0{\cdot}25$, we find

$$2{\cdot}58 \times {\cdot}25 \times \sqrt{2/n} = {\cdot}03$$

giving

$$n = \left(\frac{2{\cdot}58 \times {\cdot}25}{{\cdot}03}\right)^2 \times 2 = 925.$$

It would appear, therefore, that a satisfactory procedure would be to measure a uniform number of 1000 fibres in every case,* and to accept as significantly different, tops whose mean diameters differ by more than about 3 per cent.

The question of the grading of tops with respect to an arbitrary limit for mean fineness, sometimes arises, as for instances, in the determination of limits for combing charges. Now cases will arise where the true mean of the top will lie very near the grade boundary, and in such cases a large number of measurements will have to be made to determine on which side of the boundary the true mean lies: clearly the extra labour involved in taking more measurements is not justified by the slight additional information that the top falls just above or just below a particular grade boundary line.

If then the standard number of 1,000 measurements is adhered to, "regions of uncertainty" can be fixed at the grade boundaries in the following way:—

Let a top whose true mean diameter is m, and standard deviation σ, give a sample mean of $\bar{x}$ from n measurements. Then $\bar{x}$ has a standard error $\sigma/\sqrt{n}$ and as in the previous argument the top will yield on the average, only one sample in every hundred whose mean $\bar{x}$ either exceeds $m+2{\cdot}58\ \sigma/\sqrt{n}$ or falls below $m-2{\cdot}58\ \sigma/\sqrt{n}$ that is, one in *two* hundred exceeding and one in two hundred falling below the limits. For the present purpose, however, it is better to consider the limits $m\pm2{\cdot}33\ \sigma/\sqrt{n}$ which are such that one in a hundred fall *above* and one in a hundred fall *below* the limits (or, if we replace "one in a hundred" by "one in twenty" the limits are $m\pm1{\cdot}65\sigma/\sqrt{n}$).

Let us, therefore, draw a line at distance $2{\cdot}33\sigma/\sqrt{n}$ above the grade boundary. Any top whose true mean diameter m lies on the boundary will give rise to only one sample in a hundred whose mean falls above this line, and tops whose means are less than m will give rise to even fewer. We can, therefore, consider the line to define a region of uncertainty such that any sample having mean diameter above this region is unlikely to have come from a top in the lower grade.

A similar line is drawn at distance $2{\cdot}33\sigma/\sqrt{n}$ below the grade boundary. If the sample mean falls within the uncertainty region, the quality is said to be undecided. It should be noted that we are not creating an intermediate grade, as the width of the uncertainty region can always be reduced by increasing n. Our confidence in grading is in a sense measured by the "one in a hundred" chance.† Should we be satisfied

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* It is best to record these in four successive lots of 250, or five lots of 200, thus providing a check on the method.

† Note that the "one in a hundred" chance here referred to does *not* necessarily mean that we should err in grading once out of a *hundred* times on the average. To have the latter information would imply a knowledge of the *a priori* distribution of all the tops being sent for test, and this clearly is impossible to ascertain. We have circumvented this difficulty by adopting the standpoint of "fiducial" limits, cf. Fisher, *loc. cit.*

with a confidence in grading of only "one in twenty" we can narrow our uncertainty region to $\pm 1{\cdot}65\sigma/\sqrt{n}$.

SUMMARY

Previous methods of fineness measurement in wool tops are discussed and reasons given for the adoption of the present microscopic projection method. Details of experimental procedure are given in order to reduce errors of measurement to a minimum. Various sampling methods are investigated and the importance of distinguishing between "true" and "biassed" samples is stressed, in view of the correlation between length and diameter in wool tops. The method finally recommended is that of the cross-sectional sample, full details of which are given.

The final section is a statistical treatment of results obtained by this method, with special reference to (a) the significance of the difference between the sample means of two given tops, and (b) the significance of the difference of the sample mean of a top from a given grade boundary.

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Appendix I.

Objection may be raised to the fact that diameter groups as wide as 2μ are used. It is a theoretical fact that with the number of measurements actually taken, and the type of frequency distribution met with, the mean calculated from the diameters collected into frequency groups is negligibly different from that calculated, using the actual diameters themselves, as long as the number of groups is not too small. Moreover, the standard deviation σ of the grouped frequency distribution is related to the standard deviation σ_0 of the actual diameter values of the formula :

$$\sigma = \sqrt{\sigma_0^2 + w^2/12}$$

where w is the width of the group.

To illustrate this fact, the figures for a range of tops from 80's to 36's have been regrouped into groups of width 4μ, and the means calculated : the standard deviations, corrected for the extra grouping, have also been calculated and are given for comparison. The agreement is very striking, especially in the higher qualities where the number of 4μ groups is as few as 7 or 8.

Quality Number.	Mean Diameter		Standard Deviation (Corrected for Grouping)	
	4μ Groups.	2μ Groups.	4μ Groups.	2μ Groups.
36	38·61	38·66	10·07	10·06
40	38·25	38·25	9·09	9·12
44	36·33	36·40	10·50	10·48
46	34·25	34·31	9·17	9·21
48	32·52	32·54	8·20	8·17
50	30·07	30·11	7·76	7·74
56	26·64	26·66	7·26	7·24
58	24·79	24·72	6·16	6·18
60	23·53	23·49	5·71	5·68
64	20·99	20·92	4·22	4·25
70	19·58	19·53	3·90	3·92
80	19·02	18·90	3·91	3·95

Appendix II.

Let f_{ld} be the proportion of fibres in the top, of length l and diameter d.

The true mean diameter is

$$D_t = /\Sigma f_{ld} \cdot d$$

summed over all l and d while the length biassed mean diameter is

$$D_l = \Sigma f_{ld} \cdot dl / \Sigma f_{ld} \cdot l = \Sigma f_{ld} \cdot dl / L_t$$

where L_t is the true mean length. This may be written

$$D_l = \frac{\Sigma f_{ld}\,(d-D_t)(l-L_t) + D_t L_t}{L_t}$$

$$= D_t + /r\,\sigma_d \cdot \sigma_l / L_t$$

$$\text{where } r = \frac{\Sigma f_{ld}\,(d-D_t)(l-L_t)}{\sqrt{\Sigma f_{ld}(d-D_t)^2\ \Sigma f_{ld}(l-L_t)^2}}$$

$$\sigma_d = \Sigma f_{ld}(d-D_t)^2$$

$$\sigma_d = \Sigma f_{ld}(l-L_t)^2$$

It may also be written in another form.

$$D_l = D_t + \frac{\Sigma f_{ld}(d-D_t)(l-L_t)}{\Sigma f_{ld}(l-L_t)^2} \cdot \frac{\Sigma f_{ld}(l-L_t)^2}{L_t}$$

$$= D_t + b_l\left[\frac{\Sigma f_{ld} \cdot l^2}{\Sigma f_{ld} \cdot l} - L_t\right]$$

i.e., $D_l - D_t = b_l(L_l - L_t)$

Where $L_l = \frac{\Sigma f_{ld} l^2}{\Sigma f_{ld} l.}$ is the length biassed mean length

and $b_l = \frac{\Sigma l_{\,d}(d-D_t)(l-L_t)}{\Sigma f_{ld}(l-L_t)^2}$ is the regression of diameter on length.

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13—A COMPARATIVE EXAMINATION OF METHODS OF ANALYSIS OF WOOL FOR FIBRE DIAMETER AND LENGTH

Part II—The Analysis of Raw Wool for Fibre-Fineness

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In this section of the paper a technique is described by which the measurement of fibre-fineness by the optical method can be carried out on raw wool. The method of sampling is based upon systematic zoning. In this operation the original sample is first divided into primary sub-samples or zones which are judged by eye to be about the same size; from each of these a very small "sheaf" of fibres is withdrawn to make up a composite sample.

Investigations have been carried out by Roberts[1] and Burns[2] proving the necessity for employing the zoning process to avoid misleading results. The following account describes the laboratory technique for treatment and measurement of the composite sample for fineness, and discusses the factors which affect the accuracy of results.

The number of primary sub-samples to be taken is an important consideration depending upon the size and degree of uniformity of the original bulk sample. No general solution of such problems can be expected, but the number of zones to fix may be determined by preliminary experiment. An adequate number of zones is reached when the variance between the mean values of the set of composite samples is reduced to approach that expected from the measurements *within* the sample. This work has been done, for example, on a South African Cape Merino fleece (divided into three parts) and it has been found that, for each part, sixteen primary sub-samples or zones fulfil the above conditions.

For a comparatively small original sample, such as would be taken from the living sheep, the problem is simpler because a number of primary sub-samples can be taken such that they are extremely small, consisting of only a few hundred fibres, and so preclude the possibility of error. For such a sample weighing approximately 0·5 to 1·5 gms., the number of primary zones would ordinarily be eight.

Preparation of the Sample

1. The composite sample, the component sub-samples of which still retain their separate identities, is washed in three changes of benzene warmed to 40° C., and is squeezed between each change. Water should not be employed for washing. The sample is now allowed to condition to room atmosphere for several hours. A number of such samples can, of course, be prepared in successive lots, in order that the work be not delayed, thus ensuring a supply of samples at the final stage ready for actual measurement.

2. A very small sheaf of fibres is then withdrawn from each of the component sub-samples: these small sheaves together form the final sample.

3. In order that the actual diameter measurements shall be representative of all the various thicknesses *along the length of each fibre* in the sample, there must be a mixing in relation to this factor. This condition is secured by cutting up this final sample into small portions from base to tip over a card with a smooth black surface. Since the number of pieces from a given fibre is proportional to its length, the method gives what is really a length-biassed

sample. To cut the sample, the wool is slipped within the fold of a small piece of foolscap paper, and paper and wool are cut together (see Fig. 1 (a)).

Each cut is made about 1 mm. below the preceding cut. It is important, for reasons stated later, to make these cuts close together, so that the resultant pieces of fibre are very short. The pieces of cut paper should not be completely severed, ensuring easy removal from the pieces and fibres (vide Fig. 1 (a)). The paper is then tapped to shake off any portions of fibres which may still adhere.

4. All these small pieces of fibre are tapped into a wide jar, containing cedar oil to a depth of about 2 cm. The type of jar used is illustrated in Fig. 1 (b) and has an internal diameter of approximately $7\frac{1}{2}$ cm. This size of jar has proved satisfactory (see later section of this account), whereas, if a much narrower jar is used, there is a great danger of obtaining misleading results.

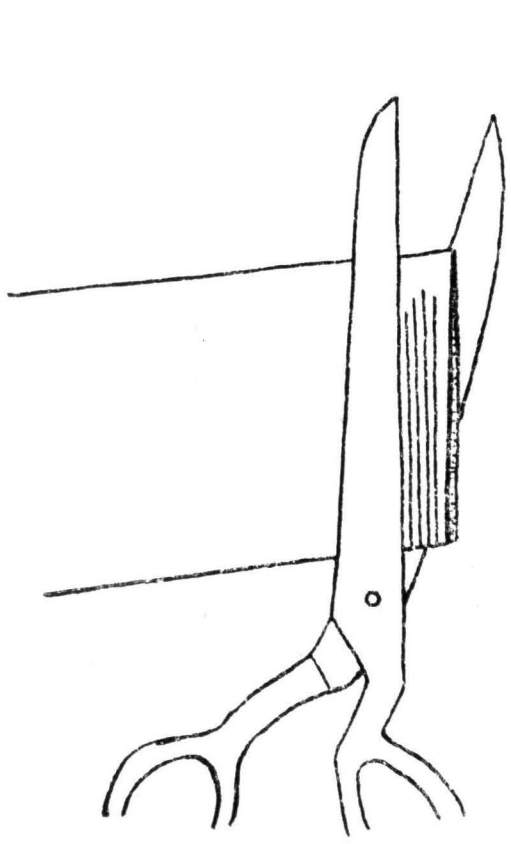

Fig. 1 (a).

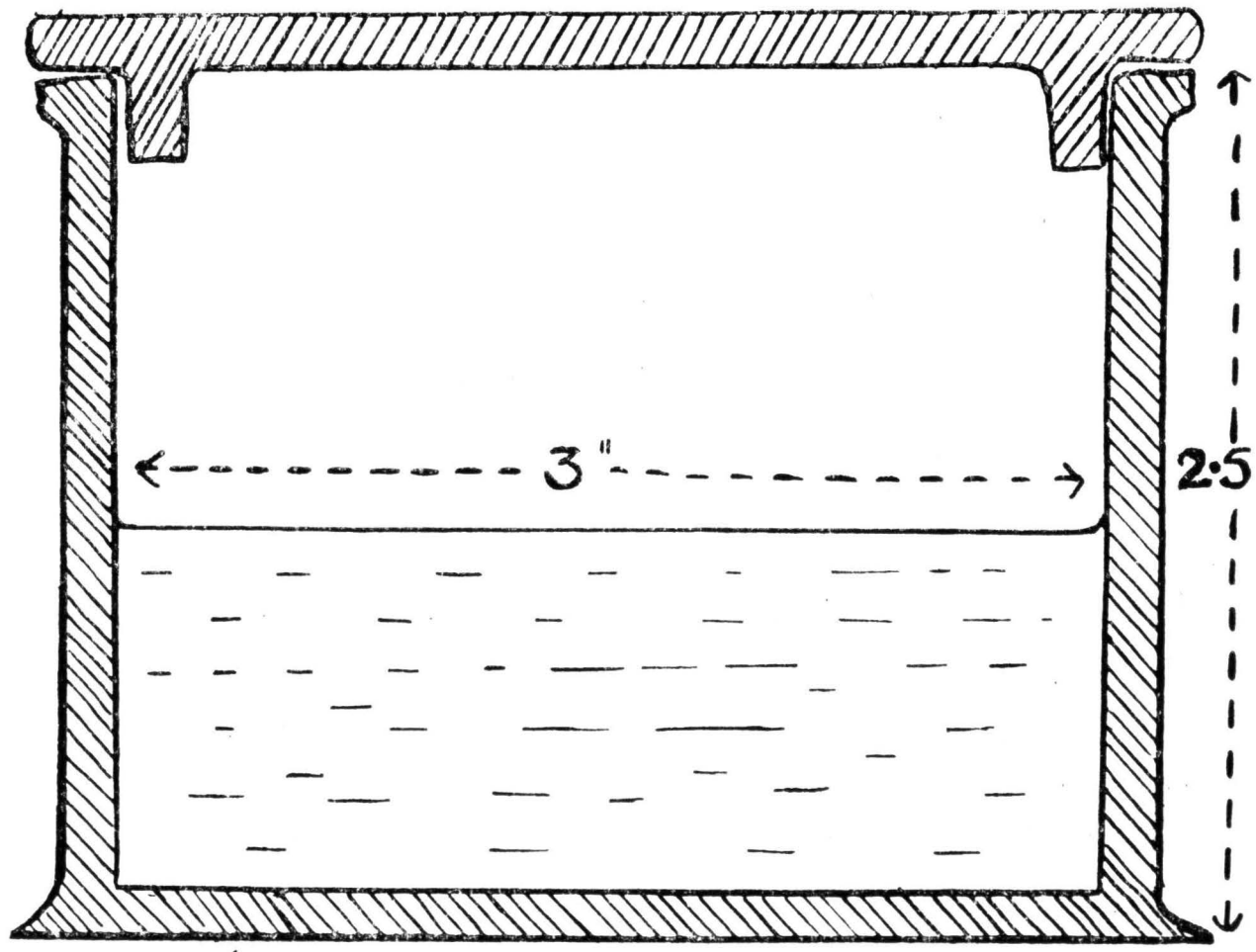

Fig. 1 (b).

5. The pieces of fibre are shaken vigorously in the oil until they are thoroughly mixed in the form of a fine suspension. This and subsequent steps in the method are similar to those used in the analysis of tops for fineness at Torridon and approved by the International Wool Textile Organisation.

6. The pieces are allowed to settle to the bottom of the jar. If the resultant sediment is rather deep, this is an indication that the final composite sample was too large and probably was not cut into fine enough pieces.

7. A portion of the sediment is withdrawn by a small spatula with a fine edge, which is inserted at one side of the jar until the bottom is reached, pushed along the diameter of the bottom and withdrawn up the opposite side. If the amount withdrawn is too small to cover the microscope slide on which it is to be mounted, a further portion may be withdrawn from the jar in a similar manner. It is essential that no *selection* should be made from any particular part of the jar, for example, the fibre-pieces must not be withdrawn from near the edges of the jar only.

8. These portions are teased out in cedar oil on a microscope slide, covered by another slide and mounted in a projector giving a magnified ($\times$ 500) image of the fibre-pieces. Actual measurements are made by using

a transparent rule and calculations made as described elsewhere.[3] See also Part 1 of this paper.

Reasons for Employing the Technique Described.

When the projection method was first used for measuring fibre diameter in raw wool, a rather narrow jar, only about $3\frac{1}{2}$ cm. internal diameter and 10 cm. deep, was used to contain the fibre suspension ; moreover, the composite sample was cut into sections often 2 mm. or more deep. When certain samples were prepared in this way, it was found that on attempting to withdraw a portion of the sediment, a whole mass of felted fibres was extracted and it was suspected that this was not a true sample of the jar's contents. However, a fineness determination was made on this mass and also several other determinations were made on portions extracted from the residue.

Table I is an example of the kind of results obtained.

Table I

	Mean Diameter (μ)	Standard Deviation.
First Portion extracted ..	19·76	± 3·14
Further Portions extracted from residue —1 ..	21·36	± 3·60
—2 ..	20·58	± 3·46
—3 ..	20·84	± 3·74

With the suspension prepared in this way, the first portion abstracted has a mean fibre-diameter which is significantly lower than the mean diameters of succeeding portions taken from the same jar. Here the first portion is clearly biassed in favour of the finer pieces of fibre. This may be due to the finer fibres felting more readily than the coarser ones. Again, determinations were made on samples (a) cut into not very fine pieces and in a narrow jar, and (b) cut into fine pieces and in a wide jar. It was found that values obtained from (a) were always significantly lower than values

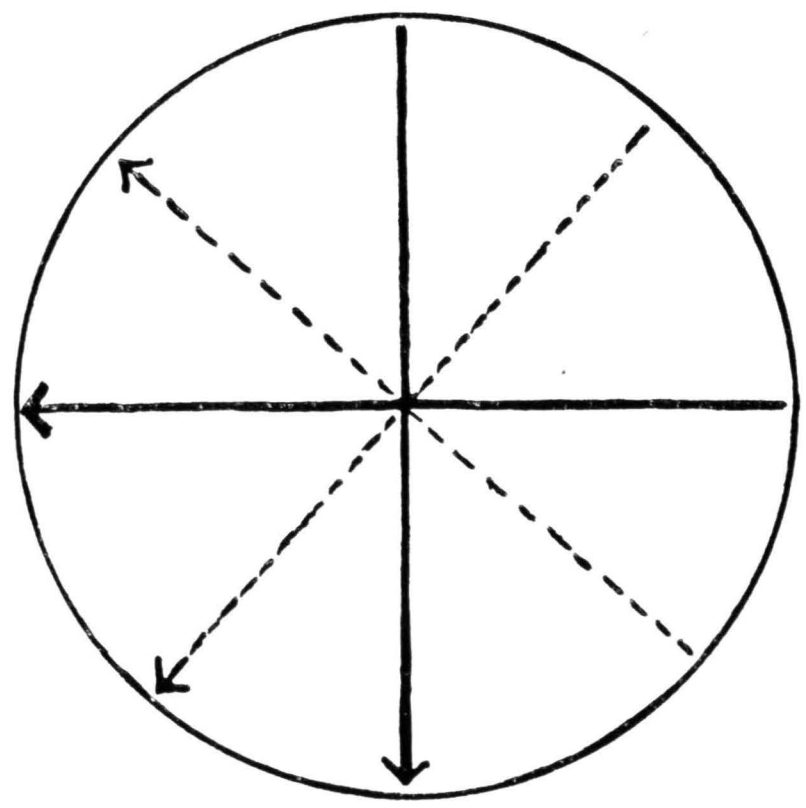

Fig. 2.

obtained from (b). Measurements from samples treated as in (a) were biassed therefore in favour of the finer fibres and were not representative of the contents of the jar.

Having decided then to use the wider jar, the following tests were made to see in what way the portions for measurement should be extracted. From each jar, portions were taken in the following two ways (*vide* Fig. 2).

(a) The spatula pushed across the bottom in two directions at right angles.

(b) Two similar strokes made at right angles to each other and also between the strokes made in (a).

In Fig. 2, the directions of the strokes are shown, the dotted lines indicating the strokes made as in (b).

Results of these pairs of experiments are given in Table II.

Table II

	Mean Diameter (μ)	Standard Deviation.	't'
8 *zones* 1(a)	21·14	3·88	0·30
(b)	21·06	3·62	
2(a)	20·76	3·48	0·28
(b)	20·84	3·64	
3(a)	21·06	4·16	0·65
(b)	21·24	3·70	
16 *zones* 1(a)	21·42	3·50	1·29
(b)	21·06	3·82	
2(a)	21·10	3·70	0·44
(b)	20·98	3·54	
3(a)	21·20	3·96	0·45
(b)	21·08	3·62	
4(a)	20·76	3·92	2·06*
(b)	21·32	4·14	
5(a)	20·98	3·28	0·76
(b)	21·20	3·54	
6(a)	21·00	3·90	0·19
(b)	21·06	3·82	
7(a)	21·06	3·38	0·50
(b)	20·90	3·46	
8(a)	21·26	3·50	0·69
(b)	21·46	3·64	

Using Fisher's table of values for " t " these pairs of results were tested for statistical significance. In this series of eight pairs of results (16 zones, Table II), the mean diameter as obtained in the manner (a) above was not significantly different from that obtained in (b) except for the one pair of results marked with an asterisk (Table II). In this case, the value of " t " is 2·06 and would seem to be significant at 1 in 25. But it must be remembered that the chance of at least one value of " t " greater than 2·06 occurring in such a group of eight pairs is $1-(\frac{24}{25})^8 = \cdot 28$, that is, rather more than one group of 8 out of every four such groups would contain at least one value of " t " exceeding 2·06 by pure chance. The occurrence of one such value in this set of eight is thus not unreasonable. We conclude that the portions can be taken from the jar in the above manner with confidence. This work indicates that the procedure described in the first part of the article can be applied to a sample of raw wool with the confident expectation that reliable and representative results will be obtained.

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[2] Burns, R. H. Univ. Wyoming Agric. Expt. Sta. Bull. 204.
[3] Wildman, A. B. *J. Text. Inst.* **27**, P181–P196, 1936. And references quoted in this paper.

Received 4/5/37

Correspondence

A REVIEW OF TESTING INSTRUMENTS AND AN IMPROVED RECORDING FIBRE TESTER

To the Editor.

SIR,

As a member of the Textile Institute I beg to be allowed to make some remarks regarding the publication in the May issue of the *Journal* by Messrs. G. Osumi and E. Kato of Tokyo under the title, " A Review of Testing Instruments and an improved Recording Fibre Tester."

I fully appreciate the very careful and exact manner in which the authors have described all the known single fibre testers. But I am not in agreement with the authors as regards their requirements made on the top of page T140.

By the first stipulation, that the apparatus must be " free from the effect of friction " the fourth condition, that " it must be simple in both making and handling " is made impossible.

I have now more than fifteen years' experience with single fibre testing and may say that the apparatus constructed on the balance principle gives the best and most accurate results, because the pull on the fibre under test is exerted by a suspended part of the apparatus instead of a fixed member. The proof of the good quality of the Krais-Keyl apparatus (which is illustrated and described by the authors on pp. T130-T131) is that 125 such testers have been made and sold throughout the textile world. The type shown is the old one of the year 1920, but since then a number of improvements have been added, such as electric movement, loading and unloading device, registration of load by burette or stopwatch, testing of wet fibres, testing at different humidities, and, the reduction of friction to a minimum, such that one drop of water (about 0·05 g.) corresponds to about 1·5 cm. on the sooted paper on which the elongation is recorded. This gives a sensitiveness of ·0017 g., since half millimetres can easily be measured on the paper. Friction in the Krais-Keyl apparatus is thus negligible.

(*Signed*) PAUL KRAIS.
Dresden.
17/6/37.

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IS ONLY AS GOOD AS THE

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TEXTILE NATURE
THREADS THAT COMPOSE IT:

is the justification for

Control Plan

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1. **(a) FABRIC CONSTRUCTION (Woven materials)** . . . There must be sufficient warp and weft threads. The weave must be uniform, the "surface interest" must be reasonably permanent.

(b) FABRIC CONSTRUCTION (Knitted materials) . . . Examination is made for fabric construction, bursting strength, strength at seams, etc.

2. **FABRIC PURITY** . . . The fabric must be free from excessive weighting and adulterants that would tend to shorten its life. Finishes must be reasonably permanent.

3. **TENSILE STRENGTH** . . . Fabric must be durable enough to withstand fair wear and tear. Seaming qualities must be satisfactory.

4. **WASHABILITY OR DRY-CLEANABILITY** . . . Fabrics or garments not intended for washing are tested for dry-cleanability. Washable-Tested Fabrics must pass washing tests with minimum shrinkage.

5. **COLOUR FASTNESS** . . . In dry cleaning, washing and hot-pressing.

6. **RESISTANCE TO FRAYING.**

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2. **FABRIC PURITY** . . . The fabric must be free from excessive weighting and adulterants that would tend to shorten its life. Finishes must be reasonably permanent.

3. **TENSILE STRENGTH** . . . The fabric must be durable enough to ensure wear according to its purpose.

4. **COLOUR FASTNESS TO SUNLIGHT** . . . The fabric must withstand specific tests for fastness of colour.

5. **DRY-CLEANABILITY AND WASHABILITY** . . . Tests for shrinkage, stretching and colour fastness must be passed.

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★ **Write to Courtaulds Limited, Foleshill Road, Coventry, for further particulars.**

COURTAULDS
RAYON

THE JOURNAL OF THE TEXTILE INSTITUTE

ABSTRACTS

LIST OF ABSTRACTORS

The Abstracts in this Section of the "Journal" are supplied by the following Organisations, and the source indicated by the initials hereunder shown.

British Cotton Industry Research Association	C.
British Launderers Research Association	La.
Bureau of Hygiene and Tropical Diseases	T.
Cuthill, Dr. R.	S.
Imperial Bureau of Animal Genetics	W.
Imperial Bureau of Plant Genetics	C. or L.
Linen Industry Research Association	L.
Water Pollution Research Board	W.
Whitelegg, C. J.	C.J.W.
Wool Industries Research Association	W.

1—FIBRES AND THEIR PRODUCTION

(B)—ANIMAL

Fleece Characteristics of Stud Merino Sheep in Relation to the Degree of Wrinkliness of the Skin of the Breech. III. H. G. Belschner, H. B. Carter and H. N. Turner. *Australian Veterinary J.*, 1937, **13**, 16-28.

A continuation of previous investigations (see *J. Text. Inst.*, 1937, A57) on the fleece characteristics of merino ewes with plain (A type) and wrinkled (C type) breech conformation. The observations were repeated on the same sheep from the same two stations 12 months later at the 1936 shearing. The statistical analysis of the results is given in the same form. Under the conditions of the experiment no marked difference was evident in the wool production of the A and C type sheep. Though the A type may produce a somewhat lower weight of greasy fleece, the yield is higher, so that no difference is apparent in the weight of clean-scoured wool produced. In addition to this, A type fleeces are inclined to be of greater commercial value. W.

Effect of Plane of Nutrition of Ewes on their Wool, Lamb and Milk Production. M. G. Snell. *Louisiana Agric. Exper. Sta. Bull.*, 1936, No. 269, 23 pp.

A three-year investigation was made on the problem of loss of wool during the winter, the condition not being due to scab. Four lots of ten ewes each were fed on different planes of nutrition. The results showed that a low plane of nutrition adversely affects live weight, and wool, lamb and milk production, and may result in shedding of wool. W.

The Piri-piri Burr: Biological Control. "Malabar." *New Zealand Farmer Weekly*, 1937, **58**, No. 4, pp. 28-29.

The Cawthron Institute, Nelson, New Zealand, has imported and reared a Chilean sawfly as a parasite of the piri-piri weed (or "biddy-biddy"). The plant is quickly spreading and its burr-like seed heads depreciate the value of New Zealand wool. So far, the insects have given very satisfactory results. W.

The Wool Trade of North China. A. H. Rasmussen. *Pacific Affairs*, 1936, **9**, No. 1, pp. 60-68.

The chief foreign trade in the wool produced in China is in those grades used for making carpet yarns, and the chief buyer is the United States. Figures for annual exports are shown. A description of the various grades of wool is given, together with an account of transport difficulties and handling prior to shipment. The importance of promoting the Chinese wool trade in view of

w

frontier conditions is stressed, and this can only be done by united government policy directed to reducing internal transport costs and local taxes and to eliminating adulteration. W.

Sheep Dips: Revised Standards. *Queensland Country Life*, 1937, **2**, No. 33, p. 4.
A description of revisions in standards for proprietary lines of arsenical sheep dipping, spraying, jetting and swabbing compounds and concentrates, now brought into conformity with the new Queensland regulations for arsenic in wool. W.

Problems of Wool Growing in New Zealand F. W. Dry. *Royal Agric. Soc. of New Zealand (Inc.) Gazette*, No. 14, 30th May, 1936.
An account of wool problems in general considered from the viewpoint of the measurement of wool character, wool consumption and production, and the physics, chemistry and biology of wool. Emphasis is laid on the necessity for making out a sound system of fleece-sampling and analysis. However laborious and difficult this task it must be accomplished in order that " the difference (i.e. in wool performance) between one sheep and another can be measured ; " the effects of heredity and environment on fleeces can only be accurately tested when such a system is available. New Zealand problems in particular are discussed with special reference to the occurrence of hairiness in the fleece. Important principles underlying the relation of wool research to the manufacturers are clearly outlined, and the great need for a closer liaison between manufacturer and producer is stressed. There are broad suggestions on wool research policy in general and particularly from the biological point of view, together with indications of present day knowledge on the scientific aspect of problems of production. The essay is written with pleasing clarity and has a direct appeal to all interested in wool problems. W.

