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The Journal of the

TEXTILE INSTITUTE

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THE TEXTILE INSTITUTE

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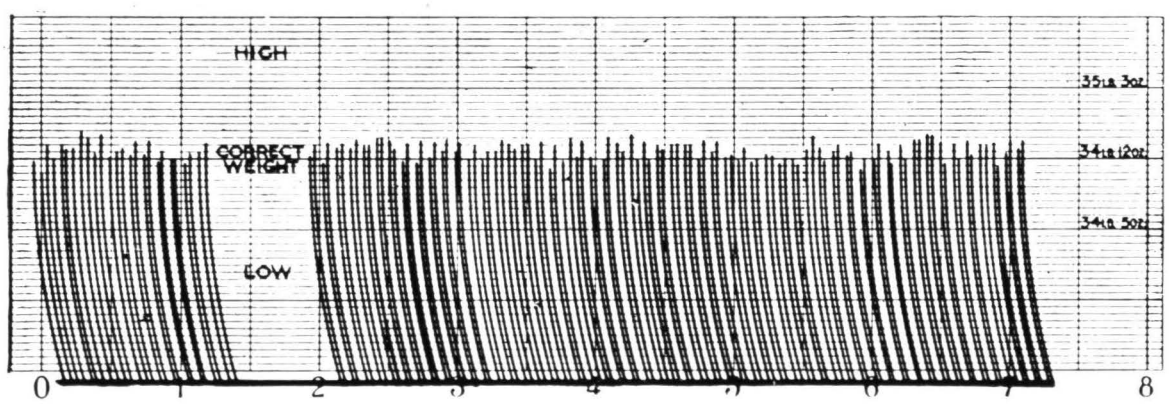

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NOTICES—INSTITUTE MEETINGS

Tuesday	2nd October	*Manchester*—3 p.m. Meeting of Publications Committee, at Institute.
Wednesday	3rd October	*Manchester*—3 p.m. Meeting of Selection Committee, at Institute.
Wednesday	16th October	*Manchester*—3 p.m. Meeting of Council, preceded by Finance and General Purposes Committee, at Institute.

LANCASHIRE SECTION

Wednesday	24th October	Visit to works of Messrs. Small & Parkes Ltd., Asbestos Spinners and Weavers, Manufacturers of Woven Beltings, etc. Hendham Vale Works, Manchester. Depart from Institute at 2 p.m.

MIDLANDS SECTION

Friday	5th October	*Leicester*—7.30 p.m. Dinner at Grand Hotel: Members and Ladies. During the evening the Certificate of Award of the Honorary Fellowship of the Institute will be presented to C. F. Topham Esq.

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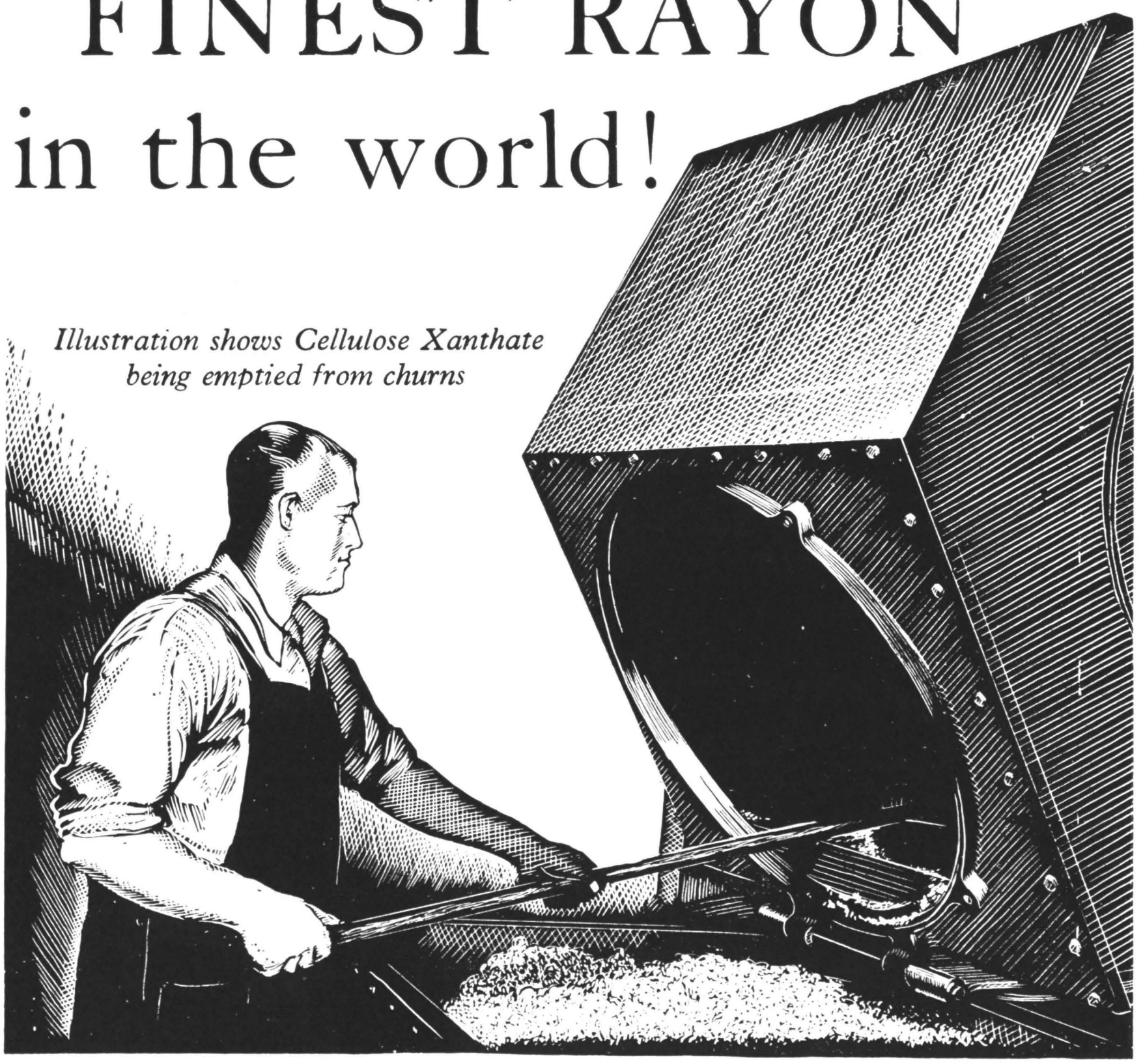

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THE JOURNAL OF THE
TEXTILE INSTITUTE

Vol. XXV SEPTEMBER 1934 No. 9

PROCEEDINGS

Yorkshire Section

Meeting at the Midland Hotel, Bradford, on Thursday, 22nd February 1934;
Mr. T. H. Robinson presiding.

(i) FAULTS IN WOOL TOPS; (ii) TEXTILE EDUCATION IN LONDON; (iii) WARPING WORSTED WARPS TO PATTERN

This meeting was an innovation in that three short papers were presented each by an Associate of the Institute. An interesting discussion followed each paper and at the close the contributors were warmly thanked for their services. The following are abstracts of the papers.

Faults in Wool Tops. *By* **H.** Haigh.

Topmaking might be looked upon as the establishment of a basis from which all following operations, drawing, spinning, weaving, etc. proceeded. Thus it was very necessary that tops should be as free from faults as possible. The faults to which tops were liable might be divided into two classes, namely (1) Noticeable Defects, and (2) Hidden Defects. These classes would be dealt with in this order.

After giving a brief sketch of the process of making a top, Mr. Haigh said that the topmaker had only one ball or at the most two on which to judge the result of his blending. There might be a fault with the colour. If so then it would be seen at once. The colour was generally important and tops, particularly fine tops, should be as white as possible. If it were a poor colour the scourers were not getting all the dirt out of the wool; or the fault might be with the wool itself; too much skin wool in a blend or all skin wool would tend to create a dirty coloured top. With skin wool in the blend more care was required in the scouring. But in attempting to get a good white, care must be taken not to adversely affect the material.

Looseness was a very noticeable fault, continued the speaker, and made itself evident as soon as one made a draw from the sliver. The fibres appeared to have no cohesion; each appeared entirely independent of its neighbour. That characteristic so important for spinning, namely "clinginess" seemed to be lacking. This might be due to newness if the top were hot off the combs. The wool in the blend might cause this fault; any low quality wools were apt to cause looseness in the top. A too-dry top might be rather loose, but this, however, would be remedied by the addition of more moisture and oil. Where the wool was at fault either more greasy wool was introduced into the blend or the top would be sold with this fault. Sometimes a top loose in the fibre, due to the type of wool used, would have additional oil put on to cover up this lack of adhesion. Looseness might also be caused by over-scouring in the attempt to get a good white colour. This was most likely to occur with medium cross-bred tops. Prevention rested with the scouring operatives.

Handle, said Mr. Haigh, was a very important point especially with fine tops. If this were wrong, it would have an effect throughout the processes and would be

most evident in the finished fabric. The handle of a top might be spoilt by over-scouring. Too much slipe would always tend to harshen the handle of a top, therefore the maker must allow for this in the blend. Monte Video wools also were apt to give a hard handling effect in the top. If, of course, all M.V. wool was used in the top and sold as such, this inferior handle would not be a fault as it was part and parcel of the particular type of top.

The damage caused by vegetable matter was next referred to. Care in sorting would help to eliminate this, pieces containing "shives" should be thrown out; a careful watch should be kept for straws, etc., and most particularly all pieces of string should be picked out. Pieces of string caused terrific havoc if they passed through the processes, as also did pieces of bagging, hemp, etc.

Low hairs in Merino tops, continued the speaker, were a dangerous fault and often their presence could have been avoided. Greater care and watchfulness would prevent this fault. The use of badly bred wool would also cause this fault as poor breeding generally means occasional low fibres in the wool. Only the person responsible for the choice of wool could prevent this.

Hidden faults formed the second part of the address, and Mr. Haigh pointed out that such faults as these were generally only discovered when the tops were being used. Hence there was no chance of rectifying them unless the work was done over again. Re-gilling would rectify some of the faults noted.

Bad combing, said Mr. Haigh, included faults made during finishing. These faults might take the form of thick and thin places at regular intervals throughout the top and very often were only detected by the drawing operatives. Good operatives quickly noted any unevenness and if too bad the tops were returned to the comber and re-gilled. The cause was a too hard draft on the gill boxes, and this was most liable with short fibred tops. This fault was occasionally caused by neglect on the part of the operative. When several ends were running up to the finisher gill-box, and one broke down, the operative might not see it at once and a few yards would run through with one slubbing short. When the end was put in again, unless care was taken, a portion of the slubbing would overlap, this then caused the thin-and-thick place.

Worn leathers on rollers, he continued, might cause a variety of faults, such as unevenness of sliver due to uneven delivery of the rollers and also the rubbing of the sliver into a pith-like state. Such a fault as this would quickly be seen and recurrence avoided. Another fault which might be serious was the presence of minute dark hairs in the top. Because of this the "creams trade" only used yarns made from 70's quality. It had been found that 70's tops were much less liable to this defect than 64's. If, however, the yarns were for dyeing this fault was not as serious.

Mr. Haigh concluded by reference to lack of strength in tops which he attributed to the use of unsound wools and to bad blending which, though not easily discovered, was of the utmost importance. It should be avoided by using every care in the making of the pile where even layers of wool should be made, and by pulling the wool thus piled evenly from the face. He urged that practically all the faults enumerated could be eliminated by the exercise of the proper precautions.

Textile Education in London. *By* H. S. Newsome.

Textile classes were first started in London at the commencement of the present century. The honour of being the pioneer of textile courses in London belonged to Mr. A. E. Garrett. About 1896 he was asked to give a series of Economic lectures on Commodities, dealing with Iron and Steel, Coal, Textiles, and other Basic Industries. Experience showed that the demand for a closer and more detailed study of textiles was greater at that time than for any other commodity. Thus shortly after their commencement these classes became wholly textile. The syllabus covered the elementary sections of textiles and was

of a similar nature to the course in General Textiles at the City of London College at the present time. About 1910 an attempt was made to start a series of Textile courses at the Regent Street Polytechnic. These classes were allowed to lapse, because about this time the Polytechnic was re-built and altered, and the classes were abandoned, rather than seek accommodation elsewhere. In the autumn of 1911, Textile Courses were launched at the City of London College. Mr. A. E. Garrett was the principal lecturer and Mr. Hooper also gave a series of lectures on Silk during the first session. At the commencement of the second year, Mr. Garrett took over the whole of the courses and modelled them into a General Course on Textiles. The Course he had been giving at the Aldersgate Street Y.M.C.A. was now transferred to the City of London College, and continued in that form until the year of 1927/1928, when Mr. Garrett retired.

Mr. Newsome next referred to the part played by the London County Council in the development of Textile Education in London. In 1917 an official in the Education offices of the L.C.C. suggested the formation of part-time day classes in "Distributive Textiles", primarily for the employées of the large retail stores. A committee was formed to assist in the development of these courses. Students were released from employment under conditions similar to those now applying in the North for part-time students. These classes were held at the Central Schools of Arts and Crafts in Southampton Row. There was, apparently no anticipation of the continuance of these classes and they only had a life of two years. Then the Assistance Committee reported to the General Council the desirability of their transference to more convenient centres. Accordingly, in the early part of 1919 the Council approved of the formation of Textile courses at the following four centres: (1) Camberwell, (2) Hammersmith, (3) Barrett Street Trade Schools, (4) Rooms in Tottenham Court Road, which were hired specially for this purpose. These classes were a failure from their commencement. At one centre no students attended, and at the others the numbers who did attend were so few as to make the continuance of these classes impossible. Accordingly in the latter part of 1919 all four centres were closed. Running concurrently with these classes practically from their commencement in 1917, were classes held at Barrett Street Trade School for girls employed in the workrooms of the West End houses. They incorporated a certain amount of elementary textiles along with the main courses in Dressmaking, Designing, and Millinery. These classes were organised and run by a special committee, composed of the heads of the West End stores, on behalf of the Education Committee of the London County Council. In 1922 this Advisory Committee suggested the formation of evening classes in "Distributive Textiles" for the selling staffs of the London Retail Houses. The former Assistance Committee which, on the failure of the previous classes, had become defunct, took over the suggestion on the distributive side only. Their name was changed to the Consultative Committee for Classes for Distributors. Barrett Street Trade Schools were suggested as the best centre.

These new classes were to embrace all sections of the Textile industry, together with the allied trades such as Furs, Leather, Boots and Shoes. These classes all took the form of short courses of five lectures in each section. Every lecture and series of lectures were to be complete in themselves, yet they were so arranged so as to form a constructive and continuous course on any particular section, should the students so desire to take them. The lecturers were mostly appointed in collaboration with the London Section of the Textile Institute. The courses were continuing in their present form and it was not anticipated there would be any radical alteration in the method adopted for some years to come.

About 1922, continued the speaker, the Principal of the Day Continuation School at Westminster, proposed the running of part-time classes in Textiles. These courses were to train young boys leaving school for either salesmen or buyers in the West End Houses. The scheme was approved both by the L.C.C. Education

Committee and by the business houses concerned, and the School of Retail Distribution came into being. Success in the establishing of the day classes led to the formation of evening classes and the school had throughout enjoyed a fair measure of success.

The City of London College and the School of Retail Distribution, said Mr. Newsome, were the two main centres at present for the teaching of textiles in London, whilst the latter was the only school in which day-classes in textiles were held. During the past two or three years classes in Textile Salesmanship had been held at Schools in Wimbledon, East Ham, and Stepney, the latter being run at the request of the Co-operative Wholesale Society who had their London headquarters and workrooms in Leman Street, near to the Stepney Evening Institute. The North-Western Polytechnic and the Borough Polytechnic also ran classes in Textile Advertising and Salesmanship, with the approval of the L.C.C. Education Committee on similar lines to the School of Retail Distribution Evening Classes. Similar classes had also been promoted at Peckham, Norwood, and Streatham, but these had been a comparative failure.

The lecturer next referred to the question of Examinations. The London Chamber of Commerce had held examinations in sections similar to those now in vogue at the City of London College. The School of Retail Distribution, however, had never had an external examination, and in 1931 the City and Guilds of London Institute was approached as to the possibilities of awarding Certificates in Retail Distribution. A Committee was formed and in the 1932/33 session an examination in "The Principles of Retail Distribution" was held. This examination, although Wholesale distributors were not barred from entering, was primarily for Retail distributors.

Realising this, the authorities of the City of London College, in collaboration with the London Chamber of Commerce approached the City and Guilds of London Institute for the institution of an examination in "The Principles of Wholesale Distribution", on similar lines to that on Retail distribution. The scheme was still under consideration by the sub-committee appointed by the various bodies.

In conclusion, Mr. Newsome considered the question "What exactly is the purpose of Textile Classes in London" ? Originally the classes were intended solely as a means of giving salesmen a slight knowledge of the fabrics they constantly handled. To-day, this intention had been considerably amplified and enlarged. Students were trained not only for Salesmanship but also for the Buying side of the trade. It had been realised that if future buyers had a thorough knowledge of raw materials; of the processing of those raw materials to the finished fabric and of the requirements of each individual set of processes, a closer co-operation and collaboration would be possible between Buyers and Manufacturers. Manufacturers had suffered from the type of Buyer who knew what he wanted but could not tell them what it was. Much time and money had been lost by a lack of understanding amongst Buyers as to exactly what could be expected from a particular type fabric. Many times a fabric had been put to a use for which it was totally unsuitable. It was, then, to obviate much of such misunderstanding that the Textile classes were being run to-day. Their progress might be slow but in the end it was hoped that the ideals of those who instigated these classes would be realised.

Warping Worsted Warps to Pattern. *By* **W. L. Plunkett.**

Warping, said the speaker, might be defined as the transition from length to area, as it was the first process in cloth manufacture where length and width had to be considered.

Warping might be considered, either as a final operation of the spinner or a preparatory process of the manufacturer. Speaking as a spinner, he thought that mutual satisfaction would be obtained if manufacturers were to take over all warping operations, taking delivery of yarn on cheese or warping bobbins.

He thought that the manufacturer might, in view of the importance to him of this preparatory process, take more care than the spinner to whom it is a finishing process. If manufacturers were to do their own warping, dog-legged flanges, loose-collars, and gudgeon pins would be things of the past, whereas at the present they were, with a few exceptions, a source of trouble and delay to the spinner.

He thought the manufacturers present would not agree with him and that many would, no doubt, think this would be a retrograde step, however the point was one which could form the basis of an interesting debate.

Warping to pattern, he continued, might be divided into three groups—using right and left twist yarns; using all wool yarns with union or rayon and wool twists; and using all-wool yarns and coloured unions with a large number of turns, solid cotton, or hard twist cord yarns, either singly or in combination.

The first two groups presented no real difficulties provided reasonable care was taken in tinting and creeling. Group 3 was the most important and presented the greatest problems owing to the different characteristics of the yarns being used and the necessity which often arose for allowing greater lengths of some of the cotton stripes to allow for take-up in the weaving and skrinkage in the finishing. Opinion was divided regarding this group and the three methods employed might be classed as—Dressing, Rollers, and Waving Motion. Each had its supporters who contend their method is the best for the production of perfect pieces and certainly each had its own particular merits.

Where expense had not to be considered, continued Mr. Plunkett, and the variation in length of the stripes was not too great, dressing produced the best weaving warps from the point of view of lost or broken ends and saved much time in the subsequent weaving. His only quarrel with dressing was in regard to the tensioning of the ball warps on entering the dressing frame. How often had one heard the remark "I am about two yards out in these two cut marks, but I will level them up before the next ones are reached". Tension would then be added or taken off in the hope of producing this result. Slight variations in the measuring rollers of two warping mills could cause a variation in length such as this. The tension applied in dressing probably not being the cause at all, an alteration of this tension might only make matters worse.

Some manufacturers swear by rollers, said the speaker, and this method consisted of placing the striping ends on a roller which was then placed at the back of the loom above the warp beam and the ends allowed to be drawn into the cloth with only a small tension on the roller, so that the weave might take in the extra length required. The happy medium between "cracked ends" and "looping" would appear to be almost unobtainable as both faults often appeared in the same piece due to uneven take-up in weaving.

Mr. Plunkett next described the actual insertion of stripes on the warping mill itself, which he claimed was the quickest and cheapest method of all, and certainly, from the number of problems and difficulties presented, the most interesing. The unavoidable problems were largely caused by the difference in counts and twist of the component yarns in a patterned warp. Excessive twist causing snarling might be overcome by steaming the cheeses in an oven from 3 to 5 minutes without damaging the paper tube. This applied more to some of the fancy union twists such as 2/36 with 30–40 turns per inch and to the cord yarn type of stripings. The difficulty of uneven over-running of the cheeses in the creel when starting or stopping the swift during running-on could only be overcome by seeing that the take-up of the friction drive was as smooth as possible and that the swift was running easily so that it did not lose its speed too rapidly after the stop rod was used. A centrifugal clutch or fluid flywheel type of drive to the swift would be of great help in these cases where of necessity the size of the cheeses in the creel varies and varying degrees of over-run cause felters.

Where the extra length of striping required only amounted to 1, 2, or even 3 yards per cut longer than the ground, he continued, this might be obtained

without the use of the waving-motion by tensioning the ground ends by running them under the leasing bow before entering the leasing sley whilst the striping ends are allowed to run straight through. This method had proved very satisfactory in actual practice.

The uncertain and possible inaccuracy of other methods led to the invention of the Waving Motion, said Mr. Plunkett, by means of which five variations in length might be obtained and repeated with an accuracy before unobtainable. The ends requiring the greater length were passed through a small vertical inverted comb placed between the section sley and the measuring rollers, the ground ends passing above. This comb was given an oscillating movement in a horizontal plane by cranks working from a wheel on the end of the measuring roller. This wheel had five holes set eccentrically from its centre giving five lengths of pick or traverse to the comb. This enabled increased lengths of stripings from 2–6 yards per cut to be obtained depending upon the hole in which the first crank was set. In weaves where cracked or broken ends were troublesome in the finished pieces, this motion was undoubtedly helpful and, once the correct ratio has been found, reduced this trouble to a minimum. Other modifications which could be effected so that the full benefits of the Waver were obtained, were described by the speaker, who also briefly discussed the costs of warping.

London Section

Meeting at the Section Rooms, 104 Newgate Street, London, on Wednesday, 28th February 1934; Mr. J. Howard in the chair.

STANDARD LANCASHIRE FABRICS

At this meeting Mr. L. J. Mills (Fellow) was the speaker, and he illustrated his remarks with a number of very interesting samples. Several questions were asked at the conclusion of Mr. Mills' address to which he replied. A vote of thanks terminated an instructive meeting. Mr. Mills spoke mainly from notes, but during the course of his address distributed duplicated copies of particulars of two classes of fabrics which are reproduced hereunder.

Longcloth

The term Longcloth has been in use for hundreds of years. For example, in the Rates and Customs House Duties 1545, "one long cloth makyth one shorte cloth and VII yarde". In those days, it is probable that the term was applied to any cotton cloth or calico woven in long length for domestic purposes. Another possible reason for the use of the term longcloth is its utility, such as long white dresses or robes for infants, long night gowns, and so on. Another, but less likely, reason for the use of the term longcloth is by analogy with broadcloth and thus to differentiate therefrom.

Longcloth was originally a comparatively fine fabric, consisting of 60's to 80s' warp and 40's to 60's weft, good quality or super yarns, and 96 ends and 90 picks per inch. In current practice, longcloth is a medium-weight shirting style of bleached cotton cloth, fairly close in texture, usually plain weave, but in some cases the weave is the ordinary 2-and-2 twill. It is made in several widths and in numerous qualities, due to competition, manufacturers' and customers' personal preferences, etc. From 28 to 40 in. wide and from 28's to 36's warp and from 18's to 38's weft probably include the majority of longcloths made to-day.

Longcloth is bleached, cockle finished, and with very little filling added, say, 3 to 4% after the actual bleaching, mangling, drying, and calendering. It is dull or unglazed in finish and the cloth should be easy to sew. Nearly all longcloths are heavier than cambrics and madapollams, and are usually made from American cotton yarns, but the very best qualities are made from somewhat better yarns spun from the lower qualities of Egyptian cotton. Typical examples are as follows—

(*a*) Comparatively coarse quality: 57 ends and 42 picks per inch, 28's warp and 18's weft.

(*b*) An ordinary quality: 60 ends and 60 picks per inch, 30's warp and 30's weft, 34 to 36 in. wide, 36 yards long as received by the distributor.

(*c*) A still better quality: 72 ends and 72 picks per inch, 36's warp and 38's weft, 28 to 36 in. wide.

The fabric should be fairly evenly woven, but it is not usually free from slight unevenness in the picks when the weft is replenished. Longcloth should have good selvedges

about 1/10th in. wide and be free from any wavy or saw-like effect at the extreme edges. In the average qualities of longcloth, common faults are (*a*) irregularity in the weft due to insufficient tension on the weft during weaving allowing small loops to form ¼ to ½ in. long; (*b*) broken warp ends during weaving not promptly repaired at the loom; (*c*) faulty restarting place after the weaver has placed a full shuttle of weft in the loom, resulting in a few picks very irregularly spaced—and may appear either as a thick or thin place across the cloth.

Cotton Sheets

Cotton bed sheets are made in the plain weave and 2-and-2 twill, and are usually bleached, but in some cases are sold in the unbleached, natural, or grey state. Common sizes of sheets are as follows—

in.		in.		
58	×	78		
60 to 63	×	100		
70 to 72	×	108	termed	2 × 3 yd.
80	×	100		
80 to 81	×	108	,,	2¼ × 3 yd.
90	×	108	,,	2½ × 3 yd.

The superior qualities of cotton sheets are made from virgin cotton throughout, 2-fold or single American warp yarn and single American weft yarn. Other cottons are also used for spinning into yarns suitable for sheets, depending, in some cases, on the country in which the cotton is spun into yarn. Cotton sheets of superior qualities are usually made from 22's to 26's warp and similar counts of weft. Such sheets are about balanced in ends and picks per inch and in counts of yarns. Examples are: (1) 78 ends per inch of 24's warp and 74 picks per inch of 22's weft, (2) 72 ends per inch of 24's warp and 70 picks per inch of 27's weft. Sheets 2 × 3 yd. made from such particulars will weigh 1¾ to 2 lb. each, have a good-class, close-woven, and clean appearance, contain very little filling (not more than 3 or 4%) and, although not so heavy as some of the poor quality sheets, are very durable, that is, will withstand a great deal of wear and washing.

Examples of poorer qualities of plain cotton sheets are woven from 24's warp, but only 44 ends per inch, and 66 picks of 13's weft; 45 ends of 27's warp and 57 picks of 15's weft; 43 ends of 32's warp and 53 picks of 15's weft. It will be observed that the weft in each of these poorer examples is thicker than the warp; this gives weight and thickness to the fabric, and may even have a fuller handling quality, but the fabric is not as durable. Still poorer qualities of plain cotton sheets are regularly made. For example, 45 ends of 26's warp and 42 picks of 9's condenser or waste weft.

Twill sheets also vary considerably in quality. Twill woven sheets are softer and warmer than plain weave sheets. A superior quality twill sheet consists of 72 ends of 24's and 83 picks of 22's weft. In general, twill sheets usually have more picks than ends per inch and the weft is coarser than the warp. An example of a low quality of twill sheet is 44 ends of 24's warp and 44 picks of 7's condenser or waste weft, making a 2 × 3 yd. sheet weighing about 2½ lb.

The medium and low qualities of sheets, bleached, usually contain an excessive amount of filling. In such cloths, the simple rubbing action, as when hand washing, dislodges some of the powdery filling, which can be seen to fly out. There may be anything up to 25% of filling in the low-quality sheets, and although it increases the weight and gives the impression of being of better quality than is actually the case, it serves no good purpose so far as wear is concerned. A few washings will remove all such fillings from sheets.

IRISH SECTION—ANNUAL MEETING

The 8th annual meeting of the Section was held at the Municipal College of Technology, Belfast, on Friday, 20th April 1934: Mr. W. H. Webb presided. The Honorary Secretary, in his report, stated that two meetings had been arranged for the beginning of the session, but unfortunately both meetings had had to be cancelled at rather short notice, and it was only possible to procure one other suitable lecture, viz. "Recent Work on the Power Loom", by W. A. Hanton, M.Sc.(Tech.). Two members were added during the year and there were two resignations, the total membership remaining at 35.

It was decided that the Chairman, Hon. Secretary, and Committee be recommended to Council for re-election. The Chairman stated that a further endeavour should be made to increase the membership of the Section and suggested that invitations to attend one of the meetings might be forwarded to a number of firms engaged in the linen industry. These firms could also—in some suitable manner—be invited to become members. With regard to Section meetings for

the following session, Dr. Gibson suggested that a paper on "Chemical Engineering" might be welcomed, and said he would endeavour to procure a suitable lecturer. The Hon. Secretary, Mr. F. J. W. Shannon, was instructed to invite Dr. Hampson to deliver his postponed lecture in Belfast during next winter. He was also instructed to ascertain if it would be possible to secure a lecture on "Dyeing"—with some reference to naphthol colours.

MIDLANDS SECTION—ANNUAL MEETING

This meeting was held on the 4th May 1934, at the College of Technology, Leicester, Mr. T. Morley presided over a small but representative attendance.

Mr. T. A. Purt (Hon. Secretary) presented his annual report which showed an increase of 8 members for the year. The programme of lectures for last session proved really interesting, and though attendances were not so large as might have been hoped, yet fairly long journeys were associated with some of the visits to works. He appealed to each member to decide upon definite attendance at one or two of the fixtures each session, as this would ensure satisfactory assemblies. On the occasion of the visit to the Dunlop Works at Erdington, interesting addresses were contributed by Mr. R. Truesdale (Associate) and Mr. T. M. Lawson (Fellow). It was deeply deplored that, since that occasion, the death of Mr. Truesdale, following a short illness, had taken place. The report was accepted, and Mr. Chamberlain observed that in the matter of attendance the widely scattered area covered by the Section was to be taken into account. Regarding visits to works, a suggestion by Mr. Purt that these should take place preferably in summer months was referred to the Committee.

It was agreed to recommend to Council the re-election of the existing Committee. Mr. T. A. Purt was unanimously re-elected Honorary Secretary and warmly thanked for his services during the past year. The programme of meetings for next session was discussed and several suggestions submitted, including the holding of a dinner. Arrangements of the programme was referred to the Committee.

The meeting concluded with a hearty vote of thanks to the Chairman.

LONDON SECTION—ANNUAL MEETING

This was held at the Section Rooms, 104 Newgate Street, on Monday, 7th May 1934, when Mr. A. E. Garrett took the chair. The Committee's annual report, of which a summary follows, was read and approved.

Inter alia the report stated that the London Section during 1933 had lost through resignations, transferences, and other causes, 17 members. In the same period 7 members had been added, making the total membership at 1st January 1934, 119. During the Lecture Session 1933–34 two public lectures had been held. One by the kind permission of the Clothworkers' Company had been held in their hall, and the other in the hall of the London County Council, Barrett Street Trade School. A public lecture arranged jointly with the Society of Dyers and Colourists had also taken place in the hall of the Barrett Street Trade School. In addition six informal Discussion Meetings had been held in the Members' Room at the offices of this Section. The Committee was pleased to be able to report that as a whole the lectures had been better attended this Session and in order that the interest of members might be retained asked for their closest co-operation in the matter of suggestions for 1934–1935 Lecture Session. A very successful party of 18 was organised to visit Mills, etc. in the Manchester district during 20/22 September 1933. In this connection the Committee wished to record its keen appreciation of the interest shown and the assistance given by the Council and Headquarters Staff. It was proposed to organise a similar visit to Yorkshire Mills during the autumn 1934. The Special Committee appointed at the last annual meeting had been giving consideration to several proposals having reference to increasing the usefulness of the London Section, and a very carefully considered report had been sent to the Council in Manchester.

The Honorary Secretary reported that 19 nominations had been received and, therefore, no ballot would be necessary. It was unanimously decided that these nominations should be recommended to Council for election to the London Section Committee.

It was unanimously recorded that Mr. John Howard be re-elected Chairman of the Committee for the ensuing year, and thanks were recorded to Mr. Howard for his past services. Messrs. A. E. Garrett, F. Henley, P. J. Neate, and E. Wigglesworth were unanimously re-elected Vice-Chairmen for the ensuing year. Mr. A. R. Down was re-elected Hon. Secretary, and Mr. Albert Gowie, Hon. Assistant Secretary. Thanks were expressed by the Chairman for their continued interest and service.

YORKSHIRE SECTION—ANNUAL MEETING

The annual meeting of members of the Yorkshire Section was held at the Midland Hotel, Bradford, on the evening of 31st May 1934. Mr. T. H. Robinson (Chairman of the Section Committee) presided, and there was a fairly good attendance.

The Chairman stated that Mr. John Robinson, owing to retirement, had resigned membership of the Committee. Over many years past Mr. Robinson had been a most enthusiastic supporter of the work of the Section and of the Institute. On the motion of Prof. Midgley, seconded by Mr. Bailey, it was unanimously decided that the Hon. Secretary should send a suitable letter to Mr. Robinson, expressing regret on account of his withdrawal from Committee, and hearty appreciation of his past services.

The Chairman referred to the membership of the Section and said it was encouraging to note that eight new members had been elected since the commencement of the present year.

It was reported that there were 11 nominations for 10 vacancies on the Committee. It was agreed to ask Mr. George Garnett to attend meetings of the Section Committee in his capacity of Past-President, instead of taking a place on the Committee, and to omit his name from the Committee nominations. The remaining names were then unanimously recommended to Council for election to the Section Committee.

NOTES AND NOTICES

Council of the Institute

At the September meeting of the Council (Mr. F. Wright presiding), there was an excellent attendance for the consideration of many items of interest contained in a somewhat lengthy agenda. The results of the June Examination of the Institute, as submitted by the Board of Examiners, were confirmed and satisfaction was expressed not only on the score of definite increase of numbers, but more particularly on that of the wide geographical distribution of candidates. In view of the greater demands upon the services of examiners, the Council accorded grateful thanks to all concerned in the conduct of the Examination. At the request of the Publications Committee, preliminary consideration was given to the subject of the next Annual Conference, and it was agreed that, for next meeting, this matter should be specially included in the agenda. Meanwhile, it was decided that, subject to final assent to the holding of a Conference in 1935, the policy of covering one general subject in papers contributed should be continued. The subject for next Conference, therefore, will be "Conversion of Fibres into Yarns". The Council also dealt with casual vacancies which had arisen among the Vice-Presidents and the Council. Mr. Henry Binns, of Bradford, was unanimously elected a Vice-President in succession to the late Alderman Wm. Frost. Mr. F. Kendall, of Bradford, was elected to membership of the Council, thus filling the vacancy created by the death of Mr. R. J. H. Beanland. Fitting reference was made to the services of the late Mr. Beanland, and a vote of condolence was recorded.

Honorary Fellowship—Presentation

The Committee of the Midlands Section of the Institute, of which Mr. Tom Morley (Leicester) is Chairman, have decided to hold a Dinner at the Grand Hotel, Leicester, on the evening of Friday, October 5th. The event is arranged in order to provide a social gathering for members of the Section and friends, including ladies. The Council has decided to take advantage of the occasion for the formal presentation of the certificate of the Honorary Fellowship of the Institute recently awarded to Mr. C. F. Topham, of Coventry. Members of Council and other officers have been invited to attend the function; any member of the Institute interested in the event may notify attendance and apply for tickets, the charge for which is 7s. 6d. each. It is hoped that the efforts of the Section Committee in the organisation of the event will receive the fullest possible support.

Examination in General Textile Technology

The Council of the Institute announces that the following candidates passed the Institute's Examination in General Textile Technology, held simultaneously in June last at Manchester, Nottingham, Dunfermline, Belfast, Quebec (Canada), and Calcutta (India)—S. Appleyard (Bury); T. Baker (Bolton); R. C. Boyce (Loughborough); J. V. Davidson (Leeds); W. A. Dutton (Ilkeston, Derbyshire), with special merit; J. Dyson (Rochdale); O. Engelhardtsen (Norway); E. Elliott (Didcot, Berkshire); C. H. Hampson (Westhoughton); A. A. Hayes (Bolton); G. V. Hirst (Bradford); J. L. Holland (Bury); F. G. Holroyd (Bradford); J. H. Maudsley (Quebec, Canada); H. R. Neill (Lisburn, N. Ireland); D. A. North (Halifax); Wm. W. Platt (Oldham); J. H. Riley (Bury); T. Roscoe (Bolton); C. E. C. Wilson (Liverpool).

T. Baker (Bolton) also passed the Examination, Part I (Auxiliary Subjects).

The above-named candidates have now completed the qualification requirements for award of Associateship (A.T.I.).

Institute Members in U.S.A.

It was reported at the September meeting of the Council that Mr. Frank Nasmith, Vice-President, during a recent visit to the United States, had been able to meet a considerable body of Members of the Institute in America. The occasion was a luncheon kindly given by the Universal Winding Company. Twenty members of the Institute attended, along with other guests, and Mr. C. H. Clark, Secretary of the United States Institute for Textile Research, presided. In the course of the proceedings, Mr. Nasmith, after expressing gratitude for the opportunity to meet so many fellow-members, briefly outlined developments in the work of the Institute consequent upon the grant of a Royal Charter. The scheme of professional qualification of members was of the utmost importance and had definitely put "on the map" the profession of textile technologist. Successful applications on the part of members in America for the Institute's Diplomas had been made in several instances. He invited their hearty co-operation in the development of textile technology. The meeting appointed a small committee to draw up a resolution expressing to the Textile Institute, the appreciation of American members for the opportunity of meeting Mr. Nasmith. The resolution, forwarded to Manchester by Mr. Clark, is as follows—

Whereas the American Members of the Textile Institute, assembled at a luncheon at the Parker House, Boston, Mass., U.S.A., 6th August 1934,. have been privileged to have as their guest of honour Mr. Frank Nasmith, F.T.I., Honorary Secretary and a Vice-President of the Textile Institute, be it

RESOLVED, that we desire to express our deep appreciation of the message that he brought to us, and also of the honour of having for the first time at a meeting of the American members an officer of the Textile Institute. Also, be it

RESOLVED, that we extend greetings to our fellow members in Great Britain, and offer our co-operation in all matters affecting the welfare of the Textile Institute.—(*Signed*) DOUGLAS G. WOOLF, BRACKETT PARSONS, Prof. H. J. BALL, *Committee on Resolutions*, and CHARLES H. CLARK, *Toastmaster of the Meeting and Luncheon of American Members of the Textile Institute in honour of Frank Nasmith, F.T.I.*

The Council expressed warmest satisfaction in regard to the meeting, thanked Mr. Nasmith for his services, and directed that a suitable letter of acknowledgment of the resolution be forwarded to Mr. Clark.

The Late Mr. R. J. H. Beanland

The Institute has suffered the loss of several prominent Members in recent months, and the death of Mr. R. J. H. Beanland, of Clayton West, near Huddersfield, in the latter part of August, has removed a most ardent and active supporter over many years. From the time of the obtaining of the Royal Charter, in 1925, Mr. Beanland became particularly interested in the scheme of qualification of Members and devoted a great deal of time and energy to the work of the Selection Committee, the meetings of which he attended with marked regularity as a representative on the side of industry. Mr. Beanland was Chairman and Managing Director of the firm of Messrs. R. Beanland & Co. Ltd., Worsted Spinners, Clayton West. Elected a Fellow of the Institute in 1927, his experience in relation to technical education in regard to the textile industry was most advantageous in reference to his duties as a member of the Selection Committee of the Institute. Mr. Beanland also took a warm interest in the annual competitions of the Institute and, in quite recent years, had made considerable effort to secure support for special competitions for students engaged in the woollen and worsted industries. The funeral took place at Scholemoor Cemetery, Bradford, on the 31st August, and was attended by a large body of representatives of textile interests in the West Riding. Institute officers and members were represented by Messrs. Henry Binns, T. H. Robinson, J. Dumville, S. Kershaw, and J. D. Athey (General Secretary).

We have also to record the death in August of Mr. John Ainscow, a well-known cotton manufacturer, of the Beehive Mills, Lostock, Bolton. Although Mr. Ainscow was not directly associated with the work of any Committee of the Institute nevertheless he was a warm supporter of our institution.

Formerly head of the Textile Department of the Burnley Technical College, Mr. James Holmes, who had been retired and resident at Blackpool since 1923, has passed away after prolonged illness. Mr. Holmes was a pioneer in teaching and the conduct of classes in weaving, and it is computed that for thirty years an average of 500 pupils came under his care. A native of Hebden Bridge, he spent most of his life at Burnley and contributed substantially to early literature on weaving subjects.

Special Course for Textile Teachers

A week-end course for teachers of textile subjects at technical colleges and schools was conducted at Loughborough from 7th to 9th September. There was an attendance of about 40 teachers representing the Midlands, Yorkshire, Lancashire and the West of England, and hostel accommodation was provided at the Rutland Hall in connection with the Loughborough College. The course was promoted by the Board of Education, and Mr. H. Salt acted as Organising Inspector, other inspectors present being Messrs. Thorne and Burns. The Chief Inspector, Mr. E. G. Savage, of London, attended part of the proceedings and elicited the views of the teachers in regard to place, subjects, and period for a course next year, opinion favouring a period of one week. The Loughborough course was opened with an address on "The Art of Teaching", by Professor H. A. S. Wortley. The main discussion, covering two half-days, was on the

subject of National Certificates in Textiles, the whole scheme being explored in detail. Mr. J. H. Vowler, of the British Launderers' Research Association, contributed a paper on "Laundering Effects" and he appealed for consideration of teachers to features of fabric structure in relation to launderability. Owing to indisposition, Mr. J. E. Dalton, H.M.I., was unable to attend and make a contribution on "Teaching Difficulties". The General Secretary of the Textile Institute attended and during the discussion on National Certificates alluded to aspects of the scheme from the standpoint of the Institute.

Sixth International Congress for Scientific Management

It will be recalled that the Textile Institute accepted an invitation to join the Council of the Sixth International Congress for Scientific Management, which is to be held in London in July next year, under the patronage of H.R.H. the Prince of Wales—Mr. F. Nasmith, Hon. Secretary, accepting nomination as representative. At the Council meeting held on June 28th, under the Chairmanship of Sir George Beharrell, D.S.O., Dr. E. F. Armstrong reported that the Congress meetings will be held in the Central Hall, Westminster, and at the Halls of the Institution of Civil Engineers and of the Institution of Mechanical Engineers (by kind permission of their Councils). He confidently expected that the number of two thousand members who were enrolled for the Paris Congress in 1929 would be exceeded, and that of this number of delegates, at least six hundred would come from abroad. Arrangements were being made for various visits to factories, farms, and institutions, but the only ceremony which had been definitely decided up to date was an Evening Reception in the Guildhall, upon the invitation of the Court of Common Council of the City of London. Sir Henry Fowler reported that amongst those in this country who had agreed to contribute papers upon the practical applications of management in all its phases, were managing directors in a wide range of industries, merchants, prominent agriculturists, and representatives of leading women's organisations. Mr. G. R. Freeman announced that a large number of industrial companies were supporting the Congress, and that a donation had just been received from the Fishmongers' Company.

Gifts to the Institute

Recently an advertisement appeared in the *Journal* asking for certain back issues for 1923. One solitary copy was notified to us and the advertiser secured his full volume as a result. Later, Mr. John Crompton called and gave us a complete set of issues for 1923, several extremely valuable issues of earlier volumes and a few publications of other bodies. Practical assistance and thoughtfulness such as this is much appreciated.

Institute 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. 117—Apprentice Manufacturer desires position as Manager or Assistant Manager in spinning mill. M.A.(Cantab.), Hons. in Engineering. City and Guilds 1st Class Certificates in Woollen and Worsted Weaving, Woollen Yarn Manufacture, and Wool Dyeing.

No. 118—Young man, A.T.I., seeks position as Manager or Assistant Manager in weaving factory. City and Guild Certificates in Linen Weaving and Mill Management. Nine years' factory experience in damask and fancy weaving; five years' research work on weaving and fabrics.

Textile Institute Diplomas

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

ASSOCIATESHIPS

BANKAPUR, Ramkrishna Nemasa (Dist. Bijapur, India).
DAY, John (Dewsbury, Yorkshire).
NICHOLLS, Kenneth (Sydney, Australia).
PECK, Arthur, jun. (Leeds).

Institute Membership

At the September meeting of the Council, the following were elected to Membership of the Institute—*Ordinary*—A. N. Engblom, c/o Boras Wafveri Aktiebolag, Boras, Sweden (Technical Director, and one of the Directors of the Firm); A. R. Harrison, Thornhill, Highfield Lane, Keighley (Worsted Coatings and Woollen Manufacturer); H. Hill, Department of Lands, 64/65 Merrion Square, Dublin, I.F.S. (Organiser for Development of Production of Handwoven Tweeds); I. H. S. Mattar, Chemical Department, Cairo, Egypt (Chemist, Textile and Paper Section); J. Noguera, 27 Blackfriars Street, Salford 3 (Director, Casablancas High Draft Co. Ltd.). *Junior*—J. J. Duncan, 65 Haywood Road, Mapperley, Nottingham (Student, Nottingham University College); T. M. Woo, College of Technology, Sackville Street, Manchester 1 (Student).

REVIEWS

The Worsted Industry. By J. Dunville and S. Kershaw. Published by Sir Isaac Pitman & Sons Ltd., 3rd Edition. (168 pp., Price 3/-).

Without delving too deeply into details the book covers the whole of the worsted industry from the origin of the fibre to the finished fabric. This edition should prove to be a very handy volume for those wishing to gain a general knowledge of the industry, since much valuable material relating to important developments is incorporated for the first time. The additions include a worsted calender; diagrams showing worker, stripper, and fancy actions; and information on the square motion comb; the intersecting gill box; the Anglo-Continental drawing machines; the mule ring frames; and the production of fancy yarns. A very useful bibliography for the student is the final recent inclusion. One or two points may be criticised. In the diagram illustrating the action of the fancy, the clothing is too deep in mesh. In another newly-added diagram, this time of the square motion comb, there are many reference letters and numbers which are not mentioned in the text. In the chapter "Cleansing Wool", the only references to the possibilities and dangers of the wool felting are made in the drying stage, and yet possibly the most serious causes for such entanglement and matting of fibres, are to be found in the bowls and at the squeeze rollers. In Chapter VII the two sentences on p. 79 referring to the effect of draft on twist might be misleading. Twist being "re-imposed" and repeatedly added and withdrawn, suggests that untwisting takes place at some stage. Turns per unit length are reduced by attenuation, but the total twist is always being increased and never suffers appreciable reduction. The book is well written and illustrated by clear diagrams and photographs of machines. Probably the chapter on Parallelisation is the most worthy of commendation and in particular the sections describing the principles of the very complicated combing mechanisms. An appendix is written by Robert Taylor on the Fire Hazards of Worsted Mills. S. T.

Fourteenth Annual Report of the Industrial Health Research Board to 30th June 1934. Printed and Published by H. M. Stationary Office, London, 1934. (Price, 9d. net.)