Wool: Colloid Chemical Behaviour. —. Haller. *Textilber.*, 1937, **18**, 5-6.
A review of methods of detecting wool damage and of decomposing wool into its histological constituents. By means of a highly concentrated pancreas gland preparation, supplied by Ferment A.-G., Basel, the author decomposed wool into its cortical cells. A diagram is given showing these on a microscopic slide. " Lanain," the cementing substance of the cortical cells (see *J. Text. Inst.*, 1936, A305), was dissolved or digested, thus destroying the bonds between the cells. W.

Jetting Race. R. N. McCulloch. *Agric. Gazette of New South Wales*, 1937, **48**, 149-152 and 173.
A plan is given for a single-sheep raised jetting race. The method is described of preparing calcium arsenite jetting mixture, made by boiling together arsenic, caustic soda and lime. W.

Shearing Sheds. N. L. Jones. *Agric. Gazette of New South Wales*, 1937, **48**, 145-148.
Plans are given for an improved lay-out for a two-stand shed. W.

(C)—VEGETABLE

Cotton: Cultivation in U.S.S.R. *Int. Rev. Agric.*, 1937, **28**, 108s.
The area to be devoted to cotton in 1937 is 5,163,000 acres, 3,886,000 acres under irrigation. American long-staple varieties are selected for nearly half the area, including 8,517 Kolkhoznik 1,167,600 acres, and 36 M2 Pakhtakor 872,500 acres. Egyptian cotton is to be grown on 309,000 acres. In 1936, yields of seed cotton averaged 1,258 lb. per acre in the irrigated regions and 1,445 lb. in Uzbekistan ; 64 per cent. of the crop was of $1\frac{3}{32}$ to $1\frac{3}{16}$ in. cotton. C.

Indian Cotton Crops: Composition. J. B. Hutchinson and R. L. M. Ghose. *Indian J. Agric. Sci.*, 1937, **7**, 1-34.
An account is given of investigations of the past history and present status of the cotton crop of Central India and Rajputana carried out in an attempt to discover the causes and estimate the extent of the deterioration which it is believed to have suffered. Observations of the percentages of Upland cotton and four types of *desi* cotton in samples from different tracts are recorded, and crop analysis data showing mean yield, lint index and seed weight, halo length and fineness are tabulated and discussed. Important associations between agri-

cultural and morphological characters are pointed out. It is shown that the opinions of the local industry and the theories offered by agricultural authorities are not supported by the facts. The trade evidence for deterioration is discussed. It is concluded that no adequate allowance has been made for short-period seasonal fluctuations. Much of the deterioration is deterioration in grade and not in intrinsic quality of the staple. The selection balance in the crops of Malwa and Nimar is discussed and a preliminary outline is given of the effects of some of the more obvious selective forces. C.

Pima Cotton : Cultivation in Morocco. F. H. Heim de Balsac et Miège. *Coton et Culture Cotonnière*, 1937, **11**, 21-36.

A report is given on the cultivation of Pima 67 cotton at the experiment stations of Rabat, Sidi-Slimane and Dar Ould Zidouh in 1934 and 1935. The climatic conditions, and irrigation and manuring requirements are briefly discussed, and yield data and the results of technological examinations of the fibre are given. Satisfactory yields have been obtained and the characteristics of the variety have remained remarkably constant in spite of varying conditions of cultivation. The cotton produced at Rabat is of good medium strength and fineness ; that produced at Sidi-Slimane is of good length but heavier and thicker than normal, whilst that produced at Dar Ould Zidouh is distinguished by its good length and strength. C.

Candid Correspondence with American Flax Inventor. The Salins-ize Process. *Irish Textile Journal*, 1937, **3**, No. 2, 8-10.

An exchange of letters between the Editor, *Irish Textile Journal*, and Mr. Howard D. Salins, on the Salins-ize flax process. In the Salins-ize system flaxseed is subject to a special chemical treatment, and the inventor claims that the yield of fibre and seed from the plant is greatly increased. It would appear that better results are obtained in a dry climate where soil humidity is low. L.

Californian Flax Pulp Scheme. *Irish Text. J,.* 1937, **3**, No. 2, 13.

Refers to proposals for the establishment of a pulp and paper mill at Mexicali, using flax and other local fibres for the production of high-grade papers. L.

Bast-fibre Producing Industry : Present-day Problems. M. Lüdtke. *Z. angew. Chem.*, 1937, **50**, 291-294.

The increase in cultivation of flax and hemp in Germany gives rise to problems in connection with retting (control of retting, artificial drying, disposal of waste water), chemical extraction including cottonisation, mechanical fibre extraction, increasing the fibre yield, and utilisation of shives. These are discussed and the lines of probable development are indicated. L.

(D)—Artificial

Alkali-cellulose : Pressing Factor and Alkali and Cellulose Contents. H. Soyer. *RUSTA*, 1937, **12**, 79-83.

The relations between the pressing factor (weight of alkali-cellulose/weight of wood pulp), T, the percentage alkali content, y, and the percentage cellulose content, x, of alkali-cellulose are studied ; $Tb = y/x$, where b is a constant. T, y and x have been determined experimentally and b calculated. Values of the ratio 100 NaOH/cellulose have also been calculated for given values of T. It is further shown that $T = a/x$ where a is the percentage alpha-cellulose content of the wood pulp. C.

Viscose : Influence of Ripening on Viscosity. D. G. Pasella. *RUSTA*, 1937, **12**, 67-71.

Samples of cellulose xanthate were ripened for different periods and then dissolved in caustic soda. The viscosities of the solutions were determined, and the degree of ripening was determined by measuring the concentration of sodium chloride solution required to precipitate viscose filaments. The results are shown graphically. Viscosity increases with time of ripening, slowly at first and then rapidly, and in the case studied complete coagulation was obtained after about thirty days. The ripening process is regarded as a process of hydrolysis. The hydrolysis is rapid at first but decreases progressively. C.

Staple Fibre Drying Apparatus. F. K. Howell. *Amer. Silk and Rayon J.*, 1937, **56**, No. 2, 24-26, 38.

Various types of apparatus for the continuous drying of staple fibre after washing and desulphurising treatments in continuous production processes are described and their advantages and disadvantages are pointed out. C.

Patents

Artificial Horsehair. C. Freudenberg G.m.b.H. F.P.803,084 of 22/9/1936, (through *Chem. Abs.*, 1937, **31**, 2717).

Fibrous animal material such as skins or scrapings thereof obtained during chrome tanning and detanning are caused to swell in known manner, pressed through spinning nozzles, solidified by drying or tanning and dyed as desired. W.

Viscose Rayon: Spinning. I. G. Farbenindustrie A.-G. and W. W. Groves. E.P.460,026 of 19/7/1935.

The process described in E.P.443,971 for the production of threads, films and other shaped objects from viscose is modified by using the water or strongly diluted electrolyte solution from the precipitating bath for washing the coagulated viscose products. C.

Rayon Yarn Liquid Treatment Apparatus. W. W. Triggs (Chatillon Soc. Anon. Italiana per le Fibre Tessili Artificiali). E.P.460,079 of 6/5/1936.

Rayon yarns are subjected to washing, desulphurising, bleaching, dyeing, and other finishing treatments in the production of continuous filament or short fibre yarns, by counter-current treatment in open channels, and during the treatment the yarns are kept under tension and subjected to squeezing within the liquid. Suitable apparatus for carrying out the process consists of a series of inclined independent channels in which are situated diaphragms or pairs of diaphragms slotted in such a way that the fibre bundle brushes with slight friction the lower horizontal side of the slot of the lower diaphragm and the upper horizontal side of the slot of the higher diaphragm, or vice versa. In a modification, spaced bars are provided alternately above and below the path of travel of the yarn. On leaving the channels, the fibre bundle is passed on to a set of squeezing rollers, one of which may be inclined with respect to the others. C.

Cellulose Derivative Solutions: Preparation. A. P. Lowes and Imperial Chemical Industries. E.P.460,144 of 15/7/1935.

Solutions of such solids as chlorinated rubber, chlorinated naphthalene, cellulose esters and ethers, in a desired solvent are obtained from solutions in an initial solvent by evaporation of the latter in the presence of the vapour of the desired solvent. The initial solution may trickle down a tower in counter-current to the vapour of the desired solvent. The tower may have a jacket heated by water or steam, or by passing in the vapour of the mixed solvents, the jacket having a reflux condenser and acting as a fractionating column. An example describes the preparation of ethyl acetate solutions of cellulose nitrate from acetone solutions. C.

Depilating Hides. M. Martens and A. van Osselaer. E.P.460,283 of 18/7/1935.

Hair is removed from hides by means of a tool operated to pass in contact with the hair close to the roots and in a direction transverse to the direction of the hairs so as to exercise a " blunt pulling effort." Suitable tools for the purpose are a toothed or ribbed bar, a spur wheel, a comb having pointed but blunt edged teeth or the tool comprising a number of operative elements carried by spring-stressed stems mounted in a bar. The hides may be supported on a roller, the hairs being strained by another roller to lie transversely to the tool which is moved along a line parallel to the axis of the roller. See also specification 403,887 (*J. Text. Inst.*, 1934, A329). W.

Depilating Hides, etc. O. Grunwald and E. E. Weiss. E.P.460,517 of 28/6/1935.

In depilating hides, etc. known alkaline media for the removal of hair, e.g. lime-alkali-sulphide, are mixed with 10 to 25 per cent. of a water miscible liquid prepared from alkali hydroxide, ethyl alcohol and a vegetable oil in quantity more than sufficient to saponify the alkali. In preparing the water miscible liquid one part of potash lye of 40° Be., 0.2 parts of ethyl alcohol and four parts

of vegetable oil may be mixed. Such a preparation may be added to an aqueous mixture of sodium sulphide, unslaked lime and salt. Mixtures of lime with alkali sulphate and sulphite may also be used. W.

Fancy Rayon Yarns: Production. British Bemberg Ltd. E.P.460,626 of 6/7/1936 (Conv. 12/10/1935).

Rayon effect yarn having knots, snarls or the like along its length is produced by causing a group of elementary filaments to issue from a spinning funnel with large exit velocity, fall upon an impact plate, and be withdrawn therefrom at a lower velocity. The hastening forward of the thread and the formation of snarls, or balls, on the impact plate is promoted by diminution of the rate of coagulation, e.g. by lowering the temperature of the precipitating water. The impact plate may be tilted backwards, or it may be made concave in order to facilitate the formation of the knots or swellings. C.

Rayon Threads: Simultaneous Spinning and Twisting. K. Berndt. E.P. 460,744 of 25/3/1936 (Conv. 27/3/1935 and 12/6/1935).

A method for spinning and simultaneously twisting rayon threads consists in spinning the threads from a rotary spinning nozzle into a vessel, rotating with the nozzle, and maintained practically completely filled with precipitating liquid during the spinning. Two forms of apparatus are described. C.

Matt Coloured Filaments: Spinning. British Celanese Ltd. E.P.460,955 of 12/9/1936 (Conv. 13/9/1935).

The process described in E.P.374,356 is modified by continuously passing through a system comprising a pump and a mixing or homogenising device and thence towards the spinning jets a substantial excess of the spinning solution and pigment mixture over that required by the spinning jets, and continuously returning the excess of spinning solution and pigment mixture to the feed side of the system. The spinning mixture may be pumped to one end of a header supplying a plurality of spinning jets and the excess may be continuously returned from the other end of the header. The process is applicable to the manufacture of viscose, cuprammonium, nitrocellulose, cellulose acetate, formate, propionate, butyrate and ethyl, methyl or benzyl cellulose filaments. The filaments may be produced by dry or wet spinning methods and may be fine filaments, bristles, artificial straw or horse-hair. C.

Amino Acids and Polyamides: Spinning. W. W. Triggs (E. I. Du Pont de Nemours & Co.). E.P.461,236/7 of 9/5/1935.

(1) One or more mono-aminocarboxylic acids having at least one hydrogen atom attached to the amino nitrogen, amide forming derivatives thereof or low molecular weight polyamides derived therefrom, or derivatives thereof, or mixtures thereof, are subjected to heat treatment in the presence of an inert solvent for a time sufficient to form a product which is spun into continuous filaments or formed into sheets or films and subsequently subjected to moderate stress. In the manufacture of fibres, the polyamide may be dissolved, with or without the addition of a cellulose derivative such as nitrocellulose, cellulose acetate and ethyl cellulose, in a suitable solvent, extruded through orifices into a coagulating chamber or a heated chamber and wound on a revolving drum or spindle. Alternatively, fibres may be obtained by touching the surface of the molten polymer with a rod and drawing away the fibre so obtained. The fibres are capable of absorbing permanently from a weakly acid medium those dyes ordinarily used for silk and wool. (2) One or more diamines containing at least one hydrogen atom attached to each nitrogen atom are interacted with one or more dicarboxylic acids or amide-forming derivatives such as anhydrides, acid halides, and esters for a time sufficient to form products capable of being drawn into continuous filaments. Fibres may be produced as above. C.

Staple Fibre Products: Production from Continuous Filaments. British Celanese Ltd. (London) and H. Dreyfus. E.P.463,485 of 30/9/1935: 30/3/1937.

A process for the conversion of continuous filaments into a staple fibre product, capable of being subjected to a drafting operation for transformation into yarn, comprises causing a bundle of continuous filaments of a total denier of from 3,000 to 50,000 denier or more to pass in contact with a cutting surface

movable in the same general direction as the bundle but at a different speed therefrom, pressing the bundle against the cutting surface substantially at a point in the length of the bundle, and collecting with little or no twist the continuous fibrous product thus formed. Alternatively, a sliver, roving or like product may be built up by combining several small continuuos staple fibre bundles converted from continuous filaments. These may be laid side by side, or be combined with a low degree of twist. The slivers or rovings are then subjected to drafting operations to reduce the denier of the product. C.

Viscose Rayon : Desulphurising. J. G. Evans and Imperial Chemical Industries Ltd. (London). E.P.464,116 of 9/10/1935 : 9/4/1937.

A method for removing sulphur from viscose rayon comprises the addition to the acid coagulating bath, or to subsequent wash liquors, or to an alkaline desulphurising bath, of a quaternary phosphonium or ternary sulphonium salt at least one radical of which consists of a long or branched carbon chain containing not less than 8 carbon atoms, e.g. dimethylhexadecylsulphonium methyl sulphate or cetyltriethylphosphonium bromide. C.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—Preparatory Processes

Shirley Opening Machines. T. C. Williams. *Textile Weekly*, 1937, **19**, 399.

A report of a lecture in which the application of stream-line air currents to the opening and cleaning of cotton is illustrated by reference to the Shirley Analyser and Lint Recoverer. C.

Carding Machines : Grinding. *Text. Rec.*, 1937, **54**, No. 648, 24 and 23.

Various methods of driving the card during grinding are described and the advantages of slow doffer speed grinding are discussed. C.

Heilmann Comber Safety Device. Platt Bros. & Co. Ltd. *Platt's Bull.*, 1937, **3**, 510.

A safety device for the Heilmann comber designed to prevent the top comb from being lifted while the machine is in motion and to prevent the machine from being started while the top comb is lifted is described and shown in a diagram. When the machine is in motion the stop collar of the setting-on rod is in the path of the tail end of the fork lever and the lever cannot be lifted to lift the top comb. When the machine is stopped it is possible to lift the lever and hence the top comb, and when the top comb is in the lifted position the machine cannot be started as the tail end of the fork lever is in the path of the stop collar on the setting-on rod. C.

Twin Sliver Draw Frame. Casablancas High Draft Co. Ltd. *Text. Rec.*, 1937, **54**, No. 648, 51-52.

The twin sliver draw frame produces a sliver twice as fine as normal draw-sliver frame and two of these are coiled together in each can. As a result only half as much draft is required at the speed frame and also only half the number of cans at the back, feeding the machine. The modification necessary to the ordinary draw frame is carried out only at the finishing head, and consists essentially in separating the sliver at the back of the machine into two groups of three or four slivers each. The fleece emerges from the front rollers separated, and passes through two condensing funnels and the calender rollers into the can in the usual way. The rotation of the cans imparts twist to the slivers, but in the twin sliver draw frame, the rotation of the can is reversed at regular intervals so that the sliver receives equal amounts of right-hand and left-hand twist. The twist in the sliver is, therefore, neutralised when this is subsequently pulled from the can at the speed frame. The use of this machine in combination with single process speed frames is discussed. C.

Raw Cotton : Weight and Value Losses on Processing. A. Bosshardt. *Rev. Fil. et Tiss.*, 1937, **22**, 103-105.

The purchase of cotton according to type is briefly discussed and it is pointed out that the determination of type must be based on detailed studies of the loss in weight and in value on processing. As an example, details are given of the amounts of waste produced in the opening, cleaning and carding processes

starting with 200 kg. of cotton. The weight of cotton required to produce 100 kg. of sliver is calculated, its price is determined and from this is subtracted the value of the waste produced. The difference between the figure thus obtained and the price of 100 kg. of cotton gives the loss in cash value of the cotton in the production of 100 kg. of sliver. C.

High Draft Roving Systems. *Textile World*, 1937, 87, 722-725.

Recent developments in high draft roving systems are reviewed. The following systems are described : Whitin-Casablancas high draft roving, " super-draft," and " inter-draft " systems ; the Saco-Lowell system, and two H and B American Machine Co. machines, viz. a five-roller super-draft speeder and a multiple draft system, based on the Harris principle of inserting false twist. C.

New Yarn Drying Machines. *Text. Mfr*, 1937, 63, 147.

Describes a new yarn drying machine of the cabinet type for drying yarn in hank or cheese form. The cabinet is of simple construction with the Spooner patent fan built into the structure. The fan incorporates an auxiliary runner whereby a percentage of fresh air is introduced into the circuit, and this quantity of fresh air is regulated by a hand control near the steam valves. Nozzles are formed on the top of the pressure and suction chambers so that a perfectly even drying effect is produced over the whole chamber and a high evaporation effect is obtained by keeping this velocity of the air comparatively high. The steam consumption is 1·5 lbs. of steam per pound of moisture removed, and the horse power required by the fan is only 2·75 b.h.p. for a cabinet dealing with 200 lb. of dry hanks per hour. The machine may be altered to suit an increased output of yarn and with the addition of chain traversing gear, the machine becomes a complete automatic hank dryer. L.

(B)—Spinning and Doubling

" Dawes " Spindle. *Textile Weekly*, 1937, 19, 368.

An illustrated description of a spindle with which the building of the package proceeds continuously at the top of a hollow spindle, the yarn being carried down by a series of carriers attached to a sleeve that slides on the spindle. Packages up to 14 inches long can be produced. C.

Mule Yarn Twist Counting Device. Engelmann. *Leipz. Monats. Text. Ind.*, 1937, 52, *Fachheft* I, 2-3.

A device for measuring twist during the spinning process consists of an endless screw gearing with two wheels which are mounted one behind the other on the same axis. The first wheel is provided with a scale from 0 to 50 showing the individual rotations of the spindle and the second wheel moves through one tooth for fifty rotations and one of its divisions corresponds to fifty rotations of the spindle. The screw is bored through its axis so that it can be fitted on to the spindle and rotate with the latter. The number of rotations of the spindle during the outward run of the mule carriage is measured and the yarn twist is obtained by dividing this number by the length of the run. C.

Ring Spindle Separators : Application to Prevent " Lashing." E. Meadowcroft. *Textile Weekly*, 1937, 19, 207-208.

When folded yarns are used to obtain decorative effects the most common defects visible are " lashed," " fish," or " fuzzy " yarn. The types of yarn which show these defects are lace, voile and lisle yarns with counts ranging from 2/20's to 2/220's, 2/60's to 2/120's and 2/50's to 2/100's, respectively. Lashed yarn is caused by the loose ends of a broken yarn flying out and lashing themselves into the two adjacent ends. To prevent this, a blank separator is secured by its base to the ring plate, one bolt holding the separator and the ring in position. Experimental results of the use of such a separator are recorded. C.

Threads Break on Spinning Machines: Frequency. F. Oertel. *Spinn. u. Web.*, 1937, 55, No. 7, 4-6.

The causes and frequency of thread breaks on spinning machines and the method of determining the frequency of the breaks are briefly discussed. It is pointed out that in order to obtain a correct estimate of the frequency it is necessary to consider not only the number of breaks repaired by the operative in a given time but also the changes in the number of spindles running empty.

An equation for the frequency of breaks is given together with curves showing the variations in breaks, piecings, and empty-running spindles in the course of spinning in a typical case. C.

Fancy Doubling Frame. Platt Bros. & Co. Ltd. *Platt's Bull.*, 1936, **3**, 469-475; 1937, **3**, 502-509.

A detailed description is given of the Platt's fancy doubler and of the roller motions applied to this machine. The three main types of special motion which can be applied to either the middle or the back roller are the cam, the rack and box, and the ball disc motions. These may be used to set the roller in motion intermittently or to accelerate it periodically. Methods of threading and running the rollers to produce spot, gimp, snarl, loop, cover, flake, marl and chenille yarns are explained. C.

Fancy Yarns: Production. —. Geodel. *Revue Textile*, 1937, **35**, 79-91.

A general account is given of the production on doubling and twisting machines of various fancy yarns, including loop, chenille, knop, corkscrew, flake and irregular coloured twist yarns. The construction of a cam for the production of irregular effects is discussed. C.

Spinning Mill: Rationalisation. W. Bauer. *Textilberichte*, 1937, **18**, 193-194.

The rationalisation of textile processes is discussed and it is pointed out that indications of the directions in which improvements are required can be obtained from tests on the raw material, determinations of the strength and regularity of yarns, analyses of thread breakages in spinning and weaving and time studies of these processes. Typical figures are given. The relation between count and output in spinning is discussed and production numbers for ring spinning are given. Normal machine speeds and productions for opening and carding machines and drawing and speed frames are indicated. C.

Print Cloth Mill: Organisation. G. R. Merrill. *Textile World*, 1937, **87**, 741, 950.

Calculations are made of the equipment required by a 50,000 spindle mill producing print cloth with 30's warp and 36's weft. The number of units, speeds, weight of cotton or yarn passing through the machines, and floor space are tabulated. C.

Viscose Yarn: Contraction on Twisting, and Yardage. Messrs. Cox and Fuller. *Textile World*, 1937, **87**, 736.

A chart is presented which gives percentage of contraction for various turns per inch as applied to six common sizes of rayon yarn. A table inset gives yardage per pound. C.

Modern Flax Spinning Machinery. *Text. Rec*, 1937, **55**, No. 650, 44-63.

An article with special references to the wear and tear on wet spinning frames. Variations in the fibre quality necessitates a certain amount of latitude in design so that any necessary adjustments can be made to meet the requirements of the material in work, and as the question of wear and tear is a big item in the running cost of a wet spinning department, it is very necessary to consider mechanical efficiency. Particulars of frames are given, suitable for spinning a wide range of linen yarns and special points are discussed which require judgment and attention in the selection of new machinery. L.

Patents

"Statex" Rubber Threads: Production. D.R.P. 613,235 (through *Textilberichte*, 1937, **18**, 208.

Threads of silk or rayon are coated with rubber, vulcanised, and then covered with textile threads. Materials produced from these compound yarns are treated with carbonising agents or solvents to remove the silk or rayon cores. In this way products of high elasticity are obtained without the difficulties experienced in manufacturing processes using ordinary elastic yarns. C.

Flat Stripping and Brushing Roller Card Clothing. W. and E. Graf (Rapperswil, Switzerland). E.P.462,841 of 17/10/1935 : 17/3/1937.

Card clothing for flat stripping, burnishing or brushing rollers is characterised by the feature that the fillet or sheet is provided in the peripheral direction of the roller with groups of wires with bent teeth and groups with straight teeth

of considerably longer wire than the former, the groups being separated by intervals varying according to the diameter of the roller. C.

Winding Machine. W. Reiners and Schlafhorst & Co. (Munchen-Gladbach, Germany). E.P.463,148 of 21/2/1936 : 23/3/1937.

A winding machine is provided with a group drive with simultaneous starting of the spindles and simultaneous doffing but the several cops are built up independently of each other, the traversing movements for producing the successive layers being independently controlled, and stoppage of the spindles being automatically and independently effected in case of yarn fracture or failure of yarn or completion of the winding. Those cops which are not completely wound, due to rupture or failure of yarn, may remain in position in the machine when the other cops are doffed, or they may be doffed with the others and finished by a subsequent operation. C.

Reef Knot Tying Appliance. Cook & Co. Manchester, Ltd., and H. I. Brook. E.P.463,446 of 9/10/1935 : 31/3/1937.

A knotting appliance for tying reef knots is of the type of knotter having a rotatable knotting bill mounted between fixed sides having cross-over members on their inside faces and operated by a toothed quadrant and is characterised by each fixed side having two fixed yarn slots so placed with reference to the knotting bill that when two strands of yarn are laid across the device in the slots both strands will be in front of the knotting bill but one will be behind the plane of rotation of the bill at one side. Each slot has a separate cross-over member, the members being mounted on the inside faces of the fixed sides and each moving only its own strand. An arm carrying a hook is provided to move up and down in front of the knotting bill and has scissors upon it. The operation of knotting makes a reef knot, the strands of which on one side are cut by the scissors on the swinging arm and slid off the bill by the hook on the swinging arm. C.

Yarn Lubricating and Tinting Compositions. British Celanese Ltd. (London). E. Stanley, H. C. Olpin, and R. H. J. Riley. E.P.463,548 of 24/9/1935 : 24/3/1937.

A textile mineral lubricating oil composition consists of a substantially clear liquid comprising a mineral oil having dissolved therein an alkylolamine soap, a free fatty acid containing a chain of at least 12 carbon atoms, and water. These compositions are capable of dissolving acid and other water-soluble dyes and are of particular value for the lubrication and/or fugitive colouration of cellulose ester and ether yarns. C.

3—CONVERSION OF YARNS INTO FABRICS

(A)—Preparatory Processes

Insulating Yarn Winding Machine. Universal Winding Co. *Textile Weekly*, 1937, 19, 212-213.

The importance of the yarn-winding operations preceding the covering of wires by " lapping " or braiding is emphasised and various " Leesona " machines are described. C.

Cops and Bobbins : Density. T. Haase. *Textilberichte*, 1937, 18, 211.

Yarns that are to be dyed in package form should be wound loosely on the bobbins or tubes. This is particularly important in the case of rayon and staple fibre yarns which swell more than cotton. Cops of which the volume expressed in cubic centimetres is about 2·5 times the weight in grams do not generally present difficulties in dyeing. Weights and dimensions of normal cops of cotton, wool and mixture yarns wound on perforated paper tubes are indicated. C.

Self-stacking Bobbin Board. Johnson Engineering & Manufacturing Co. *Textile World*, 1937, 87, 746.

A bobbin board has a special carrying handle so that they can be stacked with a clearance between the bobbin heads. The boards are rust-proofed so that they can be used in steaming and conditioning the yarn. C.

(B)—SIZING

Bobbin Stripping Machine: Improvements. (1) Terrell Machine Co. *Text. Rec.*, 1937, **54**, No. 648, 58-59; (2) G. Thomas & Co. *Text. Mfr.*, 1937, **63**, 108.

In the bobbin stripping machine described, pirns are placed in a hopper and guided down a quadrant until they assume a horizontal position. The pirn is then forced down by a plunger and accommodated in the bed of a push head assembly. Simultaneously stripping and gripping blades close on the pirn, gripping the bunch securely, and the pirn is pushed forward through its bunch. At the same time a pull head assembly comes in to meet the advancing pirn with open jaws and encircles the wide base of the pirn. With a loose grip it pulls the pirn from the push head. The machine will deal with about 120 bobbins per minute. The latest machine includes a wiper assembly, consisting of two rubberised fabric faces, for removing from the bobbin barrel loose waste which has not been removed by the steel blades. A bobbin blower unit blows air through the interior of the bobbin and thereby removes any accumulations of thread, lint or dirt. Recent improvements in the stripping blades, the push head assembly and the plunger unit are described. C.

Rayon Yarns: Sizing. W. A. Harper. *Textile Weekly*, 1937, **19**, 144-147, 209-211.

The functions of a rayon size and natural silk gum are compared, and are shown to be very similar. The characteristics of a silk gum and the requirements of a rayon size are both tabulated in summarised form. The principle underlying " aggregate " (surface coating of the yarn) and " matrix " (good penetration) sizing of rayon are outlined, but it is argued that these methods prevent the development of certain textile characteristics of the yarn. In consequence there is a growing tendency towards the use of sizes that yield effective protective results and still permit a certain amount of filament movement. Such sizes possess good powers of penetration so that the individual filaments are coated with an intimate size cuticle, and there is no aggregation. In effect, this " filament sizing " performs the same function as silk gum. The advantages of the method are pointed out. The possibility of sizing filaments direct from the rayon spinning machine is mentioned. Gelatin and linseed oil sizes are discussed and several recipes are given. C.

Glycol Boriborate: Application in Sizing. *Monatsh. Seide u. Kunstseide*, 1937, **42**, 84-87.

The sizing of rayon, staple fibre and mixture yarns is discussed and the importance of the moisture content of the size on the material after drying is pointed out. The addition of hygroscopic materials, wetting agents, and alcohol to sizing materials is discussed. The advantages of the use of glycol boriborate are described and the results of breaking load and extension tests on viscose and cellulose acetate rayon yarns before and after sizing with this product are given. The possibility of using water-soluble cellulose derivatives as sizing agents is briefly discussed, and the application and advantages of synthetic wax emulsion sizes are described. C.