The Introduction to this report, though lacking in simplicity of language and somewhat, too, in punctuation, should be widely read. It reveals the magnitude of the task to which the Board has set its hand and some, though by no means all,

of the difficulties to be faced. To read that the Board realises its "lack of knowledge about the physical condition of the working population as a whole", is to realise also something of the size and number of the problems to be attacked. It is gratifying to learn that mental fatigue is receiving its due attention and to see the name of an eminent psychologist has been added to the Board. Might it be suggested that to learn something of the physical condition of the working population goes, or should go, hand-in-hand with a knowledge of the physical condition of the child just about to leave school ?

Part III of the Report—Investigations—describes the Board's work under the heads of environmental conditions; physiology and psychology of work; sickness and absenteeism; and vocational suitability. Though only in one or two cases directly textile in character, the investigations described are indicative of work along definitely productive lines and one or two reports, when available, will be referred to in more detail. Altogether a satisfactory position is revealed. It is a pity that the "official" atmosphere of a Government body produces such stilted language and long-winded sentences. T.

Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1933, Vol. XVIII. Published by the Society from its offices in Finsbury Square, London, E.C.2. (710 pp. with name and subject indexes. Price to members 7s. 6d., and to others 12s. 6d.)

These invaluable reports constitute an example that might well be followed by other similar organisations. It may be claimed that practically every separate report has points of interest to textile technologists with perhaps the exceptions of those dealing with Soils and Fertilisers, Medicinal Substances, and Sanitation, but so catholic are the interests of the textile industries, or at least should be, that even these sections might profitably be read. On the other hand the reports on "Colouring Matters and Dyes" by E. H. Rodd and H. A. Piggott; "Textiles, Fibres, and Cellulose" by J. C. Withers; "Bleaching, Dyeing, Printing, and Finishing" by J. B. Speakman; "Oils, Fats, and Waxes" by T. P. Hilditch; and "Sugars, Starches, and Gums" by L. Eynon and J. H. Lane should be generally read. It is not known to what extent previous volumes in this series are available, but there can be little doubt that the series is valuable and will continue to increase in demand as a source of reference and as its existence and purpose become more widely known. T.

The Jubilee Issue of the Journal of the Society of Dyers and Colourists. Published by the Society at the General Offices, 32 Piccadilly, Bradford. (227 pp. Price, to non-members, 25s. per copy.)

This Society celebrates its fifty-year jubilee in 1934 and the volume of which this is a notice has been issued in commemoration of the event. Whilst by no means to be compared in age with Societies such as the Royal Socety, founded 1660; or the Royal Geographical Society, and the British Association for the Advancement of Science, both in 1831; yet of organisations associated definitely with industry the Society of Dyers and Colourists is among the oldest and most widely known. It would not perhaps be too much to say that probably no other analogous society has so close a contact with any specific industry. A list of its members and of its office-bearers would serve with little alteration or addition as a list of the leading makers, users and scientists concerned with dyestuffs of the past half-century. The contents of this jubilee number consist of original articles, some being reviews of 50 years' progress and others dealing chiefly with the present state of knowledge of the subjects under consideration. Perhaps the best service a reviewer can render to this publication is to give a list of its articles and authors who as the "Editorial" says "are too well-known to need . . . introduction and have been, or are, actively and intimately concerned with the subject of their articles". The list is as follows—"The Romance of the Society of Dyers and Colourists" by George G. Hopkinson (Honorary Secretary of the Society); Early History of Dyeing" by J. Huebner; History of the Worshipful Company of Dyers, London" by A. H. Brewin; "The Constitution of Cellulose" by W. N. Haworth; "The Constitution of Animal Hairs" by W. T. Astbury and J. B. Speakman; "Reactions for the Detection of Damage or Irregularities in Textile Fibres" by P. Krais; "Landmarks in the Evolution of the Dyestuff Industry during the Past Half-century" by A. G. Green; "Substitution in the

Benzene Nucleus" by R. Robinson; "The Relation between the Constitution and Substantivity of Dyes" by P. Ruggli; "British Patent Laws, Ancient and Modern" by H. Levinstein; "A Review of Cotton Bleaching" by W. Kershaw and F. L. Barrett; "Some Outstanding Events and Methods in the Commercial Application of Dyes on Cotton and Allied Fibres" by A. Singer; "The Dyeing and Finishing of Cotton" by F. Scholefield; "Progress in Calico Printing" by J. B. Fothergill; "The Dyeing of Rayons" by C. M. Whittaker; "Slubbing and Wool Yarn Dyeing" by E. Isles; "Half a Century in the Dyeing and Finishing of Worsted, Woollen, and Union Piece Goods" by W. S. Stansfield; "Hosiery Dyeing and Finishing 1884-1934" by W. A. Edwards and G. F. Hardcastle; "A Survey of the Dyeing Printing, and Finishing of Natural Silk" by G. Tagliani; "Dry Cleaning, Wet Cleaning, and Dyeing" by F. W. Walker; "Fur Dyeing" by T. R. V. Parkin; "The Dyeing of Leather" by T. H. Wilson; "The Chemistry and Technology of Rubber and Synthetic Resins" by W. J. S. Naunton and F. J. Siddle.

It may perhaps be permitted to wish the Society a prosperous and equally useful progress to its Centenary. T.

British Association for the Advancement of Science. Report of the Annual Meeting at Leicester, 1933. Published by the Association at Burlington House, London W.1.

In addition to the Presidential address by Sir F. G. Hopkins, and the Section President's addresses, this volume contains two valuable reports by Committees appointed by the Association. The first is on "General Science in Schools" and the second constitutes an "Inland Water Supply". In the Section Transactions, abstracts of the papers presented are printed, and of these the following are of interest—"Some Recent Developments in the X-ray interpretation of the Properties of Hair, Feathers, and other Protein Structures" by W. T. Astbury; "Fibre Chemistry and X-ray Analysis" by J. B. Speakman; "The Chemistry of Quebracho Tannin" by P. Maitland; "Economic Theory of Patent and Copyright Law" by A. Plant; "Organisation as a Technical Problem" by L. Urwick; "The Practical Value of Physiology to Industry" by G. P. Crowden; The Legal Aspect of River Pollution" by H. F. Atter; and "The Hosiery Industry" by J. Chamberlain. In addition, Sir Josiah Stamp delivered an evening discourse "Must Science Ruin Economic Progress?" which is fully reported. T.

GENERAL ITEMS AND REPORTS

P.E.P. (Political and Economic Planning) Industries Group. Report on the British Cotton Industry. Published from the Offices of P.E.P., 16 Queen Anne's Gate, London S.W.1.

Three major points come to mind on reading, even cursorily, this report. Firstly, that every Lancashire man ought to read it and would probably get very wroth in the process. Secondly, that no other survey of the causes of and the present position in Lancashire yet exists which is anything like so comprehensive. And thirdly, that to attempt a critical or even a descriptive survey of the report would involve quotation of nearly half of it and is therefore out of question in this *Journal*. It must suffice to detail its contents and to refer to one or two points of specific interst to those whose concern is textile technical education and/or textile research.

Fourteen pages are devoted to the Introduction, which amounts to a short summarisation of the facts and figures accumulated in Part II—The Survey. Proposals for reform are put forward in Part III—Reorganisation. Part IV deals with the Cotton Industry in other Countries. The survey covers the Extent of the Depression, Causes of the Depression; Markets; Purchase of Raw Cotton; Spinning; Weaving; Finishing; Marketing; Labour; Plant and Equipment; and Research.

The point is made that "Lancashire has failed to move forward in structure, organisation, and technique". How true this may be in many respects cannot be discussed here, but so far as educational and research organisation is concerned there can be no hesitation in affirming that this country is well ahead of its competitors. If, as may be urged and as had been urged by those in a position to know, the cotton industry does not avail itself any too readily of the advantages

of its educational and research facilities, that is a fault that can be easily remedied. The report itself says "the technique of utilising research is not well developed in the British cotton industry". It may be that seeming neglect is almost entirely due to the harassing and pressing incidence of economic and financial problems. The report continues that "it cannot be overestimated that an apparently dying and nearly bankrupt industry does not attract good and young men". Whether this be true or not is perhaps a moot point; it seems to have been overlooked that many men who would now be in their forties and who would have been giving the best years of their lives to the industry were killed in the war. The Introduction concludes with the statement that "Any proposals will be jeopardised if a scientific and factual approach is not adopted in trying to put them into effect". If this may be interpreted into a plea for the application of the scientific spirit and method to textile economics it can be heartily endorsed. This form of research has, it would appear, been too long neglected. In this connection the report urges "research from the consumer's angle", and further states that "insufficient attention has been devoted to the question of economic research and the collection of statistical data".

P.E.P. are unhesitatingly to be congratulated upon this report. It may well be that each and every paragraph could be challenged and profitably discussed. But there can be no doubt as to its comprehensive character which enables the broad outlook to be maintained in the discussion of any of the details of the pressing Lancashire problems. There can also be nothing but commendation of its courage and of the message it bears to Lancashire to "pull together" and sink "internal, often personal, dissensions". T.

Specialised Courses in Advanced Chemistry, 1934-1935.

These courses have been arranged by a Committee appointed by the Yorkshire Council for Further Education in 1933. The scheme proposed has been approved and will be provided by the Local Education Authorities concerned at the Bradford, Huddersfield, and Leeds Technical Colleges in the Session 1934-1935. The booklet describing these courses, published by the Y.C.F.E., refers to the Objects of the Scheme in terms which cannot be improved upon and these are therefore quoted here—

> Owing, however, to the very wide curriculum now necessarily covered in the training of chemists, one very serious difficulty is found, not only by senior students and young graduates of our Technical Colleges and Universities, but also by experienced chemists already engaged in industry, namely, that of keeping abreast of the latest developments in the theory and technique of special branches of the subject; to realise this, one need only quote the developments in recent years of the theories of organic chemistry, microchemical analysis, and electrometric methods of analysis and control.
>
> New discoveries are recorded in the first instance in scientific technical journals, but it is generally a matter of many years before they find a place in students' textbooks or manuals. It is, however, important that information regarding new discoveries and their applications should be made available to technical chemists as soon as possible.
>
> At the same time the number of potential students in a single section of the subject is necessarily limited and they will be scattered over a considerable area. It is, therefore, not possible to provide courses of instruction either every year or at more than a few centres.
>
> It has been long felt that there is a definite need for suitable short specialised "refresher" courses to be given by experts in convenient centres. Such courses are intended primarily for chemists who already possess qualifications equivalent to a University degree, the Associateship of the Institute of Chemistry, the Higher National Certificate in Chemistry, or Final Certificates of the City and Guilds of London Institute. It is hoped that the courses outlined in this pamphlet will help to meet a real need.

A brief list of the courses arranged is as follows—

Courses at Bradford.

i—Practical Work in the Microscopy of Food and Drugs. ii—Recent Advances in Textile Chemistry.

Courses at Huddersfield.

i—Chemical Engineering. ii—Recent Advances in Synthetic Organic Chemistry.

Courses at Leeds.

i—Modern Analytical Methods. ii—Modern Theories of Organic Chemistry.

T.

FROM ANY ANGLE—

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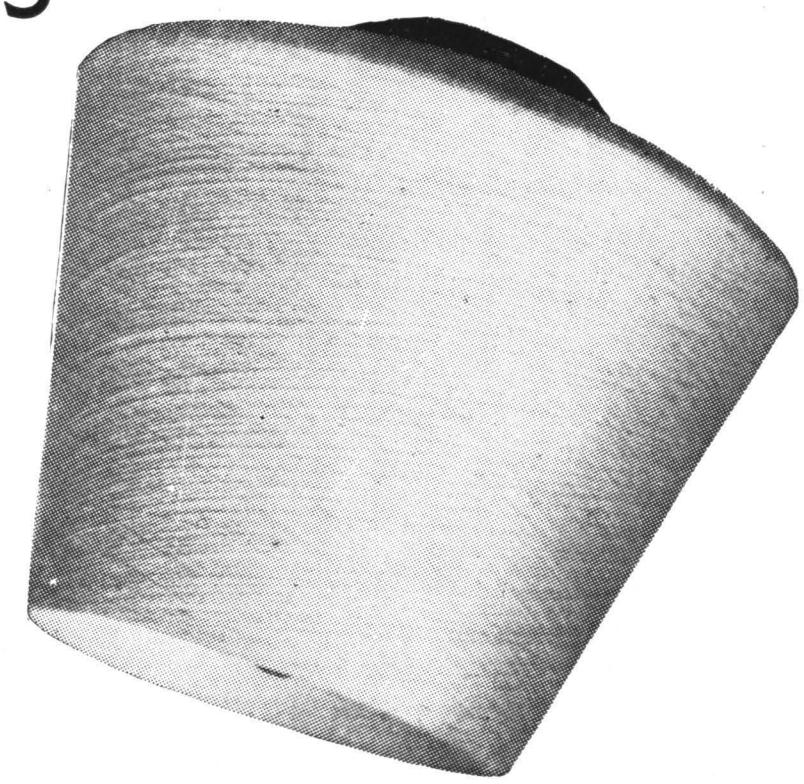

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TRANSACTIONS

17—SOME PHYSICAL PROPERTIES OF KNITTED FABRICS
I—THICKNESS, WEIGHT, AND COMPRESSIBILITY

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SUMMARY

For a large number of samples, selected from a wide range of knitted fabrics, the thickness and weight per unit area have been measured. Two types of thickness measurer have been discussed and the number of readings necessary has been determined. The effect of pressure on the thickness of knitted fabrics was investigated in detail so that the best pressure for comparative experiments between fabrics could be employed. A pressure of ten grams per square centimetre was found to be generally suitable for comparison, but the lower pressure of one gram per square centimetre was more desirable for determination of the actual thickness. The ratio of thickness to weight was studied for the different types of fabric and, although the results are very diverse, some general inferences were drawn. The actual construction of the fabric has the greatest influence on this ratio; the material employed for the fabric appears to be a secondary consideration except that rayon fabrics generally tend to be thin. They are also, as a class, not very compressible on account of their lack of surface fibres and consequently compare most favourably if the thickness is measured under high pressure. Interesting results have been obtained by calculating the density of the fabrics and so forming an approximate idea of the proportion of the fabric space actually occupied by the fibres of which they are constructed.

INTRODUCTION

Very little is known about the physical properties of knitted fabrics, particularly their relationship to those of the better known woven cloths, and the purpose of this survey was an endeavour to discover and record some of these elementary characteristics. The properties selected for investigation were thickness and weight, since these two are fundamental and of primary importance, and the present paper is confined to a discussion of these two factors.

Since the range of knitted fabrics has now been extended to all classes of textile materials, by the gradual improvement of machinery and processes, the work necessary for a complete survey would be excessive. For this reason, the present investigation has been confined entirely to fabrics suitable for clothing purposes, in which weight and thickness are of equal importance with appearance, strength and other properties and not subservient to them as in fabrics for special purposes. Particular attention has been paid to the underwear fabrics, since this class of goods forms the largest part of the output of knitted wear.

In view of the variation of plain fabric that can be produced on one machine with the same yarn, by adjustment of the knitting mechanism, it

was evident that measurements would not be sharply defined but would tend to be spread over ranges of values; the same class of fabric made by different manufacturers is not identical.

MEASUREMENT OF WEIGHT

The weight per unit area of each fabric was determined on a four-inch square sample cut in a hand screw press. Each sample was conditioned for three days and weighed in an atmosphere of temperature 73° F. and 70 per cent relative humidity. For convenience of comparison they have been converted into the accepted units of ounces per square yard.

MEASUREMENT OF THICKNESS

All thicknesses required in this work were measured on the instrument designed by Marsh[1] at the Wool Industries Research Association, by means of which the thickness of a fabric at any reasonable pressure may be determined. A small sample of fabric is attached to a wire frame and suspended vertically between two opposed circular vertical faces, each of one square centimetre area. One of these faces can be traversed horizontally by a fine screw, a dial gauge recording the traverse in thousandths of an inch. The other face is supported on the vertical arm of a freely mounted bell-crank, whose horizontal arm can be loaded with suitable weights. This system enables any convenient pressure to be applied to the fabric. When the upper arm is truly vertical, it makes a light contact with a stop and operates an electrical circuit. The difference in the dial readings when the fabric is between the faces and absent, at this contact, represents the thickness of the fabric at the pressure applied.

Great care was necessary in mounting the fabric specimens on to the wire frame, on account of the ease with which knitted fabrics can be stretched; this applies particularly to fabrics with a ribbed or similar structure. The least amount of tension required to hold the sample flat was used, and the thickness was measured as near the centre of the specimen as possible. This care was found to be very necessary, as excessive stretching might cause as much as 30 per cent. decrease in thickness of the fabric.

NUMBER OF OBSERVATIONS

The accuracy of the readings obtained by the use of the instrument was very good, control being possible to half a scale division, which was the limit of reading, but the results, of course, were subject to the usual errors of random sampling of the specimens from the fabric bulk. To form an idea of the number of readings necessary for a reasonable degree of accuracy, a large number of samples from one fabric was examined. A determination of this character is of greater importance for knitted fabrics than for woven ones since the irregularities are generally greater. This may be ascribed to various causes, e.g. low twist yarns are used; the yarns are not sized before knitting; the structure of the fabrics is naturally loose and open; surface fibres are a recognised part of the fabric; fabrics may be lightly brushed or raised and the surface is not cropped in any way. All these factors combine to produce a comparatively uneven surface.

The main investigation was made on a sample of good quality wool underwear fabric knitted from 2/28's yarn, scoured and finished with very light milling and brushing. A piece of this fabric was cut up into a large number of suitably sized specimens and one hundred of these was selected

at random for the actual testing. The thickness of each sample was measured successively at six pressures in ascending magnitude, viz. 0·5, 1, 5, 10, 25, 100 grams per square centimetre. The statistical treatment of these results has followed the lines suggested by Turner[2] and the most important values are given in Table I. In Table II are shown the number of readings necessary at three different pressures for varying degrees of accuracy of the means, and of suitable probabilities or odds that such results are reliable. It will readily be seen that five per cent. accuracy can be obtained with good probability, for all pressures, by comparatively few readings but that greater accuracy requires an increasing number, the rise being particularly rapid in the case of the lowest pressure. It is evident that measurement at a lower pressure than ten grams per square centimetre will require a long time, and it is inadvisable to use a lower standard than this for the purpose of accurate comparisons unless ample time is available.

It is probable that much of the irregularity of thickness at low pressures is due to the effect of the surface fibres; their arrangement and individual rigidity are then the controlling factors and occasional rigid fibres will produce an apparently thicker fabric. A medium quality crossbred fabric, with a good covering of surface fibres, was tested for thickness at two pressures only, one and ten grams per square centimetre, 42 samples being taken for this purpose. The results of this experiment, treated as for those from the botany fabric, are shown in Table III. In Table IV are given the corresponding numbers of results required to satisfy the various conditions. The smaller variation of this crossbred fabric is at once evident from both Tables, and it is interesting also to note that the reduction in thickness caused by increasing the pressure from one to ten grams is much greater than for the botany fabric. The only possible explanation of these facts is that the actual substance of the crossbred fabric is really less thick than that of the botany fabric, but that its superior covering of surface fibres, of approximately uniform characteristics, gives it an apparently equal thickness at low pressures by the greater resistance of these fibres to compression.

Table I

Pressure (gms. per sq. cm.)	0·5	1	5	10	25	100
Range	50	44	38·5	35·5	33	29
	87·5	80	59·5	54·5	49·5	40
Mean	63·54	56·90	46·35	42·91	39·38	34·14
Mean deviation	4·72	4·00	2·61	2·34	2·00	1·56
Standard deviation of single observation	6·06	5·34	3·45	3·14	2·70	2·11
Standard deviation of mean	0·61	0·53	0·35	0·31	0·27	0·21
Per cent. irregularity	7·44	7·04	5·64	5·45	5·08	4·57

N.B.—Coefficient of variation is approximately 1·253 × % irregularity.

Table II

	Degree of Accuracy											
	5%			3%			2%			1%		
Probability	gms. 100	10	1	100	10	1	100	10	1	100	10	1
1 : 1	1	1	2	2	3	5	5	6	10	18	25	40
10 : 1	5	7	10	12	17	28	28	37	63	109	153	251
22 : 1	7	9	15	18	25	40	39	55	90	156	218	360
55 : 1	9	12	16	24	33	55	53	75	123	212	298	490
140 : 1	12	16	26	31	44	71	70	97	160	277	390	640

Table III

Pressure (gms. per sq. cm.)	1	10
Range	49 68·5	30 40·5
Mean	58·46	35·83
Mean deviation	4·15	1·67
Standard deviation of single observation ...	4·98	2·09
Standard deviation of mean	0·76	0·32
Per cent. irregularity	7·10	4·66

Table IV

			Degree of Accuracy											
			5%			3%			2%			1%		
Certainty ...		gms.	100	10	1	100	10	1	100	10	1	100	10	1
1 : 1	...	...	–	1	2	–	2	4	–	4	9	–	10	33
10 : 1	...	...	–	4	9	–	11	23	–	25	52	–	96	206
22 : 1	...	...	–	6	12	–	16	33	–	35	75	–	140	297
55 : 1	...	...	–	8	16	–	21	45	–	48	101	–	190	405
140 : 1	...	...	–	10	21	–	28	59	–	62	132	–	247	528

A comparison was also made with a woven wool material in the form of a heavy overcoating. This fabric had been heavily milled, raised and cropped, and finished under heavy pressure so that its surface "skin" of fibres was very thin. The mean thicknesses measured at the above two pressures were 83·3 and 71·8 thousandths of an inch respectively, showing that the compression of this fabric was small. Further, the variation found was also small, indicating that, at a pressure of ten grams per square centimetre, ten readings were sufficient for two per cent. accuracy of the mean with a certainty of 55 to one.

The extreme example is furnished by the rayon fabrics which, of course, have no surface fibres. Tests of five fine rayon fabrics, warp-knitted, showed that the range rarely extended further than one half a thousandth of an inch on either side of the mean and the above accuracy of two per cent. with 55 to one certainty necessitated only four readings at the lowest pressure. Further, the decrease in thickness caused by increasing the pressure from one to ten grams never exceeded two thousandths of an inch.

Thickness/Pressure Relations

From the results already quoted it seems evident that the thickness of any fabric cannot be adequately expressed by a single figure, and that the pressure at which the measurement was made must also be quoted. For a complete description, the thicknesses at a number of pressures are necessary and they can be conveniently shown as a curve as suggested by Marsh (*loc. cit.*). It should be noted that the form of the curve can be accurately determined on a smaller number of samples than is necessary for absolute values of thickness, since the successive readings of each set are made on the same sample and are, therefore, correlated. Typical curves for plain knitted fabrics in wool, cotton and rayon are shown in Fig. 1.

The curve for wool flattens out only slowly with increasing pressure, while the corresponding curve for rayon has a more pronounced change of direction at about one gram per square centimetre; the cotton gives a curve very similar to that for wool. The length of the steep left-hand portion of the curves gives some indication of the amount of surface fibres on the fabric. When examining these curves, it should be remembered that the greater thickness of the wool fabric will tend to give its curve a steeper

slope at all points than the rayon curve, because the actual compression will always depend on the initial thickness.

Use of the Roller Caliper

Instruments of this type have been frequently used for the measurement of fabric thickness and an account of some experiments made with such a caliper may be of interest here. The particular instrument used consists of a framework with a horizontal flat face on which the fabric rests. The frame carries a short pivoted lever; at one end is a roller which rests on the upper face of the fabric, while the other end is a pointer which moves over a fixed quadrant scale and records the extent to which the roller is raised by the cloth, which is the apparent thickness.

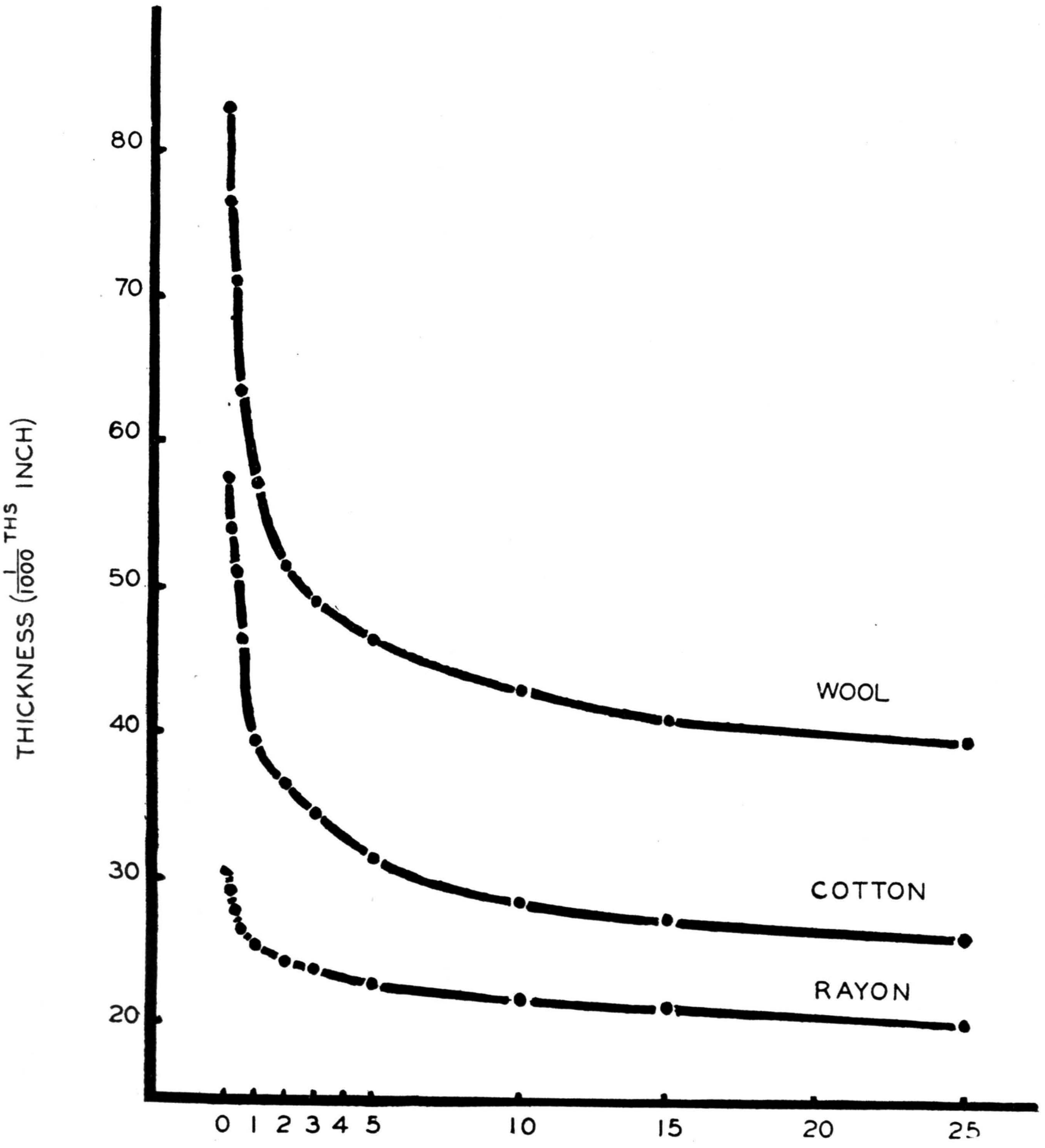

FIG. 1

The only recommendation of this method is the speed of measurement, which enables a large number of readings to be taken for a fabric. Serious disadvantages arise from the use of a circular roller for contact with textile materials since the area of contact depends on the extent to which the roller

sinks into the fabric; this means that the pressure at which the measurement is made depends on the degree of compressibility of the material and will vary from one fabric to another. Further, the thickness recorded is measured to the lowest point of the roller and is less than the true value at the particular pressure. By observation, the area of contact was found to vary between 0·5 and 1·4 square centimetres, the resultant pressures being respectively 130 and 46 grams per square centimetre. These limits have been confirmed by measuring fabrics on the roller caliper and on the standard instrument, increasing the pressure on the latter until the same thickness was recorded on both.

These pressures are, of course, too high for the measurement of fabric thicknesses and the use of this instrument should be confined to comparative determinations on similar types of fabric only. It seems that the performance of this instrument for textile work could be greatly improved by replacement of the roller with a horizontal flat surface of smaller weight.

Description of Samples

When selecting a series of samples for the purpose of a survey of this nature the greatest difficulty lies in keeping the numbers down to a manageable limit. It is desirable that all abnormal fabrics should be omitted as they give exceptional results, e.g. fabrics knitted from yarn too thin or too thick for the gauge of the machine. The only real test for this quality is that a fabric shall be a commercial production.

A comprehensive range was included, both in regard to the materials used and to the methods of knitting, and all the fabrics are actually in use in commerce. A small number of speciality samples was chosen, each of a definite type, for purposes of comparison. The restrictions reduced mainly the number of fancy outerwear fabrics selected, leaving chiefly underwear, plain outerwear and hose fabrics for consideration. The chief materials used were cotton, rayon and wool, both separately and in combination as plated fabrics; no mixture yarns were investigated.

The basic types of stitch used for the fabrics were plain, one and one rib, and interlock. Other types introduced were half-cardigan, tuck-stitch, jacquard, and plain warp-knitting, with two samples in the simplest "purl"-stitch. Ten samples of cellular fabrics, woven and knitted, were also included for comparison. The knitted fabrics were produced on well-known types of machinery such as—Blackburn plain and rib, Wildman, Minotaur, Scott & Williams rib, "B5", "K", Terrot loop-wheel, Jacquard. The thicknesses range from thirteen to one hundred and thirty-five thousandths of an inch and the weights from 2·18 to 13·34 ounces per square yard. The actual distribution of these fabrics is shown in Table V.

Table V

	Wool	Cotton	Rayon	Wool/ Cotton	Rayon/ Cotton	Rayon/ Wool	Spun Silk/ Wool
Plain	7	7	4	6	3	2	1
1 × 1 Rib ...	4	6	2	–	1	–	–
Interlock ...	2	7	2	–	–	–	–
Half-cardigan	–	2	–	–	–	–	–
Tuck-stitch ...	1	–	2	–	–	–	–
Jacquard ...	2	–	–	–	–	–	–
Warp-knit ...	–	–	6	–	–	–	–
Purl-stitch ...	2	–	–	–	–	–	–
Fleecy	–	1	–	–	–	–	–
Cellular woven	–	8	–	–	–	–	–
Cellular knitted	–	1	–	–	1	–	–

RESULTS

The actual results of all measurements are given in detail in Table VI. For convenience of examination the results have been arranged in groups, first according to fabric structure and second according to material. The samples in each class are arranged in order of increasing weight. It is difficult to appreciate the value of the results without actually handling the samples but a brief description has been included in the third column. Weights are given in the fourth column in ounces per square yard. The fifth and sixth columns, marked (*a*) and (*b*) respectively give the actual thicknesses in inches at pressures of one and ten grams per square centimetre respectively. The last two columns, also marked (*a*) and (*b*), give the values of the thickness weight factor calculated respectively from the thicknesses in columns (*a*) and (*b*). This factor is the ratio of thickness to weight multiplied by one hundred, an index for a fabric suggested by Davis[3] in an earlier survey of this problem.

As some small indication of the relative merits of knitted and woven goods, seven samples of the latter class, two of wool and five of cotton, have been measured and the results included at the end of the list.

Table VI

Class	Sample No.	Description	Weight	Thickness (*a*) 1 gm./cm.²	Thickness (*b*) 10 gm./cm.²	(*a*) $\frac{100T}{W}$	(*b*) $\frac{100T}{W}$
Plain—							
Wool	26	Fine; Botany	3·56	0·035	0·021	0·98	0·59
	88	Medium; crossbred ...	6·06	0·058	0·036	0·96	0·59
	72	Fine; 2/54's Botany ...	6·26	0·040	0·030	0·64	0·48
	23	Medium; Botany... ...	7·17	0·061	0·046	0·85	0·64
	71	Medium; 2/28's Botany ...	9·26	0·057	0·043	0·62	0·46
	21	Coarse; crossbred... ...	9·82	0·056	0·044	0·57	0·45
	22	Coarse; crossbred... ...	11·39	0·078	0·058	0·69	0·51
Cotton	27	Fine	2·80	0·025	0·016	0·89	0·57
	73	Fine; 2/60's merc. ...	3·78	0·031	0·020	0·82	0·53
	10	Fine; 1/20's	4·16	0·042	0·028	1·01	0·67
	14	Medium; 1/16's	4·90	0·040	0·029	0·82	0·59
	11	Medium; 2/30's	5·46	0·051	0·034	0·94	0·62
	24	Coarse	6·52	0·059	0·040	0·91	0·61
	4	Coarse; 1/8's	6·61	0·055	0·042	0·83	0·63
Rayon	17	Fine; 200 den.	2·95	0·024	0·017	0·81	0·58
	16	Fine; 150 den.	3·46	0·020	0·016	0·58	0·46
	9	Medium; 2/150 den. ...	4·07	0·030	0·022	0·74	0·54
	5	Medium; 450 den. ...	4·52	0·026	0·022	0·58	0·49
Plated—							
Wool/Cotton							
	28	Fine	4·90	0·033	0·022	0·69	0·45
	54	Medium; 24's/14's ...	6·87	0·054	0·041	0·79	0·60
	25	Medium	8·56	0·055	0·043	0·64	0·51
	51	Medium; 26's/9's	8·76	0·063	0·042	0·72	0·48
	52	Medium; 24's/10's ...	8·85	0·063	0·047	0·71	0·53
	53	Medium; 22's/9's	10·32	0·071	0·055	0·69	0·53
Rayon/Cotton							
	15	Medium; 150 d/40's ...	3·87	0·038	0·025	0·93	0·65
	74	Medium; 150 d/36's ...	4·72	0·036	0·025	0·76	0·53
	63	Medium; 150 d/40's ...	5·69	0·044	0·028	0·77	0·49
Rayon/Wool							
	75	Fine; 100 den/70's ...	4·16	0·030	0·021	0·72	0·50
	30	Fine-medium	6·20	0·043	0·031	0·70	0·50
Spun Silk/Wool							
	29	Fine	5·25	0·036	0·028	0·69	0·53

Table VI—*continued*

Class	Sample No.	Description	Weight	Thickness (*a*) 1 gm./cm.²	Thickness (*b*) 10 gm./cm.²	(*a*) 100T/W	(*b*) 100T/W
1 × 1 *Rib*—							
Wool	32	Medium; Botany ...	4·72	0·044	0·034	0·93	0·72
	55	Medium; 1/44's Botany ...	5·05	0·034	0·027	0·67	0·55
	76	Medium; 1/32's Botany ...	5·69	0·056	0·047	0·99	0·83
	31	Coarse; Botany	6·52	0·058	0·045	0·86	0·69
Cotton	56	Medium; 1/30's	4·01	0·044	0·036	0·10	0·90
	33	Medium; 1/30's	4·64	0·041	0·032	0·89	0·69
	57	Medium; 1/30's	4·90	0·044	0·034	0·90	0·69
	78	Medium; 1/26's	5·96	0·050	0·038	0·84	0·64
	1	Coarse; 1/16's	6·05	0·059	0·050	0·98	0·83
	13	Very coarse; 1/8's ...	10·56	0·080	0·061	0·76	0·64
Rayon	79	Fine; 150 denier	3·72	0·022	0·020	0·59	0·54
	58	Fine; 150 denier	4·37	0·026	0·024	0·59	0·55
Rayon/Cotton							
	77	Medium; 150 d/28's ...	4·92	0·051	0·043	0·04	0·88
Interlock—							
Wool	82	Heavy; 1/45's Botany ...	6·81	0·053	0·043	0·78	0·63
	81	Heavy; 1/38's Botany ...	8·03	0·073	0·053	0·91	0·66
Cotton	85	Very fine; 1/80's Eg. ...	2·66	0·035	0·027	1·32	0·02
	61	Fine; 1/60's	3·22	0·034	0·027	1·06	0·84
	84	Fine; 1/48's Amer. ...	4·34	0·041	0·034	0·94	0·78
	34	Medium; 1/40's	4·90	0·042	0·032	0·86	0·65
	60	Coarse; 1/30's	5·25	0·041	0·034	0·78	0·65
	83	Very coarse; 1/26's ...	6·87	0·048	0·040	0·70	0·58
	59	Very coarse; 1/24's ...	7·15	0·048	0·036	0·67	0·50
Rayon	62	Fine; 125 denier	3·60	0·016	0·014	0·44	0·39
	86	Fine; 100 denier	5·05	0·023	0·021	0·46	0·42
Half-cardigan—							
Cotton	80	Coarse; 1/14's	7·31	0·072	0·060	0·98	0·82
	2	Very coarse; 1/8's ...	10·53	0·078	0·070	0·74	0·66
Tuck-stitch—							
Wool	64	Coarse; 1/24's	5·40	0·064	0·048	1·19	0·89
Rayon	87	Fine; 150 denier	2·72	0·028	0·021	1·03	0·77
	6	Medium; 450 denier ...	3·92	0·059	0·034	1·25	0·87
Jacquard—							
Wool	8	Medium; 2/44's	6·61	0·062	0·051	0·94	0·72
	7	Medium; 2/40's	9·06	0·094	0·073	1·04	0·81
Fleecy—							
Cotton	12	Coarse; 1/20's, 1/30's, 1/6's Condenser ...	8·90	0·104	0·071	1·17	0·80
Purl-stitch—							
Wool	89	Coarse	7·34	0·176	0·130	2·40	1·77
	90	Coarse	7·85	0·200	0·135	2·55	1·72
Warp-knit—							
Rayon	3	Coarse; 300 denier ...	13·34	0·064	0·059	0·48	0·44
	95	Fine; lace net; 80 den. ...	2·18	0·025	0·023	0·17	1·06
	94	Fine; pique; 60 den. ...	3·52	0·023	0·021	0·65	0·61
	93	Fine; pinhole stripe; 60 denier	3·54	0·015	0·013	0·42	0·38
	91	Fine; plain; 120 den. ...	3·84	0·016	0·015	0·43	0·40
	92	Fine; hairline stripe; 80 denier	4·02	0·021	0·019	0·54	0·49
Cellular Woven—							
Cotton	45	Pattern 931	3·81	0·040	0·034	1·05	0·89
	46	,, 1601	3·96	0·038	0·033	0·96	0·83
	41	,, 1616	4·37	0·048	0·040	1·10	0·92
	43	,, 88	4·58	0·043	0·036	0·94	0·79
	42	,, 1080	5·34	0·046	0·038	0·86	0·71
	47	,, 14AE	5·61	0·050	0·041	0·89	0·73
	48	,, 11EA	6·20	0·058	0·052	0·94	0·84
	44	,, 11AW	6·79	0·062	0·055	0·92	0·81

Table VI—*continued*

Class	Sample No.	Description	Weight	Thickness (*a*) 1 gm./cm.²	Thickness (*b*) 10 gm./cm.²	(*a*) $\frac{100T}{W}$	(*b*) $\frac{100T}{W}$
Cellular Knitted—							
Cotton	49	Ribbed tuck	5·05	0·056	0·046	0·11	0·91
Rayon/Cotton	50	Ribbed tuck	4·90	0·050	0·043	1·02	0·92
Woven—							
Wool	101	Heavy overcoating ...	14·47	0·083	0·072	0·57	0·50
	102	Worsted suiting	9·43	0·046	0·032	0·49	0·34
Cotton	104	2 × 1 Twill	4·91	0·033	0·022	0·67	0·45
	106	2 × 2 Twill	4·94	0·037	0·024	0·76	0·48
	103	1 × 1 Twill	5·14	0·019	0·013	0·37	0·26
	107	2 × 2 Twill	6·00	0·037	0·024	0·62	0·40
	105	2 × 2 Twill	6·69	0·041	0·031	0·61	0·46

DISCUSSION OF RESULTS

The extreme range of weight shown by the knitted samples is from 2·18 to 13·34 ounces per square yard. Both limits are actually supplied by the rayon warp-knitted fabrics, but the plain knitted fabrics vary to nearly the same extent and also cover the intermediate range thoroughly. It may be noted that the cotton fabrics in this class vary generally from light to medium and the wool from medium to heavy, although the same is not true for the 1 × 1 ribs. The weight range for useful knitted fabrics is evidently less than that for woven materials.

To a great extent the thicknesses in each class increase with the weights although generally not so rapidly. All the rayons are the thinnest, grouped about 0·020 inch, the plain fabrics are intermediate, and the more developed stitches in wool and cotton are the thickest. The interlock fabrics are rather finer than the plain and are the most uniform as a group. This is controlled by the fact that the structure is very firm and that there is only one gauge of machine for all the fabrics in this class, which restricts the use of coarse yarns. By far the thickest materials are the two purl-stitch outerwear fabrics, which are, of course, a class entirely on their own with regard both to bulkiness and to openwork of stitch. It may be noted that the few woven samples included are thinner than the corresponding knitted plain fabrics of similar weight.

It is evident that, within certain limits, a knitted fabric can be constructed to any specification of weight and thickness by using the appropriate material and structure; consequently, consideration of these two factors separately gives little information about the fabric. For this reason, it has been found desirable to combine them in the form of the "index" already referred to, as given in the final columns of Table VI. This index has some practical merit in that it helps to convey an idea of the compactness of a fabric. If the weight and thickness in a class increased regularly together, this index would remain constant and would clearly define the class of fabric.

Unfortunately, this was found not to be exactly true, the index for any class actually spreading over a considerable range. In the case of the interlock fabrics, which form a very complete series, the index falls regularly as the weight increases. This may be attributed to the single gauge of machine available, which really makes the coarser fabrics too dense and heavy, while the finer fabrics are too gauzy and light. The truly balanced fabric is No. 34 at the centre of the range. For the manufacture of plain

fabrics a wide range of different gauge machines is available and no fabric is far unbalanced. The effect is shown by the range of the index being more restricted and fluctuating irregularly. A large increase in the index can be noticed as the stitch construction is developed. The 1 × 1 rib fabrics, half-cardigan, jacquard and tuck-stitch are definitely distinguished from the plain fabrics, while the purl-stitch are the highest class of all. The woven fabrics generally give a lower index than the corresponding plain knitted fabrics, while the cellular fabrics as a class are slightly superior to the 1 × 1 rib stitch.

The index, of course, depends on the pressure at which the fabric thickness was measured and two such sets of values have been given. From inspection of the results it appears to be largely immaterial which set is used for comparative purposes in a class; from one class to another there may be some difference in compressibility at the pressures used, depending mainly on the fabric structure. Figs. 2 and 3 illustrate the difference in index obtained, at the two pressures used, for the 1 × 1 rib and interlock fabrics respectively. These indices are arranged in progressive order, the pairs of values on each ordinate relating to the same fabric.

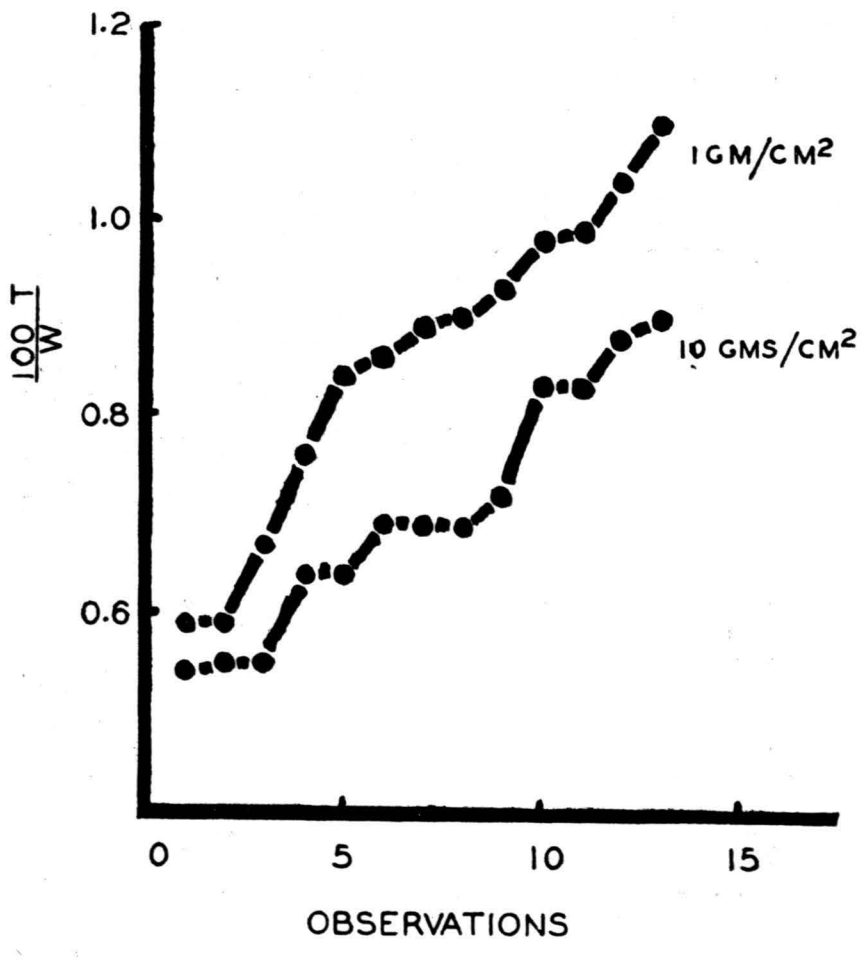

Fig. 2

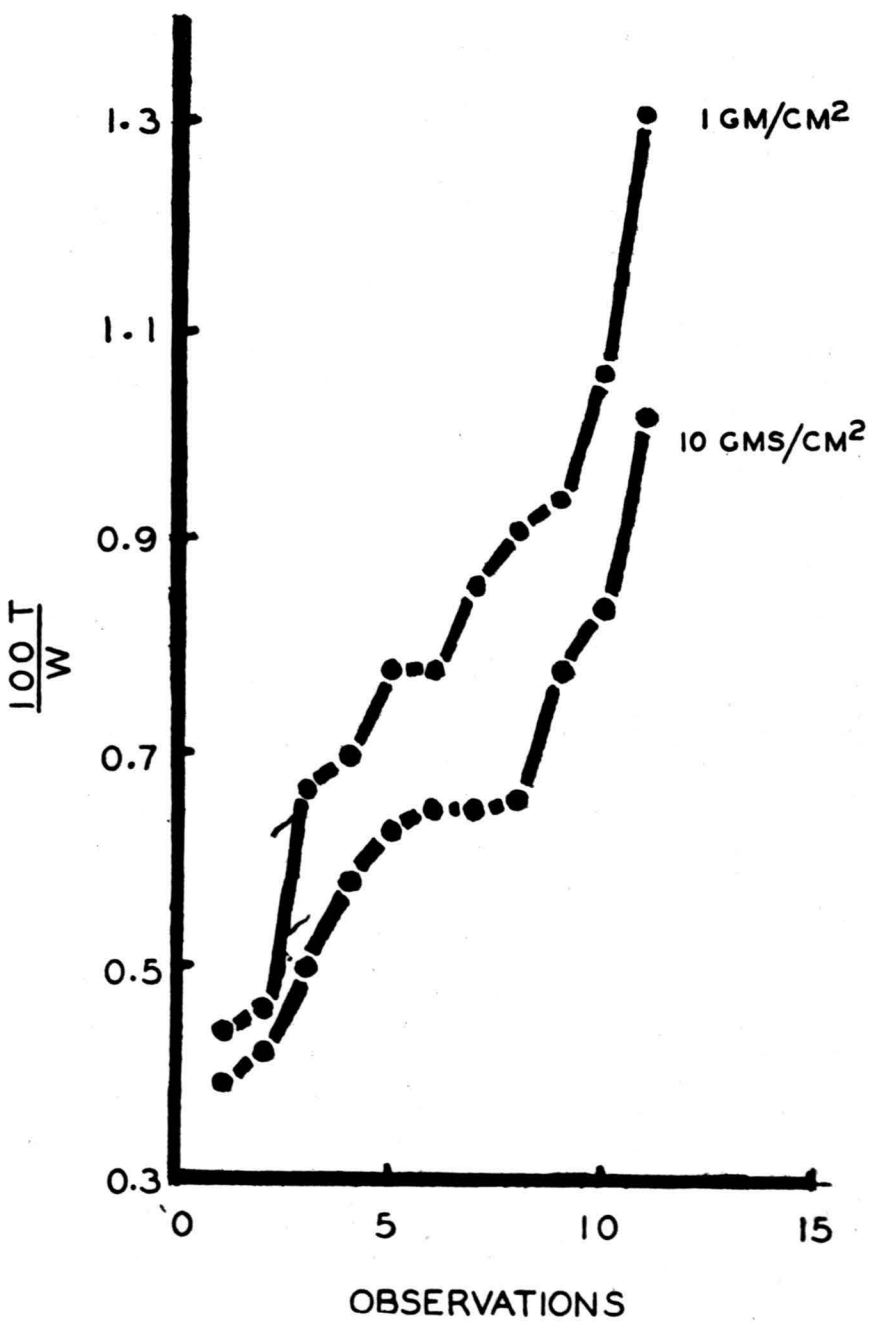

Fig. 3

In each diagram the two lines follow approximately similar paths with the upper one showing a steeper slope as expected. The relative compressibilities of the plain, 1 × 1 and interlock fabrics are shown better on one diagram in Fig. 4. This is obtained by plotting for each fabric the index at 1 gram per square centimetre as ordinate and the other index as abscissa. A line through the origin at 45° with both axes represents no compression and the slope of the line joining each point to the origin is a measure of the compressibility of each fabric.