"Moist-o-Graph" Tape Frame Control Device. R. P. Hawkins (Brown Instrument Co.). *Textile World*, 1937, **87**, 743-744.

The Moist-o-graph equipment for control of the moisture content of sized yarn as it leaves the tape-frame depends on the electrical resistance of the yarn and consists of a calibrated wide strip chart recorder, a power unit, and a detecting roller supported by an insulating bracket. The fitting of the instrument to the tape-frame is briefly described. It is recommended that the moisture content of the yarn should be regulated by altering steam supply or speed rather than the machine speed since change of the latter tends to alter conditions in the size box. C.

(C)—WEAVING

Pick Finding and Loom Stopping Devices. H. Trautmann. *Textilberichte*, 1936, **17**, 922-924, 1937, **18**, 147-148.

A general account is given of the functions, constructions, and modes of connection to other parts of the loom of a device for finding broken weft and a device for stopping the loom immediately on weft breakage. Practical experience with these devices, types of looms to which they are applicable, and the advantages of each device are discussed. C.

Shuttle-changing Automatic Looms. W. B. White and Sons, Ltd. *Text. Mfr.*, 1937, **63**, 61 and 71.

A non-stop, two-shuttle, weft-mixing, weft-replenishing over-pick loom suitable for rayon and silk weaving and a single-shuttle, shuttle-changing automatic loom suitable for weaving a wide range of all classes of goods are described. The change of shuttle is indicated by a light weft-feeler motion usually acting on slotted pirns (or alternatively on the single-shuttle loom from the weft fork). Action by the weft feeler puts into engagement a clutch on the chain-driven wheel of a shaft carrying five cams, which are thereby given one revolution. The cams are all fixed on the shaft and do not require adjustment. The box front and bottom or fly plate are made separate from the box back, slay and other parts being mounted on arms from the rocking rail. By the operation of the cam the box front parts are held by a catch at the beat-up, and remain for one pick disengaged from the slay, and underneath the magazine. During this time the shuttle is placed in the stationary box ready for engagement of the box to the slay in its normal working position at the next beat-up. Underneath the ordinary working box is another box or shuttle-trap consisting of two steel jaw plates with facings of leather. These are lever-connected positively to the front box part so that the trap rises as the slay goes back and is ready to receive the incoming exhausted shuttle. Similarly the trap falls as the slay comes forward and deposits the spent shuttle in a chute to the container. The exhausted weft thread is held and cut at the selvedge and taken away by the shuttle. The shuttle carrier placing the new shuttle in the box acts positively but can yield in case of obstruction, and the action would stop the loom. The 45-in. reed-space loom is being run at 185 picks per minute. The automatic two-shuttle drop box loom is similar to the single-shuttle loom in essential features but has some additional parts. The weft-feeler is on the magazine side and the shuttle is ejected when it returns, that is, after the third pick following weft-feeler indication. The motion is made to work on a six-pick cycle. Instead of one compartment carrying twelve shuttles, there are two compartments carrying twenty-four, the weft being the same or different as required. There is an indicator of box-motion position and when the cams are operated the magazine is swung into position with the second compartment above the shuttle box if the second weft is to be replenished. The loom could be run at 145 picks per minute for 45-in. reed-space and the number of looms per weaver could be up to sixteen or twenty. C.

Shuttle and Shuttle-traverse Loom Parts: Requirements. H. Barlow. *Text. Mfr.*, 1937, **63**, 53 and 62.

A general account is given of the requirements, construction, fixing, etc. of shuttles, slays, shuttle boxes, box spindles and swells of cotton looms. C.

Warp Tensioning Systems. W. Wilkinson. *Text. Mfr.*, 1937, **63**, 58-59, 65, 99-100, 142-144.

Methods of tensioning the warp on the loom by weight or friction applied to the beam are described with drawings of the essential mechanism. The " Catterall " warp let-off motion is described and experiences with it are recorded. The Lakeland-Baines motion is also given special attention. C.

Cotton Cloth: Statistical Control of Strength. A. W. Bayes. *Text. Mfr.*, 1937, **63**, 45-46, 50.

The possibility of the maintenance of a specified strength of fabric by statistical control of production is discussed and an account is given of the production of one cloth. Sources of variation in the processes of production are pointed out, a control chart is given, and the results of two series of routine tests are tabulated and discussed. C.

Loom Efficiency Records: Usefulness. F. Weiss. *Spinn. u. Web.*, 1937, **55**, No. 8, 1-3.

The author discusses the value of records of the efficiency of looms and shows how mill managers can obtain ideas for improvements from a study of such records. Charts and diagrams showing the output and efficiency of looms and the times and causes of stoppages are given. C.

Shuttles: Flying Out; Causes. S. Major. *Text. Rec.*, 1937, **54**, No. 647, 33-34, 40 ; No. 648, 27-28.

The causes of shuttles flying out are classed under three headings, namely: those caused by defective shuttles, those due to erratic or wrongly timed throw of the shuttle, and those resulting from a diversion of the shuttle after it has been ejected from the shuttle box. The various causes are discussed and methods by which they may be ascertained and rectified are explained. C.

Dress Fabrics : Weaving. J. W. Pennington. *Text. Mfr.*, 1937, **63**, 138-139.

Problems encountered in the change from weaving bulk lines for export to the production of many styles of dress goods are discussed, including the production of " cover " without undue strain on the warp, the " slating " of healds to secure " cover " on poplins, take-up and let-back motions and pick finding. A pick-finding motion for cross-rod looms is described. C.

Five-shaft Sateen : Weaving. *Textilberichte*, 1937, **18**, 150-151.

Various answers are given to a question concerning the possibility of weaving a 4-group 5-shaft sateen of given pattern with only 15 shafts, using healds with long eyes for the shafts of the second and third groups and drawing in the warp threads of the fourth group with those of the second and third groups. In one answer it is pointed out that the simplest way of producing the given fabric is by means of a 20-shaft dobby but a 16-shaft dobby may be used ; details are given. In another answer it is stated that the fabric cannot be woven with dobbies having less than 20 lifting hooks. C.

Wide Fabrics : Weaving on Narrow Looms. *Textile Weekly*, 1937, **19**, 441-443, 573.

Point-paper diagrams are shown for the weaving of a plain and a fancy cloth in two folds and a 2-and-2 twill in three folds. C.

Silk Bolting Cloths : Weaving. J. Scott. *Silk J. Rayon World*, 1937, **13**, No. 153, 30 and 28.

Silk bolting cloths for sifting fine powders are made in various grades. The No. 25 Standard has 38,416 openings to the square inch and 196 threads per linear inch, and has the least amount of open area. Two weaves, known as full twist and half twist, are used. In the first kind, every set of two warp threads is twisted or looped, and a weft thread passes through each of the twists or loops. In half-twist, the double warp threads are alternate, each pair having between them a single warp thread of the same diameter as the weft threads which cross them. The twisted or warp threads are, in each case, two threads of equal diameter with the weft threads. The sides of the twists or loops give wide V-shapes to the meshes, one in each mesh of a half-twist cloth ; two facing one another in the case of a full-twist cloth. The threads are very smooth and free from minute fluff, and consist of silk filaments, each thread having a large number of these. C.

Lancashire Looms : Limitations in Weaving of Rayon Fabrics. S. Major. *Silk J. and Rayon World*, 1937, **13** ; No. 153, 27-28 ; No. 154. 97.

It is possible to weave many types of rayon fabrics on ordinary Lancashire looms after certain modifications have been made, but it should be carefully considered, especially when weaving high quality dress fabrics, whether to modify Lancashire looms, or to install new rayon looms. A general account is given of the differences between rayon and Lancashire looms from the point of view of the properties of rayon. C.

Looms : Lubrication. I. Moberg. *Textile World*, 1937, **87**, 726-727.

A general article on the importance of correct lubrication in weaving. Oil should be more viscous than that used for general machine bearings ; say, 900 to 2000 seconds at 100° F. in the Saybolt viscometer. Oiling equipment and instructions to oilers are discussed. A system is mentioned in which there is a central reservoir for the oil at one side of the loom and pipes leading to the 37 bearings ; when a plunger is actuated 2 cub. ins. of oil are released and distributed to all the bearings. C.

Reeds : Construction. E. Schmidt. *Textilberichte*, 1937, **18**, 274-275.

The development of the reed from the old types with fish bone and wooden dents to the modern type with steel dents is briefly discussed and the need for

skilful handwork in their construction is emphasized. The construction of tin soldered and pitch bound reeds is described. The status of reed makers in the time of the hand-loom industry is discussed, and the present numbers, distribution and organisation of reed makers in Germany are outlined. C.

Shuttles : Flying Out ; Causes and Prevention. O. Wilbur. *Textile World*, 1937, 87, 737.

A list of ten rules is given by following which the tackler can minimise the trouble of shuttles flying out. C.

Shuttle Box Control Device. J. M. Bolt. *Textile World*, 1937, 87, 744-745.

A simple shuttle box control consists of only two pieces, a lifting finger pointing to the rear of the loom and fastened to the protector rod, and a device bolted to the pitman arm to contact the finger as the cramp-shaft nears top-centre. Use of this device is claimed to decrease weft breaks by at least 75 per cent. C.

Shuttle Position Control Device. Ateliers Diederichs. *L'Ind. Text.*, 1937, 54, 123.

A device which stops the loom or puts the cop or shuttle changing mechanism out of action when the shuttle is not in the correct position is shown in diagrams and its action is explained. C.

Silk Upholstery Fabrics : Weaving. R. Griffon. *L'Ind. Text.*, 1936, 53, 333-334, 485-487, 536-538 ; 1937, 54, 122-123.

A detailed account is given of arrangements for weaving silk upholstery fabrics, including damasks, lampas, brocatelle and velvets. Such fabrics are usually woven by means of mountings with several threads per heald eye and raising and lowering healds, or mountings with several cords to the neck band and shafts, preferably the former. The production of oriental shawls is also described. C.

"Re-weaving" Damaged Fabrics. *Text. Rec*, 1937, 54, No. 649, p. 52.

A patent device, designed to overcome laborious hand darning of weft-damaged fabrics is discussed. It consists of two sets of metallic members controlling odd and even warp threads respectively, synchronised to produce crossed and open sheds alternately as in plain weaving, on depressing the control cams the weft being then inserted by hand. The device may be used on fabrics counting up to 120 ends per inch, and can also be employed for producing small sample pieces. To facilitate re-weaving of more complex patterns it is proposed to incorporate a pattern box in the commercial model of the darner. The inventor is a Mr. R. G. Macpherson of Harrogate, who was awarded the Silver Medal at last year's International Exhibition of Inventions, Westminster. L.

A Technical Analysis of the Movement of the Loom Sley. Stephen Major. *Text. Rec.*, 1937, 54, No. 649, pp. 31-32.

An informative article on the eccentric movement of the sley and its necessity in power loom weaving. Diagrams show the resulting variation in eccentricity produced by altering the relative positions of the constituent parts. L.

Jute Bags for Cement. *Text. Mfr.*, 1937, 63, 166.

Refers to a serious attempt being made to recover the trade in cement bags which the jute industry lost to the paper trade some years ago. Jute bags have now been produced, constructed in the same way as paper cement bags with a valve or rent in one corner, and made of non-porous jute cloth or paper lined. It is claimed that these bags are cheaper than paper bags and have none of their disadvantages. The jute bags, either of impervious materials or paper lined, may be dropped in any position and will not burst, so that there is a definite saving. L.

(D)—KNITTING

Circular Knitting Machine Pattern Building Mechanisms : Application. J. B. Lancashire. *Text. Rec.*, 1937, 54, No. 646, 40-41 ; No. 648, 40-41.

The Brinton trick wheel mechanism and the Berridge multi-step mechanism are briefly described and the various purposes for which they can be employed to make selections are indicated. Both mechanisms are used on latch needle circular machines with stationary needle cylinders. The production of a jacquard design on a six-feeder rib machine with a Brinton trick wheel mechanism and the

production of a ripple cloth on a six-feeder rib machine fitted with a Berridge multi-step mechanism are described in detail. C.

Warp-knit Strapping Machine. W. Davis. *Text. Mfr.*, 1937, **63**, 148.

The production of narrow fabrics by knitting is discussed and the Berridge circular strapping machine in which fabrics are produced from narrow warps is described. Illustrations are given of fancy strappings made on this machine. C.

Tartan and Check Knitted Fabrics: Production. W. Davis. *Text. Rec.*, 1937, **54**, No. 648, 43-44.

Tartan, check and zig-zag designs for knitted fabrics are shown and their production is briefly discussed. C.

German Knitting and Weaving Terms: Significance. — Worm. *Textilberichte*, 1937, **18**, 218-220.

Various German words, such as " Köper," "Atlas," " Trikot," " Gaufré," " Nadel," and " Platine," are used in both the knitting and weaving industries but with different meanings in the two cases. Thus " Köper " in the weaving industry is a twill but in knitting the word is applied to a certain tuck stitch pattern and to a warp-knitted fabric having a crepe-like appearance, and " Platine " in weaving is a lifting wire of a jacquard mechanism and, in knitting, a sinker. The author explains the different meanings of a number of such terms. C.

(E)—Lacemaking and Embroidering

Bead Netting: Patterning Possibilities. A. Elster. *Spinner u. Weber*, 1937, **55**, No. 9, 42-47.

A general account is given of the method of production and the patterning possibilities of bead netting. C.

(G)—Fabrics

Endless Multi-ply Fabrics: Design. R. Werner. *Textilberichte*, 1937, **18**, 141-143.

The structure of endless multi-ply fabrics such as are used in the manufacture of driving belts and felts is discussed and the different stages in the design of such fabrics, comprising the preparation of diagrams showing sections in warp and weft directions, plans of the upper fabric, peg plans and shuttle change motions, are illustrated by examples of endless 3-ply and 5-ply fabrics. C.

Fancy Loop Yarns: Application. H. E. Gebhard. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft I*, 25-28.

Effects obtained by the use of yarns produced by the " Fadenraub " process and the advantages of these yarns are discussed, and photographs of fabrics containing them are given. C.

Fibre Mixtures: Colour Effects. S. Brierley. *Text. Mfr.*, 1936, **62**, 337, 378-379, 384, 464-465; 1937, **63**, 51-77.

A survey is made of possibilities in the use of colour in practical cloth designing and fibre mixtures giving tone ranges are discussed. Steel grey mixtures made from black and white are studied in detail and monochrome mixtures are also considered. The production of polychrome mixtures or fancy ranges of coloured fibre mixtures is also studied, and the effects on tone and hue of adding proportions of bright colours and the possibilities of getting well-balanced ranges economically are examined. C.

" Fibro " Mixture Fabrics: Structure. H. Ashton and J. A. Kirby. *Textile Weekly*, 1937, **19**, 244-247; 273-275.

A general account is given of the increased production of all-Fibro materials and of mixtures with wool. Particulars are given of a cotton and Fibro furnishing fabric; a dress fabric of Fibro, cotton and " Opaceta " (dull acetate filament of coarse denier); a colour-woven check in coarse denier Fibro; and a colour-woven check dress cloth having folded knop Fibro and linen yarns. C.

Large Pattern Fabrics: Production on Dobby Looms. E. Gräbner. *Spinner u. Weber*, 1937, **55**, No. 10, 3-7.

Further examples illustrating the production of large patterns on dobby looms are studied. C.

Patterned Double Fabrics: Design. J. Daniel. *Textilberichte*, 1937, 18, 146-147.
A patterned double fabric comprises two distinct fabrics which are connected together and change places at suitable intervals according to the pattern effects required. By using cellulose acetate rayon for one of the fabrics and viscose rayon for the other it is possible to obtain two-colour and colour-white effects by single-bath dyeing processes. Cellulose acetate yarns of ordinary twist are used, and for the viscose rayon fabric warp yarns of ordinary twist and weft yarns of crepe twist are used. On finishing a light cloqué effect is produced which is reduced in strength by stretching the fabric in width. Notes are given on the weaving of this type of fabric on dobby and jacquard looms and the patterning possibilities are discussed. Suitable designs are shown. C.

Coloured Staple Fibre Fabrics: Patterning. *Monatsh. Seide u. Kunstseide*, 1937, 42, 91-92.
Details are given of tweed, duvetyn, diagonal and other dress materials showing check and similar pattern effects woven from coloured staple fibre and mixture yarns. C.

Rayon Fabrics: Design. A. Weber. *Textilberichte*, 1937, 18, 213-215.
The production of pattern effects by the combination of different weaves and different types of yarns and the use of effect threads is briefly discussed and examples of designs for rayon fabrics are shown. The examples include brocade and figured voile, piqué and crepe fabrics. Details of their construction are given. C.

Staple Cotton Fabrics: Construction and Uses. J. Hoye. *Textile World*, 1937, 87, 714, 951.
Details of the construction and finishing of warp sateens, venetians and crepes are given, and the uses of the fabrics in the finished and the grey state. C.

Patents

Circular Knitting Machine Sinker. Scott & Williams Inc. E.P.460,004 of 29/6/1936 (Conv. 26/7/1935).
A sinker or web-holder for use in a circular knitting machine having needles capable of being bent back from their normal position to reverse the normal plating arrangement of yarns is formed with a curved or angular depression. Yarns plating normally are received on the left-hand corner of this depression; yarns plating reversely by reason of the displacement of their needles are received on the right-hand corner. A bent needle, unless pressed back, will place its yarns on the left-hand corner of the depression, i.e. in correct relation for normal plating. As the needles are lowered the sinkers come forward and the finished loops are drawn to uniform length on the high level part. C.

Purl Knitting Machine. Elite Diamantwerke A.-G. E.P.460,126 of 6/7/1936 (Conv. 8/7/1935).
In a purl knitting machine, needles headed at each end are moved by pushers formed with hooks to engage over the heads and with extensions having knife-edged ends to open the latches of the needles. The needles are bent upwards so that they are held down in their beds by the extensions. The pushers are held down by bridge pieces mounted on slides. A brush prevents the latches from shutting and it may also effect or assist in the latch-opening. C.

Anti-ladder Fabric: Knitting. Hosiery Developments Ltd., T. H. Jones, and R. K. Mills. E.P.460,184 of 20/7/1935.
In order to prevent striping or ring-effects due to inequalities or variations in the size and/or shade of the yarn, an anti-ladder fabric or article produced on a straight-bar machine consists of a repeating series of courses in which two or more threads, functioning as ground thread or as stitch locking thread or having both functions, are laid in successive courses of each series and appear therein at the same face of the fabric. The locking of the stitch loops may be effected by completely encircling each leg of a stitch loop with locking thread, which also extends from one side to the other of the loop. C.

Warp Knitting Machines. J. Kayser & Co. E.P.460,260 of 9/3/1936 (Conv. 30/8/1935).

Separate counters are driven by threads from the several warp beams and by gearing from the course regulating element of the machine, the counter pulleys being of such diameters that with normal supply of warps all the indicators show the same reading. Should either counter be out of register the corresponding beam brake is adjusted by hand or automatically. Details of automatic adjusting arrangements are given. C.

Knitting Machine Electric Jacquard Mechanism. C. Scheller. E.P.460,382 of 1/10/1935 (Conv. 1/10/1934).

In an electric jacquard pattern mechanism the pattern sinkers have armatures at their upper ends divided into eight groups, the armatures in each group lying in a row, and being acted upon in turn by eight electromagnets in a carriage displaceable in guides. The electromagnets are excited selectively by passing their leads through a tube to eight contacts on a cross-piece thereon. These contacts co-operate with stationary contacts connected to contacts which are selectively excited by jacquard card controlled displaceable contact pins. Certain electromagnets are thus in turn excited, the corresponding sinkers being raised and held raised by springs on a bar. A bar on an oscillating shaft then engages the sinkers, causing those that are raised to operate corresponding jacks and needles. After completion of the course, the bar rocks and the raised sinkers are released. They may be returned to their initial position by their weight or by a bar. Patinat and trick patterns may be produced by the apparatus. C.

Knitting Machine Gearing. Elite Diamantwerke A.-G. E.P.460,422 of 22/7/1936.

The carriage of a knitting machine is connected by a releasable coupling member with a casing which is reciprocated on its own guides by a rotating shaft and inclined friction rollers. At the end of each traverse of the carriage the inclination of the rollers is changed by means of the crank arms, sliding racks, a gear and crank. C.

Elastic Fabric: Knitting. Lawson Knitting Co. E.P.460,601 of 9/8/1935 (Conv. 15/11/1934).

In the knitting of an elastic fabric, plain or ribbed, comprising strands of cotton, silk, rayon, etc., and rubber strands, preferably uncovered, such tension is applied to the rubber strands as to stretch them considerably, so that in the contracted condition of the finished fabric the inelastic strands cover the elastic strands on both faces of the fabric. The rubber strand may occasionally be floated or otherwise knitted in a manner to produce ornamental fabric, and the projecting inelastic loops may be napped. C.

Elastic Fabric: Knitting. Dore et Fils. E.P.460,608 of 25/10/1935 (Conv. 20/11/1934).

An elastic weft thread is fed in at spaced courses and is knitted alone at spaced wales without being plated by a textile thread, the body of the knitted article being constituted by ordinary textile threads. For ornamental purposes, the elastic weft may be fed in under tension. The elastic loops may be staggered in successive elastic wefts, by longitudinal displacement of the bar carrying the presser fingers. To inhibit laddering upon breaking of an elastic weft, in one of the courses preceding the insertion of an elastic weft, the loop of the needle which will knit a loop from the elastic thread is transferred back to the adjacent needle. The fabric may replace a rubber band in the tops of stockings, etc., and may be used for ordinary or orthopædic hosiery or the like. C.

Full-fashioned Hosiery: Knitting in One Piece. Perfecta Soc. Anon. pour la Fabrication de la Bonneterie. E.P.460,614 of 24/2/1936 (Conv. 29/3/1935 and 6/12/1935).

In knitting the leg and foot of hose in a single operation on a full fashioned machine, the heel being subsequently joined thereto, thinner courses, knitted with the splicing thread alone, are located between two slack courses in both reinforced side portions of the hose in order to facilitate the running of the hose on the heel knitting machine and the running of the side portions of the foot on the linking machine. These thinner courses are slightly narrower than the heel and are located between the leg and foot. To avoid damage by the needles of the heeling machine or the points of a transfer comb, the slack course may be

knitted of a stronger thread similar to the cotton thread used for the heel, and may be preceded by a tight course of the same thread. The heeling machine may be a sole knitting machine with the needles of the middle portion of the needle bar, and the sinkers, removed. C.

Circular Knitting Machine Needle Selecting Mechanism. W. W. Triggs. E.P. 460,771 of 30/7/1935.

A circular machine having dependent or wrap thread guides for supplying an extra thread at each point in the needle circle where patterning is required is provided with means for selectively raising needles of a group at one point, means for raising a second selection of the same needles at a second point, and means for wrapping different threads about the selected needles at the two points. C.

Circular Knitting Machine Stitch Transfer Mechanism. S. Percival (Chemnitzer Strickmaschinenfabrik A.-G.). E.P.460,934 of 21/2/1936.

A circular machine for the automatic production of knitted hosiery with a change over from 1 : 1 to 2 : 2 rib, and back to 1 : 1 rib, has the longitudinally displaceable latch needles of cylinder and rib disc intercolated, and provided with means fitted on the shank for the opening of the stitches, and the release of the needle taking over. C.

Circular Knitting Machine Patterning Mechanism. Hemphill Co. E.P.460,945 of 12/6/1936 (Conv. 14/6/1935).

To increase the size of striped patterns the wrap yarn guides of a machine such as that described in E.P.300,605 are mounted upon two discs and means are provided for rotating the discs in opposite directions so that the two sets of guides carried thereby are shogged in opposite directions. The discs are rotated to wrap their yarns about the needles by a spindle driven at the same speed as the needle cylinder and mounted eccentrically thereof. C.

Knitting Machine Yarn Conditioning Device. Textile Machine Works (Wyomissing, Pennsylvania, U.S.A.). E.P.462,922 of 18/11/1935 : 18/3/1937.

A multi-section machine for producing knitted fabrics is provided with a continuous yarn housing structure extending along a plurality of machine sections and comprising separate co-operatively associated box sections as yarn container units for enclosing a yarn-treating medium, and means for maintaining the yarn-treating medium uniformly distributed and homogeneous throughout the length of the housing structure, comprising means co-operatively connecting the box sections, the sections and maintaining means being arranged to effect free distribution and homogenisation of the medium throughout the length of the housing structure. C.

Automatic Cop Change Initiating Device. Société Anonyme Adolphe Saurer (Arbon, Switzerland). E.P.463,156 of 2/7/1936 : 23/3/1937.

In a device for initiating automatic cop changing in looms, a weft feeler controlled rocking lever carrying the device for cutting off and clamping the weft thread and controlling the motion of the transfer hammer is mounted so as to be capable of rocking in a horizontal plane and in a direction substantially at a right angle to the path of the shuttle. C.

Warp Let-off Motion. W. Bradley (Addingham). E.P.463,336 of 2/10/1935 : 30/3/1937.

In a loom let-off motion having oppositely moving brake members as described in E.P.439,843 the warp beam is mounted on a balanced assembly which is poised, suspended, or supported freely in a frictionless manner which will eliminate static friction and allow for bodily movement of the beam frontwards or rearwards of the loom and means are provided whereby the pull of the warp is balanced by an opposing force which may be produced by a weighted or loaded lever, the essential feature being that the beam is held against rotary movement and, with the supporting assembly, in a rigid manner against bodily movement until the disturbance of the free balance is affected by a change in the force value on one side or the other. When any disturbance of the balance takes place, some movement resulting therefrom effects the change in the amount or degree of brake movement given to the oppositely moving braking members whereby equilibrium is restored. C.

Warp Yarn Dividing and Arranging Apparatus. British Celanese Ltd. (London), R. W. Moncrieff, and P. H. Miller. E.P.463,483 of 30/9/1935 : 30/3/1937.

The division and arrangement of yarns in warp or sheet form is effected by means of a dividing reed which is drawn in the direction of travel of the yarn, and in contact with them, and the yarns on withdrawal of the dividing reed are dropped into a fixed reed which retains the warp or sheet formation. The reed is then returned out of contact with the yarns, this operation being repeated as many times as is necessary until the yarns have been combed out and correctly deposited in an orderly warp or sheet form. The invention is especially suitable for arranging yarns in warp form for treatment in a bath of treating liquid, for instance, for stretching cellulose derivative yarns in warp form. C.

Circular Loom Electrical Stop Mechanism. British Celanese Ltd. (London), F. C. Hale, and J. R. Yorke. E.P.463,484 of 30/9/1935 : 30/3/1937.

A switch for actuating the electrical stop mechanism of a circular loom comprises a member (conveniently a pivoted member) urged by a toggle spring into one of two positions, one in which the member maintains a pair of contacts closed and another in which the member remains in indicating position. The contact points operate without sliding action, the first movement of the member controlled by the deflecting means being to move one contact directly away from the other with the minimum of danger of sparking. C.

4—CHEMICAL AND FINISHING PROCESSES

(A)—Preparatory Processes

Enzymes : Preparation and Application. N. Bourguignon. *TIBA*, 1937, **15**, 13-23, 85-95.

A general account is given of the preparation of enzymes, methods of separating them from their solutions, the velocity of enzymatic reactions, the results of recent investigations of proteolytic diastases, methods for the determination of enzymatic and diastatic compounds, and the use of enzymes in the de-sizing of textile materials. C.

(C)—Weighting

Silk Fibroin : Effect of Regain on Stannic Chloride Adsorption. G. V. Jansen and E. A. Smith. *Canadian J. Res.*, 1937, **15**, B53-64.

The effect of the moisture content of silk fibroin on the amount of weighting it takes up in given periods of time from a 30° Bé stannic chloride solution has been determined. Saturated silk (> 35 per cent. moisture content) attains maximum adsorption much faster than does dry silk, whereas a minimum rate of adsorption exists for silk of about 10-23 per cent. moisture content. An explanation is advanced for these phenomena based on the rate of swelling of silk in water and in stannic chloride solution, the size of the pores in dry silk and the effect that the water in these pores would have on the stannic chloride solution entering them. It is pointed out that the weighting taken up by silk from stannic chloride solutions is probably adsorbed not as stannic chloride but as a mixture of the various tin complexes that have been shown to exist in aqueous stannic chloride solutions. The effect on the weighting of increasing the temperature of the hydrolysing bath and of the addition of inorganic chlorides and sulphates to this bath has also been investigated. The final weighting retained by the silk consists of hydrated stannic oxide, the amount of water present depending upon the conditions obtaining during hydrolysis and drying. C.

(E)—Drying and Conditioning.

Paper Drying Machine : Efficiency. R. J. Chambers. *Pulp and Paper Mag. Canada*, 1937, **38**, 154-162.

Factors affecting the performance of paper drying machines are discussed. The distribution of heat units in a typical drying operation is shown and each of the important heat uses are individually discussed. Curves are presented showing the effect on steam flows, efficiency, and capacity of altering air volumes and moisture content of the paper entering the dryers. C.

"Williams-Peace" Cloth Conditioning Machine. J. Mitchell and Sons Ltd. (Brookholes). *Text. Mfr.*, 1937, **63**, 145.

A machine is described in which the cloth passes between a roller covered with muslin and rotating in a water trough and a pressure roller. The amount of water taken up from the trough is controlled by a third roller disposed just below the nip and the take-up by the cloth is governed by the pressure applied. C.

(G)—BLEACHING

Bleaching Instructional Film. J. Pelerin. *Textilberichte*, 1937, **18**, 243-245.

The instructional film "Vollweiss" of the Böhme Fettchemie G.m.b.H. is briefly described and photographs from it are reproduced. The first part of the film shows the usual treatment of cotton piece-goods comprising singeing, desizing, washing, boiling, washing, chlorine bleaching, washing, souring, washing, and after-treatment with peroxide, and also the precipitation in hard water, deposits on the fabric and incrustations on the heating pipes resulting from the use of water glass as a stabilizer for the peroxide. The second part shows modern bleaching plant for research purposes, and the improved Ce-Es bleaching process. This process consists only of chlorine treatment and peroxide bleaching without any intermediate treatment, the shortening of the bleaching process in this way being made possible by the use of wetting agents. Photomicrographs showing the swelling in cuprammonium solution of unbleached cotton hairs and of hairs from goods bleached by the ordinary chlorine bleach and the Ce-Es bleach are given and it is pointed out that the Ce-Es process does not damage the cuticle to the same extent as the ordinary bleaching process. C.

Continuous Bleaching Plant. H. Jaeger. *Textilberichte*, 1937, **18**, 226-228.

An account is given of plant in which cloth in open width is subjected to treatment with boiling caustic soda, washing, chlorine bleaching, washing, souring, washing, blueing, and drying in a continuous process. Productions up to 1800 metres per hour are possible or double this amount if two cloths are run side by side. Continuous working from Monday morning to Friday evening, with a change of shift every 8 hours, and cleaning of the plant on Saturday, is recommended. C.

Hypochlorite Bleaching Baths: Effect of Addition of Sodium Bicarbonate. H. Wasser. *Textilberichte*, 1937, **18**, 225-226.

Bleaching tests with neutral sodium hypochlorite with and without additions of sodium bicarbonate showed that the addition of the bicarbonate produced a better white. The addition makes the neutral liquor slightly alkaline and it is suggested that the better white is due to the better washing action of the weakly alkaline liquor. An even better white was obtained by bleaching with a commercial hypochlorite solution which contained a certain amount of alkali, and addition of sodium bicarbonate to this solution was not advantageous. Comparing the various bleaching solutions used, it was found that the whiteness of the bleached samples improved with increasing *p*H of the solutions. Strength tests showed practically no change due to bleaching with the commercial hypochlorite and appreciable losses in strength after bleaching with neutral hypochlorite and also with both commercial and neutral hypochlorite containing sodium bicarbonate. The differences between the effects on strength of the different bleaching treatments were accentuated by an alkali boil after bleaching. Measurements of the *p*H at the beginning and end of the bleaching operation showed that sodium bicarbonate can act as a buffer in the hypochlorite liquor. C.

Metal Thread Fabrics: Bleaching. W. Hundt. *Textilberichte*, 1937, **18**, 228.

Cotton fabrics containing metal effect threads composed of copper or brass should be bleached in open width on a jigger with hydrogen peroxide solution containing water glass, soap and Lamepon A at a temperature of 70-75° C. The treatment is repeated once or twice, and the goods are then washed, soaped and washed. C.

Stripping Methods. *Wool Rec.*, 1937, **51**, 686 and 689.

Stripping methods are classified in the following groups according to the principles involved: (1) processes depending upon the formation of a soluble compound with the stripping agent; (2) processes depending upon the ability of chemicals to disperse the dyestuff in solution; (3) processes depending upon chemicals which effect a destruction of the dyestuff. W.

Linen Bleaching in the Sixties. *Irish Text. J.*, 1937, 3, No. 3, pp. 13-16.
Refers to some old recipes on linen bleaching and general directions are given for the bleaching of light and heavy linens. L.

Corset Fabrics: Bleaching, Dyeing and Finishing. *See* Section 4K.

(I)—Dyeing

Dyes: Influence of Position Isomerism on Colour and Dyeing Properties. W. R. Brode and Marion E. Griffith. *Amer. Dyes. Rept.*, 1937, **26**, 90-99.
The mono-azo dyes which have been studied were prepared by diazotisation of aniline and *o*-, *m*-, and *p*-sulphanilic acids, and coupling with naphthols, naphthylamines, and their mono-sulphonated derivatives. The absorption spectra of solutions of the purified dyes are described, and the curves are reproduced. The dyes can be divided into three structural types on the basis of the parent non-sulphonated amino-azo dye. Differences in the absorption curves are pointed out. Dyeing and exhaustion tests are described. Fading and darkening data were obtained by measuring reflection of light from dyed samples with a spectro-photometer, after exposure to sunlight, or the Fade-ometer. Washing tests were also carried out with a Launder-ometer. The results, expressed in tables and graphs, are discussed. A special expression—the "utility factor"—is used to denote usefulness or stability of a dyeing; the factor sums the expressions for light fastness, washing fastness, etc. General conclusions about the effect of position isomerism on "utility" are drawn. C.

Dyehouse Fault Records: Application. R. Lassé. *Textilberichte*, 1937, **18**, 102-103, 157-158.
A general discussion of the difficulty of matching patterns, batches which must be counted unsatisfactory and the causes of the faults, the desirability of recording occurrences and causes of faulty batches, and the usefulness and value of the records. C.

Rayon-Cotton Lining Materials: Dyeing and Finishing. E. Ebbinghaus. *Textilberichte*, 1937, **18**, 155-157.
A general account is given of the preliminary treatment, dyeing and finishing of rayon-cotton lining materials. Suitable dyes and finishing agents are mentioned. C.

Stabilised Azoic Dyes: Production. H. A. Lubs. *Amer. Dyes. Rept.*, 1937, **26**, 101-103.
The development of the use of bases such as diethanolamine, proline, sarcosine, methylglucamine, pipecolinic acid and 2-amino-4-sulphobenzoic acid as stabilizers of diazo compounds is discussed. Examples of Naphthol dyes are given covering a range yellow to black. The necessity for careful selection of the stabiliser is demonstrated, and a few guiding principles in the selection of components for mixtures to produce the various shades are indicated. C.

Staple Fibre-Wool Mixture Yarns and Fabrics: Dyeing. R. Haynn. *Textilberichte*, 1937, **18**, 164-165.
Difficulties experienced in the dyeing of yarns and fabrics composed of mixtures of wool and staple fibre are discussed and it is pointed out that the production of level shades is made easier by an even distribution of the two components. Requirements in regard to shade, fastness and quality are not so easily attained with these mixture fabrics as with all-wool fabrics and a greater tolerance in regard to shade matching is recommended. The best results from the point of view of fastness are obtained by dyeing the wool and the staple fibre separately but this is not always practicable. Staple fibre dyed in the spinning process may be used but this method has various disadvantages. Dark shades of satisfactory fastness can be obtained on mixtures but it is not yet possible to produce light shades on wool-staple fibre goods with the same purity, freshness and fastness as on wool. C.

Aniline Black: Application. E. Duhem. *L'Ind. Text.*, 1937, **54**, 139-142.
A review of patent procedures for the dyeing of wool, silk and mixture fabrics with aniline black by oxidation. C.

Cellulose Acetate Rayon: Saponification and Dyeing. J. E. Meili. *Amer. Dyes. Rept.*, 1937, **26**, 162-166.

A report of a lecture in which experiments on saponification by caustic soda, soda ash and trisodium phosphate are reported. In one test, the acetate rayon was treated in a 1 : 60 bath containing (*a*) 10 per cent. of caustic soda (on the weight of the rayon), (*b*) 26 per cent. of soda ash and (*c*) 75 per cent. trisodium phosphate, each having in addition 20 per cent. of calcined Glauber's salt. The baths were maintained at 120° F. for 1½ hours, 4 per cent. of Diazamine Blue BR was added and then the baths were kept at 195° F. for a further 1¼ hrs. Sample (*a*) lost 10·8 per cent. in weight and dyed a medium shade; (*b*) lost 9·7 per cent. and dyed lightest; (*c*) lost only 8·2 per cent. but dyed deepest. C.

Multiple Kettle Piece Dyeing Plant. Riggs and Lombard Inc. *Textile World*, 1937, **87**, 745.

A brief description is given of a multiple piece dye kettle sytem which is designed to produce a large yardage of uniform shade. A series of dye kettles is fed from one dye tank by means of a pump; they may be cut out of action by means of valves. It can be supplied complete, or applied to existing dye kettles. C.

Peregal O and OK: Use in Dyeing. C. Schöller. *Textilberichte*, 1937, **18**, 234-236.

The use of Peregal O as a levelling agent in the application of vat and substantive dyes is discussed and the properties and advantages of this substance are described. The levelling action is due to a reduction in the rate at which the dye is adsorbed by the fibre. The possibility of this effect being due to the formation of unstable addition compounds between Peregal O and the dye is discussed and it is pointed out that aggregates of dye molecules are formed with Peregal O at the centres. The formation of large aggregates is confirmed by the results of diffusion measurements. When Peregal O is used with vat and sulphur dyes it is necessary to increase the amounts of caustic soda normally used. This necessity can be avoided by the use of Peregal OK, which has a similar action to that of Peregal O. The effect of Peregal OK on the rate of adsorption of dyes is much greater than that of Peregal O and it is therefore of great value in the dyeing of rayon and staple fibre products which normally adsorb dyes very rapidly. Peregal OK also has good protective colloid, detergent. lime soap dispersing, and wetting powers. C,

Vat Dyes: Application in the Unreduced State. F. Gund. *Textilberichte*, 1937, **18**, 231-232.

The development of the so-called Prästabitöl or pigment padding process for the application of vat dyes and practical details of the procedures are discussed. The goods are padded with a suspension of the dye in a finely-divided state, to which suitable wetting and levelling agents such as Prästabitöl V and Eulysin A are added, and then treated with hydrosulphite and alkali, and the dye is finally developed in the usual way. Indanthrene dyes suitable for this process can be obtained in paste form and in the form of fine powders. The method is particularly advantageous for the dyeing of dense fabrics and hard twisted yarns, the penetration and levelness being superior to that obtained by the usual methods. It may be used for the dyeing of cotton, staple fibre and mixture yarns and fabrics. C.

The Theory of Wool Dyeing. F. L. Goodall. *J. Soc. Dyers & Col.*, 1937, **53**, 50-56.

A review of the present state of knowledge of theories of wool dyeing. A brief explanation is given of the circumstances controlling the accessibility of the interior of the fibres to dye, followed by a consideration of the factors affecting the distribution of acid dyes between fibre and dye solution. Observations are made on the general effect of temperature, from the point of view of both dyeing and stripping, this including fastness properties to wet treatments. W.

A Picture of the Acid Dyebath. *Wool Rec.*, 1937, **51**, 273-275 and 395-397.

A description of a theory of the acid dyeing method applied to good levelling colours. This is based on the work of Speakman on the swelling of wool in water and aqueous solutions and of Elöd on the Donnan theory. Particulars

are given of the applications of the latter to (1) wool in acid solution only ; (2) wool in a solution of acid and dye ; (3) wool in a solution of acid, dye and Glauber's salt. W.

A Picture of the Neutral Dyebath. *Wool Rec.*, 1937, **51**, 509-511 and 515.

A description is given of the properties of the neutral dyeing wool colours and of Goodall's theory of the mechanism of fixation. (See *J. Text. Inst.*, 1936, A170.) W.

Wool Hats : Dyeing. K. Richter. *Klepzig's Text. Z.*, 1937, **40**, 189-191 and 201-203.

A description of methods of dyeing wool hats at various stages of manufacture. W.

Some Analytical Methods Used for the Identification of Dyeing Faults. *See* Section 5C.

Corset Fabrics : Bleaching, Dyeing and Finishing. *See* Section 4K.

(J)—PRINTING

Vat Prints : Ageing. C. Schlatter. *Amer. Dyes. Rept.*, 1937, **26**, 159-162.

The reactions proceeding in the vat colour ager are discussed, and it is shown that the main reactions (reduction and fixation of dye) do not generate heat. The considerable development of heat is due to side reactions, about which knowledge is meagre. C.

(K)—FINISHING

Synthetic Resin Finishes : Permeability to Moisture. G. M. Kline. *J. Res. Natl. Bur. Stnds.*, 1937, **18**, 235-249.

A method of determining the permeability to moisture of synthetic resin finishes used on aircraft is described in which a film of the finish is prepared and is sealed on a glass dish containing phosphorus pentoxide, water or a saturated salt solution which will produce the desired relative humidity inside the cell. The cells are placed in a cabinet in which the temperature and relative humidity are controlled and are then weighed at approximately 3-day intervals until a constant for the moisture permeability has been established. Results are given for various aircraft finishes. The glycerol-phthalate enamels are less permeable to moisture under relatively dry conditions than are the enamels made with a phenol-formaldehyde resin. This order is reversed, however, under wet conditions. This corresponds with the service uses to which these finishes have been found to be best adapted. The aircraft finish made with a cellulose nitrate base is much more permeable to water vapour under both wet and dry conditions than are the resinous materials. The permeability of these finishes is not directly proportional to the vapour-pressure difference. The rate of passage of moisture per unit difference in vapour pressure increases with rising temperature. A given type of aircraft finish transmits moisture at the same rate whether in contact with liquid water or with saturated water vapour. The mechanism of penetration is, therefore, probably the same in the two cases. The film probably behaves as a typical colloidal, permeable membrane, and the water vapour is adsorbed by it and transmitted through the film by a process of chemical diffusion. Some observations on the absorption of moisture by resinous films and the effect of carnauba wax on permeability are presented. Results of measurements of the permeability to moisture of gas-cell fabrics of varying gelatin content and amount of paraffin coating are also given. C.

Continuous Hosiery Finishing Machine. Bates Machine Co. Ltd. *Text. Rec.*, 1937, **54**, No. 648, 54.

In the continuous hosiery finishing machine the shapes are attached vertically to an endless chain which travels continuously in a long elliptical circuit. The operatives draw the stockings over the shapes as they move slowly forward. They then pass through an enclosed spray box in which jets of water or liquids containing special chemicals for dulling, etc., play upon them and are then pulled down on the shapes to the desired length by the operative. After manipulation on the shapes they pass through successive pairs of squeezing rollers and spray boxes and forward to the drying chambers. The temperatures of the

drying chambers can be controlled. The makers claim that the final finish is equally good on cotton and rayon portions of stockings. On this machine dyeing, dulling and finishing may be combined in one operation. C.

Photo-electric Control Knitted Fabric Tentering Machine. C. G. Haubold, A.-G. *Text. Mfr.*, 1937, **63**, 66 and 67.

Illustrated descriptions are given of a patent automatic feeding device controlled by photo-electric cells and a device for maintaining constant piece length, with an overfeed arrangement which may be adjusted automatically or by hand according to the variations in width. C.

Rotary Pressing Machines: Application. M. Berg. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft I*, 20-22.

The influence of moisture content, temperature, pressure, and time of pressing in the treatment of fabrics on rotary pressing machines is discussed and arrangements for indicating and adjusting the pressure on modern machines are described. The advantages of automatic control are pointed out. C.

Stentering Machine. H. Krantz Söhne. *Text. Rec.*, 1937, **54**, No. 648, 55-56.

The Krantz stenter for finishing knitted fabrics is equipped with an automatic feeding arrangement and a patent arrangement for needling up the fabrics loosely and automatically, and for slacking them in width. The fabric passes through a selvedge straightener and is fed to the stenter pins by positively driven opening rollers and feed rollers running at an advanced speed so that the stenter chain is fed with over-running fabric. As a result of this method of feeding a predetermined finished length and weight of fabric can be obtained during the continuous drying process. Shrinkage can be effected both in the width and lengthwise in the fabric simultaneously. The width changing is carried out by a longitudinal shaft which drives the width changing spindles through gears, whereby both side walls are moved simultaneously. The hot-air drying chambers of the machine are supplied with air by a closed air current which is produced by means of fans arranged along the cloth, each drying chamber having two fans. The air current is heated by steel ribbed pipes arranged in a chamber underneath the machine. C.

Tubular Fabric Opener. H. Nicholson and Whitehead and Poole Ltd. *Text. Mfr.*, 1937, **63**, 62.

The Nicholson tubular fabric opener consists of an opener frame or "shuttle" which is provided with rollers. The opener, inside the cloth, is placed in a bracket which is provided with pairs of control rollers which positively limit the downward and upward movement of the "shuttle." The opener, however, acts chiefly by its weight, and is capable of opening the most heavily dressed cloth. The bracket is provided with guide rollers for the cloth, the opener being mounted vertically. The whole device is placed in a position in the course of drying where the tubular fabric will be readily opened, and once opened will not stick again. In an arrangement shown diagrammatically the fabric is taken from the mangle, where it may have been treated, for example, with a starch dressing, and passed round the first four drying cans. It is then threaded through the bracket and round the opener and brought back to the drying cylinders for the completion of drying. The process is continuous, the pieces being sewn together. C.

Staple Fibre Fabrics: Crease Resistance. K. Quehl. *Textilberichte*, 1937, **18**, 241-242.

The causes of the low resistance to creasing of rayon and staple fibre products are discussed and mention is made of the process for improving crease resistance which depends on treatment with a bath containing Preska 110. The treatment imparts wool-like properties to staple fibre fabrics and the effect probably depends on the formation on the fibres of an elastic outer layer of low degree of orientation. A method of measuring resistance to creasing is described which depends on measurement of the creasing angle. The results of measurements on woollen fabrics and on untreated and Preska-treated staple fibre fabrics are discussed. C.

Corset Fabrics: Bleaching, Dyeing and Finishing. L. P. Michel. *TIBA*, 1937, **15**, 173-177.

A general account is given of the scouring, bleaching, dyeing and finishing of fabrics for corsets. C.

Finishing Processes : *p*H Control. A. Landolt. *Textilberichte*, 1937, 18, 153-154, 236-238.

The meaning of *p*H is explained and methods of measurement are outlined. The influence of *p*H in sizing, desizing, bleaching, dyeing and finishing processes is discussed and the need for control is pointed out. C.

Knitted Fabric Stentering Machine. H. Krantz Söhne. *Silk J. and Rayon World*, 1937, 13, No. 154, 111-112.

A stentering machine for finishing knitted fabrics is equipped with an automatic over-feeding arrangement, the essential feature of which is that a predetermined finished length and weight of fabric can be obtained during a continuous drying process. This arrangement is briefly described. A device for needling up the fabrics loosely and automatically and for slacking them in the width, and a special selvedge straightener are also fitted. The drying chambers are totally enclosed and each has individual temperature control; air is circulated so that there is no difference in air pressure above or below the cloth. The temperature in the chambers is graduated so that the fabric is delivered at room temperature. A brief description of the control switchboard is given. C.

Knitted Rayon Underwear Fabric : Brushed Finish. L. A. Jordan. *Textile World*, 1937, 87, 707.

A lofty pile and soft handle can be imparted to some knitted rayon underwear by brushing with a series of rollers covered with wire carding or with a set of abrasive rollers working on the cloth on a spongy, clinging bed. The fabric should not be too thin or the filaments too coarse. Good results are obtained with 1-2 den. rayon in fabrics running about 2-2½ yds. per lb. in 48-in. widths. Viscose and cuprammonium rayons give better results than cellulose acetate. C.

Pile Fabrics : Pile Fixing Treatment. *Textilberichte*, 1937, 18, 239-240.

In order to fix the pile of corduroy and velvet more firmly and prevent its removal during mechanical treatment, washing and wear, the back of the fabric is treated with an alkaline solution of Azolon FLM, a product having a cellulose basis, and then with sulphuric acid-sodium sulphate, in order to precipitate a thin film on the back of the fabric. Details of the procedure are given. After this treatment the goods are dyed and finished in the usual way. C.

Weft Straightening Tenter Frame Controls. C. Schlatter. *Amer. Dyes. Rept.*, 1937, 26, 158-159.

A differential gear has been developed for tenter frames by means of which one of the chains can be advanced or retarded automatically so as to maintain the weft at an angle of 90° with the warp. The angle of the weft is followed at the selvages by mounting a light-source and a photo-cell on each side of the tenter. Rotating discs with slots in them for the passage of the light are placed between the cloth and the cells, the rotating mechanism being so chosen that the speed of rotation of the discs is always exactly proportional to the cloth speed. The electrical impulses thus emitted from the photo-tubes operate push-button contacts through a system of condensers and amplifying tubes. These controls have been successful on plain weaves up to 80×80, 136×60, but for sateen weaves further improvement may be necessary. The equipment does not eliminate bowed weft, but this can be effected with a pair of rollers running at the delivery end of the tenter which can be run at the chain speed, or faster, or slower. The top roller has a crown of soft rubber which only touches the centre of the fabric, and thus the centre of the cloth can be retarded or pulled forward to eliminate the bow. C.

Chlorination of Wool. E. Meisaner. *Deut. Wollen-Gewerbe*, 1936, 68, 1411-1412 (through *Chem. Abs.*, 1937, 31, 2440).

Chlorinated wool has the lustre and feel of silk and absorbs dyes better than untreated wool. If chlorinated wool is boiled one minute in dilute NH_4OH solution no turbidity is formed. If the final residue of the NH_4OH solution is evaporated with a little NaOH and if after cooling a few drops of $CuSO_4$ are added the solution turns violet. Untreated wool produces no turbidity and no purple colour. Directions are given for the proper chlorination and for titration of the bleaching-powder solutions. The use of chloramines for bleaching is discussed. Such organic products have a milder action than bleaching powder and hypochlorites and greatly facilitate the operation of the treatment. W.

Wool Finishing Processes: Necessity for Scientific Control. E. Elöd. *Textilber.*, 1937, **18**, 49-51.

A discussion on the liability of acids and alkalies to cause wool damage and on the influence of *p*H and temperature control in the scouring, drying, carbonising, dyeing and chlorinating processes. Tables are given showing the dye absorption of carbonised and uncarbonised wool. W.

Rayon-Cotton Lining Materials: Dyeing and Finishing. *See* Section 4I.

(L)—PROOFING

Pile Fabrics: Waterproofing. T. Ridd. *Amer. Dyes. Rept.*, 1937, **26**, 75-88.

Methods of waterproofing pile fabrics are briefly discussed. The aluminium acetate method is applicable, with some modification, to all types, and the result is improved if the goods are treated with wax, solid, in solution, or as an emulsion. Methods using wax as solid rolls, and as emulsions are described. The former method is confined to 100 per cent. cotton velvet, and is unsuitable for rayon pile goods. The emulsion method is more costly, but gives better results, and is more generally applicable. The incorporation of plasticisers such as rubber, linseed oil and so forth, and a dye, gives an effect in imitation of leather. Methods of rubberising goods, and of curing the rubbered surface are briefly outlined. It is pointed out that (1) copper salts must not be used in the dyebath, and (2) since the presence of mineral oil induces troubles due to tackiness, swelling, and ultimate degradation of the rubberised area, not more than 2 per cent. of residual oils should be present. Steam curing of rubber is suitable for flat pile fabrics. Processing of goods in tightly wrapped rolls cannot be applied to erect pile fabrics. The bulk and resilience of these fabrics also makes batching troublesome; methods of overcoming the difficulties are indicated. C.

Rubber: Processing and Applications. *British Plastics*, 1936, **7**, 308-309; 370-372; 429-430; 453-455; 1936, **8**, 119-122; 179-180; 332-333; 454-457.

A general review. Two methods of mastication of rubber, the open mill method and the extrusion method, are briefly described, and two methods of measuring the plasticity of rubber after mastication are mentioned. Theories concerning the mechanism of mastication are briefly discussed. An outline is given of the mixing procedure both in open and in internal mills, the advantages of the latter being indicated. The mixer must be used in conjunction with a sheeting mill to sheet out the rubber for cooling and storing purposes. The calender is an essential part of the equipment for sheeting out rubber to an even guage, and for coating fabrics to an even thickness. The operation of the calender for both these processes and its dependent warming and cracker mills are described. Mention is made of calender grain, its causes, and removal. Latex manufacture calls for different materials and methods. A brief account is given of the appropriate dispersion of the materials used in compounding latex, and some of the uses to which latex can be put are indicated. The production of rubber cores for textile yarns, the uses of electro-deposition of rubber, the preparation of latex sponges, and of cellular hard rubber, are briefly described. Uses of latex in the shoe and paper industries are mentioned, and a recipe for a latex size is given which imparts a crease-resisting finish to dress cloths. The manufacture of cut-sheet articles is described. A brief account is given of each of the following methods of vulcanisation; in molten sulphur, in sulphur chloride, with use of fast organic accelerators, and by external application of sulphur. Impregnation of fabric with latex is outlined and the preparation of aqueous dispersions of rubber is also mentioned. The extended use of rubber-covered rollers is pointed out, and the manufacture of rubber roller coverings is described. The production of rubber belting is discussed; emphasis is laid on the use of the right kind of textile fabric. The chemical, physical, and electrical properties of hard rubber are briefly described. The casing fabric, tyre beads, tyre tread, and the building of motor tyres are described. Other types of tyre requiring modified methods of building are mentioned, and the building of cycle tyres is briefly outlined. C.

Rubber Coated Fabrics: Copper and Manganese Content. Kehren. *Textilberichte*, 1937, **18**, 229-230.

The difficulty of producing fabrics containing less than 2 mg. Cu+Mn per square metre, the limit specified by the German rubber-proofing industry, is

discussed and the corresponding percentage contents of fabrics of different weights per square metre are indicated. The somewhat more lenient limit of 0·002 per cent. Cu + Mn, regardless of fabric weight per square metre, is still difficult to obtain. The theory of the migration of copper from the fabric to the rubber layer is critically discussed and it is suggested that only the copper in the surface layer in contact with the rubber exerts an injurious action on the latter. The results of tests of the stability of rubber treated fabrics containing different amounts of copper are given; the data show that copper contents of 0·004 per cent. did not cause premature decomposition of rubber layers which had been subjected to hot vulcanising. As the surface concentration of the metals in the fabric is the determining factor, the weight per square metre should be taken into consideration in fixing the limits. Suggested limits vary from 0·002 per cent. copper + manganese for fabric of 100 g. weight per square metre to 0·004 per cent. for fabric of 400 g. per square metre. C.

Rubber Latex: Use in the Textile Industry. A. Gagnaire. *L'Ind. Text.*, 1936, **53**, 576-578; 1937, **54**, 60-61, 111-113.

A general account is given of the history, preparation, application and advantages of rubber latex and its use in the textile industry for the impregnation of yarns and fabrics, the preparation of double fabrics and pile fabrics, and other purposes. C.

Patents

Leather Substitute. B. G. Blaupot-Ten-Cate. F.P.803,056 of 22/9/1936 (through *Chem. Abs.*, 1937, **31**, 2714).

This is made by impregnating unspun ramie fibres with a solution or dispersion of rubber. The fibres may be fixed with waste cotton, waste jute or chopped straw. W.

Felting Animal Fibres. The Non-Mercuric Carrot Co. F.P.803,407 of 30/9/1936 (through *Chem. Abs.*, 1937, **31**, 2837).

Fur and other animal fibres are treated with an aqueous solution containing one or more hydrolyzing acids, an oxidizing agent and a practically neutral solution or alkaline earth metal salt of a strong acid. This salt acts as an accelerator in the initial phases of the treatment when the solution is first applied, and prevents destructive action of the acid during drying by forming an acid salt therewith. An example contains H_2SO_4 6, HCl 2, H_2O_2 5 and Glauber salt 20 parts, or H_2SO_4 5, HCl 1, K persulphate 3, H_2O_2 4 and NH_4Cl 10 parts. W.

Making Silk Feltable. A. Gandini. F.P.803/872 of 10/10/1936, (through *Chem. Abs.*, 1937, **31**, 2838).

The silk is steeped in water to expel the air contained in the fibres, then subjected to a fixing treatment to render the albuminous and pseudoalbuminous substances insoluble. The fixing may be a solution of Hg chloride rendered slightly acid by HCl, or a solution of other salts of Hg or other heavy metals, tannic acid, salts of phosphotungstic or (molybdic) acid, phenol, CH_2O, HAc, naphthalenesulphonic acids or derivatives thereof containing OH or NH_2 groups.

Leather Substitute. T. Shiraishi. F.P.804,132 of 16/10/1936 (through *Chem. Abs.*, 1937, **31**, 2714).

A permeable sheet made of carded fibre is wetted by a solution made by adding a fine powder of $MgCO_3$ and an alkaline earth carbonate, a soap, a vulcanizing agent and an accelerator to rubber latex, coagulating the rubber by passing the sheet through an acid bath. W.

Liquid Sprays Suitable for Combating Moths, etc. C. Iddings. U.S.P.2,070,167 of 9/2/1937 (through *Chem. Abs.*, 1937, **31**, 2322).

Natural gasoline is cooled by boiling, to its boiling point, a container and a mixture comprising *p*-dichlorobenzene, ethylene dichloride and CCl_4 are cooled to substantially the temperature of the natural gasoline, and the gasoline is added to the mixture in the container and the latter is sealed, to provide a composition which is suitable for spraying by its own pressure at atmospheric temperatures. W.

Condensation Products of the Isatin Series (Protectives against Moths). J. Bindler (to J. R. Geigy, S. A.). U.S.P.2,070,350/1/2/3 of 9/2/1937 (through *Chem. Abs.*, 1937, **31**, 2322).

By the condensation of N-(benzylsulphonic acid)-isatin or N-(*o*-chlorobenzylsulphonic acid)-isatin with thymol or amylphenol (suitably by heating for three hours at 100-110° in the presence of concentrated HCl and $SnCl_4$ or $ZnCl_2$), products are obtained such as dithymol-N-(benzylsulphonic acid)-isatin, dithymol-N-(chlorobenzylsulphonic acid)-isatin and diamylphenol-N-(benzylsulphonic acid)-isatin. U.S.P.2,070,351 relates to the production of water-soluble protective agents against moths by condensing isatin-5-sulphonic acid with substituted phenols such as thymol, amylphenol, or amylcresol. U.S.P. 2,070,352 relates to the production of condensation products from 6-chloroisatin-5-sulphonic acid and substituted phenol derivatives such as *p*-chlorophenol, 6-chloro-*m*-cresol or 2,4-dichlorophenol. U.S.P.2,070,353 relates to condensation products from isatin-5-sulphonic acid and substituted phenols of like character, these products also being protective agents against moths. W.