This opportunity is taken of expressing thanks to the Wool Industries Research Association for their help and advice in the course of this investigation.

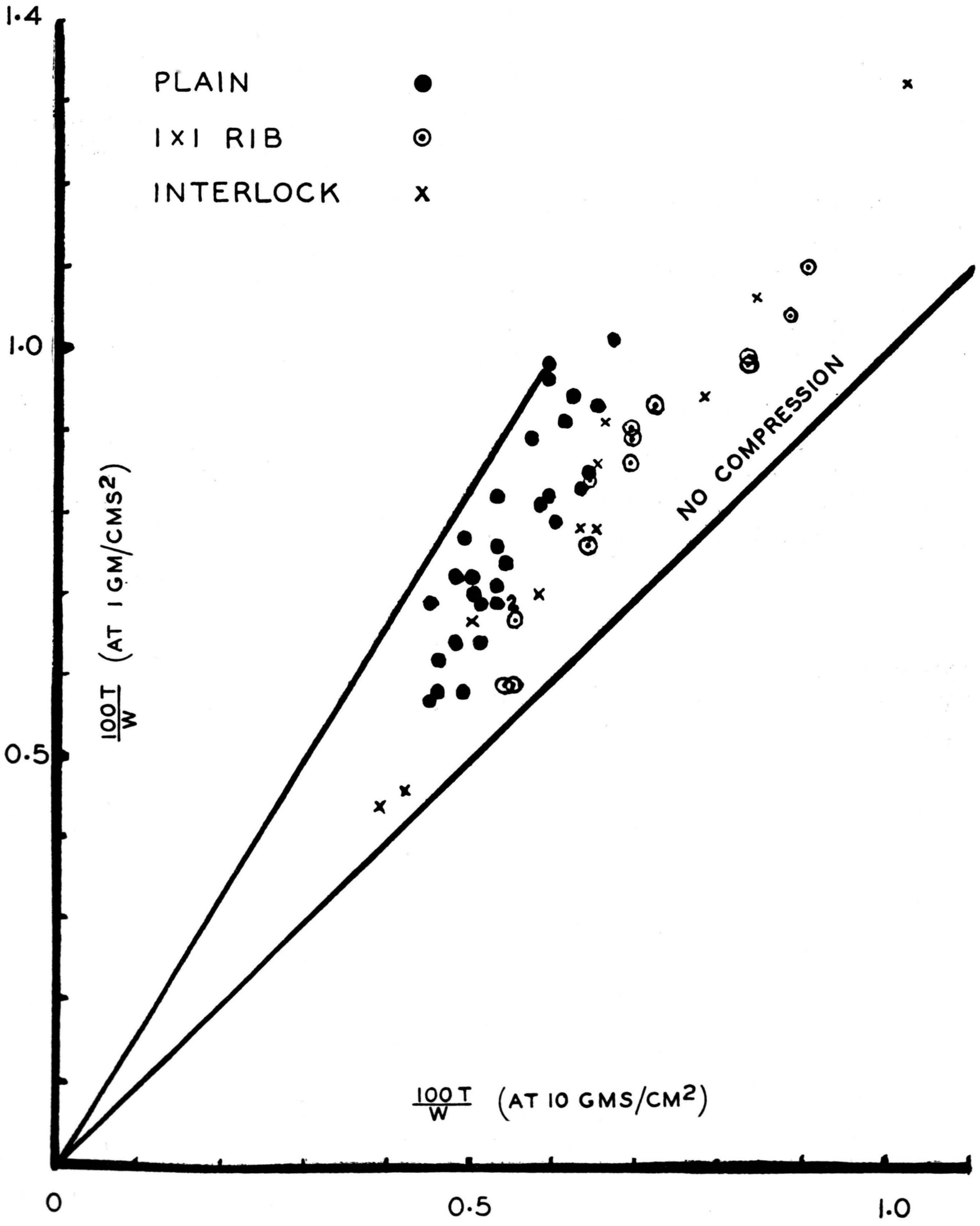

FIG. 4

APPENDIX

The index calculated above has an additional value. It will be seen from the definition of W as ounces per square yard that the index has the dimensions of the reciprocal of density ($M^{-1} L^3$). It can, therefore, be used to calculate the density of the fabric in ounces per cubic inch.

Thus, a square yard of fabric weighs W ounces and its volume is $36 \times 36 \times T$ cubic inches.

Its density is $\frac{W}{36^2T}$ oz. per cu. in.

Since the index is $\frac{100T,}{W}$ it follows that

$$\text{density} \times \text{index} = \frac{W}{36^2T} \times \frac{100T}{W} = \frac{100}{36^2} = 0{\cdot}077$$

i.e. the density is obtained by dividing the index into 0·077. The relative density is more useful and can be calculated by dividing the density by the weight in ounces of a cubic inch of water, viz. $\frac{1000}{1728}$ oz.

$$\text{Then, relative density} \times \text{index} = \frac{100}{36^2} \div \frac{1000}{1728} = 0{\cdot}1333.$$

The relative density of a fabric can thus be obtained rapidly from its index by dividing the latter into the constant 0·1333.

For the plain cotton fabric No. 10, using the index 0·67, the relative density is 0·20. Further, assuming the relative density of cotton to be 1·5, it is possible to form an idea of the approximate proportion of the fabric volume actually occupied by cotton fibres. For the above fabric, the proportion is 0·20/1·5, or 13 per cent.

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18—THE USE OF TRYPSIN FOR THE DETERMINATION OF THE RESISTANCE OF WOOL FIBRES TO BACTERIAL DISINTEGRATION

By R. Burgess
(Wool Industries Research Association, Leeds)

The disintegration of the wool fibre into its component elements, epithelial scales and cortical cells (Figs. 1 and 2) by proteolytic bacteria has been described by many workers. It is desirable, however, that another method be available, preferably one which more rapidly effects this fibre breakdown, for the following reasons—

(*a*) Owing to the incompleteness of our knowledge of the bacterial phenomena, to rapid changes in reaction and to the necessity for optimum aeration, the process cannot always be effected in culture with the same exactitude.

(*b*) The determination of variations in the resistance to bacteria of wools either possessing different degrees of soundness or treated with certain antiseptics would be facilitated.

(*c*) The resistance of the fibre to proteolytic enzymes is considered to be a more important desideratum than the inhibition of bacterial development produced by an antiseptic present in or on the fibre.

To this end the possibility of using some commercial proteolytic ferments has been explored. Exposure of wool to the action of certain enzymes is already known to effect fibre disintegration. Meunier *et al.*[5] found that wool swollen in alkaline solution is attacked by pancreatic enzymes, while Gabriel[3] cites Dych (1910) as patenting a process for removing the epithelial scales of wool fibres with pepsin or pancreatin and also records the work of Keys who showed that pepsin is capable of breaking down the fibre.

Experiments with Trypsin and Pepsin

Expt. 1. Portions (0·1 g.) of wool material were immersed in plugged test tubes containing buffered solutions of trypsin (B.D.H.), pepsin (B.D.H.) or the filtered solution from a three weeks' old culture of bacterially-decomposing wool (urine-contaminating Micrococcus spp.) and kept at 35° C. A control series, exposed in a water bath at 100° C. for 5 minutes to inactivate the enzymes, was also set up. Samples of wool treated with Eulan N, which confers some protection against bacteria, were included.

The disintegrating power of the trypsin solution compared with that of the bacterial solution is obviously great. Chlorination predisposes the wool to disintegration, whereas chrome-eulanisation has a protective action. The results of Dych and Keys with pepsin are also confirmed.

Expt. 2. A further series, rendered more comprehensive by inactivating bacteria by the addition of a little toluol gave interesting results. The test tubes were corked.

The non-participation of bacteria in the presence of toluol was confirmed by microscopic examination and cultural tests. In certain cases, however, the continued development of these organisms evidently contributed to the disintegrating process.

The superiority of the commercial enzymes over the bacterial and the modification in the effect due to previous chlorination or Eulan N treatment are again apparent.

Table I

The Effect of Enzymes on Wool at 35° C. Incubation 5 days

0 = No fibre disintegration.
\+ = Slight ,,
++ = Pronounced ,,
+++ = Severe ,,
++++ = Very severe ,,

Solution	Scoured 60's Botany top	Chlorinated and milled hosiery fabric showing notable superficial damage to fibres (heavily treated)	Dress cloth commercially dyed in a chrome bath containing 3% Eulan N and finished in the customary way	Commercially chlorinated woven baby bag material, laboratory treated with 1% Eulan N
5 cc. of 0·5% aq. trypsin 5 cc. of *p*H 8·0 buffer[4]	+++	++++	+ (very slight)	++++
Do. heated for 5 mins. in a water-bath at 100° C. ...	0	+	0	0
5 cc. of 0·5% aq. pepsin 5 cc. of *p*H 1·4 buffer[6]	++	+++	0	++++
Do. heated	0	0	0	0
5 cc. of filtered (paper) bacterial culture 5 cc. of *p*H 7·0 buffer[2]	+	++++	0	+++ (fairly severe)
Do. heated	0	0	0	0

Buffer Solutions

(*a*) *p*H 8·00	...	0·10 M Potassium di-hydrogen phosphate	46·5 cc.
	...	0·05 M Borax	53·5 cc.
(*b*) *p*H 1·42	...	0·1 M Di-sodium hydrogen citrate ...	20·0 cc.
		0·1 M Hydrochloric acid	80·0 cc.

Experiments with Trypsin

Expt. 3. *The Effect of Different Concentrations of Trypsin*—Similar portions of scoured botany top were exposed at 35° C. to equal parts of trypsin solution and buffer, together with a little toluol and examined at intervals. Compared with controls, which showed no disintegration, a concentration of 0·2% trypsin gave marked disintegration in 24 hours; 0·1% gave considerably less, but the effect of higher strengths was not appreciably greater. As incubation time extended, the relative effect of the higher strengths (0·4-1·0%) became somewhat more marked but for the subsequent experiments it was decided to adopt the 0·25% concentration previously used.

EXPT. 4—COMPARISON OF THE EFFECT OF TRYPSIN AND WOOL-DECOMPOSING BACTERIA

Microscopically the trypsin solution and the bacterial culture produce disintegrations of essentially the same type, the former being, however, considerably more rapid. If, therefore, by a comparative test of the effect of both agents on a series of different wools, further correlation can be obtained, the more rapidly acting trypsin solution may be held to simulate in less time the action of bacteria. Its function will also be independent of some of the as yet unavoidable irregularities which sometimes occur in the case of bacterial culture solutions.

FIG. 1

Epithelial scales and a few cortical cells isolated from wool by retting with *B. mesentericus ruber*.

× 300

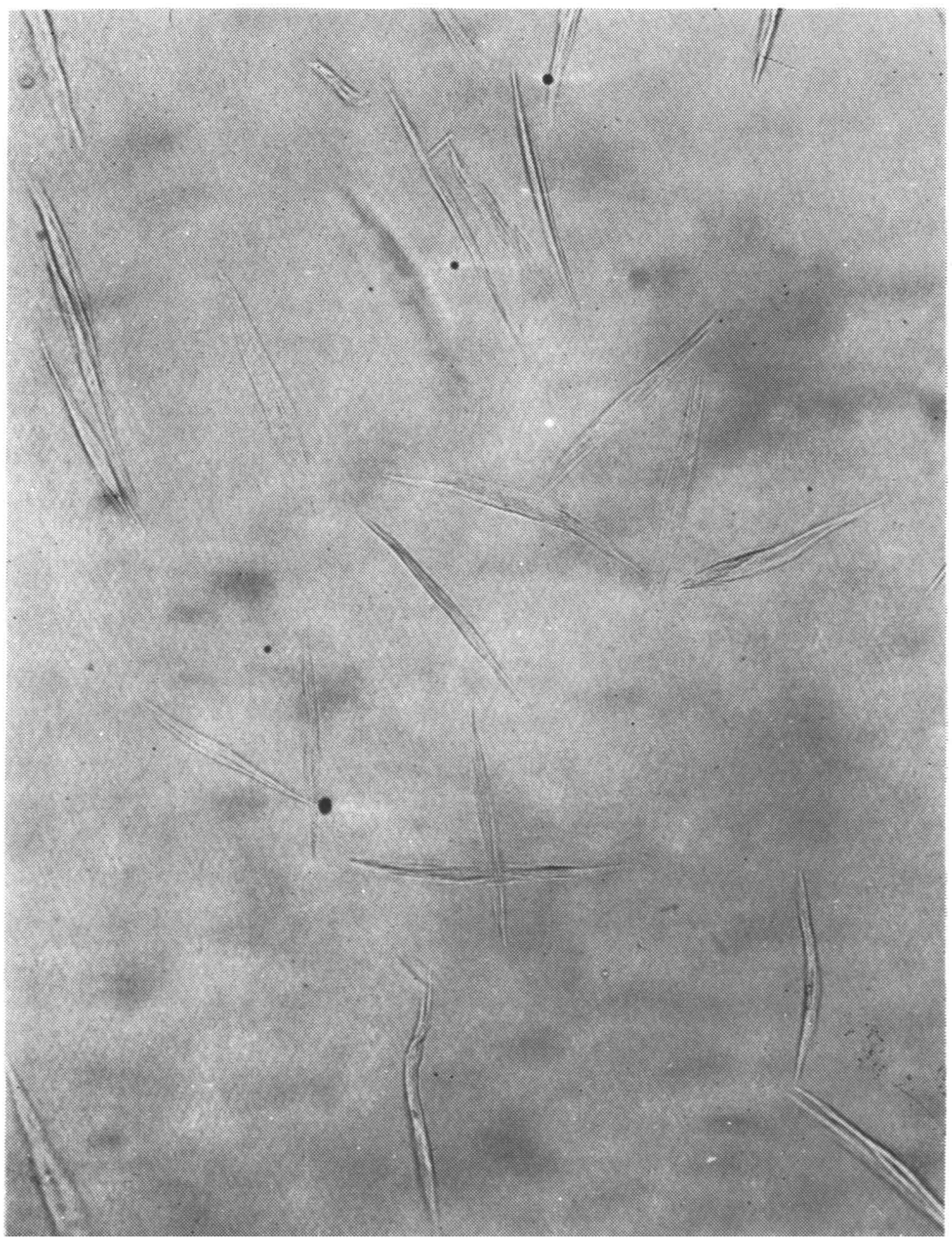

FIG. 2

Cortical cells, some of which are showing evidence of thinning (decomposition?). Isolated by trypsin solution.

× 200

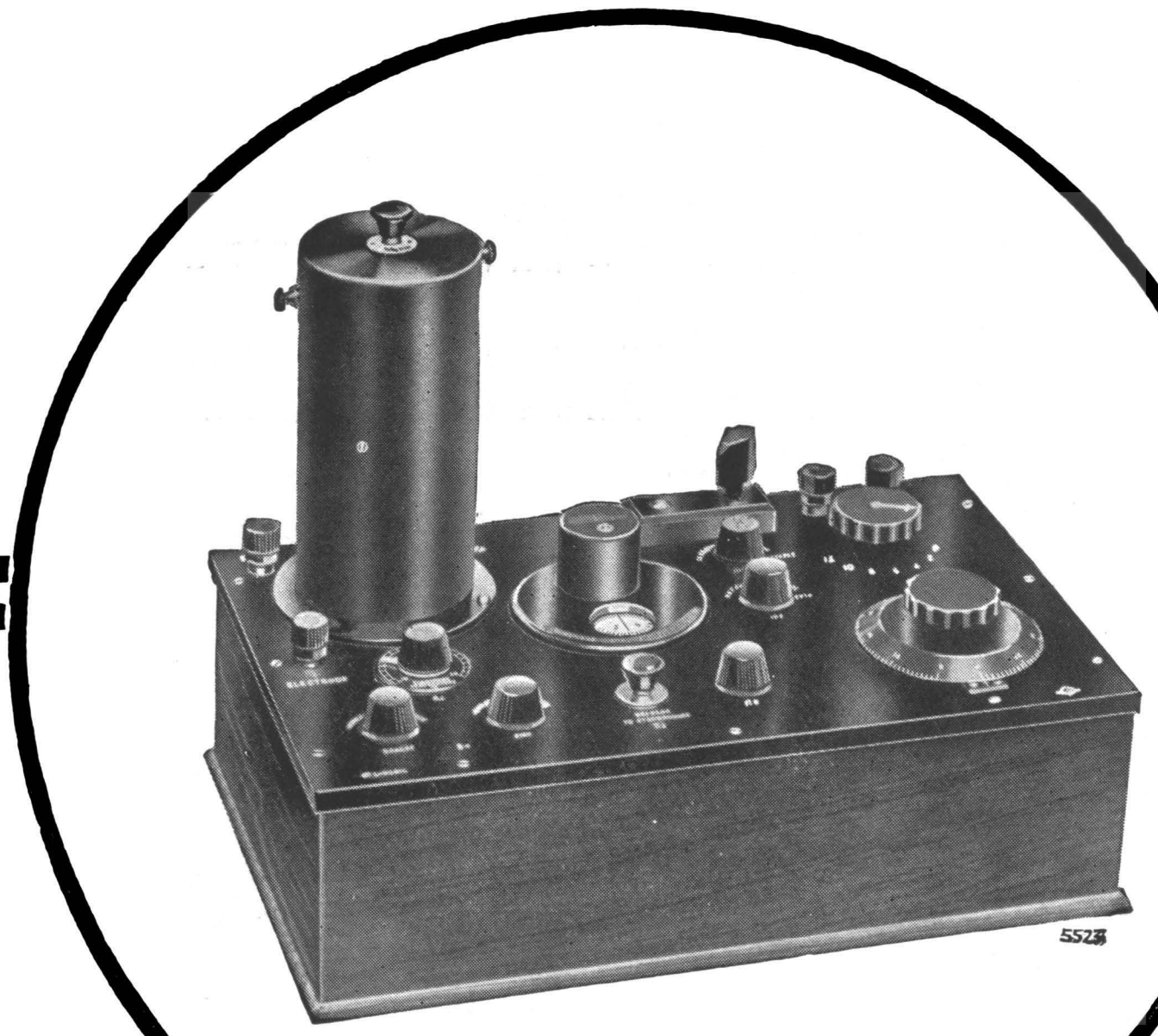

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Table II

The Effect of Enzymes and Bacteria on Wool at 35° C. Incubation 6 days

0 = No fibre disintegration.
\+ = Slight ,,
++ = Pronounced ,,
+++ = Severe ,,
++++ = Very severe ,,

Solution	Scoured 60's Botany top	Chlorinated and milled hosiery fabric showing notable superficial damage due to rather heavy treatment	Woven papermakers' felt, laboratory treated with 3% Eulan N	Papermakers' felt not treated with Eulan N
Trypsin solution as in Expt. 1	++++	++++ (extremely severe)	+ (fairly pronounced)	++++
Do. plus toluol ...	++ (very pronounced)	++++	+	++++
Do. heated as in Expt. 1	+ (very slight)	++ (very pronounced)	0	+
Do. heated plus toluol	0	0	0	0
Pepsin solution as in Expt. 1	++	++++	+	+++
Do. plus toluol ...	++ (very pronounced)	++++	+ (fairly pronounced)	+++
Do. heated as in Expt. 1	0	0	0	0
Do. heated plus toluol	0	0	0	0
Filtered (paper) bacterial culture as in Expt. 1	+ (very slight)	+++	0	+ (fairly pronounced)
Do. plus toluol ...	0	++	0	+ (very slight)
Do. heated as in Expt. 1	0	+	0	0
Do. heated plus toluol	0	0	0	0

Various wool materials were incubated at 35° C. in corked test tubes with trypsin and similar ones in 300 cc. plugged flasks containing 50 cc. of buffered (pH 7·0) and non-buffered cultures of *B. mesentericus ruber*. In the bacterial series the materials were first neutralised and suspended with the lower ends dipping in the inoculated culture medium, viz. 50 cc.

of 3% nutrient broth solution. The addition of broth enhances the fibre-decomposing action of the organism. Inquiry led to the adoption of a *p*H 8·6 buffer for the trypsin solution which otherwise was as in Expt. 2. The wools were examined microscopically after appropriate periods.

Results—

Table III

Comparison of the Effects of Trypsin and Bacteria

The extent of fibre disintegration is expressed approximately in terms of an arbitrary scale of values, 0 to 10, where 0=no disintegration, 2=slight, 5=noticeable, 7=pronounced, and 10=very severe disintegration. The bracketed values represent the results for the buffered bacterial culture series.

Wool Material	0·25% Trypsin Solution								*B. mesentericus ruber*					
	Hours								Days					
	1	2	4	7	24	48	96	168	1	2	3	4	7	10
1—70's Botany (tips removed), scoured in ether and warm water	0	0	0	0	1	5	7	?	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)
2—60's Worsted cloth, scoured	0	1	2	4	8	9	9	9	0 (0)	0 (0)	2 (4)	3 (7)	6 (10)	7
3—Hosiery fabric, chlorinated and milled (heavily treated)	7	9	9	10	–	–	–	–	3 (4)	8 (8)	10 (10)	– –	– –	– –
4—Woven baby bag fabric, chlorinated	3	4	7	9	10	–	–	–	2 (3)	5 (6)	7 (7)	9 (9)	10 (10)	– –
5—60's Worsted cloth, scoured, treated with 2% pot. bichrome, 1% H_2SO_4 and 10% Glauber's salt	0	0	0	0	1	3	5	6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6—As No. 5 *plus* 3% Eulan N	0	0	0	0	1	2	2	3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7—As No. 6 *minus* the pot. bichrome	0	0	1	2	4	5	7	7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Apart from the time period, the similarity between the two methods is evident and it is therefore proposed to adopt the trypsin solution as the basis for a laboratory method for determining the resistance of wool and other animal hairs to bacterial action. The significance of the breakdown rates of the different wool materials will be discussed in a further paper dealing with natural and acquired resistance of animal fibres against bacterial action.