Carrotting Fur. J. D. Sartakoff. U.S. P.2,070,927 of 16/2/1937 (through *Chem. Abs.*, 1937, **31**, 2454).

The fur is treated with a solution containing permanganate and HNO_3 or H_2SO_4 in excess of that which will completely cause the permanganate to react into a substantially colourless compound on the fur upon completion of the reaction (the permanganate and acid being present in proportions sufficient to cause substantial shrinkage but insufficient to burn the fur). W.

Leather Substitute. F. Harris (to Plymouth Rubber Co.). U.S. P.2,071,626 of 23/2/1937 (through *Chem. Abs.*, 1937, **31**, 2714).

Flock is applied to the surface of a woven cloth fabric, a binding saturant such as a rubber solution is applied to the flocked surface, and the material is subjected to facial pressure while under tension. W.

Cotton and Rayon: Waterproofing. W. W. Groves (I. G. Farbenindustrie A.-G.). E.P.416,179 of 8/6/1935.

Cotton, rayons, etc., are treated with a compound of the general formula R.X.N.:C:Y or R.X.NH.CY.Halogen, where R stands for an aliphatic or isocyclic hydrocarbon radical of at least 4 C-atoms, X stands for a hydrocarbon radical which is linked to R by O, S, N or CO, and Y stands for O or S; or as a particular case with a compound of the general formula R.N.:C:O or R.N.H.CHalogenO, where R stands for an aliphatic hydrocarbon radical of at least 5 C-atoms. After impregnation, the material is hydro-extracted, etc., and afterwards dried and heated. The materials so treated are rendered water-repellent, and they acquire an increased affinity for certain groups of dyes. C.

"Patexfine" Printing Roller-Engraving Process. H. Kindermann (Koniginhof-on-Elbe, Czecho-Slovakia). E.P.432,506 of 29/1/1934.

In a process for applying the etching ground to copper rollers for textile printing, the etching ground areas are printed by transfer not in their entirety but in the form of broad outlines or margins bounding the places to be etched on the copper roller, the remainder of the etching ground then being covered with an etch-proof varnish or the like by hand. The etching ground is finally covered with asphalt, resin, etc., and the roller is then etched. (For a discussion of the advantages of this process, and a list of the corresponding foreign patents, see *Textilberichte*, 1937, **18**, 240.) C.

Fabric Winding Apparatus. M. Bretschneider (Plauen, Germany). E.P.458,472 of 17/6/1935 (Conv. 25/6/1934).

A winding device for webs, wires, and the like, particularly for use in the treatment of full width fabrics, comprises two hydraulic gears of the meshing wheel type or the rotary drum and sliding vane type, driven by a common driving member in the form of a rim surrounding the gear casing and connected to two coaxial torque shafts which project in opposite directions from the gear casing, and each of which is mechanically coupled to one of the two rollers, the liquid chamber of each hydraulic gear being divided by a cross wall into two sections, and at least two of these sections being always hydraulically interconnected. The invention is described as applied to the feeding of fabric from

one roller to another through a dye liquor, but it may be applied for the driving of warp and cloth beams in looms, or for feeding or winding paper, wires, etc. C.

Thiosulphate : Application to Protect Dyed Cellulose Ester and Ether Materials from Fading in Gas Fumes. H. M. Bunbury and C. H. Giles. E.P.460,027 of 19/7/1935.

The fastness to combustion gases of dyeings on cellulose ester or ether material is improved by treating the dyed material with a water-soluble thiosulphate, e.g. 5 per cent. " hypo " for 1 minute. C.

Quaternary Ammonium Compound Wetting Agents : Preparation. Coutts & Co. and F. Johnson (I. G. Farbenindustrie A.-G.). E.P.460,146 of 16/7/1935.

Quaternary ammonium salts, containing at least one hydroxyalkyl group, are obtained by treating an ammonium or amine salt with an alkylene oxide at a raised pressure, the alkylene oxide being taken in about the minimum amount theoretically necessary for the production of a quaternary salt or in slight excess over that amount. The reaction may be effected at a temperature up to 100° C. in the presence or absence of water and the products may be converted into the corresponding ammonium bases. The products are useful as dye intermediates and also as assistants in the textile industry, particularly as levelling, wetting, foaming, dispersing and emulsifying agents and as agents for imparting an affinity for wool dyes to vegetable or artificial fibres. C.

Phthalocyanine Dyes : Production. Coutts & Co., F. Johnson and A. Carpmael (I. G. Farbenindustrie A.-G.). E.P.460,147 of 16/7/1935.

A phthalocyanine sulphonic acid or a water soluble salt thereof is caused to react in aqueous solution with an organic base to form a salt-like product in substance or on a cellulosic or other substratum. The base may be an amine of the aliphatic, araliphatic, aromatic, hydroaromatic or heterccylic series or a basic dye. The products from weakly sulphonated phthalocyanines are, in general, lakes, and those from strongly sulphonated phthalocyanines are, in general, soluble in organic solvents and suitable for colouring lacquers of the phenol-formaldehyde, urea-formaldehyde and polyvalent alcohol-polybasic acid types. Specified cellulosic materials are cotton, viscose rayon, paper, cardboard, and wood pulp, and other specified substrata are alumina and barium sulphate. C.

Soluble Azo Dyes : Production. A. Carpmael (I. G. Farbenindustrie A.-G.) E.P.460,224 of 23/7/1935.

Water-soluble azo dyes are manufactured by coupling diazotised amino-arylsulphofluorides with coupling components containing at least one sulphonic acid group, e.g. pyrazolone sulphonic acids, hydroxy- and aminonaphthalene sulphonic acids, aminonaphtholsulphonic acids, and their acyl derivatives. The products dye animal fibres clear shades. C.

Cyclohexylarylamine Azo Dyes : Production. G. W. Johnson (I. G. Farbenindustrie A.-G.). E.P.460,276 of 23/7/1935.

Azo dyes are manufactured by coupling aromatic diazo compounds with N-cyclohexylarylamines capable of being coupled, which may be substituted in one or both rings and which have an aliphatic radical containing at least one oxgyen atom, e.g. a hydroxyethyl, hydroxypropyl, dihydroxypropyl, hydroxy-ethyl alkyl or hydroxyalkyl ether or hydroxyethyl ester radical attached to the connecting nitrogen atom, the components being so selected that the dyes are free from sulphonic and carboxylic acid groups. The products are suitable for dyeing cellulose esters and ethers, hydrocarbons, lacquers, inks, etc. C.

Cyanuric Derivative Polyazo Dyes : Production. Society of Chemical Industry in Basle. E.P.460,378 of 30/7/1935 (Conv. 30/7/1934).

Polyazo dyes capable of being coppered on the fibre or in substance are made by coupling a diazo compound of an aminoazo dye, obtainable by coupling a diazo compound which contains an —OH group with a —COOH group in *o*-position to each other with a 1-naphthylamine-2-alkylether, with a compound of the formula CyARX in which Cy is the cyanuric residue, A is a substituted or non-substituted aminonaphthol residue, R is the residue of an amine containing an —OH group in *o*-position to a —COOH group and X is a halogen atom or any other residue connected with Cy by means of N, O or S. They dye cotton blue to green shades which when after-coppered undergo only little alteration in shade and are fast to washing and light. C.

Indigoid Dyes: Production. A. G. Bloxam. E.P.460,384 of 22/10/1935.

Indigoid dyes are prepared by condensing a 1-hydroxy-naphthalene with a reactive *α*-derivative of a 4-halogen-7-alkoxyisatin which may contain a further halogen in the 5-position. In modifications, a mixture of reactive *α*-derivatives of 4-halogen-7-alkoxyisatin and of 4 : 5-dihalogen-7-alkoxyisatin is condensed with a 1-hydroxynaphthalene and reactive *α*-derivatives of isatins obtained by halogenating 4-halogen-7-alkoxyisatin to such and extent that less than two halogens are introduced, are condensed with 1-hydroxynaphthalene. C.

Disazo Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). E.P. 460,385 of 23/10 1935.

Asymmetrical disazo dyes are made by coupling the tetrazo compounds of the condensation products of hydroaromatic ring ketones and aniline or *o*-toluidine, with 2-naphthol-6 : 8-disulphonic acid (1 mol.) and 1-naphthol-4-sulphonic acid (1 mol.). They yield bright scarlet red shades on silk and wool fast to light and fulling. The dyeings can be discharged to pure white. The dyes also yield pure white cellulose acetate rayon effects. C.

Azo Dye Metal Compounds. Society of Chemical Industry in Basle. E.P. 460,561 of 13/7/1936 (Conv. 12/7/1935).

Complex metal compounds of azo dyes are made in substance by treating with an agent yielding metal an azo dye of given general formula which contains a phenyl residue containing a group capable of binding metal in complex union, e.g. a hydroxy, carboxy or alkoxy group in *o*-position to the azo group or the salicylic acid group. Agents yielding chromium, copper, iron and cobalt are mentioned. Examples of dyeing or colouring wool, silk, regenerated cellulose, cotton and nitrocellulose lacquers are given. C.

Emulsions of Chlorinated Naphthalenes. H. Pirie and Imperial Chemical Industries, Ltd. E.P. 460,578 of 29/7/1935.

Compositions capable of being dispersed in water comprise chlorinated naphthalenes, or mixtures thereof, together with a hydrogenated naphthalene, the proportions preferably being such that a liquid mixture is obtained. Emulsifying agents, e.g. ammonium caseinate, turkey red oil, sulphonated mineral oils or goulac, which is derived from the residual lyes in the sulphite-cellulose process are preferably added. According to examples: (1) 180 parts of monochlornaphthalene and 20 parts of decahydronaphthalene are added to a solution of 10 parts goulac in 60 parts of slightly alkaline water, and subjected to agitation in a high speed stirrer; (2) 100 parts of a mixture of polychlor-naphthalenes (42 per cent. chlorine content) are dissolved in an equal weight of decahydronaphthalene and then added to the emulsifying solution as above. The products may be used as insecticides and fungicides or for impregnating textiles. Specification 413,756 is referred to. W.

Ethylene-imine: Application. I. G. Farbenindustrie A.-G. E.P.460,590 of 31/7/1935 (Conv. 14/8/1934).

In a process for improving the capacity of cellulose fibres for being dyed by wool dyes, the fibres are subjected to the action of ethylene-imine preferably at a raised temperature, the ethylene-imine being present as a vapour. In an example, 55 g. of viscose staple fibre are subjected to vacuum in an autoclave and then treated with the vapour of 10 c.c. of ethylene-imine for 4 hours at 100° C. The fibre is then washed with water, dilute sulphuric acid, and again with water. [According to E.P.460,888, I. G. Farbenindustrie, ethylene-imine is obtained by the action of alkali on ethanolamine sulphuric ester.] C.

Indigoid Dyes: Production. Society of Chemical Industry in Basle. E.P. 460,627 of 15/7/1936 (Conv. 15/7/1935).

Indigoid dyes prepared by condensing an active *α*-derivative of an isatin of the benzene or naphthalene series with 1-hydroxy-5-alkoxynaphthalene are treated with halogenating agents. The products may be used for dyeing cotton, wool, silk or regenerated celluloses blue to blue-green shades. C.

Stiffened Fabrics: Production. British Celanese Ltd. E.P.460,631 of 29/7/1935 (Conv. 9/8/1934).

Stiffened compound fabrics suitable for wearing apparel, e.g. for collars, cuffs, fronts, etc., of shirts, hats, and parts thereof, and linings are made by

uniting two or more layers of fabric with the aid of heat and pressure by means of one or more intermediate preformed layers containing cellulose acetate or other thermoplastic cellulose derivative, one or more of said intermediate layers containing a finely divided pigment. If a white or light-coloured pigment is used, the appearance of the outer fabrics is maintained unchanged after hot pressing. Fabrics woven, knitted or netted from non-thermoplastic yarns, e.g. cotton, linen, regenerated cellulose, wool, or silk, or mixed fabrics, may be so united. The intermediate layer may be a cellulose derivative fabric or mixed fabric woven, knitted or netted from yarns of cellulose derivative containing a finely-divided pigment or from mixed yarns, or a pigmented cellulose derivative foil, or a non-thermoplastic fabric coated or impregnated with a mixture of finely-divided cellulose derivative and pigment with or without a binder such as gum tragacanth or gum arabic. The cellulose derivative may be plasticised, e.g. with dimethyl or dibutyl phthalate or dibutyl tartrate. To promote union the assembly may be treated with a solvent or heat-activated solvent for the cellulose derivative before applying heat and pressure. The heated pressure surfaces may be embossed with designs, stripes, etc., to give local adhesion. C.

Wetting Agents: Preparation. G. W. Johnson (I. G. Farbenindustrie A.-G.). E.P.460,710 of 2/8/1935.

Products stated to have wetting, cleansing, disinfecting and emulsifying properties are obtained by heating alkylene oxides with trialkylamine oxides in the presence of water. Organic solvents such as alcohols, acetone, ether and cyclohexanol may be present, and the products may be sulphonated. The products may be used in the textile, leather and lacquer industries with soaps, glue, gelatin, gum, mucilages, sulphite cellulose liquor and solvents. The latter are emulsified and may be used in bleaching and dyeing processes, e.g. in acid baths. In association with hydrosulphites the products may be used for stripping vat dyes. C.

Compound Fabrics: Production. W. D. Schofield. E.P.460,751 of 17/6/1936

The layers of a compound fabric are united by a cellulose derivative adhesive applied as an openwork pattern by printing on one or both of each pair of contacting surfaces, allowed to dry, and activated by a comparatively weak solvent, e.g. a mixture of acetone and methylated spirits, before applying heat and pressure. The pattern may comprise spots, continuous or dotted parallel or intersecting lines or floral or geometrical designs. A fabric may be printed on both sides and subsequently united to two outer plain or printed fabrics. The fabrics may be cut into blanks for collars, cuffs, etc., before uniting and before or after printing. C.

Azo Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). E.P.460,782 of 19/8/1935.

Azo dyes insoluble in water are made in substance, on a substratum or on the fibre by diazotising an amine of given general formula and coupling with arylamides of 2 : 3-hydroxynaphthoic acid with the exception of those containing at least two alkyl groups as substituents in the aryl nucleus. They yield intense yellowish to red shades particularly fast towards boiling caustic soda solutions. In an example, cotton is impregnated with 1-(2′-hydroxy-3′-naphthoylamino)-2-methyl-4-chlorobenzene and developed with diazotised 2-amino-4-*n*-propyl-sulphone-diphenylether (yellowish scarlet). C.

Iminazoline Wetting Agents: Preparation. E. Waldmann and A. Chwala. E.P.460,858 of 9/8/1935 (Conv. 10/8/1934).

Iminazolines containing sulpho groups and at least ten carbon atoms which are stated to have wetting, washing, foaming, dispersing, and levelling properties are prepared by (*a*) sulphonation of the parent iminazolines; (*b*) exchanging a halogen present in the parent iminazolines for the sulphonic group by means of a sulphite; or (*c*) combining at the nitrogen alkyl or aralkyl groups containing sulpho groups, e.g. by means of bromethanesulphonic acid or benzylchloride-*p*-sulphonic acid. Alternatively, the products may be prepared from components, i.e. aliphatic diamines and fatty acids, sulpho groups. C.

Cleansing Compositions: Making Emulsions. J. Halden & Co. Ltd., and J. Holden. E.P.460,839 of 1/5/1935.

A cleansing preparation adapted to be applied to the skin to remove grease, etc., consists of a mineral oil, vegetable oil, petroleum jelly, or wool fat, together

with less than 50 per cent. of its weight of a mixture of a straight chain fatty alcohol having between twelve and eighteen carbon atoms with 10 per cent. or less of its weight of an organic or inorganic salt of a sulphuric acid ester of such an alcohol, e.g. esters derived from oleyl, stearyl, or palmityl alcohols or mixtures thereof. Grease solvents, e.g. cyclohexanol or methyl cyclohexanol, and antiseptics, e.g. β-naphthol or menthol, may be added. In examples a mixture of palmityl and stearyl alcohols containing 10 per cent. of the sodium or triethanolamine salts of the sulphuric acid esters of these alcohols is mixed with medicinal paraffin, or with petroleum jelly, liquid paraffin, and zinc oxide. Specifications 388,485 (*J. Text. Inst.*, 1933, A373), 436,956 (*J. Text. Inst.*, 1936, A10) and 448,350 (*J. Text. Inst.*, 1936, A485) are referred to. W.

Amide and Imide Wetting Agents: Preparation. Society of Chemical Industry in Basle. E.P.461,054 of 15/4/1936 (Conv. 27/4/1935).

Carboxylic acid amides and imides are manufactured by reacting a sulphonic acid or a sulphonic acid salt of *o*-phthalic anhydride or of an *o*-phthalic acid halide or ester, or a substitution product thereof, e.g. the anhydrides, halides or esters of *o*-phthalic acid mono- or disulphonic acid or of 5-sulpho-4-chlorophthalic acid, with a primary or secondary nitrogenous base containing more than two carbon atoms in the molecule, or a derivative thereof, if desired in the presence of a solvent. Suitable bases are primary and secondary saturated or unsaturated aliphatic, cycloaliphatic, aromatic, aliphatic-aromatic or heterocyclic amines or their derivatives containing at least one free hydrogen atom attached to the nitrogen. The products may be used alone or in conjunction with other substances, e.g. solvents, soaps, etc., as textile assistants, e.g., for wetting, cleaning, dispersing and equalising, for softening the fibre, and for increasing the wetting capacity of mercerising liquors. C.

Sulphonated Alcohol Dye Preparation. British Celanese Ltd. E.P.461,214 of 11/2/1936 (Conv. 11/2/1935).

A readily-dispersible colouring matter composition for incorporation in a dyebath or printing paste comprises a water-insoluble colouring matter (i.e. a dye or a substance such as an azo dye component, convertible into a dye on or in textile material), dextrin and a sulphonated fatty alcohol containing at least 6 carbon atoms or a salt thereof. The compositions are suitable for use in colouring filaments, yarns, fabrics, felts, films, etc., made of or containing organic derivatives of cellulose. C.

Phosphatic Washing Agents: Application. I. G. Farbenindustrie A.-G. E.P. 461,328 of 14/8/1935 (Conv. 14/8/1934 and 8/6/1935).

A washing liquor contains a water-soluble salt of pyro- or ortho-phosphoric acid, and a washing agent, free from sulpho-groups, having one of the formulae (*a*) $RR_2N.R_1.COOY$; (*b*) $R.CO.N(CH_3).CH_2.COOY$; and (*c*) $R_3CO.NH.C_2H_4.O.OC.R_4COOY$, where R is an alkyl or cyclo-alkyl radical containing at least 10 carbon atoms; R_1 is a hydrocarbon or acyl radical containing fewer carbon atoms that R; R_2 is hydrogen, alkyl, or an alkyl group containing at least one hydroxyl or carboxyl group; R_3 is an alkyl radical containing at least 10 carbon atoms; R_4 is a hydrocarbon radical containing fewer carbon atoms than R_3; and Y is hydrogen or alkali metal. Other additions are also specified. The washing liquor is suitable for use with hard waters, since deposition of calcium and magnesium carbonates is prevented. Linen, wool or cotton may be treated. C.

Polymeric Ethylene Imine Levelling Agents: Preparation. Coutts & Co. and F. Johnson (I. G. Farbenindustrie A.-G.). E.P.461,354 of 15/7/1935.

A catalyst promoting polymerisation is caused to act on ethylene imine itself or on ethylene imine C- or N- substituted by a hydrocarbon radicle, such catalyst, when of acid character, being used only in such amount as is less than an equivalent proportion. The products, which are colourless and viscous to waxy, are applicable as levelling agents in dyeing, as impregnating agents, as additions to rubber, for the preparation of mixed polymerisation products from acrylic acid and its derivatives and for improving the fastness of dyeings to washing and to water. C.

Aminoanthraquinone Dyes: Production. Coutts & Co. and F. Johnson (I. G. Farbenindustrie A.-G.). E.P.461,426/7/8 of 8/7/1935.

(1) 1 : 4-Dihydroxyalkylaminoanthraquinones are prepared by reacting an anthraquinone containing in the 1-position a group —NHR wherein R stands for hydrogen, alkyl, aralkyl, cycloalkyl, aryl or acyl group, and in the 4-position an amino, alkylamino, aralkylamino, cyclo-alkylamino or arylamino group, with at least two molar proportions of a hydroxyalkylamine until the groups in the 1- and 4-position are replaced by the radicle of a hydroxyalkylamine. (2) 1 : 4-Diaminoanthraquinones of given general formula are prepared by reacting 1 : 4-diaminoanthraquinones or 1-amino-4-hydroxy- or -4-alkoxy- or -4-nitroanthraquinones in the presence of reducing agents with mixtures of different primary amines of the aliphatic, aliphatic-aromatic or cycloaliphatic series, the amount of each of which is at least one molecular proportion, and, if desired, oxidising the resulting leuco compounds in known manner. (3) 1 : 4-N-substituted diaminoanthraquinones and derivatives containing in the other benzene nucleus one or more amino, hydroxyl or alkoxy groups where in one hydrogen atom in each of the 1- and 4-amino groups is replaced by an alkyl, aralkyl, cycloalkyl, aryl or heterocyclic radical are prepared by reacting a mixture of a 1 : 4-dihydroxyanthraquinone, or a 1 : 4-diaminoanthraquinone with a 2 : 3-dihydro-1 : 4-diaminoanthraquinone, or a 1 : 4-diaminoanthraquinone with a 2 : 3-dihydro-1 : 4-dihydroxyanthraquinone, and at least 2 molecular proportions of a primary amine or a mixture of at least two different primary amines. The products in each case are suitable for dyeing cellulose esters and ethers, fats, oils, etc. C.

Anthraquinone Carbazole Dyes: Production. I. G. Farbenindustrie A.-G. E.P. 461,432 of 16/8/1935 (Conv. 16/8/1934).

Anthrimides in which an anthraquinone nucleus contains one or more acylamino groups are condensed to carbazoles by means of aluminium halides in presence of acid halides capable of forming molecular compounds therewith. The products dye cotton from the vat in red-brown shades. C.

Cellulose Ether-Esters: Preparation. E. I. Du Pont de Nemours. E.P.461,436 of 16/8/1935 (Conv. 16/8/1934).

Cellulose ether-esters are obtained by treating a cellulose ether with a halide of an aromatic sulphonic acid in the presence of a tertiary base at a temperature below 90° C., for example 40-80° C., until the product is swollen by or dissolves in the tertiary base. The products are particularly resistant to water, acids and alkalis, and may be used for coatings, films, threads, etc. C.

Fabric Liquid Treatment Apparatus. Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. E.P.461,451 of 21/11/1935 (Conv. 22/11/1934).

Lengths of flexible material such as cloth and paper are continuously impregnated with a volatile solvent and then dried in an apparatus comprising in communication with each other an impregnation chamber, a drying chamber, in which the material is dried by a current of air, and an exchange chamber in which the vapour of solvent drawn from the outgoing treated material is again carried back into the apparatus by the incoming untreated material by passing these parts in closely spaced parallel relation for a substantial distance. C.

Dyeing Apparatus. British Celanese Ltd. E.P.461,475 of 1/5/1936 (Conv. 1/5/1935).

Hosiery, gloves, and similar textile articles are mounted on forms grouped in non-touching relationship and in a plurality of superposed layers, and are immersed simultaneously in a bath of substantial depth. The forms are carried by bars attached to a frame shaped to fit the bath. The frame is deposited in the bath by a suitable hoist. The complete plant may comprise a hoist, two vats or baths, and three frames. C.

Alkaline Cellulose Solutions: Application in Finishing. Bleachers' Association Ltd. (Manchester), W. Kershaw and C. J. Whitelegg. E.P.462,824 of 16/9/1935 : 16/3/1937.

Cellulosic fabrics are impregnated with a solution of regenerated cellulose, modified cellulose or a cellulose ether or mixtures thereof in caustic alkali and are then subjected to a normal mercerising treatment. Cotton fabrics treated in

this way acquire an increased stiffness and transparency which is fast or reasonably fast to washing. According to the weight and construction of the fabric used the effect may vary from one somewhat resembling the well-known opal and organdie finishes to a sheer, linen-like finish. The treatment may be applied to other cellulosic materials such as linen or regenerated cellulose. The cellulosic solution applied to the fabric may contain fillers or colouring matters or both. C.

Regenerated Cellulose Materials; Production of Permanent Finishes on——. Calico Printers' Association Ltd. (Manchester), L. A. Lantz and N. J. Hassid. E.P.462,899 of 17/8/1935 : 17/3/1937.

In a process for the production of pattern effects which are permanent to washing upon materials composed of or containing regenerated cellulose, the material is impregnated wholly or in part with caustic soda or caustic potash solution of a concentration which under the conditions of the treatment is sufficient temporarily to plasticise but not to parchmentise the regenerate cellulose and is deformed to give pattern effects by mechanical force applied thereto or released by the plasticising treatment after which the alkali is removed by washing or by scouring and washing. The mechanical force may be applied to the fabric by embossing or similar mechanical treatments or may be applied to and retained in the yarns of which the fabric is composed before the impregnation step (for example by the use of crêpe yarns). The material is impregnated with caustic soda solution of a concentration below 6 per cent. or with caustic potash solution of a strength between 6 and 20 per cent., or is printed with a caustic soda solution of a concentration up to 18 per cent. C.

Agglomerated Fibre Fabrics: Production. C. N. Mims (London). E.P.462,962 of 5/11/1936 : 18/3/1937.

In the production of fabrics of a wadding-like nature by machining lines of stitching in a loosely agglomerated mass of short staple fibre of vegetable, animal, mineral or synthetic origin, the mass of fibre is held during the sewing operation between grids, the individual bars of which are in the form of endless flexible elements associated with rotating drums or rollers. These endless elements, which may be in the nature of jointed chains or continuous strips of comparatively supple material, are suitably guided in spaced relation whereby on approaching the sewing point they pass through the spaces between the paths of motion of the machine needles. C.

Air-permeable Rubber Sheet and Coated Fabrics: Production. International Latex Processes Ltd. (St. Peter Port, Guernsey). E.P.463,160 of 10/7/1936 : 23/3/1937.

A process for the production of air-permeable rubber sheet or air-permeable rubberised fibrous material comprises applying as by spreading, brushing or the like to a base a layer of froth or foam of aqueous dispersions of rubber, subjecting this layer to a sudden rise in temperature to for example over 100° C. for a sufficient period of time so as to burst substantially all the bubbles throughout the thickness of the layer, and completing if necessary the setting of the treated layer. C.

Elastic Fibre: Production. International Latex Processes Ltd. (St. Peter Port, Guernsey). E.P.463,176 of 15/9/1936 : 23/3/1937.

A method of making an elastic fabric comprises temporarily adhering fabric wetted with a liquid readily removable by a drying operation to a surface which has been stretched under tension, permitting the surface to contract and therewith to condense the fabric, and treating the fabric with rubber (applied before or after the contraction) so as to maintain the fabric normally in the condensed condition. Suitable apparatus for carrying out the method comprises in combination an elastic belt, a power-operated drum about which the belt is passed, means for exerting a retarding force upon one end of the belt as it approaches the drum to stretch the portion of the belt being delivered to the drum and for permitting the belt to contract prior to and as it leaves the drum, means for delivering the fabric to be condensed to the stretched portion of the belt, means for applying liquid to the fabric prior to contacting with the stretched portion of the belt, means for applying rubber to the fabric, and means for treatiug the rubber so as to maintain the fabric normally in the condensed condition. C.

Urea Plastics: Application to Render Cellulosic Materials Hydrophobic. W. W. Groves, London (I. G. Farbenindustrie A.-G., Frankfort). E.P.463,300 of 21/6/1935 : 22/3/1937.

Cellulose fibres are made hydrophobic by applying to or incorporating in them a urea derivative or an aliphatic monocarboxylic acid amide free from hydroxyl groups containing an alkyl radical having at least 11 carbon atoms and capable of reacting with aldehydes and exposing the fibres thus treated simultaneously or subsequently to the action of an aliphatic aldehyde or dialdehyde, e.g., formaldehyde or glyoxal. Suitable aliphatic monocarboxylic acid amides are, e.g., fatty acid amides such as lauric acid amide, stearoyl-methylamide, stearoyl-butylamide or stearoyl-octadecylamide. Compounds of the character of alkyl-substituted ureas may also be used, such as monododecyl urea, mono-octadecyl urea, stearoyl urea ; instead of the products named above there may also be used with advantage their products of reaction with aliphatic aldehydes, e.g., their methylol compounds. If these latter are used the separate after-treatment with formaldehyde can be omitted in many cases, a simple after-heating operation sufficing. C.

Phenol-Aldehyde Resins: Application to Impart Hydrophobic Properties to Cellulose. W. W. Groves, London (I. G. Farbenindustrie A.-G. ; Frankfort). E.P. 463,472 of 21/6/1935 : 22/3/1937.

Hydrophobic properties are imparted to cellulose fibres by applying to or incorporating with them a phenol containing at least one aliphatic or cycloaliphatic residue having at least 6 carbon atoms and exposing the fibres thus treated simultaneously or subsequently to the action of an aliphatic aldehyde or dialdehyde, for instance, formaldehyde or glyoxal. Suitable phenols are, for for example, isododecylphenol and di-isohexylphenol. Instead of the phenols there may be used with advantage their products of reaction with aliphatic aldehydes, for example, their methylol compounds. If these latter are used the separate after-treatment with formaldehyde can be omitted in many cases, a simple after-heating operation sufficing. C.

Cloth Damping Apparatus. Hunt & Moscrop Ltd. (Middleton) and E. W. Hunt. E.P.463,500 of 30/1/1936 : 1/4/1937.