After prolonged exposure to trypsin only a small proportion of the isolated cortical cells appear to show signs of decomposition (Fig. 2). It is thus probable, as in the case of bacterial action (Bartsch[1], Gabriel[3]), that the proteolytic influence is confined chiefly to the substance which cements the elements together. The tryptic digestion method may hence be a more expeditious way of providing cellular material for study than the bacterial (Waters[7]).

A Suggested Technique for the Determination of the Resistance of Wool to Bacterial Action

(*a*) Trypsin solution	Trypsin (B.D.H.)		0·5 g.
	Water (dist.)		100 cc.
(*b*) Buffer solution (pH 8·6)[4] ...	0·10 M Potassium di-hydrogen phosphate		34 cc.
	0·05 M Borax		66 cc.

The wool (0·1 g.) is relieved of natural or added grease, wetted out in water and immersed in a mixture of 5 cc. each of solutions (*a*) and (*b*) in a test tube. Two drops of toluol are added and the tube corked and incubated at 35° to 40° C. Microscopical examinations of the wool are made first at hourly intervals and later after longer periods.

In view of the variations in resistance of animal fibres from different sources and the fact that the exact amount of fibre degradation cannot be estimated by simple means, a rigid standard of resistance for fibres in general cannot be adopted. A very rough approximation of disintegration may be made by carefully stretching groups of fibres, e.g. threads, etc. to breaking point by hand, but microscopical examination is required to give more accurate results.

Small portions of the wool are teased out in water and examined for evidence of fibre breakdown. The latter is initiated by a loosening of the epithelial scales, this being followed on the part of the fibre by the assumption of a striated appearance and increase opacity. The scales become detached either fragmentarily or conjointly in sheath-like masses and eventually the fusiform cortical cells separate, the fibre becoming thinner in the process. Teasing out of the material prior to examination increases this separation and hence serves to give a clearer impression of the extent of disintegration.

Most wools contain a proportion of fibres which have been severely damaged either by weathering or by chemical or other processing, and these are the first to break down under the influence of the trypsin. Experience enables discrimination to be made between these and the bulk of the fibres constituting the sample. Other fibres, possessing considerable inherent resistance, may show localised disintegration in the neighbourhood of some mechanical abrasion.

As a guide it is suggested that wool materials which show marked fibre disintegration after one hour's exposure to trypsin, (e.g. Nos. 3 and 4, Table III), possess very low resistance to bacterial attack. If after 6 or 7 hours' incubation only a few of the fibres show disintegration (Nos. 1, 5, 6, and 7, Table III), the sample has a very high resistance, while samples showing a similar condition after four hours (e.g. the scoured worsted cloth, No. 2, Table III) may be considered to be in normally good condition and to have an average resistance to bacterial action.

CONCLUSIONS

1—The disintegration of wool fibres into their component elements, epithelial scales and cortical cells, can be effected by exposure to an appropriately buffered aqueous solution of trypsin or pepsin.

2—The action of the trypsin solution is very similar to, but much more rapid than, that of proteolytic bacteria, and a technique is therefore suggested for determining rapidly the resistance of a sample of wool to bacterial attack.

3—Treatment with chrome or Eulan N, or both, increases the resistance of wool to bacteria. This phenomenon will be considered in a further paper dealing with the natural and acquired resistance of wool and other animal hairs to microbiological agencies.

ACKNOWLEDGMENT

Mr. J. Stott has ably assisted with this work.

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THE JOURNAL OF THE
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ABSTRACTS

LIST OF ABSTRACTORS

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

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Textile Institute	T.
Water Pollution Research Board	D.
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Wool Industries Research Association	W.

1—FIBRES AND THEIR PRODUCTION

(B)—ANIMAL

The German Mutton Sheep-breeding, and Mutton and Wool Production. E. Golf. *Z. f. Schafzucht*, 1934, **23**, 93-96, 128-131, and 151-155. W.

The Karakul (Persian) Sheep. G. Frölich. *Z. f. Schafzucht*, 1933, **22**, 278-281 (also in Italian, 281-282). W.

Charmois Breed of Sheep. E. Golf. *Z. f. Schafzucht*, 1933, **22**, 313-317. W.

Finnish Native Sheep. E. Silfverhjelm. *Z. f. Schafzucht*, 1933, **22**, 318-321. W.

Foreign Breeds of Sheep—French, Italian, Czechoslovakian, Argentinian. *Z. f. Schafzucht*, 1933, **22**, 246-248, 305-308, 328-330, and 330-333. W.

Feeding of a Protein Supplement to Sheep. J. L. Rees. *Pastoral Rev.*, 1934, **44**, 594-595.

From field trials the conclusion is reached that the feeding of a protein rich supplement to the average sheep, running on natural pastures, enables them to cut heavier fleeces, promotes the growth of immature sheep and has a marked influence on the fertility of the ewe. W.

New Use for Swaledale Wool. Bradford Technical College, Textile Department. *Wool Rec.*, 1934, **46**, 73.

At the Great Yorkshire Show, Bradford, an exhibit showed a new use for Swaledale wool. The wool was reduced from 12 in. maximum length to 5 in. maximum length, providing the resultant yarns and fabrics with new and valuable properties. The machinery employed was designed for processing short wools. Mohair and Botany have been combined to give new effects. W.

Sheep Maggot Flies in Scotland. J. Ritchie. *Scottish J. of Agric.*, 1934, **17**, 249-260.

A detailed investigation on the sheep maggot fly problem in Scotland was begun in 1933. This article gives tentative results on the nature of strike and species responsible, trapping experiments, conditions inducing attack, treatment of affected sheep, distribution of the sheep maggot fly and estimates of financial losses involved. Investigations are being continued. W.

The Sheep's Fleece in Disease. L. Rikard-Bell. *Agric. Gazette of New South Wales*, 1934, 45, 311-314.

Report of broadcast address dealing with the nature and treatment of the following—mycotic dermatitis, or lumpy wool; water rot and coloured wool; lice and tick infestation; effect of chemicals used for dressings for fly-blown sheep, and shedding due to lack of care in dipping and as the result of certain types of fever; photosensitisation; nutrition and wool growth. W.

Mineral Oil Specifics: Deleterious Effects on Wool. A. N. M. *Pastoral Rev.*, 1934, 44, 596.

The use of tar and products containing mineral oils either as branding fluids or as blowfly specifics is strongly condemned, and their efficacy for blowfly trouble is questioned. The formulæ of preparations advocated by the New South Wales Department of Agriculture and endorsed by the Commonwealth of Australia Council for Sci. and Ind. Res., for the alleviation of blowfly troubles are given (see *J. Text. Inst.*, 1933, A302). W.

(C)—VEGETABLE

Cotton Blackarm Disease: Control. R. E. Massey. *Empire Cotton Grow. Rev.*, 1934, 11, 188-193.

The influence of moisture and temperature on the spread of blackarm disease is discussed. The bacteria enter through the stomata in a film of moisture on the leaf, so that rain or a humid atmosphere facilitates spreading. No secondary host has yet been found. When infected débris is powdered and dried for 3-4 months it beomes innocuous, whilst immersion for 72 hours in raw river water will also kill the bacteria. Flooding is suggested as a means of control. C.

Bale Mixing Plant. Lummus Cotton Gin Co. *Cotton (U.S.)*, 1934, 98, No. 6, p. 70.

The new arrangement, consisting of upper and lower travelling aprons, is applied in the hopper of the bale breaker and over the feeding apron, so that it occupies no floor space. The extension apron of the bale breaker, instead of being driven intermittently to fill the bale breaker hopper, is operated at the same speed as the bottom feed apron in the bale breaker. This will naturally feed cotton to the bale breaker four or five times as fast as this machine requires. The surplus cotton over and above that which passes the stripping roller of the bale breaker and is fed out of the machine, falls back on the upper apron of the bale-mixer which travels toward the back of the machine and carries the surplus cotton away from the spiked apron as fast as the stripping roller throws it back. This cotton upon reaching the back of the machine is dropped upon the lower apron to be returned to the spiked apron again. Lumpy or poorly opened masses of cotton are instantly thrown back by the stripping roller and repeatedly passes through the machine until all lumps and masses have been thoroughly opened. Fresh cotton from the bales is fed into the intake hopper at the back of the machine where it is carried along with the rest of the stock to the spiked apron. C.

World's Cotton Crop: Production and Consumption. J. A. Todd. *Empire Cotton Grow. Rev.*, 1934, 11, 213-221.

Tables of production are given for the chief cotton producing countries, and also of world consumption and futures prices. The outstanding features of the returns is the marked increase in the consumption of "outside growths", and decrease in consumption of American cotton in Asia. C.

Cotton Plant: Cytology. R. R. Gates. *Empire Cotton Grow. Rev.*, 1934, 11, 188-193.

After a general discussion of polyploidy and its part in the formation of new species, recent work is reviewed on the origin of American and Asiatic cottons and on their genetic behaviour. C.

Cotton Wilt Disease: Effect on Bast-fibre Plants. A. A. Vassilieff. *Inst. New Bast Raw Material VASKhNIL*, 1933, pp. 22-24 (in Russian) (through *Rev. Appl. Mycol.*, 1934, 13, 369).

Experiments carried out in Turkestan in 1932 show that sesame, okra, soybeans, hemp, and American jute are severely affected when grown in plots that previously bore cotton heavily infected with wilt (*Verticillium dahliæ*). The outward symptoms were similar but whereas in cotton the mycelium was confined to the vascular bundles in the stem, in the bast-fibre plants it generally penetrated to the pith. C.

Cotton Insect Pests: Control. D. O. Atherton. *Queensland Agric. J.*, 1933, **40**, 183-190 (through *Exp. Sta. Rec.*, 1934, **70**, 650).

No effective bait against corn ear worm could be found but a syrup of molasses containing sodium arsenite appeared to check the cotton looper moth (*Antarchæa chionosticta*). C.

Cotton Plant; Effects of High Temperature and Humidity on——. D. M. and E. E. Berkley. *Ann. Missouri Bot. Gard.*, 1933, **20**, 583-604 (through *Exp. Sta. Rec.*, 1934, **70**, 600).

Experiments are reported on the effects of keeping Upland cotton seedlings and plants for periods up to 72 hours in atmospheres at 42-84° C. and 69% R.H. and saturated atmospheres at 40-65° C. Seedlings were less resistant than plants, and plants were less resistant at high humidities. C.

(D)—Artificial

Coloured Rayon: Production. H. Dosne. *Bull. Soc. Ind. Mulhouse*, 1934, **100**, 232-249; *Silk J.*, 1934, **11**, No. 122, pp. 23-24.

The usual method for the production of viscose rayon is outlined and difficulties encountered in dyeing are discussed. A new process for the production of fast and level shades depends on incorporation in the viscose mass before spinning of esters, such as the sulphuric esters, of the leuco derivatives of vat dyes, which are converted to coloured compounds on treatment with acid and an oxidising agent. The treatment with acid and oxidising agent may be applied to the spun thread in the form of bobbins, cakes or hanks and is followed by the usual washing and desulphurising processes. Alternatively, an oxidising agent which is inactive in an alkaline medium and active in an acid medium may be incorporated in the viscose before spinning. The advantages of the new process are described. The method can be applied, with modifications, to the production of coloured cellulose acetate rayon and to cuprammonium and nitrocellulose rayons. C.

Cellulose Acetate: Preparation. W. Wahlig. *Dissertation* (Darmstadt) 1930, pp. 50.

This thesis begins with a useful historical review of the production of cellulose acetate in a form that is "reversibly" soluble in acetone. Experiments are then described on the formation of the primary acetate (soluble in chloroform but not in acetone) in which (*a*) zinc chloride and (*b*) sulphuric acid were used as "catalysts". The main part of the thesis, however, deals with the production of an acetate that retains the fibrous structure of the linters, and its subsequent conversion into the form soluble in acetone. The purified linters were opened up and treated in a rotating vessel with 97·7% acetic acid containing 0·3% of concentrated sulphuric acid, the temperature being kept at 30° C. The product was centrifuged until it held 100% of acid and then treated with a mixture of acetic anhydride and benzene for 20 hours at 0° C. in a rotating vessel. Several proportions were tried but the most economical results were obtained when for each gram of dry cellulose there were 4 of acetic anhydride and 10 of benzene. Two parts of anhydride were recovered in the expressed liquor and benzene washings, so that the amounts employed and actually consumed were closer to that required for the triacetate than is the case in the acetylation of untreated linters. In other experiments, benzene was wholly or partially replaced by ether or petrol but with far worse results. The reason why benzene should be especially effective is ascribed to swelling and the theoretical aspects are discussed. In the further treatment of the primary acetate, attempts were made to preserve its fibrous structure, but without avail. Ammonia, hydrochloric acid, and acetic acid mixed with sulphuric acid and benzene were the agents tested. Very good results, leading to an amorphous secondary acetate, "reversibly" soluble in acetone, were, however, obtained by heating the primary acetate at 98-105° C. for 25-75 hours with 95-97% acetic acid. C.

Cellulose Acetate Solvents: Recovery. B. Müller. *Kunstseide*, 1934, **16**, 224-225.

Solvent recovery processes depending on the use of active charcoal are carried out in many industries and are particularly valuable for the rayon, celluloid, and artificial leather industries. Data are given for the acetone recovery process in a rayon spinning plant. C.

Rayon Showing Periodic Diameter Variations: Spinning. La Soie Artificielle de Valenciennes. *L'Ind. Text.*, 1934, 51, 313.

Rayon from the spinning nozzle passes over a roller attached to a disc which rotates about a point outside the periphery of the roller. The tension on the thread shows a periodic variation which gives rise to corresponding variations in diameter and structure, the latter being responsible for variations in lustre and dyeing properties. C.

Patents

Carrotting Furs. W. C. Mercier (to American Hatters and Furriers Co.). U.S.P. 1,955,678 of 17/4/1934 (through *Chem. Abs.*, 1934, 28, 3914).

A carotting solution is used comprising $Hg(NO_3)_2$, H_2O_2, and HNO_3 in aqueous solution. W.

Rayon Yarn Winding Apparatus. British Celanese Ltd. (London), E. Kinsella, and W. I. Taylor. E.P.408,685 of 15/10/1932.

In winding cross-wound packages the package is supported between a driving drum and a traverse drum and the ratio of the speeds of the drums is varied during the formation of the package to prevent ribbon winding. Preferably the driving drum is rotated at a constant speed and the drums are arranged so that the greater part of the weight of the package is carried by the driving drum and so that, as the size of the package increases, its weight is disposed more nearly vertically upon the driving drum, the nipping effect between the drums being thereby reduced relatively to the weight of the package and the reaction between the package and driving drum maintained substantially constant. The invention is particularly applicable to the winding of rayon yarns continuously with their production. C.

Rayon Bobbin Spinning Machine. Snia-Viscosa Societa Nationale Industria Applicazioni Viscosa (Turin, Italy). E.P.408,874 of 18/9/1933.

In rayon spinning machines conical-ended bobbins are wound by imparting to the traverse guide two separate variations in amplitude, one being a slow decrease throughout the building of the bobbin and the other a frequent alternating very small increase and decrease. C.

Rayon Centrifugal Spinning Pots. Comptoir des Textiles Artificiels (Paris). E.P.408,877 of 29/9/1933.

A spinning pot for the production or treatment of artificial or other textile yarns comprises an imperforate outer shell and drainage passages communicating solely between the interior of the pot and the rim. Various forms are described. The shell may be made of any material, preferably metal such as aluminium, aluminium alloys, stainless steel or nickel chromium alloys such as Illium. The liner may be made of chemically inert material such as rubber, resinous condensation products, glass or porcelain. C.

Rayon Spinning Machine Filter Candle. M. Wilderman (Monaco). E.P.409,023 of 26/10/1932.

Filter candles for use in the manufacture of rayon have filtering elements made of micro- or macro-porous rubber, either hard or soft, the porosity of the elements being adapted to the properties of the spinning solution. C.

Aralkyl Alcohol-Viscose Rayon: Production. Viscose Co. (Marcus Hook, Pennsylvania, U.S.A.). E.P.409,247 of 9/12/1933.

Viscose rayon has its tensile properties enhanced by incorporating in the viscose to be spun, an aromatic derivative of an aliphatic alcohol, the aromatic group replacing a hydrogen atom other than that of the hydroxy group. Examples of such derivatives are anisyl alcohol, benzyl alcohol and phenyl ethyl alcohol, and the amount added is preferably from 15 to 30% of the weight of the cellulose present. The derivative is not necessarily soluble in the viscose, for example, benzyl alcohol may be added as an emulsion or as the sodium salt which is soluble. An example is described in which the yarn shows an increase in wet strength of 20%, in dry strength of 5%, and in dry extensibility of 15%. C.

Polyvinyl Alcohol-Aldehyde Condensation Products: Production. Soc. Nobel Francaise (Paris). E.P.409,507 of 19/4/1933.

Condensation products are manufactured by reacting polymerised vinyl esters with an aldehyde in a medium having a strong acid reaction, whilst agitating

until a homogeneous medium is obtained, and in the presence of an aliphatic alcohol for accelerating the reaction, without the application of external heat, the saponification and condensation being effected without isolating any intermediate product. The strongly acid medium may be concentrated hydrochloric acid, to which is added water and ethyl alcohol. The products may be used for producing varnishes, films, moulding powders, gramophone records and artificial fibres. C.

Matt Rayon: Production. Viscose Co. (Marcus Hook, Pennsylvania, U.S.A.). E.P.409,521 of 9/6/1933.

Delustred rayon obtained, for example, from viscose, cuprammonium, cellulose acetate or cellulose nitrate, contains both titanium dioxide and chlorinated diphenyl. The chlorinated diphenyl is stated to eliminate the metallic appearance which characterises rayons delustred by means of titanium dioxide. The delustrants may be employed in amounts, e.g. between 0·1 and 5·0% of titanium dioxide and between 0·5 and 15·0% of chlorinated diphenyl, calculated on the weight of dry yarn, and may be distributed throughout the solution to be spun, with the aid of a dispersing agent, prior to spinning. C.

Cellulose Ester and Ether Rayons: Production. British Celanese Ltd. (London). E.P.409,582 of 18/4/1933.

Lacquers, spinning solutions and other liquid, plastic or solid compositions or films, sheets or yarns made thereform, comprise a cellulose derivative, e.g. a carboxylate, nitrate or an ether, and a polymerised vinyl derivative of an aromatic hydroxy compound, e.g. a polymerised vinyl derivative of phenol, a cresol or halogenated phenol. The solutions may be used in either dry or wet spinning processes. C.

Matt Rayon: Production. Viscose Co. (Marcus Hook, Pennsylvania, U.S.A.). E.P.409,625 of 9/12/1933.

Chlorinated diphenyl ("arochlor") and an inert organic material of an oily or waxy nature (e.g. petroleum oil or jelly or paraffin wax) are added to the spinning solution for the production of delustred rayon. The amount of chlorinated diphenyl employed is preferably from 0·2 to 10%, and of inert organic materials, from 0·5 to 15%, calculated with reference to the finished yarn. C.

Cresol-Ketone Resins: Preparation and Application. British Celanese Ltd. (London). E.P.409,896 of 13/4/1933.

Resins are prepared by condensing *o*-cresol with unsubstituted acyclic ketones in the presence or absence of strong acids such as hydrochloric, sulphuric, or phosphoric acids. In examples, *o*-cresol and acetone are condensed in the presence of dry hydrochloric acid gas. The resins may be worked up with cellulose derivatives into liquid, solid, and plastic compositions such as lacquers, coating compositions, plastics, spinning solutions, films, sheets, yarns, and adhesives. Suitable cellulose derivatives include cellulose nitrate, acetate, formate, propionate or butyrate, and ethyl, methyl, and benzyl cellulose. Solvents, plasticisers, pigments, dyes, etc. may be added to the compositions. C.

Rubber and Rayon Threads: Production. Xetal Corporation (New York). E.P. 409,900 of 28/4/1933.

Threads or strips are made from rubber in fluid form, e.g. from natural or artificial latices, or from viscose or other cellulose compound, by supplying the material in fluid condition to a pen or like device adapted to contact with and traverse a surface and apply thereto a strip of the material. The strip may then be heated or treated with chemicals to dry or cure it on the receiving surface, and is withdrawn from the surface in set condition, and may then be dried, vulcanised, or otherwise treated. To determine the cross-section of the thread, the surface is suitably shaped or grooved. C.

Cellulose: Preparation from Wood Pulp. I.G. Farbenindustrie A.-G. (Frankfort, Germany). E.P.410,005 of 7/10/1933.

In the manufacture of cellulose of high α-cellulose content, a pulp obtained by any opening-up treatment is subjected in a moist state to a chlorination and is then treated with caustic alkali of 5-10% strength with simultaneous introduction of gaseous chlorine in the cold or at a raised temperature. C.

Cellulose Phthalates: Preparation. Kodak Ltd., London (Eastman Kodak Co., New York). E.P.410,118 of 10/8/1932.

Cellulose phthalate is prepared by treating undissolved cellulose with phthalic anhydride in presence of an organic tertiary base and continuing the phthalylation until a dope is formed; one carboxyl group esterifying the cellulose, and the other being combined with the organic base from which it can later be freed by treating the product with an acid. The products obtained are generally soluble in water containing a small amount of pyridine, in pyridine-benzene, pyridine-tetrachlorethane, pyridine-ethylene chloride, and similar mixtures, and in other inert organic solvents. They may be used in the production of transparent sheets, laminated glass, lacquers, rayons, and moulded products. C.

Cellulose Dicarboxylates: Preparation. Kodak Ltd., London (Eastman Kodak Co., New York). E.P.410,125 of 10/8/1932.

Cellulose dicarboxylates are made by treating cellulose, preferably regenerated, pretreated, modified, or partially etherified or esterified, in an undissolved state with a dicarboxylic acid anhydride other than phthalic anhydride in presence of an anhydrous tertiary organic base, and preferably continuing the treatment until a dope is formed. Suitable dicarboxylic acid anhydrides include alkyl and aryl dicarboxylic anhydrides, and anhydrides of acids in which the carboxyl groups are joined by heterogeneous atoms as well as carbon atoms. The esters of the heterogeneously linked dicarboxylic acids are generally soluble in various pyridine mixtures, such as pyridine-acetone, pyridine-benzene, etc. These esters may be used in the preparation of transparent sheets and photographic films, for laminating sheets of glass, metals, fabric, etc. and for the preparation of rayon, moulded products, and artificial leather. C.

Vinyl Polymerisation Products: Preparation. J. Y. Johnson, London (I.G. Farbenindustrie A.-G., Frankfort, Germany). E.P.410,132 of 7/11/1932.

Polymerisation products are manufactured by subjecting an aqueous emulsion of a vinyl halide (chloride, bromide, or iodide) to polymerisation while using pressures which are of the range of the vapour tension of the reactants at the temperature of working and which are not higher than about 30 atmospheres. In the case of vinyl chloride it is necessary and, in the case of vinyl bromide, preferable, to carry out the emulsification in a closed vessel. The polymerisation may be carried out by heating, e.g. to 35-80° C., or by irradiation with chemically active rays, if desired, in the presence of polymerisation accelerators such as active oxygen in the form of inorganic or organic peroxides. The polymerisation products may be used alone as substitutes for or additions to organic film-forming substances of high molecular weight, such as cellulose esters or ethers, or to rubber or rubber-like polymerisation products of olefines for the preparation of threads, films, coatings, varnishes, moulded products, etc. C.

Alkali-cellulose: Preparation. H. H. Nelson (Paris) and G. Becker (Versailles). E.P.410,310 of 11/4/1933.

In preparing alkali-cellulose a solution of caustic soda which has been cooled and diluted by crushed ice may be used. Soft soap, resinous soap, castor oil soap, etc. may be added prior to coagulation. C.

Rayon: Spooling. Vereinigte Glanzstoff-Fabriken A.-G. (Elberfeld, Germany). E.P.410,432 of 11/12/1933.

In a process for spooling freshly-spun wet rayon the filament is guided by means of a roller to a twisting spindle which is driven so slowly that a twist is imparted to the filament of only at most 20 turns per metre. The filament passes over the roller and through a guide eye and is spooled on a bobbin mounted on the spindle and centred by a cap. The twisting is effected by a traveller mounted on a ring moved up and down by a lifter device. C.

Viscose Rayon Crêpe Yarns: Production. E. Castelli (Como, Italy). E.P.412,401 of 29/5/1933 : 28/6/1934.

A process for economically obtaining viscose rayon crêpe yarn direct from the bobbins on which the parallel filaments from the spinning nozzles are wound is characterised by the fact that the filaments wound on the bobbins are subjected to bathing or sizing with false colour and subsequent drying, and are then subjected to the two usual twisting operations in order to obtain the right-hand and left-hand crêpe twisting, after which the resulting crêpe yarn is again wound on bobbins or spools ready to be packed. C.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—Preparatory Processes

Cotton: Opening and Mixing. Southern Textile Association. *Cotton* (*U.S.*), 1934, 98, No. 6, pp. 59-60.

In a discussion of methods of opening and mixing cotton preference was shown for cleaning before mixing and mixing systems were briefly described. An unsuccessful attempt to mix Indian and American cottons was reported but it was pointed out that the Japanese spinners are mixing these two types of cotton. C.

Oil-sprayed Cotton: Processing. Southern Textile Association. *Cotton* (*U.S.*), 1934, 98, No. 6, pp. 60-61.

The addition of from 0·2-0·3% of oil to cotton is an advantage in keeping down dust and fly. It is probable that the oil remains on the cotton in the drawing and spinning processes. Skeins from oiled cotton appear to have a better set twist on the reel than skeins from non-oiled cotton and are free from kinks. The possibility of applying oil to weft to prevent kinking is suggested. In some cases it has been necessary to decrease the weight of the laps when the cotton is oiled. Too much oil causes the cards to choke up. Equipment is now being developed for adding the desired percentage of oil to the cotton at the front of the card at the point where the web is condensed to a sliver. It is claimed that certain dyes fast to light and washing can be added with this oil at the front of the card. C.

Single-process Scutching: Disadvantages. Southern Textile Association. *Cotton* (*U.S.*), 1934, 98, No. 6, p. 60.

Reports are given of a fall in breaking strength on changing to single-process scutching, and the necessity for more grinding on the cards. In another case it is claimed that single-process scutching gives better cleaning and more even laps. C.

Oiling of Wool. J. B. Speakman. *J. Soc. Chem. Ind.*, 1934, 53, 174T-177T.

Worsted Carding (with J. R. Dickinson). In order to study the influence of lubrication on fibre breakage in worsted carding, a 64's merino wool (420 lb.) was scoured and divided into three lots, A, B, and C. A was left undried, while B and C were dried to different regains. The scoured wool contained 1·03% by weight of ether-soluble grease, and each of the three lots of material was again divided into three, the first being kept unoiled and the second and third oiled with 0·5 and 1·0% by weight of olive oil, respectively. To increase the chance of uniform oil distribution, the bulk of liquid to be applied was increased by converting the oil into a 20% oil-in-water emulsion by means of ammonia. In addition, the emulsion was distributed over the wool by means of an atomiser. The extent of fibre breakage in the nine lots of material was determined, the results being summarised in the table below.

Fibre Breakage in Worsted Carding

	Regain of Wool		Added Oil	Fibres below 65 mm. in Carded Sliver
	Feed	Delivery	(% by wt.)	(% by wt.)
A	35·9	13·3	0·0	61·6
	38·9	12·8	0·5	55·4
	38·3	12·9	1·0	51·0
B	32·1	11·7	0·0	61·9
	32·5	11·4	0·5	57·7
	31·8	12·4	1·0	50·0
C	22·1	8·4	0·0	62·4
	20·9	8·1	0·5	59·3
	16·2	9·2	1·0	53·4

In all cases, the addition of up to 1% of oil produces a striking reduction in fibre breakage. This amount of oil, however, increases the amount of nepp in the carded sliver. The addition of 0·5% of oil minimises fibre breakage and reduces the amount of nepp. For similar amounts of oil on the wool there is a tendency for fibre breakage to decrease as the water content of the wool increases. Difficulties in stabilising oil emulsions have been overcome by the introduction of stearamide and the newer synthetic emulsifying agents possessing acid-stable polar groups.

Rag-pulling (with P. J. H. Desplats). Two types of rags—soft-spun hosiery rags and hard-twisted worsted rags—were selected for use in experiments designed to discover the utility of oil as a lubricant in rag-pulling. In this case, however, the length of fibre produced by pulling is so small that direct measurement of fibre length becomes difficult, if not impossible, to carry out. For this reason, the strengths of the yarns made from the several materials have been used to give an indication of fibre length. Each type of rag was divided into six lots, four being oiled with 5, 10, 15, and 20% of a 70% oleine, respectively, and pulled without addition of water. The fifth lot of material was soaked in water, centrifuged to remove the excess, and then pulled without addition of oil; while the sixth was again soaked in water, centrifuged as before, but then oiled with 10% of oleine prior to pulling. The several pulled wastes were passed through the same woollen card in succession, no extra oil being added except to the material pulled in water alone, which was oiled with 10% oleine before carding. After spinning on the Whiteley mule, 12 cops were selected from marked spindles as samples of each material. These were stored in a room maintained at 70° F. and 65% relative humidity before being tested for strength, count, and twist. The results summarised in the table below are the averages of data obtained in the following manner—

Strength—Using 18 in. lengths of yarn, 50 tests were carried out on each cop, making a total of 600 determinations for each type of material.

Count—A 30-yard length of yarn was reeled from each cop and weighed, giving 12 determinations for each type of yarn.

Twist—Using 10-in. lengths of yarn, ten tests were made on each cop, giving 120 determinations for each kind of yarn.

In the last column of the table the strengths of the yarns have been reduced to a standard count of 10's Yorkshire skeins, on the assumption that the strength varies inversely with the count. No certain method of correcting for the variable amounts of oil in yarns of the same nominal count is available, but the introduction of possible corrections (based on the amounts of oil retained by the spun yarns) in no way invalidates the conclusions drawn from the results of the following table.

FIBRE BREAKAGE IN RAG-PULLING

Pulling Medium	Count (Y.S. woollen)	Twist (turns/inch)	Strength (oz.)	Corrected Strength (oz.)
HOSIERY RAGS				
5% Oleine	10·6	7·78	16·0	17·0
10% ,, ...	9·8	8·05	17·5	17·2
15% ,, ...	10·6	8·51	16·5	17·5
20% ,, ...	10·9	8·66	16·1	17·6
Water	10·0	8·00	19·3	19·3
Water + 10% oleine	8·8	7·64	25·4	22·6
WORSTED RAGS				
5% Oleine	10·6	8·15	12·2	12·9
10% ,, ...	10·3	8·45	12·8	13·2
15% ,, ...	10·6	8·70	13·3	14·1
20% ,, ...	10·5	8·75	14·6	15·3
Water	10·0	8·59	13·1	13·1
Water + 10% oleine	9·8	8·63	18·0	17·5

That water and oil are to some extent interchangeable in function is clearly revealed by the data for hosiery rags, where the strength of the yarn obtained by pulling in water alone is greater than that obtained by pulling in 20% oil. Even with worsted rags, water is as effective as 10% oil, but in both cases oil and water together are more successful than is either alone. The Continental practice of pulling soft-spun rags in water is clearly permissible, and has the great advantage that the shoddy can be washed, dyed, and stored without risk of fire and defects arising from oil oxidation. Even when oil is used, however, the rags should be saturated with water. For this purpose they need not be soaked, but may be treated with an oil emulsion adjusted to such a concentration that the rags are saturated with water when the desired amount of oil has been applied.

Woollen Carding (with H. Franks). By comparing the strengths of yarns produced by means of oil and emulsion, it is possible to obtain an indication of the

extent of fibre breakage in woollen carding, as well as of the relative efficiencies of the two methods of oiling. A 56's Down wool was scoured and divided into five lots. The first was oiled with 15% olive oil, and while the material was being carded and spun, all necessary adjustments were made to the card and mule, both machines being then left unaltered in subsequent experiments. The remaining lots were oiled with 15% olive oil, 30% of a 50% olive-oil emulsion, 22% of the same emulsion, and 15% of olive oil, respectively. In each case, carding was carried out immediately after oiling, and except for the first, which was discarded, the several spun yarns were examined. The results are shown in the following table. In the last column the strengths of the yarns have been reduced to a standard count of 11·5 Yorkshire skeins, on the assumption that the strength varies inversely with the count.

WOOLLEN CARDING

Oiling Medium	Count (Y.S. woollen)	Twist (turns/inch)	Strength (oz.)	Corrected Strength (oz.)
Olive oil 15%	12·1	9·22	19·5	20·5
Olive oil emulsion 30% ...	11·6	9·48	23·8	24·0
Olive oil emulsion 22% ...	11·0	9·33	26·0	24·9
Olive oil 15%	12·0	9·52	19·8	20·7

The use of oil emulsion gives a far stronger yarn than the normal practice of using oil, especially under conditions of rapid working, and similar results have been obtained with oleine emulsions. An analysis of the various rovings has proved that the difference is due to reduced fibre breakage in the case of wool oiled with emulsion, owing to more uniform oil distribution as well as increased water content.

Scouring—Recent research has greatly minimised the risks attached to the use of oxidising and unsaponifiable oils. To investigate the difficulty in removing mineral oils from wool, strips of a worsted fabric were oiled with 10% by weight of various fractions of a mineral oil, and the amounts of oil retained by the fabric determined after a two-fold scour with soap and soda in a model scouring machine. The results show that the difficulty of scouring increases with the boiling point of the oil, *i.e.* with the length of the hydrocarbon chain. The utility of oleyl alcohol in reducing the surface tension of the mineral oil without at the same time increasing adhesion to any marked extent, was investigated by oiling strips of a worsted fabric with 5% by weight of various mixtures of oleyl alcohol and mineral oil. The amounts of oil retained by the several pieces of fabric after a two-fold scour with soda and soap are indicated in the table below, together with data for the oil water interfacial tensions of the various mixtures at 25° C.

Oleyl Alcohol in Mixture (% by wt.)	Oil-water Interfacial Tension (dynes/cm.)	Residual Oil (% on wt. of wool)
0·0	47·9	2·50
2·5	20·9	1·81
5·0	19·1	0·61
6·0	18·9	0·58
10·0	20·2	0·57
15·0	19·6	0·83
20·0	19·1	1·14
40·0	—	2·20
55·0	16·1	2·88
70·0	15·5	3·25
85·0	14·7	3·36
100·0	14·4	2·66

Reduction in interfacial tension is accompanied by a marked improvement in scouring, and a 7% solution of oleyl alcohol in mineral oil has excellent scouring properties. If, however, the concentration of the alcohol is increased, scouring becomes difficult because of increased adhesion, for which the polar character of the alcohol is responsible. The addition of small quantities of oil-soluble polar compounds to mineral oil thus affords a solution of the scouring difficulty. W.

(B)—SPINNING AND DOUBLING

Crêpe Yarns: Production. J. W. Pennington. *J. Text. Inst.*, 1934, **25**, P225-P246.

Mule Auxiliary Drawing and Snarl Stretching Motions. C. Berntzwiller. *Fils et Tissus*, 1934, **22**, 190-194 and 237-240.

The author explains by means of geometry the action of various auxiliary drawing motions and snarl stretching motions. C.

Spindle Driving Tapes. Philipp Kastner Sohn. *Leipz. Monats. Text. Ind.*, 1934, 49, *Fachheft II*, pp. 33-34.

The requirements of spindle driving tapes are outlined and samples of suitable tapes are given. It is now possible to obtain tapes with a life duration of 4,500-4,700 hours. C.

Co-acting Rollers: Slipping Effects. R. Levi. *C. r. Acad. Sci.*, 1934, **199**, 119-120.

The tangential component of the oblique force exerted by two solids rolling upon each other produces local deformation of each solid, an expression for which is found. C.

Mules; Calculation of Stretch Duration on——. C. Ringenbach. *L'Ind. Text.*, 1934, 51, 235-237, 293-295.

The author discusses the possibility of calculating the stretch duration on mules working with and without indicators and gives examples to illustrate the method of calculation. C.

Ring and Traveller Lubricating Device. J. Schmitt. *L'Ind. Text.*, 1934, 51, 295.

The device consists of a double-walled metal ring, open at the top and containing felt saturated with a suitable lubricant, which fits inside the ring and is controlled in such a way that the upper edge of the felt is brought periodically into contact with lower inner edge of the upper flange of the ring. C.

Rayon Crêpe Yarns: Twisting. *Kunstseide*, 1934, 16, 235-237.

In France and Italy, where the crêpe twisting process is carried out very cheaply, cheap twisting machines and impregnating agents are used. The machines are not flyer twisting machines but are provided with rotating thread guides on the upper flanges of the bobbins. The required twist is produced in two operations, only a small twist being imparted in the first stage. The use of ball-bearing spindles is not recommended as the higher power, maintenance, and depreciation costs cause the cost of the twisting process to be about 20% higher with this type than with the ordinary type of spindle. The high speeds possible with ball-bearing spindles are not practicable for rayon. C.

Manipulation of Worsted Mules. "Spyndle." *Text. Rec.*, 1934, **52**, No. 613, p. 33; No. 615, p. 35, and No. 616, pp. 32-33.

The cycle of operations and the mechanical construction of the worsted mule are described in detail. W.

Leather and Cork Covered Top Rollers. J. Dumville. *Wool Rec.*, 1934, 46, 93-97.

The advantages are stated of cork covered top spinning rollers. The coverings are received in bent strip form. These strips consist of a patented cork composition made in several thicknesses. For Botany the thickness is usually $\frac{1}{4}$ in. and for crossbreds $\frac{5}{16}$ in. The bosses and arbors used are of the usual wood or iron kind, and the strips are supplied in any size or width to suit the different sizes and widths of drawing and spinning rollers. W.

(C)—Subsequent Processes

Bobbin Spool. Universal Winding Co. *Text. Weekly*, 1934, **13**, 510.

The paper spool of a new yarn package consists of a parallel body with a conical base. At the commencement of winding the thread is traversed along the parallel portion. As the diameter of the package increases, means are provided for automatically traversing the thread so that it builds up on the bevelled base, and at the same time forms a cone at the other end; the length of the traverse remains constant, but the position of the traverse shifts laterally in relation to the spool. The winding is the close or precision system and is carried out on the Leesona No. 50 winding machine. C.

Warp Yarn: Winding. G. A. Bennett. *J. Text. Inst.*, 1934, **25**, P285-P294.

Winding Frame Yarn Clearing Devices: Performance. W. English and F. Nasmith. *J. Text. Inst.*, 1934, **25**, P153-P172.

Yarns: Reeling and Bundling. P. Seuchter. *Spinn. u. Web.*, 1934, **52**, No. 27, pp. 4-5.

The reeling and making up into bundles of single and doubled yarns is discussed and data are given showing numbers of leas per hank, hanks per knot, and knots per bundle for different counts. Productions and costs of production are briefly discussed. C.

Lastex Yarn: Winding. *Text. Merc.*, 1934, 91, 102, 107.

Lastex yarn is wound from hanks on to double-ended bobbins on a machine of the type which is in common use in the silk and rayon industries. The hanks are placed on swifts above and below the bobbins, the swifts being unweighted. The drive of the bobbins is by friction. The yarn may be passed through knot catchers. In common with some other textile yarns Lastex yarn may occasionally have a tendency to snarl. To cater for this, provision has been made for winding over-end from a bobbin to another bobbin. The end from which to wind should be chosen so as to impart a twist contrary to the direction of snarl in the yarn, and the over-end winding can be carried out twice should the snarl not be eliminated by the first bobbin to bobbin wind. Cone winding is carried out on a machine in which the usual heavy thread traverse guide plate is replaced by a light thread traverse, hinged at one end and kept in position against the cone by a spring. This spring is sufficient to build a reasonably firm cone and yet prevent any rolling of the threads by the thread traverse. Also, as the guide can follow the cone contour, there is very little tendency to "cobwebbing", although the yarn is wound practically free from tension. In order to compensate as much as possible for the variable winding speed between the nose and the base of the cone, the yarn is passed through a guide placed near the base of the cone. The effect of this is that when the thread guide is travelling outwards towards the small end of the cone, the yarn speed is equal to the cone speed plus the traverse speed, but when the guide is travelling inwards towards the large end, it is equal to the cone speed minus the traverse speed, thus evening out the yarn speeds between the base and nose of the cone and as a result tending to minimise the building of cones with soft noses and hard bases. The bobbins are mounted on vertical pegs so that the yarn can be wound over either end to remove snails, and guides are set just above the bobbins to obtain a "full" balloon which causes the yarn to unwind from the bobbin freely without fouling the flanges. The bobbins should be fitted with metal bands on the flanges. C.

Rayon Pirns: Winding. P. Werler. *Kunstseide*, 1934, 16, 231-235.

A general discussion of the size and shape of rayon pirns, the selection and care of paper tubes, the packing of pirns, the advantages of winding from conical or cylindrical cross-wound bobbins instead of from flanged bobbins, and faults in rayon fabrics caused by irregularities in tension in the pirn or bobbin winding processes. C.

(D)—YARNS AND CORDS

"Burgwolf" Yarns. C. Wolf A.-G. *Leipz. Monats. Text. Ind.*, 1934, 49, *Fachheft II*, pp. 30-31.

The patent "Burgwolf-Seels" yarns for crochet and knitting consist of woollen, cotton or linen cores completely covered with rayon, giving either a lustrous or matt appearance as desired. The yarns with woollen cores have a very soft handle and high extensibility and elasticity, whilst those with cotton cores have a soft handle and withstand washing well; linen cores give yarns of high strength. "Burgwolf"-Flagano wool yarns have a natural hairy appearance resembling Angora yarns. C.

Latex Round Thread: Manufacture and Properties. E. A. Murphy. *Trans. Inst. Rubber Ind.*, 1932, 8, 328-344.

Patents for the production of latex round thread are reviewed, and tables are given comparing the physical properties of round and cut threads which show the greater mechanical strength of the former. A discussion is appended. C.

Fancy Loop Yarns: Application. *Leipz. Monats. Text. Ind.*, 1934, 49, *Fachheft II*, p. 28.

The use in knitting and weaving of the fancy yarns produced by the "Fadenraub" (thread robbing) process is discussed and samples of woven fabrics are given. Rayon yarns of this type have a permanent matt appearance and in softness and other properties resemble spun yarns. Various novel effects can be obtained by the use of yarns formed from threads of different nature and colour. C.

PATENTS

Rayon Crêpe Yarn: Preparation. F. Pächt (Vienna). D.R.P.598,468 of 7/11/1931 : 24/5/1934.

The yarn is treated, before or during the twisting operation, with a swelling, softening agent, and, after twisting, with a stiffening agent. C.

Sliver-balling Apparatus. G. Fraser, N. Fraser, and J. Fraser (Arbroath). E.P. 404,764 of 20/9/1932.

In a sliver-balling machine of the type in which the balls or rolls are wound by frictional contact with a rotating driving roller, measuring gear is provided, including a ratchet wheel which performs one revolution while a predetermined length of sliver is being wound, a striker rotating therewith and being adapted to trip a latch to bring about operation of the roll-ejecting mechanism. In a machine of the type described in Specification 323,416 (see *J. Text. Inst.*, 1930, A180), the gear comprises an eccentric which is rotated from the driving shaft through a gear train including a change wheel and which actuates a rod connected to the pawl of the ratchet-wheel. On completion of the roll the pin engages the arm of the lever carrying the latch and trips the latter out of engagement with a stud fixed to a lever pivoted which is then allowed to swing forwardly. A stud on the lower end of the trigger arm is freely slidable in a slot in the lower end of the lever, a face on the arm being engageable with an inclined face on an adjustable trigger pin. The pin is adjusted so that the arm is free to move forwardly shortly before the roll is completed, the stud, however, preventing any forward movement of the arm until the latch is disengaged. A chain-wheel fixed to the ratchet-wheel drives a second chain-wheel unitary with a hand-wheel having a mark which at commencement of winding is set opposite a fixed pointer, the ratchet-wheel being thus turned until the pin is in the position it occupies at the completion of the roll. The lowering cam on the shaft now engages an adjustable pin on the arm which is pushed backwardly until the face rides down the incline, the stud simultaneously pushing the lever back until the latch drops into engagement with the stud. As the roll is built the arm rises and the ratchet-wheel is slowly rotated by the pawl until the pin disengages the latch from the stud and allows the members to swing forward and eject the roll. W.

Winding Machine Creel Friction Band Adjusting Device. J. Stubbs Ltd. (Manchester), W. L. Stubbs, and H. E. Latham. E.P.407,937 of 24/9/1932.

In a winding machine of the type wherein thread is wound from a reel on to a holder mounted on a spindle rotated at constant speed, a friction band and drum are associated with the reel, and the growth in diameter of the package being wound effects by positive means in contact with such package a slackening of the friction band upon the friction drum. C.

Card Stripping Roller. Philipson & Co. (Bolton) Ltd., W. Smith, and F. Greenhalgh (Bolton). E.P.408,048 of 22/11/1932.

A stripping roller or brush particularly for stripping or cleaning the flats of carding engines comprises short end bristle sections which are adjustable independently of the main bristles, the end sections being arranged to clean the ends of the flats extending beyond the carded surfaces which are cleaned by the main bristles. C.

Skein Holder. K. Peplow (Osnabrück, Germany). E.P.408,904 of 13/11/1933.

A rotatable skein holder comprises a pair of diverging arms pivotally adjustable in a plane at right angles to the plane of rotation of a rotatable carrier, e.g. by means of a wing nut, the arms being provided at their free ends with yarn supports which are wider than the pivot about which the carrier rotates. The carrier preferably consists of a sleeve encircling the pivot, and a lug to which the arms are connected. C.

Winding Machine Traverse Mechanism. L. H. Leedham and Wildt & Co. Ltd. (Leicester). E.P.409,285 of 24/10/1932.

In a yarn winding machine having traverse mechanism comprising a riser spindle, a yarn guide extending from, formed in, or operatively connected with a nut member in screw-threaded engagement with the spindle, and means to produce relative rotation between the nut member and the spindle, means are provided for varying the velocity ratio between the screw and the nut member, e.g. by varying the pitch of the screw thread. The variable pitch screw thread comprises a helical spring coiled round the spindle, the upper extremity of which is screw-threaded to accommodate nuts through which the pitch of the spring is varied. The relative rotation between the progression wheel and the spindle is produced solely by ratchet mechanism or by other mechanical means. C.

Spinning Machine Lappets and Thread Guides. Cook & Co. (Manchester) Ltd. and H. J. Towlson. E.P.409,431 of 24/11/1932.

In a lappet and thread guide therefor the guide is adjustably mounted in a hollow weighted member, pivotally mounted on an adjustable back plate, the member having a tongue extending downwardly and rearwardly toward the back plate. The top of the device is rounded to provide a minimum lodgment for dust, the bore being screwed to receive the guide member and a lock nut, also rounded to prevent lodgment of dust, abutting against the end of the hollow member. The guide eye may be provided with one or more spikes to break the roving when lumps endeavour to pass through, and a V-slot may be formed in the eye opposite the spikes. C.

Bobbin Drag Device. J. F. Low & Co. Ltd. and J. Hargrove (Monifieth, Angus). E.P.409,489 of 9/3/1933.