Apparatus for damping textile fabrics, paper, and the like of the type in which the liquid is directed on to a smooth or a roughened or serrated surface which causes it to be broken up into a fine mist or spray and deflected into contact with the material to be treated comprises two mist or spray producing surfaces arranged at an angle to one another, each surface being supplied with liquid from a separate set of nozzles or jets whereby the spray deflected from the two surfaces meets and intermingles at a line beyond the meeting line of the surfaces or if the latter do not meet, at a line beyond the line at which they would meet if prolonged, thus producing a greater atomising of the liquid. The spray boards may be fixed or adjustable with respect to one another and also to the horizontal. C.

Cellulose Acetate-Stiffened Shoe Fabric: Production. British United Shoe Machinery Co. Ltd. (Leicester). E.P.463,633 of 1/10/1935 : 1/4/1937.

Fibrous sheet material is treated with a solution of cellulose acetate of acetyl number 48-54½ and the impregnated material is cooled to allow the cellulose acetate to be deposited in and on the material. The product is suitable for use in stiffening parts of shoes. C.

Mercerising Liquor Wetting Agents. W. W. Groves, London (I. G. Farbenindustrie A.-G. ; Frankfurt). E.P.463,644 of 3/10/1935 : 5/4/1937.

A mercerising liquor contains a salt of a carboxylic acid of the general formula $H(CH_2)_m.X.(CH_2)_nCOOH$, where X is one of the divalent radicals O, S, NH or N-alkyl and m and n equal 1 or a whole number but $m+n$ equal at least 3 and do not exceed 9. The salts of these acids, which, in aqueous solution, have themselves no wetting properties, are excellent wetting agents in mercerising liquors. They are advantageously used in combination with phenols, highly sulphonated oils or solvents, such as glycol ethers. C.

Cloth Plaiting Machines. Bleachers' Association Ltd. (Manchester) and J. Grundy. E.P.463,762 of 6/5/1936 : 6/4/1937.

A cloth plaiting machine, particularly a machine for plaiting double or double-doubled cloth, is provided with a wince having a plurality of radially projecting

longitudinal edges and adapted to run freely in an adjustable mounting on the nose of the guide table whereby the wince can be adjusted and secured to ensure that the running or delivery edge is on or approximately on the centre line of the machine, whereby puckering of the cloth at the end of each stroke of the reciprocating folding knife is eliminated and the cloth is plaited in even folds. C.

Sulphonium Salt Levelling Agents: Application. H. A. Piggott, C. S. Woolvin, and Imperial Chemical Industries Ltd. (London). E.P.464,110 of 11/10/1935: 12/10/1936.

Natural or regenerated cellulose, wool, or mixtures of these materials, are dyed with vat dyes in an alkaline vat with which has been incorporated a ternary sulphonium salt having the general formula R.CO.NH.Ar.SXYAc, where R is a normal aliphatic chain having at least 10 carbon atoms, Ar is an aromatic nucleus of the benzene series, X and Y are lower alkyl and Ac is a radical of an inorganic acid or of an organic sulphonic or carboxylic acid. C.

Process for Rendering Wool Materials Unshrinkable. A. J. Hall, W. N. Hicking and S. J. Pentecost. E.P.464,503 of 19/4/1937.

The tendency of wool to felt and therefore to shrink is reduced by treating it with a solution of not more than about 2 per cent. by volume of sulphuryl chloride dissolved or dispersed in an inert organic liquid, removing the solution, washing with water and neutralising residual acid with ammonia or soda ash or equivalent, washing with water, and drying. The process relates to the treatment of materials consisting wholly or partly of wool, and which may be in the form of fibres, yarns or fabrics. The wool treated acquires a moderately increased affinity for acid dyes. The process may be conveniently worked in conjunction with the carbonising of wool. Examples are given. W.

5—ANALYSIS, TESTING, GRADING AND DEFECTS

(A)—Fibres

Photo-micrographic Apparatus: Application in the Textile Industry. A. Kufferath. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft* I, 29-33.

Various modern forms of apparatus for photo-micrographic work are shown and briefly described and their use in the textile industry is discussed. Photo-micrographs of fibres and fabrics are given. Methods of illumination and improved types of lamps are briefly discussed. C.

Wool: Spinnability. F. Calzone. *L'Ing. Text.*, 1937, No. 329, 51-66 (from *Boll. Laniera*, Sept., 1936).

A method for the determination of the spinnability of wool involves determinations of the mean length and fineness of the fibre, the preparation of a roving of 10's count using drafts that do not exceed the mean length expressed in cm., determination of the exact count of this roving and calculation of the twist to be applied to it to produce an angle of twist of 63° 26′, determination of the strength of a sample with this twist, determination of the number of fibres in the cross-section of the thread, calculation of the number of contacts and the linear friction (ρ) on the mean length, and finally calculation of the degree of spinnability ϕ from the relation $\phi = 2{\cdot}609\rho/r$, where r is the mean strength of the single fibre. The theory of the method is explained and formulae for the calculations are deduced. Examples are given and some general conclusions are outlined. C.

Animal Fibres: X-ray Structure. H. Biermann. *Monatsh. Seide u. Kunstseide*, 1937, **42**, 48-50, 93-94.

A general discussion of the study of fibre structure by means of X-rays and the results of recent studies of silk, wool, hair, and other protein fibres. C.

Cellulosic Fibre: Structure and Dyeing. Wanda K. Farr. *Amer. Dyes. Rept.*, 1937, **26**, 143-145.

The author expounds her conception of the cellulosic fibre as a mass of fibrils of ellipsoid cellulose particles embedded in a pectic medium and suggests that in studies on the mechanism of dyeing the fibre surface, the cementing material and the cellulose should be considered separately. C.

Cellulose Acetate Staple Fibre: Thermal Conductivity. H. Lohmann and P. Braun. *Textilberichte*, 1937, **18**, 202-206.

The heat transmitting powers of textile materials is discussed and a method of comparing different fibres is described. A mass of fibre is placed in a brass cylinder and compressed until 50 per cent. of the total volume occupied is occupied by fibre material. A thermometer is introduced into the cylinder with its bulb in the fibre mass, the cylinder is placed in a water bath maintained at 40° C., and thermometer readings are taken every minute. When the thermometer records 40° C. the cylinder is transferred to a water bath maintained at 20° C. and readings are again taken every minute. Heating and cooling curves are constructed and the heating or cooling velocity constant is determined. The velocity constants of different materials are proportional to their thermal conductivities and provide a suitable basis for comparisons of the latter. Results are given for wool, Rhodia staple fibre, Vistra and Cuprama fibres; the conductivities increase in the order given, the velocity constant for Rhodia staple fibre being very little greater than that for wool. Tests with fibre masses pressed to different fibre : air ratios showed that the differences between the different types of fibres were less marked with higher air contents. The thermal conductivity of dry staple fibre was somewhat higher than that of the air-moist fibre. The denier of the staple fibre and the shape of its cross-section had no influence on its thermal conductivity but delustring with titanium dioxide produced a small increase in conductivity. C.

Lanital Fibre: Micro Dry Distillation. A. Kutzelnigg. *Textilberichte*, 1937, **18**, 201-202.

Photo-micrographs showing the effects of micro-dry-distillation, i.e. heating between two cover glasses, on Lanital fibres and also on wool and degummed silk are given. The charactistic feature of Lanital fibre is the formation of funnel-shaped bubbles on moderate heating. The bubbles or groups of bubbles formed in silk are separated by thin threads but this is not generally the case in Lanital. The appearance of the latter may in certain circumstances resemble that of cotton swollen in cuprammonium solution. Transverse structure elements are observed. On further heating the Lanital fibre begins to melt. Sometimes the original bubbles burst and new flat bubbles form. Dendritic structures are occasionally formed from the liquid drops. The surface layer of Lanital fibre appears to differ in constitution from its interior. C.

Quantitative Analysis of Blends of Animal Hairs. J. H. Shinkle. *Amer. Dyes. Rep.*, 1937, **26**, 119-120.

A microscopic method was used. Sections of yarn approximately $\frac{1}{4}$-in. long were cut, and the fibres teased out and mounted in mineral oil. An alternative, and equally satisfactory, method was to cut across the yarn with two razor blades of the wafer type both clamped in one holder, then mount the short fragments in mineral oil. The fibres were then measured and counted and the average diameter of each type obtained. If wool and mohair were not easily distinguished the scale-size method of Shinkle was used (see *J. Text. Inst.*, 1936, A90). An example of the calculation is given, using a modification of a formula due to Herzog and Preston. A table is given showing the results obtained, the error being usually 1 per cent. and in no case more than 3 per cent. Only one sample of wool-camel hair blend was available, but there is no reason to suppose that the same method would not be equally accurate on this or any other blend of animal hairs of the same density and the same nearly round cross-section. W.

Variation of the Sulphur Content of Wool. P. Larose and A. S. Tweedle. *Canadian J. Res.*, 1937, **15***B*, 124-131.

The results obtained by other investigators which have a bearing on the variability of the sulphur content of wool are reviewed briefly. The variability of the sulphur content is discussed on the basis of the various factors that might affect it. The effect of light is appreciable and is a very important one. Any sulphuric acid formed by the action of light, or present owing to some other cause, is difficult to remove by ordinary washing. The effect of boiling water is small. Kempy fibres contain less sulphur than non-kempy fibres of the same wool. The root portions of fibres have a higher sulphur content than the tip portions, while middle portions have intermediate values. The writer's results and those

of other investigators which are reproduced do not allow of any definite relation being drawn between sulphur content and fineness. W.

Effect of Sulphur Content on the Properties of Wool. O. Routala and O. Kyllijoki. *Suomen Kemistilehti*, 1936, **9***A*, 49-53 (through *Chem. Abs.*, 1937, **31**, 2440).

The S content of wool was determined by the method of Saarinen (see *Suomen Kemistilehti*, 1935, 8*A*, 44-45, 57-61).

The authors found that fine wools had a higher S content and that there was a direct relation between strength and S content. Some S is lost in the washing and bleaching processes and the loss is greater with more alkaline solution and a higher temperature. To keep S losses at a minimum the solution should be acid as in the dyeing process. W.

Quality Studies of Farm Wool. H. Tossavainen and E. J. Simola. *Teknillinen Aikakauslehti*, 1936, **26**, 426-433 (through *Chem. Abs.*, 1937, **31**, 2440).

Comparisons of three main types of Finnish wool were made as to grease, dirt, fineness, fibre-length and evenness. W.

Determination of Mercury in Carrotted Fur. F. H. Goldman. *U.S. Pub. Health Repts.*, 1937, **52**, 221-223 (through *Chem. Abs.*, 1937, **31**, 2442). W.

(B)—YARNS

Cotton and Spun Rayon Warps: Weaving Quality. H. Pomfret. *Text. Mfr.*, 1937, **63**, 141, 144.

A report of a lecture on the value of testing at various stages of warp preparation. Some tests on a sized 30's spun rayon yarn are recorded that indicate that the stretch in sizing balanced the added weight so that the count was unchanged. A comparison between 30's yarns spun from combed American cotton, $1\frac{1}{8}$ in. staple, and "Fibro," $1\frac{1}{2}$ in. staple, both about 15·5 t.p.i. is also, recorded. C.

"Scott" Inclined Plane Serigraph: Rate of Loading Effect. A. S. Hunter. *Amer. Silk & Rayon J.*, 1937, **56**, No. 1, 25-28.

Experiences in the testing of single threads of rayon on the "Scott" serigraph are recorded in tables and graphs. In the first place, it is shown that breaking load increases with the rate of loading and decreases with length of specimen. The increase is much more pronounced than it is with cotton yarn and is emphasised as a valuable property of rayon. For testing purposes, therefore, although the Scott serigraph secures a constant rate of loading, the rate needs to be adjusted to the denier of the sample so that yarns can be tested under a common rate of loading per denier per unit time. The ideal is to obtain stress-strain curves of a uniform shape from which the yield point is easily determined. For 20-in. specimens a rate of 4 gm./den./min. is found suitable. Tests on rayons ranging in denier from 50 to 200 are recorded on this basis and further graphs provide a direct comparison between silk, cotton and rayon. C.

Faulty Coloured Twist Yarn Knitted Goods: Examination. H. Bach. *Monatsh. Seide u. Kunstseide*, 1937, **42**, 87-91.

When fancy yarns are produced by twisting together two yarns of different colour, considerable variations in the appearance of the twisted product may be caused by irregularities in the thickness and colour for the single yarns and by irregularities in twisting, e.g. variations in the tensions at which the yarns are fed to the twisting machine. Light and dark sections or bands in knitted goods may result from the use of such irregular coloured twist yarns. Differences due to irregularities in the twisting operation may be detected by comparing the contractions on twisting, determined by means of the Frenzel-Hahn twist counter, of the constituents of yarns from the light and dark portions. Results obtained in the examination of faults in stockings and socks are given, together with photographs of normal and irregularly twisted yarns. C.

Hosiery Crepe Thread: Minimum Twist Specification. W. T. Leggis. *Textile World*, 1937, **87**, 702-703.

The "standard specifications," proposed by the National Association of Hosiery Manufacturers, are criticised, particularly on the ground that they do not distingulsh between initial and final twist. Examples are quoted to show the need for such differentiation. The author proposes the following definition:

" Hose to be designated as crepe should be constructed in the body or boot of yarn in which the total number of turns per inch in both the initial and final twists shall be at least 100 for two-thread, 85 for three-thread, 70 for four-thread and 60 for five-thread. Also, the minimum final twist shall be 45 for two-thread, 40 for three-thread, 35 for four-thread, and 30 for five-thread." C.

" Scott " Inclined Plane Serigraph : Rate of Loading Effect. A. G. Scroggie and M. Castricum. *Textile Research*, 1937, **7**, 211-212.

A few tests on cotton yarns ranging from $7\frac{1}{2}$'s to 63's on the Scott inclined plane tester show that an increase in the rate of loading per unit of yarn weight results in higher apparent strength and lower extension, though the effect is not so great as it is with rayon. The data recorded are means of at least 40 measurements. Counts (nominal) are converted into deniers and rates of loading are given in grams per second and grams per denier per minute. C.

Twist Tester : Application. W. Frenzel. *Textilberichte*, 1937, **18**, 209-210.

The author shows by means of examples how it is possible to determine, by means of the recording twist tester, the changes in length of yarns on twisting and the effective lengths and counts of the twisted products. C.

(C)—Fabrics

Direct-dyed Rayon: Fastness to Washing. A. M. Patel. *Amer. Dyes. Rept.*, 1937, **26**, 55-58.

Regenerated cellulose discs have been dyed with substantive cotton colours in a bath containing 0·05 g. dye per l. and 5·0 g. sodium chloride per l., or its equivalent of any other electrolyte. Two methods of stripping were used according as to whether desorption was carried to its final stage, or whether the dye removed in a certain time was estimated. The effect of electrolytes, and of heat, on fastness has been examined, and the data obtained are tabulated. Aluminium sulphate and thorium nitrate were the only electrolytes used that materially improved fastness. Rate of desorption was observed to be less than that of absorption, but this condition is reversed by adding large amounts of electrolytes. These results indicate that fastness to washing is affected by the size of the dye micelle ; this theory is elaborated. Fastness to washing depends upon the amount of dye absorbed at equilibrium, and the way in which it increases with the concentration of the electrolyte added to the dye bath. Experiments with dyes that vary greatly in their colloidal properties show that those dyes which are readily taken up by cellulose are very poor to washing ; technical experience confirms this. An increase in fastness has been partly achieved by replacing the sodium ion by a complex cation having only a negligible solubility in water, and in dilute soap solution. Thus boiling the dyed material in 0·05 per cent. thorium nitrate increased fastness to water considerably, but not fastness to soap or dilute alkali. C.

Dyed Textiles : Fastness. H. Ris. *Textilberichte*, 1937, **18**, 93-94, 161-164.

A general account is given of methods of measuring the fastness to light of dyed textiles. The development of the German fastness standards is outlined and the English and American standards are briefly discussed. The method of measuring fastness developed in France which depends on colour analysis by means of the Toussaint photocolorimeter is described and some disadvantages of this method are pointed out. C.

Fabrics : Testing. H. Sommer. *Spinner u. Weber*, 1937, **55**, No. 7, 1-4.

The aims of textile research in Germany are outlined and methods of testing textiles are briefly discussed. It is pointed out that a better indication of the wearing qualities of fabrics is obtained from bursting strength and wear tests than from ordinary strength tests. The practical importance of determinations of resistance to washing, shrinking and other changes of form, and creasing, and of determinations of heat insulating powers, permeability to air, and water-repelling properties is discussed. C.

Rayon Fabrics : Quality Control. D. L. Armstrong (for Courtaulds Ltd.). *Textile Weekly*, 1937, **19**, 429-433.

An announcement is made of a plan " to ensure that products made with Courtaulds' yarns conform to specifications of consumer serviceability, established

by us (Courtaulds) before they have Courtaulds' trade mark attached to them so that our label shall be a visible symbol . . . that these products have passed a series of qualifying tests." The plan foreshadows co-operation with a new Testing House to be opened in London by the Retail Trading Standards Association and the proposed tests are for fabric structure, freedom from excessive weighting, etc., strength, ability to stand washing or dry-cleaning, colour fastness, and resistance to fraying. C.

Weft Diamond Patterns : Analysis. J. M. Preston. *Text. Mfr.*, 1937, **63**, 54-56, 60.
The analysis of diamond patterns in woven fabrics produced by periodic variations in the weft is discussed and a general equation for the ratio of yarn period to pick length in terms of the number of diamonds in the direction of the weft between the selvedges and the number of picks required for the pattern to repeat is deduced. The range of diamond patterns and the limitation of possible patterns are discussed, and typical examples are studied. C.

Electrical Insulating Materials : Thermal Conductivity. J. A. Weh. *Gen. Elect. Rev.*, 1937, **40**, 138-140.
A direct electrical method of measuring the thermal conductivity of a single specimen of test material is described. The apparatus consists of hot and cold plates to set up a temperature drop across the sample and instruments and accessories for measuring the heat flow. Some typical results are tabulated, expressed as thermal resistivity and thermal conductivity. In general the error in these measurements is less than ± 10 per cent. which is usually within design requirements. The factors contributing to the total error are discussed individually. The conductivity of a varnished cloth is given as 0·0019 to ·0023 watts/sq. cm./°C./cm. and that of cellulose acetate as 0·00185. C.

Fabric Trapezoid Tearing Test Apparatus. H. R. Bellinson. *Textile Research*, 1937, **7**, 208-210.
A "Tentative Standard" of the American Society for Testing Materials recommends cutting fabric for the tearing test to a trapezoidal shape, 3 ins. wide, top 1 in., and bottom 4 ins. A board is now described that facilitates cutting the specimen and fixing it in special clamps. Two grooves are cut in the board to correspond with the sloping edges of the trapezoid and the lower parts of the clamps fit in these grooves, flush with the surface. C.

Some Analytical Methods Used for the Identification of Dyeing Faults. H. R. Hirst. *J. Soc. Dyers and Col.*, 1937, **53**, 45-50.
An account of methods for the detection of defects in wool due to alkaline solutions, acid stains, metallic impurities, carbonising, chlorinating, traces of oil, scorching and miscellaneous faults. W.

Tests of Fabrics used in the Rubber Industry. P. Bourgois. *Rev. gen. caoutchouc*, 1936, **13**, No. 126, 11-13 (through *Chem. Abs.*, 1937, **31**, 2861).
The general technique of various tests is described, including examination in filtered ultra-violet light, resistance to heating, moisture content, structure, tensile strength, extensibility, sizing, discolouration, behaviour on washing, permeability, permanent deformation, etc. W.

(D)—Other Materials

Spectrophotometer : Application to Colour Problems. A. C. Hardy. *Amer. Dyes. Rept.*, 1937, **26**, 67-71.
The procedure by which an observer inspects a piece of coloured cloth with the spectrophotometer is briefly described. The possible applications of spectrophotometry to the textile industry are divided into (1) colour measurement and specification, (2) qualitative and quantitative estimation of the behaviour of dyes and pigments in mixing, (3) colour analysis, (4) means of discovering new colour phenomena, (5) means of making a graphical representation of colours, (6) means of obtaining theoretical specifications in problems connected with change or neutralisation of colour without loss of brightness (e.g., the choice of a blue to correct yellowness). Each of these categories is briefly discussed, and in some cases examples are described. C.

Tendered Cotton Goods: Fluidity Test. F. H. Guernsey and L. T. Howells. *Amer. Dyes. Rept.*, 1937, **26**, 62-67.

The B.C.I.R.A. fluidity test is explained and the equipment in use in the laboratory of an American firm of manufacturers of laundry materials is described. The authors call the fluidity numbers " chemical tendering units " and regard 10 units as the maximum permissible for new goods, 35 as the " end of service " point (limit of useful life) and 50 the point at which cellulose is completely degraded. C.

Waterproofed Fabric Testing Apparatus. (1) T. Stenzinger, (2) H. Bundesmann. *Textilberichte*, 1937, **18**, 168-169 and 169.

(1) The author replies to some criticisms of his comments on their apparatus made by Franz and Henning and discusses the claims to originality of both the Franz and Henning apparatus and the Bundesmann apparatus. Further criticisms of the Franz and Henning apparatus are made and the advantages of the Bundesmann apparatus are pointed out. (2) Bundesmann points out that he developed his apparatus without any knowledge of that of Franz and Henning and that the difference was sufficient to warrant the granting of a patent. He expresses the opinion that both forms of apparatus are simply combinations of previously known testing processes and conditions. C.

Paper: " Opacifying Power " of Components. F. A. Steele. *Paper Trade J.*, 1937, **104**, *TAPPI*, 129-130.

In treating the gross optical properties of papers mathematical relationships have already been presented which permit useful calculations concerning the opacity, reflectivity and basis weight of paper. It is now shown how these equations can be used to determine the individual contributions of the components of paper to its opacity. The " opacifying " powers of fibres, pigments, and fillers, are presented and discussed. C.

Pulp: Hysteresis in Water Sorption. C. O. Seborg. *Ind. Eng. Chem.*, 1937, **29**, 169-172.

After the original desorption, hysteresis in a highly beaten spruce sulphite pulp was found to persist unchanged in magnitude on repeated sorption cycles over a range of 0 to 95 per cent. R.H. The ratio of adsorption equilibrium moisture contents to the corresponding desorption values of a wide variety of paper-making pulps and stuffs over a range of 12 to 88 per cent. R.H. is apparently a constant, slightly higher than the corresponding values for lignin, kapok, and wood. The theory that sorption hysteresis can be attributed to the difference in number of hydroxyl groups available for attachment of water molecules during adsorption and desorption appears inadequate. An adequate explanation of the hysteresis phenomenon should include the consideration of some additional factor of a physical nature. C.

Thread Density Counting Device. *Monatsh. Seide u. Kunstseide*, 1937, **42**, 94-96.

A device for counting warp and weft densities in fabrics comprises a microscope travelling along a suitable support and over a graduated scale resting on the fabric, and a counting device. The eyepiece of the microscope is provided with a cross-thread and the key of the counting device is pressed each time this thread passes over a thread of the fabric. The scale may be graduated in millimetres or inches. Measurements may be made of the distance traversed in passing over only a few threads and from tables it is possible to obtain the corresponding number of threads per centimetre or inch. C.

Waterproofed Fabric Testing Apparatus. (1) E. Franz and H. J. Henning. (2) H. Bundesmann. (3) T. Stenzinger. (4) E. Franz and H. J. Henning. *Textilberichte*, 1937, **18**, 245-246, 246-247, 247, 247-248.

Further criticisms and replies and discussions of priority claims. C.

Paper Extracts: Conductivity Measurements. A. Lambertz and B. Schulze. *Zellstoff u. Papier*, 1937, **17**, 104-106, and *Papier Fabrikant*, 1937, **35**, Tech. 67-70.

A relationship is established between the electrical behaviour of condenser papers and the conductivities of their aqueous extracts. Two suitable arrangements are described for making such measurements one employing a telephone in the Wheatstone's bridge and the other the grid circuit of Jander and Schorstein. C.

Humidity Measuring Instruments. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft* I, 33-34.

The importance of temperature and humidity control in the textile industry is pointed out and the selection of suitable indicating devices is briefly discussed. Photographs of suitable instruments are given and the advantages of automatic recording devices are outlined. C.

Determination of Sulphate and Sulphuric Acid in Wool. A. Eavenson and J. W. Creely. *Amer. Dyes. Rep.*, 1936, **25**, 719-722 and 732.

An investigation is recorded on the limitations of Barritt's pyridine method for the determination of sulphuric acid in wool (*J. Text. Inst.*, 1935, **26**, T87-T92). By applying various methods of exhaustive extraction, e.g., (1) 5 times with 0·5 per cent. pyridine at 55° C., (2) 42 times with boiling water, followed by 5 times with pyridine as in (1), and (3) frequent determination over a period of 60 days with 0·5 per cent. pyridine as extractant, it is concluded that, irrespective of the original total acid, a constant amount (0·72 per cent.) is not determined by this method. This result was checked by determinations of total sulphate, using a modification of Mease's method (*J. Text. Inst.*, 1935, A102). It is concluded that if extraction by pyridine is made at the boiling point, the method is ideal for mill control. W.

Determination of Sulphur in Wool. P. Larose and A. S. Tweedie. *Canadian J. Research*, 1937, B15, 65-74.

A modification of Pregl's micromethod for the determination of sulphur in organic compounds has been found to be satisfactory and convenient when applied on a micro scale to wool. The investigation of various methods of cleaning the samples shows that the best results are obtained when the wool wax is extracted with a solvent before washing with water. It is shown that a treatment with dilute hydrochloric acid is not necessary in preparing the sample. Three different procedures have been followed in determining the dry weight of the sample and the differences in the results are discussed. Results obtained by the new method are compared with those obtained by other recognised methods and the agreement with the results of the Benedict-Denis-Barritt method is shown to be very good. W.

Thermoelectric Method for Determining Atmospheric Humidity. W. Bachmann. *Arch. Hyg. Bakt.*, 1936, **117**, 139-143 (through *Brit. Chem. Abs. B.*, 1937, **56**, 396.

The current generated between a " dry " and a " wet " element is measured and the values at different air temperature and absolute humidity are used to calculate the relative humidity. W.

Detection of Arachis Oil in Olive and Almond Oils. N. Evers. *Analyst*, 1937, **62**, 96-101.

One ml. of the oil is saponified with 5 ml. of 1·5 *N*-alcoholic potassium hydroxide solution by heating on a water-bath for 5 minutes, avoiding loss of alcohol; 50 ml. of 70 per cent. alcohol are added, followed by 0·8 ml. of hydrochloric acid (sp. gr. 1·16). After heating to dissolve any precipitate that may be formed, the solution is cooled in water, stirring continuously with a thermometer, so that the temperature falls at the rate of about 1° C. per minute. If a turbidity appears before the temperature reaches 9° C., the usual confirmatory test for arachis oil must be applied; if the liquid remains clear, arachis oil may be regarded as absent. Precise details of necessary precautions to be observed are given. W.

7—LAUNDERING AND DRY CLEANING

(A)—Cleaning

Hydrocarbonated Soaps: Production, Properties and Application. J. P. Sisley. *Rev. Gén. Mat. Col.*, 1937, **41**, 66-77.

A general account is given of the preparation, properties, and uses in scouring, bleaching and similar processes of soaps in which hydrocarbons are incorporated for the purpose of improving solvent and emulsifying powers. C.

Oil and Rust Stain Removers: Application. P. J. Ariente, W. H. Cady and B. Verity. *Amer. Dyes. Rept.*, 1937, **26**, 133-134.

The principal oil and rust stain removers are classified as " safe " and " unsafe " with respect to their influence on cloth during storage before bleaching or in the bleaching operation. A recommended " spot wash " consists of white castile soap, 10½ lb., chloroform, ½ lb., ammonia 26° Bé, 3 lb., and water to 300 lb. C.

Soap and Synthetic Detergents: Application. J. Nüsslein. *Textilberichte*, 1937, **18**, 248-252.

A general account is given of the properties and uses of soap, Nekal A, Amphoseife DN, Igepon A and T, Medialan A, and Igepal C, W, L and F, and the extent to which these synthetic detergents and finishing agents are displacing soap in textile processes is discussed. C.

8—BUILDINGS AND ENGINEERING

(A)—Construction of Buildings

Magnesium Oxychloride-Copper Cement and Adhesive. D. S. Hubbell. *Ind. Eng. Chem.*, 1937, **29**, 123-132.

The shortcomings which have restricted the use of magnesium oxychloride cements are eliminated by the addition of 10 per cent. of finely divided copper powder. During and for long periods following the hardening of the cement, the metal is converted to a new cementing material which resembles the natural mineral, atacamite. The formation of this new phase in the cement composition increases its strength and resistance to abrasion, prevents its damage by water, eliminates harmful expansion, reduces efflorescence, and imparts sufficient tolerance of lime to permit of permanent bond to Portland cements. Tables and graphs showing the effects of different proportions of copper on the various properties are given and the uses of the new product are briefly discussed. C.

Stainless Steel: Application for Bleaching Plant. J. E. Goodavage. *Amer. Dyes. Rept.*, 1937, **26**, 71-75.

Experiments are described on the effect on 1-vol. hydrogen peroxide solution made alkaline with sodium silicate (*p*H about 10) when metals commonly used in the textile industry are placed in contact with it. The effect of definite areas of metal to volume of solution has also been studied. The results are presented as tables and graphs, and the following conclusions have been drawn. (1) Assuming that 50 per cent. decomposition is the average for plant practice, the most economical metals for peroxide bleach baths are nickel, aluminium, and " Enduro 18-8s." (2) When ratio of area to volume is taken into consideration, and also the time and temperature, nickel and Enduro 18-8s are the most practical. (3) Stainless steel, soldered with silver solder, varies in its effect on the peroxide bath; it is not desirable to use soldered containers for peroxide bleaching. (4) Wool has a slight stabilising effect on alkaline peroxide bleaching solutions. (5) The following are the tolerance limits (ratio at which decomposition occurs) of area/volume ratios for various metals:—copper, 3 sq. cm. per 100 c.c.; " Everdur," less than 4 : 100; Monel, less than 4 : 100; aluminium, 8 : 100. (6) Enduro 18-8s is almost as inert as porcelain or glass to peroxide bleaching solutions. With respect to calcium hypochlorite bleaching liquors, a notably high resistance is shown by Enduro 18-8s and Enduro 18-8s Mo. C.

Nickel Alloys: Application in Bleaching Plant. G. L. Cox and F. L. LaQue. *Amer. Dyes. Rept.*, 1937, **26**, 127-132.

The principal factors governing the behaviour of Monel and other non-ferrous nickel alloys in hypochlorite bleaching solutions are (1) the concentration of available chlorine, (2) the duration of each individual contact of the metal with the solution, (3) the condition of the metal surface (e.g. smoothness), and (4) the presence of corrosion inhibitors (e.g. sodium silicate). An investigation of the effect of each of these factors is briefly described and the use of Monel metal is recommended for ordinary bleaching apparatus. Monel, nickel, and Inconel are not recommended, however, for tanks or pipe lines to handle concentrated stock bleaching solution. Hastelloy C. may be used for such purposes. Peroxide solutions are relatively non-corrosive, but more susceptible to decomposition. The major factors influencing stability such as temperature, *p*H, and so on are listed. Evidence is adduced to show that both nickel and Monel have a negligible

catalytic effect on the decomposition of peroxide bleaching solution and that impurities in the air have a larger effect than the metals in question. Examples of successful use of Monel for both hypochlorite and peroxide bleaching are quoted. C.

(C)—Steam Raising and Power Supply

Engines: Vibration Problems. J. P. den Hartog. *J. Applied Physics*, 1937, 8, 76-83.

A general review of problems of vibration in machinery and especially of the torsional oscillations in the shafting of Diesel engines. The torque-time curve in this machine is periodic but quite irregular and the speed range exhibits several spectra of resonances. Methods of overcoming this difficulty, such as avoiding critical speeds and the use of dampers, are described. Problems in vibration presented by the modern steam turbine are also considered. It is found necessary to measure the natural frequencies of the various parts, and several such measurements are described. The Thearle balancing head and the Baker balancing machine for balancing rotating machines are described. The importance of vibration in so static a structure as an electric transmission line is briefly explained and other recent problems, partly or completely solved, are mentioned. C.

"Patchett" Electrical-Steam Engine. Supreme Power Co. Ltd. *Textile Weekly*, 1937, 19, 277-278.

Claims of power economies, absence of chimneys, smoke, etc., are made for an engine in which the feed water is supplied to a special electrically heated boiler. In a test the steam pressure reached 200 lb. in ten minutes. C.

(D)—Power Transmission

Finishing Machine Multi-motor Drives. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft* I, 14-16.

Multi-motor drives for textile finishing machines are described and shown in diagrams and photographs. C.

Individual Electric Loom Drives: Operation. H. Stein. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft* I, 17-20.

A discussion of individual electric drives for looms with different systems for transmitting the motion from the motor to the crank shaft and various arrangements for reducing the influence on the motor of the load and current variations due to the irregular running of the loom. C.

Textile Machinery Bearings: Lubrication. H. Esch. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft* I, 12-14.

A general discussion of modern types of bearings for textile machines, methods of applying lubricants, and the selection of suitable lubricating agents. C.

Variable Speed Gear. Glasgow Electrical Engineering Co. Ltd. *Engineer*, 1937, 163, 312.

A development of the expanding pulley Vee belt variable speed drive depends for its action on the axial movement of the two cones between which there is imprisoned the wedge-shaped belt. The closer together the cones are pressed, the nearer to the circumference must the belt lie, and as a consequence the greater its linear speed. In this way, either with a pair of oppositely moving pulleys or with a jockey pulley to take up the slack of the belt, an infinitely variable range of speed can be attained. The cones are cut up into a series of radial fingers which interlace much after the fashion of the fingers of the hand in praying. With this arrangement it is only necessary to have a belt sufficiently wide to bridge between the two cones at the smallest diameter and effective contact will still be made with the driving faces at the extreme diameter. The gears are made in a variety of forms, with single and double reductions for powers ranging up to 12 H.P. and with speed ratios with a maximum of about 2 to 1. C.

(G)—Heating, Ventilation and Humidification

Eupatheoscope: Application. C. D. Niven. *Canadian J. Res.*, 1937, **15**, A 25-33.

Readings have been taken on the eupatheoscope and compared with readings on thermometers and with readings on the American Society of Heating and

Ventilating Engineers effective temperature chart. It was found that the mean of the readings on two thermometers, situated one at the floor level and one at the level of the head of a sedentary worker, gave a value fairly close to the reading on the eupatheoscope. The general conclusion is reached that elaborate apparatus for reading comfort temperature is not justified until an explanation has been given of what constitutes " freshness " of air, but that in Canada in rating comfort conditions more attention should be paid to temperature gradients, which are pronounced during spells of zero weather. The effects of the " Rutledge Pure Air " system, in which shallow pans are placed very close to the ceiling and water circulated through them, are discussed. C.

Humidification Plant : Application. M. C. Marsh. *Text. Mnfr.*, 1937, **63**, 111-112.

A report of a lecture on mill humidification in the wool industries. Types of humidifying plant are described and factors affecting the choice of plant, and its control, are indicated. C.

Air Conditioning Plant : Installation. E. R. Dolby. *Engineer*, 1937, **163**, 260-262 ; *Engineering*, 1937, **143**, 243-244, 299-301 (Discussion, p. 239-240).

Two reports of a lecture on the installation of air-conditioning plant in public buildings. Typical installations and various parts, such as pre-heaters, ducts, filters, ozone generators and control instruments are described. Special attention is paid to refrigeration and a centrifugal refrigerator employing methylene chloride is described in detail. C.

Weaving Shed Dust : Composition. B. V. Ponomarenko. *Guigiéna Trouda*, 1936, **14**, No. 1, 87-89 (through *Chim. et. Ind.*, 1936, **36**, 924).

Silica contents ranging from 2·96 per cent. to 25·37 per cent., and sesquioxide contents (chiefly ferric oxide) of 4·19 to 24·13 per cent. are recorded. On the whole, the coarser particles contain more silica and less ferric oxide. C.

Tables and Calculations for Air Conditioning. E. Kuster and H. Meixner. *Arch. Hyg. Bakt.*, 1936, **117**, 158-178, (*through Brit. Chem. Abs., B.*, 1937, **56**, 396).

Tables, nomograms, and methods of calculation are given for the conditioning of the atmosphere of rooms at different temperature and relative humidity. W.

(I)—Waste Disposal

Textile Mill Waste Water : Purification. K. Lorenz. *Textilberichte*, 1937, **18**, 273-274.

The difficulty of purifying waste water of textile mills is discussed and the conditions to be fulfilled by purification plant discharging the waste water into rivers are described. Chemical treatment of the water is discussed and the different stages involved are outlined. C.

Patents

Air Conditioning Plant. A.-B. Svenska Fläkt-fabriken (Stockholm). E.P. 463,369 of 3/7/1936 : 30/3/1937.

Air conditioning plant is provided with a number, at least two, of alternatively working systems for controlling the water content and temperature of the air, the supply of fresh air and, if desired, also other factors such as ozone content that are of importance for the condition of the air, and with at least one shifting device, by means of which one system or the other is set into operation automatically in dependence upon the condition of the outdoor air, for instance heat content, in relation to the condition of the indoor air to be conditioned. C.

Air Conditioning Plant. Heating Ventilating & Air Conditioning Co. Inc. (New York). E.P.463,855 of 4/9/1936 : 7/4/1937.

In an air-conditioning apparatus the condenser coil of the refrigerating system is directly air-cooled and the apparatus further comprises an enclosing casing provided at its upper end with a chamber containing means for cooling air drawn through and discharged from it by a fan, and a compression refrigeration machine, including a compressor and a motor, located in the casing below the chamber and disposed in vertical alignment with each other, the shaft of the motor being directly coupled to the compressor of the refrigerating machine, and a second fan mounted on the shaft of the motor for drawing air into the lower part of the casing and discharging it therefrom after circulation round the air-cooled condenser coil of the refrigerating machine. C.

9—PURE SCIENCE

Cotton Lint: Character in Relation to Position of Bolls on Plant. K. R. Sen and M. Afzal. *Indian J. Agric. Sci.*, 1937, **7**, 35-47.

Measurements of fibre length, seed and lint indices, mean fibre-mass per unit length and mean proportion of mature fibres for cotton from bolls from different positions on cotton plants of the Punjab-American strain are recorded and discussed. Temperature and humidity data for the period of growth are also given and difficulties due to shedding of bolls are mentioned. It is pointed out that bolls seem to possess a critical age within which the odds are heavily against their living up to maturity, and that the percentage of boll-shedding at any time of the flowering period seems to depend almost directly on the mean moisture percentage of the atmosphere. Analyses of the data show that fibre properties do not depend on the position of the boll on the plant. All the observed fluctuations could be explained by reference to the effect of climate. C.

Fumigation Testing Devices. A. B. P. Page and O. F. Lubatti. *J. Soc. Chem. Ind.*, 1937, **56**, T54-T61.

Different types of small spaces in ships and houses, and their penetration by fumigants are described. Volumes of intergranular spaces of certain food products, leaf tobacco in cask and in bale, sand, and glass beads are determined and an expression giving the permissible volume of a gas sample to be taken under certain conditions is developed and tested. Various methods are described of drawing samples from the types of spaces mentioned. C.

***p*H-Measuring Devices.** F. Schroeder. *Leipz. Monats. Text. Ind.*, 1937, **52**, *Fachheft* I, 6-8.

Various new German instruments for the measurement of *p*H, including the Neo-Komparator, the Pan-Photometer, the Panchromator, the Cito-Ionometer, the Ionograph, the Ultra-Ionograph, and the Kontroll-Ionometer, are briefly described. Photographs are given. C.

Standard Buffer Solutions: Preparation. Agnes Shore. *Biochem. J.*, 1937, **31**, 219-222.

A method is described by which a series of standard buffer solutions may be prepared from two or three stock solutions which are easily stored. C.

Chromotropic Acid: Colorimetric Determination in Commercial H-Acid. R. Joszt. *Textilberichte*, 1937, **18**, 95-96, 159-160.

A method of determining the chromotropic acid occurring as an impurity in commercial H-acid is described that depends on the development of a red colour by reaction of this acid with titanium sulphate in sulphuric acid solution and measurement of the extinction coefficient of the solution by means of the step photometer using the green S.50 filter. Investigations of the influence of the concentrations of the acids and reagents are described and sources of error are discussed. Details are given of the procedure finally adopted. C.

Resin: Determination in Papers and Pulps. H. F. Launer. *J. Res. Natl. Bur. Stnds.*, 1937, **18**, 227-234.

In a method for the determination of resin in papers, including papers that have been surface-sized with glue or starch or coated with casein-clay emulsion the extracting solution is 95 per cent. ethyl alcohol acidified with hydrochloric acid in the ratio 4 ml. of concentrated HCl : 1,000 ml. of alcohol. The solution is evaporated to dryness, the residue extracted with the solution evaporated and the residue dried, cooled and weighed. The equivalent weight of the extracted resin, based on oxidation by dichromate is suggested as the basis for a new criterion of the purity of the extract. The method is applicable also to the determination of natural resins in wood pulps. C.

Waxes: X-ray Analysis. S. H. Piper. *J. Soc. Chem. Ind.*, 1937, **56**, 61-66T.

A report of a lecture on the application of X-ray diagrams in the analysis of mixtures of aliphatic compounds, particularly waxes. C.

Cotton Hair Primary Substance: X-ray Diagram and Constitution. J. Gundermann, W. Wergin and K. Hess. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 517-526.

In recent lectures Hess and his co-workers have announced that the growing cotton hair (from hot-house plants) does not show the main features of the X-ray

diagram of cellulose until about the 35th day from the fall of the flower. Until then the diagram is characterised by two strong interferences of $d = 4{\cdot}14$ and 3·73 Å, ascribed to the " primary substance " of the cell wall. It is now shown that these frequencies are those of long-chain hydrocarbon systems and more particularly of the waxes ; they are given, for example, by carnauba wax. The period of the interferences is about 83Å which corresponds with a total chain length of about 64 C atoms. That is to say, the " primary substance " probably comprises compounds of alcohols and acids of the series C_{30}, C_{32} and C_{34}. The benzene extract of young cotton (15 days) is a wax with the same diagram, and m.p. 77-79° C. The wax from ripe cotton is a more complex mixture ; it has m.p. 68-78° C. and is resolved by methyl alcohol into an insoluble fraction with the same diagram as the wax from the young hair, and a soluble part with a period of 55Å. The C_{30}-C_{34} waxes of young cotton appear to be mixed with waxes down to C_{24} in ripe cotton. Evidence that the wax belongs to the cell wall rather than the cell content is provided by grinding the young hairs with sand under water so as to disintegrate the walls and wash away the cell content ; on pressing the residue to a compact, dry mass it could be stained with Sudan III. Although the young hair does not exhibit the main equatorial 101, 10$\bar{1}$ and 002 interferences of cellulose, the diagram includes a very sharp interference that persists after solvent extraction of the hair and corresponds with the fourth order interference of the base of the cellulose crystallite. This 040 interference is best seen in hairs up to nine days old but is also shown, in addition to wax interferences, by young coleoptiles of barley, many other seed hairs (poplar, dandelion, etc.) and the glumes of barley and rye. The appearance of the equatorial interferences, therefore, is not an indication of the first development of cellulose, but only of the onset of the secondary thickening. The role of wax in the growth of the hair is discussed and the conclusion is drawn that, in the early stages at least the framework of cellulose and the impregnating wax are formed from the protoplasm simultaneously. It is not suggested that the wax is utilised in the further development but that the thickening of the cellulose proceeds to such an extent that the small amount of wax in the ripe hair escapes detection by the X-ray method. Work of Fargher and Probert (1923/24) and Piper, Chibnall and others (1934) on the waxes is cited. C.

Soda-cellulose IV : Formation and Composition. K. Hess and J. Gundermann. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 527-537.

Soda-cellulose IV is the name given to a product obtained by washing mercerised cellulose with alkali of decreasing concentration, and recognised by its X-ray diagram. The present paper discusses the conditions under which it is formed, its alkali content and the possibility of producing it in the reverse order—by the action of alkali on cellulose hydrate. The X-ray diagram is exhibited when ordinary soda-cellulose is washed at 100° C. with 10 per cent. caustic soda, but at 20° C. the alkali concentration has to be reduced to 6 per cent. before the diagram appears. The diagram changes to that of cellulose hydrate when the compound is washed with 2 per cent. alkali at 100° C., but at 20° C. the compound retains its diagram in the presence of 0·5 per cent. alkali. The diagram closely resembles that of cellulose III (obtained by the action of dry ammonia on native cellulose) and it is doubtful whether the compound really contains Na ; analysis indicates at most 1 NaOH : 10 $C_6H_{10}O_5$. X-ray evidence as to the formation of soda-cellulose IV by steeping cellulose hydrate in 2·5-9 per cent. alkali is discussed at length. The evidence is obscured by the facts that the initial cellulose hydrate might contain a core of soda-cellulose IV and that the latter might only be formed as a skin in the reaction. C.

Lignin : Mercuration and Constitution. R. S. Hilpert, E. Littmann and R. Wienbeck. *Bev. Dtsch. Chem. Ges.*, 1936, **70**, 560-567.

The belief that lignin is fundamentally an aromatic compound rests largely on the fact that it can be mercurated. Attention is now called to the fact that mercury derivatives of aromatic compounds substituted in the ring are quite stable towards ammonium sulphide and acids whereas compounds with double bonds readily react with mercuric acetate to give derivatives that are easily decomposed by these agents. All the lignin materials tested and raw cotton and pulps, behave like compounds with double bonds. It is doubtful whether

lignin is aromatic; any aromatic fission compounds that are obtained from it are most probably due to chemical reactions. C.

Lignified Tissues: Extraction with Cuprammonium. R. S. Hilpert and Q. S. Woo. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 413-421.

Several workers have described the separation of wood into "cellulose" and "lignin" by extraction with cuprammonium and have assumed the "lignin" to be identical with that isolated by acid hydrolysis because of the agreement in methoxyl content. Experiments with pine, beech, straw, sisal, jute and asparagus rind are now described that throw doubt on previous work. The residual "lignin" is found to contain from 1 to 2 per cent. of N, firmly combined, and the "cellulose" regenerated from the extract also contains nitrogen and methoxyl. Wood also combines with ammonia in the absence of copper but the N content of the product is not so great. C.

Oleic Acid, Methyl Oleate and Oleyl Alcohol: Auto-oxidation. L. A. Hamilton and H. S. Olcott. *Ind. Eng. Chem.*, 1937, **29**, 217-223.

The course of oxidation of oleic acid, methyl oleate, and oleyl alcohol has been studied by an apparatus and methods that permit the simultaneous measurement of the oxygen absorbed and of its distribution among the transitory and final products of oxidation, including water, carbon dioxide, and carboxyl, hydroxyl, peroxide and aldehyde compounds. Details of the methods and apparatus are given and the results are tabulated and discussed. The data show that, in the initial reactions at the double bond, each molecule of methyl oleate and oleic acid absorbs approximately four, and each molecule of oleyl alcohol approximately five, atoms of oxygen. Simultaneously each of the three compounds loses one molecule of water. The peroxide level in the early stages of oxidation is higher in oleyl alcohol and methyl oleate than in oleic acid; conversely, the hydroxyl content of oxidising oleic acid is higher than that of methyl oleate or the extra hydroxyl of oleyl alcohol. The destruction of the double bond occurs faster than would be expected if the reaction proceeded at a unimolecular rate, presumably because of secondary reactions, which become more prominent as the oxidation progresses. A tentative explanation of these observations is proposed. C.

Aqueous Soap Solutions: Peptisation. A. S. C. Lawrence. *Trans. Faraday Soc.*, 1937, **33**, 325-330.

Aqueous soap solutions are peptised by numerous alcohols, phenols and amines, the solubility of which is much greater in soap solution than in water. The peptised solutions are still colloidally dispersed. There is no evidence for the existence of complexes in simple stoichiometric proportions. For each soap and for each peptiser there is a definite saturation point which seems to be determined by the solubility of the complex. The amount of peptiser taken up at saturation varies from less than one molecule per molecule of soap to 17. The complexes exist only in solution. The temperature coefficient of peptisation is very small. Complex formation seems to be by dipole interaction. C.

Foams: Mechanical Properties. A. Siehr. *Kolloid Z.*, 1937, **78**, 156-158.

The possibilities of the mechanical destruction of foam are discussed. It is shown experimentally that foams cannot be destroyed by pressure from all sides, but only by pressure from one side, i.e., by strong deformation of the foam bubbles. The results of Derjaguin and Obuchov seem to be in direct contradiction to this. An explanation for this is advanced. C.

Macro-molecular Substances: Molecular Weight Distribution. H. Dostal and H. Mark. *Trans. Faraday Soc.*, 1937, **33**, 350-353.

A method is described for the calculation of a distribution curve for molecular weights in chain macro-molecular substances, which is based on the fact that the mean molecular weights differ as they are determined respectively from the osmotic pressure, or from the viscosity, and coincide only in the special case of a completely homogeneous system. The method consists in evaluating expressions for the mean molecular size from (1) viscosity and (2) osmotic pressure, and the two mean values are then combined to give the final expression. Some experimental details are given. C.

Nitrocellulose Solutions: Viscosity; Influence of Calcium Hydroxide. S. Rogovin and M. Schlachover. *Kolloid Z.*, 1937, 78, 224-230.

The influence of calcium and other alkaline earth hydroxides on the viscosity of nitrocellulose solutions has been investigated. Varying amounts of Ca are introduced by treating the nitrocellulose with waters varying in degree of hardness. With increasing calcium hydroxide content there occurs a considerable rise in viscosity in concentrated nitrocellulose solutions but the viscosity of dilute solutions remains unchanged. This fact confirms previous evidence that in a series of cases there is no direct connection between viscosities in concentrated and in dilute solution. This increase observed in concentrated solutions is dependent on the solvent used. The least effect was observed with acetone and methyl alcohol in which calcium hydroxide is practically insoluble. The introduction into the nitrocellulose solution of small amounts of hydrochloric acid produces a considerable decrease in the viscosity of concentrated solutions within a certain range, independent of the original viscosity of the solution. These phenomena can be explained on the assumption that calcium hydroxide forms a chemical or complex compound with the single chains or micelles, and thus raises the state of aggregation of the single particles. C.

Rotational Wide Range Viscometer. A. A. Clark and H. J. Hodsman. *J. Soc. Chem. Ind.*, 1937, 56, 67-70T.

A concentric cylinder viscometer is described that has been designed especially for viscous materials like tars but can be used over the range 50 to one million poises. The theoretical basis of the measurements is discussed, manipulation is described and typical results are reproduced in tables and graphs. C.

Suspended Level Viscometer and Surface Tension Dynamometer: Application. L. Ubbelohde. *Ind. Eng. Chem., Anal. Edn.*, 1937, 9, 85-90.

A detailed description is given of a viscometer in which errors due to fluctuations in the imposed pressure are avoided by employing the suspended level principle. This principle is explained, diagrams of the apparatus are given, and its calibration and use are discussed. The suspended level principle has also been applied in apparatus for the measurement of interfacial tension by capillary rise and in a new method for the measurement of dynamic surface tension, details of which are given. C.

Mercury Arc Lamps: Characteristics. B. T. Barnes and W. E. Forsythe (General Electrc Co.). *J. Opt. Soc. Amer.*, 1937, 27, 83-86.

Reasons are given for the small extent to which Cooper-Hewitt, low-pressure, mercury lamps have been used in industrial plants. New and more suitable types (H-1, and H-2) are described. A table is given in which data for the Cooper-Hewitt, H-1, H-2 and H-3 lamps are compared. The H-3 lamp has a small quartz-capillary arc tube and a solid electrode, and is designed to operate at a mercury vapour pressure of 40 atms. The H-1 and H-2 lamps have a larger arc and an impregnated electrode, and they are intended for A.C. operation only. The comparative energy and brightness of these lamps are discussed. A second table shows operating characteristics and percentage of input radiated in various ultra-violet lines for a bare capillary arc tube and a bare Uviarc. Both these arcs have about the same efficiency for producing ultra-violet light of wave-lengths greater than 2800 A if the radiation is weighted according to its effectiveness in producing a minimum perceptible erythema. The Uviarc is more efficient in producing radiations of shorter wave-lengths. Specially constructed capillary arc tubes may be operated at pressures of 100 atms. or more if a water jacket is fitted to keep the quartz tube cool. A table gives the operating characteristics and spectral distribution of the visible radiation for an experimental table of this type, and a figure shows the spectral distribution of the energy radiated in a direction perpendicular to the arc axis, for a similar tube. A further table shows percentage of total light from mercury arcs operating at various pressures, from the sun, and from a tungsten lamp of wave-length 6000-7600 A. These data show that even for the water-cooled capillary arc tube the proportion of light which is of wave-length greater than 6000 A is much less than for sunlight. The brightness at the centre of the arc for the water-cooled tube is nearly eight times that of melting tungsten. C.

Spectrophotometers: Application in Colorimetry. M. G. Mellon. *Ind. Eng. Chem., Anal. Edn.*, 1937, 9, 51-56.

The author discusses the principle of spectrophotometry, spectrophotometric apparatus, the nature of spectrophotometric data, and applications of spectrophotometry for the evaluation of colour and for analytical purposes. C.

Spectro-Radiometer: Transmission Factor. K. K. Kay and H. M. Barrett. *J. Opt. Soc. Amer.*, 1937, **27**, 65-68.

A spectro-radiometer is briefly described and it is shown that in order to standardise an ultra-violet lamp by means of this instrument, two corrections must be applied to the observed intensity values, (1) the spectral transmission factor which corrects for the absorption in the optical system of the spectro-radiometer, (2) the distance transmission factor which takes into account that fraction of radiation incident on the slit which impinges on the walls of the collimator tube, and therefore does not pass through the instrument to the thermopile. The former factor has been measured by comparing the intensity of a monochromatic beam before and after its passage through the spectro-radiometer. A method is described for the evaluation of the latter factor which consists in measuring the intensity of any strong region in the spectrum of a source, at a number of distances from the spectro-radiometer. C.

Paper Machine: Stroboscopic Measurement of Speed Differences in Different Sections. A. A. Scott. *Pulp and Paper Mag. Canada*, 1937, 38, 163-167.

A method of obtaining accurate measurements of the sheet stretch or " draw " between successive sections of a paper machine is based on the use of a stroboscopic device whereby the speed differences are measured directly, and not by obtaining the difference between two measurements. This method has been used to determine the amount of slipping between the wire and the couch roll, and to establish a relation between the " draw " and the position of the cone-pulley belt. C.

Pulp: α-, β-, and γ-Cellulose Determination. H. F. Launer. *J. Res. Natl. Bur. Stnds.*, 1937, **18**, 333-342.

The special feature of the method described is that the " celluloses " are determined by oxidation with dichromate, the volume required being measured by back-titration with a ferrous solution. The actual concentration of the dichromate need not be known, the calculation following from the volume; thus, if the α-cellulose requires x c.c. and the $(\beta+\gamma)$-cellulose y c.c., the percentage of α-cellulose is $100x/(x+y)$. The α-cellulose is the residue from maceration with 17·5 per cent. caustic soda (20 c.c. are used to 0·03 g. of pulp). The filtrate is made up to 100 c.c. and half is used for the measurement of $(\beta+\gamma)$-cellulose. The other half is acidified with 15 c.c. of $6N$ sulphuric acid, diluted to 100 c.c. and left over-night for the β-cellulose to settle. The γ-cellulose is measured in the supernatant liquid and β-cellulose calculated by difference. Full details are given. C.

Unsaturated Compounds: Iodine Value. E. Rossmann. *Angew. Chem.*, 1937, 50, 187-190.

A table of iodine values obtained by different methods shows wide variations, especially with compounds containing conjugated double bonds. The advantages of methods based on the absorption of bromine vapour are emphasised. In its simplest form, for non-volatile compounds, the method consists merely in measuring the increase in weight after exposure to bromine vapour in a flask that can be evacuated. A " short " exposure (up to half-an-hour) gives a measure of double bonds, and a " long " exposure (several hours) includes labile carbon linkages. C.

Cellulose: Crystal Structure. K. H. Meyer. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 266-274.

Recent work on the crystal structure of cellulose is reviewed and reasons are advanced for believing that the two chains occupying the unit cell are arranged in opposite directions instead of the same. For example, cellulose hydrate as represented by rayon has the same lattice as that represented by mercerised ramie. If rayon is regarded as the " statistical average " of chains pointing in both directions why suppose the chains in the natural fibre to be all arranged in one direction ? A new space model of cellulose is given and discussed. It is

compatible with X-ray data. The authors regard as a most important feature of X-ray analysis the proof that the chains are built up of cellobiose units, but point out that it does not provide a means of exploring small deviations such as the supposed presence of carboxyl groups or the configuration of end groups. The new conception of chains pointing in opposite directions is reconcilable with the conception of closed ring systems. C.

Cellulose and Glucose : Acetolysis. K. Freudenberg and K. Soff. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 260-266.

The common experience that the rotation of the solution obtained by acetolysis of cellulose, maltose, dextrin, etc., is smaller than that observed with an equivalent amount of glucose is ascribed to the formation of glucose hepta-acetate in varying amounts. This has a low rotation and resembles glucose penta-acetate in being stable in the acetolysing mixture. C.

Protein Molecules : Structure. T. Svedberg. *Chemical Reviews*, 1937, **20**, 81-98.

A review is given of work on the structure of proteins by means of sedimentation velocity and sedimentation equilibrium methods in strong centrifugal fields, as well as by means of diffusion and electrophoresis determinations. A table of physical constants of protein molecules is presented, also a bibliography. C.

Air-driven Ultra-centrifuge. R. W. G. Wyckoff and J. B. Lagsdin. *J. Sci. Instr.*, 1937, **14**, 74-77.

A description is given of the following improvements in an air-driven ultra-centrifuge intended for molecular sedimentation : (1) A driving mechanism equipped with reversing air jets which provide for smooth and rapid stopping and with spring compression screws for adjustment to eliminate vibrations ; (2) A head which makes it possible to centrifuge considerable volumes of solution in a field sufficiently great to concentrate and crystallise large protein molecules. (3) The use of a high pressure arc in place of the usual direct-current lamp as light source for both absorption and refractive index measurements. (4) A device for automatically taking the series of photographs needed for determinations of rate of sedimentation. C.

Mono-molecular Films ; Molecular Interaction in—. J. H. Schulman and E. K. Rideal. *Proc. Roy. Soc.*, 1937, **B122**, 29-45.

Investigations of the effects of injecting substances such as saponin and sodium cetyl sulphate under mono-layers of various substances, e.g. sphingomyelin, cholesterol, oleyl alcohol, lecithin, etc., on the surface of suitable substrates are described and it is shown that molecular complexes can be formed in this way. Two distinct types of complexes can be identified, those formed by association of a submerged polar group in the film-forming material with a polar group in the material injected, and those in which a subsequent penetration of the hydrophobic portion of the film by the hydrophobic portion of the material injected takes place. This subsequent stage is termed film penetration and the stability of the resulting mixed film is shown to be due to molecular association. The extent of the molecular association is found to be dependent on the mutual interaction both of the polar and of the hydrophobic portions of the interacting molecules ; slight variation in the properties of either of these portions is found to exert a profound effect on the stability of the complexes. A remarkable degree of specificity is to be observed in complexes formed in this way. Those molecules which show strong association in films, make complexes in solution which can be distinguished by various methods, such as inhibition of haemolysis and dispersion phenomena. C.

Cellulose Acetate Sol : Coagulation. V. A. Kargin and A. A. Stepanova. *Acta Physicochimica U.R.S.S.*, 1937, **6**, 183-194.

Coagulation of cellulose acetate sols is studied by dissolving samples in acetone, ethyl acetate or ethylene dichloride and precipitating with water, alcohol, or cyclohexane, the changes in viscosity and in osmotic pressure at coagulation being measured. After the addition of the coagulating agent the viscosity remains for some while unaltered and then increases continuously until coagulation sets in. This increase in viscosity is thought to be connected with aggregation of desolvated particles. In fairly concentrated solutions, it appears that the desolvation process, which can be considered as the establishment of equilibrium

between solvation sheaths and the dispersion medium, is very quickly completed. The addition of cellulose acetate gels causes acceleration of the coagulation; the mechanism of this acceleration is discussed. Turbidity changes on coagulation run parallel with viscosity changes. All the data indicate that the coagulation process of cellulose acetate sol may be considered as auto-catalytic. The temperature coefficient of the coagulation velocity indicates that that part of the solvate sheath which conditions the repulsion force between the particles, and also the solution and coagulation phenomena, is very small. C.

Fats and Fatty Acids: Viscosity, Density, and Iodine Value. G. B. Rawitsch. *Acta Physicochimica, U.R.S.S.*, 1937, **6**, 205-212.

The viscosity of pure linolenic, oleic, and stearic acids has been measured over the range 20-90° C., by means of a Ubellohde viscometer. The data are densities are tabulated. Viscosity decreases and density increases, linearly with rise in degree of unsaturation as expressed by the iodine values. The changes in viscosity and density of a mixture of cottonseed oil with linseed oil on hydrogenation has been investigated. A rise in viscosity and a decrease in density is observed, the relationship between viscosity and iodine value remaining almost linear. C.

Lubricating Oils: Micro-measurement of Viscosity. H. Levin. *Ind. Eng. Chem., Anal. Ed.*, 1937, **9**, 147-149.

A method for the determination of viscosity of a few milligrams of petroleum lubricating oils is based on the rate of rise of the sample into a clean fine vertical capillary. With the known samples examined, this rate is directly related to the absolute viscosities. C.

Magnetic Rotational Speed Measuring Device. L. B. Snoddy and J. W. Beams. *Science*, 1937, **85**, 273-274.

In a simple method for the measurement of rotation speeds over a wide range, a small magnet is fastened to the high-speed rotor or driving turbine, and induces an alternating current in a coil connected across a bridge that can be balanced at only one frequency. A wiring plan is shown. The inductance or capacity is altered until a loud speaker or the like indicates balance. The method is rather more accurate than stroboscopic methods. C.

Recording Time-study Instrument. C. A. Marston & Co. *Textile World*, 1937, **87**, 745.

The operation and installation of a "Marstograph" is described. The instrument is a portable electric time-study device that may be installed at any machine or process. It automatically prints the story of operating efficiency, and idle machine time on a continuously moving strip of perforated paper tape, and registers yardage or any other unit of production. C.

Torsion Balances. W. W. Loebe. *Archiv. Techn. Mess.*, 1937, *Lieferung* 68, T25-T26.

Brief descriptions, aided by diagrams, are given of a number of German torsion balances based upon (1) the torsion principle, and (2) the bending of a spiral spring. Micro-balances are included and a bibliography is provided. C.

Sound: Measurement; Tables of Data. G. H. Domsch. *Archiv. Techn. Mess.*, 1937, *Lieferung* 68, T21-T22.

Tables are presented which show the important fundamental physical relationships in technical acoustics. The first deals with sound velocity in solids, liquids and gases, the second with sonic field magnitudes, the third with resonance, and the fourth with resonators and air cavities. Values for air are included. C.

Cellulose: X-ray Structure. E. Sauter. *Z. physikal. Chem.*, 1937, **B35**, 83-116.

A new X-ray camera and goniometer for use with fibres are described by means of which (using copper radiation) the vertical cone fibre diagram of native cellulose has been constructed and 67 interferences (42 new) have been established. New data are obtained concerning the translation lattice and characteristic symmetry of cellulose that are not in agreement with the unit cell model of Meyer and Mark (1928-1930) but support the measurements made by Sponsler and Dore (1926). A new unit cell model is discussed. C.

Cellulose : Crystalline and Fibrillar Structure. E. Sauter. *Z. physikal. Chem.*, 1937, B35, 117-128.

It has been observed that, in monochromatic fibre diagrams of the most varied preparations of native cellulose suitably illuminated, there is always present a more or less intense line lattice spectrum. This shows that a particularly high degree of lattice distortion is characteristic of these fibres. The existence of ultra-crystalline fibrillar lattice " splinters " confirms the chain structure for cellulose as opposed to the micellar structure of Meyer and Mark. These lattice deformations are chiefly significant in explaining the physical properties of cellulose fibres (e.g., their flexibility), their heterogeneous reactions, degradation and swelling phenomena. C.

Particles : Numerical Definition of Size and Shape. H. Heywood. *Chem. & Ind.*, 1937, 149-154.

Methods for defining the shape and size of a single particle or the average of a sample of approximately equal particles are compared. The " mean projected diameter " (diameter of the circle having an area equal to that of the projected image of the particle when placed in its most stable position) is the best measure for calibration purposes. Martin's statistical diameter (diameter along any line that bisects the area of the projected image) is almost as accurate but Feret's statistical diameter (distance between two parallel tangents on opposite sides of the apparent outline) gives too high a figure. Andreasen's method (1928) is based on counts and uses as " mean diameter " the cube root of the volume of the particle. The relationship between mean projected diameter and volume is defined by the " volume constant," k ; volume $= kd^3$. The proportions of a particle are defined by the " flatness ratio " $= m =$ breadth/thickness, and the " length ratio " $= n =$ length/breadth. The shape of a particle is defined by the " projected area ratio " $= a =$ projected area/(breadth $\times$ length), and the " prismoidal ratio " $= p_r =$ volume/(projected area $\times$ thickness). The " volume constant " is related to these ratios by the expression $k = (\pi\sqrt{\pi p_r})/(8m\sqrt{an})$, or, when the breadth, length and thickness are equal, by $k_e = (\pi\sqrt{\pi p_r})/(8\sqrt{a})$. Particles may be classified into the following shape groups : (1) rounded (2) sub-angular, (3) angular (prismoidal and tetrahedral). Mean values of a, p_r and k_e are tabulated for these groups. The value of the ratio of equivalent round and slotted apertures (apertures that retain the same percentage of the sample) is a useful measure of " flatness ". C.

Silica and Charcoal Powders : Apparent Densities in Liquids. J. L. Culbertson and A. Dunbar. *J. Amer. Chem. Soc.*, 1937, **59**, 306-308.

The apparent densities of silica gel and active charcoal have been measured in water, benzene, carbon tetrachloride and light petroleum. The results show that water and petroleum which, respectively, give the highest and lowest apparent densities for silica yield values of the opposite order for charcoal. Some existing theories are examined in the light of the data obtained. and the tentative hypothesis is advanced that the observed variations in density are due to differences in the degree of penetration of the porous solid by the liquids as a result of differences in the surface energy decrease on wetting, or to differences in the degree of compression of the liquids at the solid-liquid interface as determined, primarily, by the different forces of attraction at the interfaces, and secondarily, by the different compressibilities of the liquid. C.

Colloid Particle : Influence of Shape on Viscosity. J. W. McBain and M. E. Laing McBain. *J. Amer. Chem. Soc.*, 1937, **59**, 342-344.

Some observations are described on the actual effect on resistance to movement when a silica or steel sphere is elongated to a fibre 2500 times longer than its diameter. The results lead to the conclusion, in accordance with the hydrodynamic theory employed by Einstein for colloidal particles and large molecules, that although the effect of extreme departure from sphericity is measurable it is of too low a magnitude to explain the high viscosity which 0·1 per cent. of colloids such as nitro-cotton impart to solvents in which they are dissolved. The chief factor appears to be structural viscosity due to entanglement and local adherence of molecules and particles, effectively immobilizing a disproportionate amount of the solvent in comparison with the amount of the colloid itself. C.

Cooked Linseed Oils : Viscosity. M. Tatimori. *J. Soc. Chem. Ind. Japan*, 1937, 40, 19B-21B.

Viscosities (in benzene solution), iodine values, densities and refractive indices are recorded for various " cooked " (oxidised and heat-polymerised) linseed oils and previous general equations relating viscosity to concentration are applied to the results. C.

Photochemistry : Application to Textile Problems. H. Freytag. *Textilberichte*, 1937, 18, 89-91.

The tasks and aims of textile photochemistry are discussed and reference is made to some of the results already achieved. A programme of photo-chemical work with textile interest is divided into sections for (1) fastness testing, (2) photo- and luminescence-analysis of dyes, etc., tendering influences, defects and so forth, (3) development of photo-chemical processes of finishing and bleaching and synthesis of dyes and other products, and (4) photo-biology, applied to the stimulation of seeds and silk-worms, the killing of cocoons, retting, and the health of operatives. C.

Linseed Oil Acids ; Formation of " Absorptive " Acids from——. T. Moore. *Biochem. J.*, 1937, 31, 141-148.

A detailed study of the effect of refluxing with potash on the mixed acids of linseed oil is described. The first effect of refluxing was to raise the absorption at 230mμ. Later, however, absorption at 270mμ began to develop, almost equalling the absorption at 230mμ in intensity after about a week. The development of absorption at 270mμ was found to coincide with the formation of a solid unsaturated acid which could easily be separated by crystallisation. The new acid bore a striking resemblance to the elaeostearic acids which may be prepared from tung oil, but had a higher melting point than either the α- or β-isomeride. The mother-liquor of the mixed acids from which the solid acids had been crystallised showed absorption only at 230mμ, which was not appreciably changed by further refluxing. The current view that linolenic acid and the elaeostearic acids are isomeric, considered in conjunction with the finding that absorption at 270mμ was not developed by the mixed acids of maize oil, which is considered to contain no linolenic acid, suggested that the new solid acid might be derived from linolenic acid. " Crystalline hexabromide " and " non-crystalline bromide " fractions were prepared from the mixed acids of linseed oil. A slight concentration of potential absorption was found in the " crystalline " fraction, which should presumably have consisted of almost pure linolenic acid, but absorption at both these positions remained in the much larger " non-crystalline " fraction. These results suggest either that the acid may give rise on treatment with potash to separate products absorbing in different positions, or that the " hexabromide " fraction was in reality a mixture. In common with the acids of tung oil the mixed acids of linseed oil, after prolonged refluxing with potash, no longer gave a crystalline ether-insoluble precipitate with bromine. A commercial sample of boiled linseed oil gave acids showing substantially increased absorption at 230mμ, but no absorption was present at 270mμ. C.

Colour Kinematography. D. A. Spencer. *Photographic J.*, 1937, 77, 84-101.

A general outline is given of the principles upon which colour kinematography is based, and of the systems at present available. Such two-colour additive systems as the Francita Realita process, the Dufaycolor mosaic screen process, and lenticular processes (e.g., Agfacolor and Kodacolor) are described, subtractive processes such as Technicolor and Ufa processes, and also integral tri-pack processes. The advantages and disadvantages of the available systems are discussed. C.

Glossy Surfaces : Testing. R. S. Hunter. *J. Res. Natl. Bur. Stnds.*, 1937, 18, 19-39.

Glossiness is attributed to specular reflection, which occurs at the surfaces of reflecting objects. Owing to the diversities of minute surface structure, many kinds of glossy appearances result. Six different kinds of gloss are recognised :— (1) specular gloss, identified by shininess ; (2) sheen, identified by surface shininess at grazing angles ; (3) contrast gloss, identified by contrast between specularly reflecting areas of surfaces and other areas ; (4) absence-of-bloom gloss, identified by the absence of reflection haze or smear adjacent to reflected high lights ;

(5) distinctness-of-reflected-image gloss identified by the distinctness of images reflected in surface ; (6) absence-of-surface-texture gloss, identified by the lack of surface texture and surface blemishes. The gloss of a surface cannot in the general case be defined in any simple way that permits quantitative measurement. Data that describe the directional distribution of light reflected by surfaces illuminated under specified conditions furnish the fundamental physical basis for describing gloss. It is because such data are unwielding that gloss has been mostly measured by trial and error or empirical methods. It is suggested that the designer of a prospective gloss meter should determine from goniophotometric data taken on representative samples what differences in apparent reflectance are most characteristic of the difference in glossiness observed visually. Typical gloss instruments and the measurements they make are described. A bibliography on gloss is given. Differences between various types of gloss are analysed in some detail. C.

10—ECONOMICS

British Textile Industry Production Statistics, January, 1937. *Bd. Trade J.*, 1937, **138**, 268.

Monthly averages of raw cotton delivered to mills, index of wages paid in the wool industry, percentages of insured workers unemployed in the cotton and wool industries, production of rayon yarn and waste, and deliveries of raw silk for home consumption are given for 1930, 1935 and 1936, and for January and December, 1936, and January, 1937. C.

Cotton Buying Transactions. W. A. Foulkes. *Textile Weekly*, 1937, **19**, 215-217.

A report of a lecture describing the various operations connected with the spinner's purchase of cotton, including grading and classification, baling and "hedging." The chief argument raised against Manchester as a buying centre is the frequent lack of sufficient light in which to inspect samples ! C.

German Textile Machinery : Exports. *Wirtschaftsdienst*, 1937, **22**, 301.

German export figures are given for looms, lace curtain, knitting, embroidering, finishing and sewing machines for the years 1934, 1935, 1936. Exports of embroidering machines declined in 1936 but exports of all the other types of machines increased. C.

Japanese Silk and Rayon Goods : Costs of Production. *Silk J. Rayon World*, 1937, **13**, No. 153, 14.

The selling price of a 50-yard piece of a 6 momme (12 dram) silk habutae, one of the simplest unglossed silk fabrics manufactured in Japan, is approximately 20s. 1½d. (4·83d. per yard). The cost of the raw silk required for manufacturing a 50-yard piece of equivalent fabric in Great Britain amounts to 20s. 4d. In the Japanese production the cost of the raw silk usually accounts for 80 per cent. of the total selling price of the manufactured article. The cheaper grades of silk crêpe fabric can be produced to sell for approximately 9·66d. per yard. The costs of production in Japan for a plain dyed rayon fabric are rather less than 2d. a yard and for a printed rayon fabric less than 2½d. a yard. Silk weaving is still largely a family industry in Japan and in 1934 employed some 267,345 workers. For weaving a 50-yard piece of crêpe-de-chine a man is paid approximately 2s. 11d., which amounts to less than one shilling a day. C.

Lancashire Cotton Industry : Competitive Power. F. Nasmith. *Textile Weekly*, 1937, **19**, 249-250, 279-280.

A report of a lecture reviewing the condition of the cotton industry. The following statistics are given and discussed : spindles and looms, 1913 and 1936 ; World and British consumption of raw cotton : rayon production ; savings in an American mill due to introduction of high draft spinning ; and wage costs in various countries. C.

Rayon : World Production, 1936. *Silk J. Rayon World*, 1937, **13**, No. 153, 44.

Tables showing estimated world rayon yarn production, world staple fibre production, production of continuous filament rayon by countries and processes, and rayon yarn exports and imports of the chief producing countries in 1934, 1935 and 1936, are given. Japanese exports of rayon yarns increased from

22 million pounds in 1934 to over 70 million pounds in 1936. In the case of most European countries there appears to have been a drop in yarn exports in 1936 though German exports showed an increase. Exports from the United Kingdom declined to 8 million pounds in 1936 and imports into the United Kingdom fell to 1·2 million pounds. Staple fibre production increased by over 100 per cent. in Germany and 50 per cent. in Italy in 1936. Japanese staple fibre production increased from 2½ million pounds in 1934 to 40 million pounds in 1936. C.

Textile Price Indices, January-March, 1937. W. H. Slater. *Textile Weekly*, 1937, 19, 251, 493.

The index numbers for January, February and March, 1937, are :—*Raw cotton* ; American 101·09, 102·78, 110·07, Egyptian 84·48, 82·02, 96·39. *Cotton yarns* ; American 121·0, 126·9, 136·9, Egyptian 102·5, 104·9, 114·9. *Cotton piece goods* ; 134·8, 138·6, 143·5. "*All cottons*" ; 118·5, 121·3, 130·3. *Wool group* ; 161·1, 158·1, 161·3. *Other textiles* ; 81·5, 81·9, 82·7. "*All commodities*" ; 122·5, 123·6, 127·7. (1913 = 100.) C.

German Fabric Glove Industry. *Spinn. u. Web.*, 1937, 55, No. 11, 14-15.

The dependence of the German fabric glove industry on export trade is pointed out and the influence of trade restrictions, weather and fashion is discussed. The effects of Czecho-Slovakian and Japanese competition and of increased American import duties and increased prices of English yarns are also mentioned. Exports of rayon gloves have increased considerably since 1930 whilst exports of cotton gloves have declined. The United States and Great Britain are the chief importers of German fabric gloves ; import figures of these two countries are given for the period 1930-1936. C.

Japanese Cotton Mills : Organisation. *Cotton (U.S.)*, 1937, 101, No. 3, 73-77.

An illustrated description is given of the labour conditions and organisation in four typical Japanese mills as observed by members of the American Textile Mission to Japan, January, 1937, to discuss quota arrangements. Several labour-saving devices are mentioned but the observers "came away without having seen any evidences of any outstandingly superior efficiency." C.

Raw Cotton : Price. D. de Prat. *L'Ind. Text.*, 1937, 54, 109-111.

A discussion of the influence of supply and demand on the price of American cotton. The author shows the difficulties of forecasting the price of cotton, and believes that the amount of the crop and the demand are the only really significant factors. C.

Textile Distributive Trade : Organisation. *M/cr. Guard. Comm.*, 1937, 34, 119.

A brief account is given of the membership and work done by the following distributors' organisations :—Wholesale Textile Association, Retail Distributors' Association, Wholesale Fashion Trades Association, Drapers' Chamber of Trade of Great Britain and Ireland, Retail Trading Standards Association, and the National Association of Outfitters. The main functions served are the preparation of trade statistics, the protection of members, and the ensuring of fair and standard trading conditions. C.

Textile Fibres and Yarns : Prices, 1936. *Text. Merc. and Argus*, 47th *Annl. Trade Rev.*, pp. 59, 77.

The following tables are provided (1) Spot prices of American, Brazilian, Peruvian, Egyptian and Indian (Broach) cottons, month by month. (2) Prices of the chief American and Egyptian yarns, month by month. (3) Prices of the main types of silk, rayon and staple fibre yarns at the end of the year. (4) Prices of British wools, (5) Bradford tops, (6) standard wool yarns for weaving and worsted moquette yarns, and (7) noils, month by month. C.

Textile Wholesale Prices, February, 1937. *Bd. Trade J.*, 1937, 138, 358 and 361

Tables are given showing the average monthly price index numbers of cotton, wool and other textiles, and the average monthly wholesale prices of American and Egyptian cottons, cotton yarns and cloths, raw wool, tops, noils, woollen yarns and cloths, viscose and cellulose acetate rayon yarns, linen yarn, hemp and jute for the period February, 1936, to February, 1937. C.

11.—INDUSTRIAL WELFARE, INDUSTRIAL PSYCHOLOGY, AND EDUCATION

Colour Chemists: Training. O. Mecheels. *Textilberichte*, 1937, **18**, 59-63.

The training of textile chemists and colourists in Germany is discussed and it is suggested that the course should be divided into two parts, the first devoted to the study of chemistry, physics, engineering, economics, botany, etc., and the second to a study of bleaching, dyeing, printing and finishing, the testing of materials, dye and fibre chemistry, textile assistants, etc. The need for adequate practical work and also for more teachers with actual works experience is pointed out. Differences between High School and technical students are briefly discussed and it is pointed out that assessments at the end of the course should not be based on the usual type of examination but should take into consideration ability, characters, method of tackling problems, capacity for leadership, etc. The qualities required in the colourist and his functions are discussed. C.

Textile Operatives: Training. H. Rostron (Tootal Broadhurst Lee Co., Ltd.). *Textile Weekly*, 1937, **19**, 351-353.

A report of a lecture, based on long experience of the educational systems of Lancashire and of a special school for selecting and training young operatives. C.

Empire Cotton Growing Corporation: Activities. L. G. Killby. *Empire Cotton Growing Review*, 1937, **14**, 1-23.

A historical review of the origins of the Corporation and the development of cotton growing within the Empire during the past 15 years. C.

Silk Association of Great Britain and Ireland: History. *Silk J. and Rayon World*, 1937, **13**, No. 154, 31-53.

The development of the Silk Association is traced from its inception in 1887. The concluding pages deal with its interest in fostering research. C.

Textile Research: Organisation in the U.S.A. R. E. Rose. *Amer. Dyes. Rept.*, 1937, **26**, 146-148, 173.

A report of a lecture deploring the apathy of textile interests in the U.S.A. towards scientific research. Most of the money for research comes from makers of dyes, assistants, machinery and similar auxiliary branches of the Trade, which, on the other hand, claims to be doing much research work privately. "Unfortunately, this is only true if the meaning of research is debased to cover any search for new weaves, new methods of marketing, new mechanical ways of doing things. It does not reach to the underlying facts any more than the chef discovers vitamins." C.

Safety First in Dyeworks. *Irish Text. J.*, 1937, **3**, No. 2, 16.

Refers to new regulations to be introduced by the Home Office to ensure the safety of workers in dyeing and finishing works. L.

Psychology in the Mill. *Irish Text. J.*, 1937, **3**, No. 3, 9.

The National Institute of Industrial Psychology devotes an article to methods whereby the causes of discontent can be discovered and alleviated by confidential interviews with members of the staff. Efficiency suffers in an uncongenial atmosphere and an unhappy staff results in reduced output and a high labour turnover and sickness rate. The reputation of a firm spreads quickly, and if it is not good both the quality and quantity of the applicants for employment will be unsatisfactory. Interviews are conducted by members of the Institute staff, and in practice the results of conducting such interviews are sometimes startling and invariably gratifying. L.

Report of the Bureau of Occupational Diseases for the Fiscal Year ending, June, 1935. A. S. Gray, Director. Connecticut State Department of Health. 52 pp. (through *Bull. of Hygiene*, 1937, p. 257). T.

Advances in Dealing with Dust. Gutmann. *Zent. f. Gewerbehyg. u. Unfallverhütung*, 1936, v. 23, 293-5. 6 figs. (through *Bull. of Hygiene*, 1937, p. 258). T.

NOTES—In the references to publications abstracted the name of the publication is followed by the Year, Vol., Issue No., or date, if necessary, and Page No. (or Nos.).

Literature relating to the composition and manufacture of Dyestuffs is not dealt with in the abstracts of this *Journal*.

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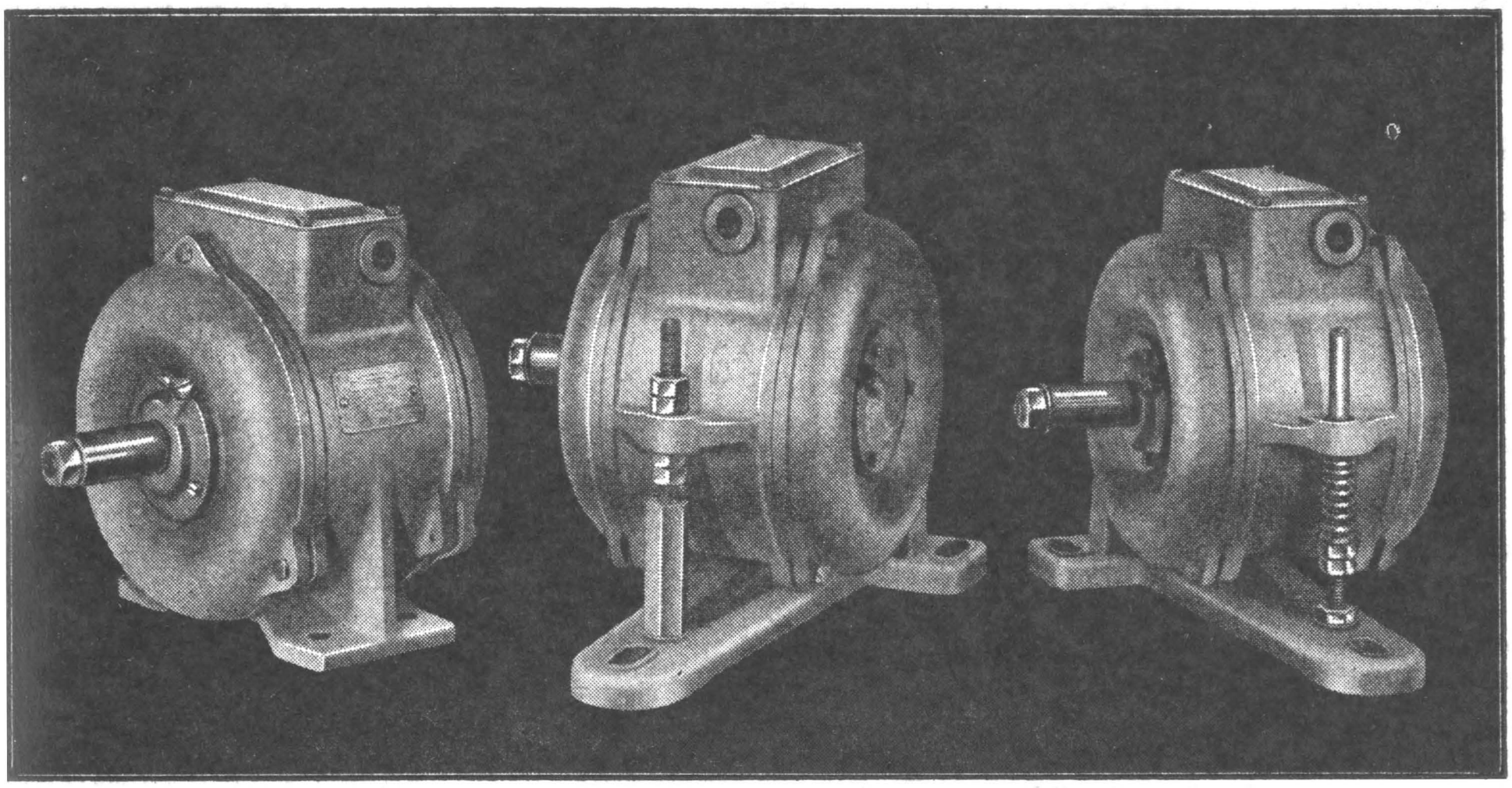
LOOM MOTORS



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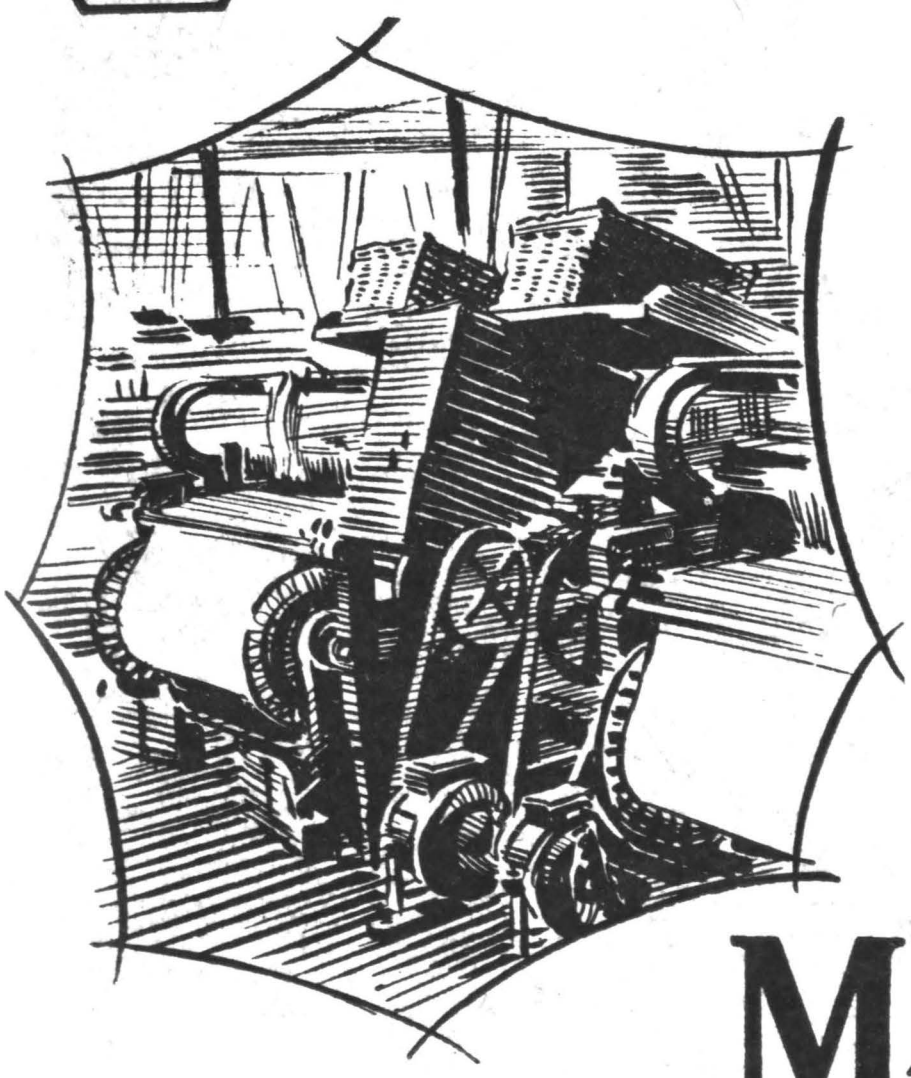

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