A bobbin drag device for spinning and twisting frames, having a bobbin tube journalled on the bobbin spindle, comprises a bobbin-supporting drag disc or plate, separate from the bobbin tube and positively connectable with the bobbin, e.g. by pins, to rotate therewith, and a bearing on the upper end of the spindle to take the weight of the bobbin tube. The drag plate rests on friction pads supported by a disc, the drag plate and the disc being flanged to prevent the ingress of foreign matter which would disturb the coefficient of friction. C.

Silk and Rayon Doubling and Twisting Frame Feed Rollers. G. N. Heath. E.P. 412,324 of 28/1/1933 : 28/6/1934.

A feed roller group or combination for doubling and twisting frames for silk or rayon comprises a pair of feed rollers which are spaced apart and have their shafts or axles relatively inclined or disposed in non-parallel fashion. The axles are supported in a gear casing adapted to enclose three gear wheels to enable the spaced rollers to be driven in the same direction from the known single horizontal shaft, the gear casing being adapted to be supported from the known vertical rod. The feed rollers are preferably provided with flanges. C.

Preliminary Carding Device. N. Vohs (München Gladbach, Germany) and H. K. J. Gilljam (Gladbach-Rheydt, Germany). E.P.412,861 of 15/12/1933: 5/7/1934.

In a process for preparing cotton for spinning, the cotton is taken from the cleaning machines in loose form and is conveyed by way of an automatic feeding and weighing device on to the feed apron of a preliminary card which employs a licker-in operating in conjunction with a cylinder provided with working rollers and a doffer. This card is made about double the working width of a flat card and delivers the carded fibrous material in the form of a web which is subdivided into strips and is delivered in the form of slivers which are united on a sliver lap winding machine into a lap wound in the form of a cheese, several of which can be placed side by side for feeding on to a flat card. With this arrangement the feeding of the preliminary card is entirely regular and adjustable, and a better preliminary opening is achieved, as the cotton is not matted to the same extent as a lap produced on a scutcher. C.

Drawing Mechanism. A. Aeberli (Zurich, Switzerland) and A. Wirz (Meniken, Switzerland). E.P.413,577 of 30/12/1933: 19/7/1934.

A drawing mechanism for drawing textile fibres for mules, ring spinning, and drawing frames consists substantially of two drawing rollers mounted in side plates connected by a cross piece and a clearer roller, the drawing rollers being in positive rotary connection with one another by means of a driving element. The drawing rollers are provided at both ends each with a neck portion tapering towards the journals of the drawing rollers and the side plates are so constructed that the lower side edge of each of them intersects the bearings bored for accommodating the drawing roller journals so that the bores are open in downward direction, at least one journal of each drawing roller being axially shiftable and held in operative position by resilient means. C.

Yarn Clearer. J. Stubbs Ltd. (Manchester) and Mary E. Stubbs. E.P.413,601 of 28/2/1934 : 19/7/1934.

An improvement in a yarn clearer of the type comprising an upper disc mounted on a central stud and a lower disc provided with orifices for the escape of waste materials from a passing yarn, consists in the provision for the lower disc of a support which is resilient and is rotatable with the disc to throw off by centrifugal force waste matters which accumulate upon it. This support may conveniently be in the form of a spiral spring surrounding the stud upon which the upper disc is centred. C.

3—CONVERSION OF YARNS INTO FABRICS

(B)—SIZING

Blufajo Rayon Size: Advantages. P. Krais. *Leipz. Monats. Text. Ind.*, 1934, **49**, *Fachheft II*, pp 46-47.

Blufajo size for rayon is sterile and immune from attack by moulds, homogeneous, readily soluble in hot water, and of good wetting and penetrating power. It does not form precipitates with dyes, undergo any disadvantageous changes on ageing or influence the lustre of the rayon, and it is economical in use. Both sizing and desizing processes can be carried out at low temperatures (below 40° C.), and when weaving warps sized with Blufajo size it is possible to increase loom speeds about 5%. C.

Stoko Tablets and Tallosan S: Use in Preparation of Sizes. Chemische Fabrik Stockhausen & Cie. *Leipz. Monats. Text. Ind.*, 1934, **49**, *Fachheft II*, pp. 44-45.

Stoko tablets decompose starch to the soluble starch stage and are used in the preparation of starch sizes of uniform consistency and good adhesive and penetrating properties. Tallosan S contains tallow in a practically water-soluble form and is used with advantage in place of ordinary tallow, especially in weighted sizes containing China clay and Epsom salts. When it is desired to avoid the formation of magnesium soaps in weighted sizes it is advantageous to use Monopol soap in place of tallow or Tallosan. Formulæ of sizes suitable for different purposes are given. C.

Size Mixtures: Compounding. J. H. Strong. *Text. Weekly*, 1934, **13**, 465, 488, and 533-534.

The aims of sizing and the effects of starches on cloth are outlined. Rules are given for the preparation of pure and heavy sizes, and examples and various analyses of size mixings are discussed. C.

Sized Warp: Production Costs and Profits Calculation. C. Sustmann. *Spinn. u. Web.*, 1934, **52**, No. 29, pp. 3-4.

The calculation of costs of production is discussed and illustrated by a study of the sizing process. The intersections of curves showing the proceeds obtained by different charges per unit of sized warp with the curve showing the increase of cost with production indicate the critical points below which the process becomes unprofitable at the particular prices charged. Production costs per unit weight of sized yarn decrease with increase in total production. C.

(C)—WEAVING

British Looms: Developments. J. Starkie. *J. Text. Inst.*, 1934, **25**, P144-P152.

Rayon Yarns: Processing and Weaving. A. E. Delph. *J. Text. Inst.*, 1934, **25**, P247-P261.

Roller Bearing Looms: Advantages. F. U. Naughton, jun. *Cotton (U.S.)*, 1934, 98, No. 6, pp. 43-46.

The advantages of ball and roller bearings are described and some general loom applications are discussed. The power requirements of a loom are indicated and it is pointed out that in actual tests savings of approximately 15% in total power consumption and increases of 1·7% in production have been observed for roller bearing equipped looms as compared with plain bearing equipped looms. The results of worn bearings on crankshafts, take-up drums and dobbies are described. Illustrations showing the use of roller bearings for crankshaft, crankshaft outboard, bottom shaft, rockershaft and take-up drum bearings are given. C.

Silk and Rayon Warping, Sizing, and Weaving Machinery. E. Honegger. *J. Text. Inst.*, 1934, **25**, P116-P133.

Smallware Preparation and Weaving Machinery. W. Holt. *J. Text. Inst.*, 1934, **25**, P295-P310.

Heald-actuated Electric Warp Stop Motion. *L'Ind. Text.*, 1934, **51**, 299-300.

When a thread breaks the corresponding heald falls and comes into contact with one or more conducting bars, thus completing an electric circuit. The current actuates an electro-magnet which controls an arrangement for stopping the loom. C.

Cover in Woven Fabrics. *Wool Rec.*, 1934, 45, 1493-1495.
An article dealing with methods of obtaining cover, either warp or weft, in fabrics generally, with details of makes of cloths. W.

New Method of Carpet Manufacture: Short Fibres and Plastic Agents. *Wool Rec.*, 1934, 45, 1375-1377 and 1384.
Cotton fabric is sprayed with rubber latex, short-fibred wool then being deposited on to this surface by special machinery, a short pile fabric being produced. Stencils are used to produce pattern effects by means of further applications of adhesive and flock. Combination effects of wool, silk, cotton, etc. may be obtained on one fabric. Carpets with a long pile are made by two methods, in each of which the wool (dyed in loose condition or as sliver) is carded. In the first method, the carded web is made corrugated by knives or blades which are practically of the depth of the desired pile of the carpet. The webbing is kept in this corrugated condition, and one side of the corrugations is loaded with latex. Whilst this is in a fluid condition it is pressed on to a jute or cotton backing, to which a layer of latex has been applied. Whilst being pressed together the material is dried, after which the whole is rolled and vulcanised. The curved loops of the sliver are broken by a raising machine, thus producing the pile effect, and cropped to the desired length. The second method consists of passing the webbing between two sets of cogged cylinders, the teeth of which produce corrugated lengths twice that of the desired pile. As the webbing leaves the corrugating device it is loaded on both sides with rubber, and to each side a prepared backing fabric is applied. After drying and vulcanising, the goods are cropped or sheared, so that two carpets are produced. Lustre wools or mohair are used in the wallpaper trade to produce silken effects. The wool fibres are cut to 1 mm. length flock and sprayed on to the paper to which a design of adhesive has been applied. The material is dried and the loose fibres removed by suction only. W.

(D)—KNITTING

Full-fashioned Hosiery Selvedges: Knitting. M. C. Miller. *Text. World*, 1934, 84, 1258-1259.
The author describes in detail the intricate and accurate movements which the needles and sinkers must make for the formation of correct and even selvedges on full-fashioned hosiery. C.

Knitting Stitches. J. Chamberlain. *J. Text. Inst.*, 1934, 25, P197-P206.

Warp Knitting Machine Yarn Feeding Device. *Fils et Tissus*, 1934, 22, 256-257.
The threads of warp are drawn from a beam or a creel, or a series of beams, and on the way to the needles pass over a bar which is actuated to have a drawing effect on the threads and is synchronised with the motion of the needles. The unwinding of the threads is effected partly by the motion of the needles themselves and partly by the movement of the bar and the arrangements are such that periods of drawing off by the needles alternate with periods of drawing off by the bar and unwinding proceeds at a practically constant speed. A diagram of the device is given and its functioning is explained. C.

Warp-knitted Fabrics: Production. W. Davis. *J. Text. Inst.*, 1934, 25, P189-P196.

Jacquard Flat Knitting Machine. W. Hildebrand. *Silk and Rayon*, 1934, 8, 263-266, 311-312.
The disadvantages of the steel card jacquard system for knitting machines are discussed and various attempts to overcome these disadvantages are briefly described. The flat knitting machine, system jacquard, consisting of a jacquard machine of the type used in weaving combined with a flat knitting machine, is described in detail. This system has the advantages of simple and reliable operation, cheap and easily perforated cards, and the possibilities of rapid changes of patterns and of the use of one and the same pattern card for machines of different division. C.

Laddered Hosiery Repairing Devices. F. Kate. *Kunstseide*, 1934, 16, 240-241.
Four different devices for mending ladders in rayon hosiery and knitted underwear are briefly described. C.

Metal Effect Threads: Use in Rayon Knitted Goods. W. Hildebrandt. *Spinn. u. Web.*, 1934, 52, No. 29, pp. 8-11; *Kunstseide*, 1934, 16, 241-244.
Metal effect threads are prepared from fine copper wire, coated with a thin layer of silver, or gilded by treatment with zinc vapour. Gold-coated wire is sometimes

used for high quality goods. Coloured effects are obtained by applying suitable lacquers. The wires are flattened and twisted round textile threads. The use of these threads in rayon knitted goods is discussed, and methods of incorporation and patterning possibilities are shown in diagrams. C.

Rayon "Interlock" Fabrics: Knitting. *Kunstseide*, 1934, 16, 213-216, 244-247.

The characteristics of "interlock" fabrics are described and an account is given of the production of these fabrics on circular machines and of the patterning possibilities. C.

Feed for Rubber Core Yarns. *Wool Rec.*, 1934, 45, 1262.

The Lindley attachment for circular knitting machines feeds the yarn into the needles at a level and undisturbed tension. A driver wheel turns in a horizontal direction and a yarn feed roller rests on the wheel. The rubber yarn passes under this roller in a groove, and is held between the disc and the feeder wheel. The latter can move over the surface of the disc, so that when it is near the outer edge it delivers more thread. As it approaches the centre of the disc relatively less yarn is delivered, with a minute variation according to the position occupied between the outer and inner portions. W.

(E)—Lacemaking and Embroidering

Lace Fabrics: Production. G. H. Buckley. *J. Text. Inst.*, 1934, **25**, P215-P224.

(G)—Fabrics

Dress and Furnishing Fabrics: Structure. J. Read. *J. Text. Inst.*, 1934, **25**, P266-P284.

Fabrics: Structure and Launderability. R. E. V. Hampson. *J. Text. Inst.*, 1934, 25, P207-P214.

Fancy Loop Yarns: Application. *See* Section 2D.

Fabrics: Physical Properties; Review. *See* Section 5C.

Patents

Cotton Wool Filter Pad. A. Weber (Southport). E.P.408,034 of 22/10/1932.

A filter pad consists of compressed cotton wool without adhesive or backing. The cotton wool may be compressed in sheet form or after being cut up into pads. The cotton wool may be subjected simultaneously to heat and pressure and may have a pattern embossed upon it, e.g. by passing between heated embossing rollers. C.

Alternate Rib and Plain Stitch Fabric: Knitting. Hemphill Co. (Central Falls, Rhode Island, U.S.A.). E.P.408,084 of 3/2/1933.

The patent relates to a method of changing from rib to plain knitting on a circular machine having an auxiliary thread feeder and knitting cams arranged at a position substantially diametrically opposite the main thread feeders and knitting cams. The rib knitting is performed by the dial needles and the intermediate cylinder needles at the auxiliary feeder and after completion of the last rib course the dial needles retain their loops until four courses of plain knitting have been made. The first two of these are knitted at the auxiliary feeder and the second two are knitted at the main feeder. At the next course the cylinder needles corresponding to the rib needles hold their loops, and the rib needles knit, the loops formed thereby being elongated by the rib needles taking up thread from the adjacent cylinder needle loops. A plain course is then knitted by all the cylinder needles at the main feeder, and the dial needles continue to knit for one or more courses to provide a tab or extension. The plain course is then followed by the plain courses which constitute, e.g. the leg and foot of a stocking. The invention is described in connection with the knitting of a stocking or fabric having a selvedge which does not curl or roll. C.

Loom Pile Wire Knives. C. Schlemper (Ohligs, Solingen, Germany). E.P.408,132 of 5/8/1933.

The wires have removable cutting knives displaceably mounted so that they can be pivoted or rocked about their front ends, or about their rear ends, or made to slide in a recess whereby two or more different points of the knives may be moved in succession into operative cutting position. C.

Warp-enchaining Knitting Machines. R. K. Mills (Nottingham). E.P.408,168 of 24/10/1933.

Multiple-latch needles are used in a knitting machine for enchaining warps and connecting them by wefts, ordinary or locked stitches being made according as

the needles are raised to a normal or abnormal height. The warp chains may thus consist of tied and tying stitches arranged in alternation. C.

Heald Eyes. C. W. Bracker (Zurich, Switzerland). E.P.408,188 of 28/12/1933.

Eyes made from a continuous piece for steel wire healds are formed with the wall of the groove for receiving the wire thicker in cross-section in the middle than at the margins. The eyes may be oval or oblong for twisted wire healds, or for healds having plain wires soldered together. The eyes may be made by punching a hole in a strip of metal, reducing the thickness of the metal around the hole, drawing down the metal to form a neck so as to reduce the thickness of the metal at the other margin, and then crimping the neck and stamping out the eye. The eyes may also be made from tubes or annular stampings crimped and drawn to the required cross-section. C.

Lace Machine Jacquard. A. F. Schuler (Philadelphia, U.S.A.). E.P.408,205 of 31/8/1932.

In a Nottingham lace machine wherein a wide piece or several strips of lace curtain are controlled by a single or double jacquard mechanism situated above the centre of the machine, the harness cords pass through a rectifying grid which is lowered before radiating to the control jacks when the cords are raised thereby taking up slack. C.

Knitting Machine Yarn Changing Device. H. Brinton Co. (Philadelphia, U.S.A.). E.P.408,292 of 6/10/1932.

The yarn fingers of a yarn changing device for a dial knitting machine are pivoted to swing above the rib needles on a vertical pivot. Each newly-introduced yarn is taken first by the rib needles. Slides actuated selectively to release each finger in turn as required are connected by springs to detents which normally hold the fingers in feeding position. The springs move the detents into engagement with the slides and also retract the slide which is out of engagement therewith. The idle yarns are placed by a rotary hook in a fork situated between the yarn-changing device and the trapper. C.

Sock Lengths: Knitting. K. Lieberknecht Ges. (Oberlungwitz, Germany). E.P. 408,538 of 21/10/1933.

Sock lengths are produced in a continuous strip without narrowing upon a flat bed machine. The transfer courses of the heel portions are continued to the end of the central or instep portion and, after completing the instep, additional transfer courses are knitted over the whole width of the blank. The transfer courses are knitted of cheap, thin material. After the blanks have been transferred to the plain machine for knitting the heels and toes, the superfluous courses are cut away. Loose courses are made immediately before the transfer courses. C.

Leno-weaving Heald. Grob & Co. Ltd. and H. Oberholzer (Zurich, Switzerland). E.P.408,555 of 9/12/1933.

A heald for leno weaving comprises two lifting healds having slotted off-set portions for guiding the limbs of the clasp heald which is provided with the usual eye. The slotted parts are bent in opposite directions out of the plane of the flat metal heald. Instead of a slot, two cuts may be made, two of the resulting limbs being bent in one direction, whilst the third limb is bent in the opposite direction. The lifting healds have the usual eyes at each end. C.

Circular Knitting Machine Feeder Mechanism. P. A. Bentley, J. H. Goddard, C. F. Manger, C. H. Wainwright, and G. A. Buswell (Leicester). E.P.408,598 of 7/10/1932.

In a circular knitting machine having two or more feeders, one, which feeds a main yarn and a plating yarn, is arranged so that immediately it moves from its feeding position towards its associated yarn trapper and cutter, its yarns cease to be knitted by the needles. A latch retarder engages the latch of each needle as the latter is descending and prevents its sudden closing. A machine having five feeders is shown. C.

Terry Towels: Weaving. W. Holt (Bury). E.P.408,728 of 17/11/1932.

The fabric is woven with highly twisted terry warp yarns so that the terry loops twist into snarls which cover the entire surface on both sides. The yarns used are doubled two or more fold. Thus yarns may be used of counts 20 with 30 to 40 instead of the normal 17 turns per inch, there being 12 to 18 instead of the normal 6 turns per inch in the doubling. C.

Knitting Machine Knot-tying Device. W. Spiers Ltd. and W. Spiers (Leicester). E.P.408,769 of 24/1/1933.

A superposed needle cylinder machine is provided with a knot-tying device wherein the tying bill functions simply to tie the knot and to clamp the two yarns while the knot is pulled tight, and with independent yarn-cutting means for cutting the old yarn after the clamping of the yarns by the bill. C.

Weft Pile Fabric: Weaving. N. Vohs (Munich, Germany). E.P.408,873 of 18/9/1933.

A Genoa cord pile fabric is formed with pile and ground weft threads inserted in the order of at least three pile picks to one ground pick, each pick comprising two threads of ordinary counts such as 12/1 to 24/1, which are either not twisted or are only slightly twisted together. Plain weave or a combination of plain weave and 3-end or 4-end twill is employed for the ground picks. The ground warp threads may consist of differently coloured yarns and different materials. C.

Circular Knitting Machine Alternate Lock and Plain Stitch Mechanism. R. K. Mills (Nottingham). E.P.408,888 and 408,889 of 24/10/1933.

(1) In a circular knitting machine having multilatched needles, thread feeding means and a plurality of needle operating cams, some of the cams can operate to produce locked stitches and others to produce ordinary stitches, at different positions in the machine. (2) In a circular knitting machine for producing locked or tied stitches in a ribbed fabric, two sets of plural latched needles draw the loops in different directions, and each set is actuated by a pair of cams. One cam of each pair produces normal, and the other locked, stitches. C.

Circular Knitting Machine Patterning Mechanism. T. Grieve & Co. Ltd. and T. Grieve (Leicester). E.P. 408,942 of 17/10/1932.

A superposed needle cylinder machine has auxiliary transfer cams in both cam boxes acting upon differential sliders under control of an auxiliary pattern device. The ordinary transfer cams may also function for patterning. C.

Loom Warp Stop Motion. Société Alsacienne de Constructions Mecaniques (Mulhouse, France). E.P.409,228 of 2/11/1933.

In toothed-bar warp stop motions the normally-movable bars are mounted on a carriage carrying a handle lever engaged in a slot in a sector which is slidable on an oscillating shaft carrying a collar. Pins on the sector are normally held against shoulders on the collar by means of a spring-pressed pin between the collar and the sector. The sector is thereby held in a raised position. When a warp breaks, the motions of the bars and of the sector are stopped, and relative rotation between the shaft and the sector causes the collar to depress one or other of the pins so that the lower surface of the sector turns a stop lever. The handle may be raised to disconnect the bars from the oscillating sector when finding broken warps. By arresting the movement of the handle the operative may stop the loom at any time. C.

Parallel Knitting Machine Auxiliary Needle Beds. W. Lunke (London). E.P. 409,243 of 28/11/1933.

A device to be fitted on a parallel machine comprises an additional pair of beds for sets of needles serving solely to transfer the stitches automatically. The needle grooves are not at right angles to the axis of the machine and their profile causes the direction of movement of the needles to vary, during stroke in a plane perpendicular to the bed. C.

Elastic Fabrics. G. C. Moore (Westerly, Rhode Island, U.S.A.). E.P.409,273 of 21/9/1932.

A fabric which is elastic both lengthwise and transversely comprises elastic warps and wefts of covered vulcanised rubber and inelastic fibrous threads. It may be made more contractile in the direction of the warp than in that of the weft by employing elastic warps which are thicker, more numerous or under greater tension than the elastic wefts. The fabric may be used to make a girdle having less stretch up and down the wearer's body than across it. A two-way stretch fabric combined with a one-way stretch fabric by weaving or alternatively by sewing may be used to make a two-way stretch girdle or corset with top and bottom one-way stretch cuff portions. The elastic threads may be distributed equally between the face and back of the fabric, which may have ribbed, reticulated or smooth surfaces. Various two-way stretch fabrics are described. C.

Aluminium Loom Picker. H. Bairstow and R. Smith (Keighley). E.P.412,216 of 21/12/1932 : 21/6/1934.

A metal picker, preferably of aluminium, is formed so that the part through which its guiding spindle passes is integral with the end parts that reach from it to the downward extension that gives impact to the shuttle. The portion encircling the guiding spindle is of semi-cylindrical shape below the spindle and its upper outer side parts are of a tapering formation of such a depth as to produce a cavity within the upper extending part of as large a capacity as the size of the picker will allow without adding to the ordinary width and depth of the part to be enclosed by the picking strap. A wick of absorbent material for supplying lubricant to the spindle is placed in the cavity. C.

Drop Box Loom Over-picking Motion. R. R. Riley (Nelson). E.P.412,310 of 18/1/1933 : 28/6/1934.

An over-picking motion for drop box looms comprises an oblong bar having horizontal and vertical guide surfaces and constituting the picker spindle, and a picker having a hole of oblong cross-section to slidably fit the bar and having also an eye or eyes formed integral therewith and situated above the bar for connection to the picking strap or the picking strap and check strap. The bar is removably mounted in brackets having an oblong slot or hole into which fit the ends of the bar. C.

Slasher Sizing Machine Presser-lever. Howard & Bullough Ltd. and J. Irving (Accrington). E.P.412,335 of 11/2/1933 : 28/6/1934.

A two-part presser-lever device of an automatic character, capable of acting as a pressure-compensating device and directly operating the presser rollers, is provided for slashers or sizing machines. One part of the device is pivoted about an axis of the usual cross-shaft of the machine and the other part, provided with weighting means, is pivoted about the axis of an independent shaft or support. The two parts make pressure-contact with each other and maintain the desired pressure at the pressure rollers. C.

Shuttleless Loom Weft-selecting Mechanism. British Celanese Ltd. (London) and W. Pool. E.P.412,612 of 31/12/1932 : 2/7/1934.

According to the invention, there is provided at the side of a shuttleless loom a weft-measuring apparatus comprising a plurality of trapping means supplied with weft from a corresponding number of packages and each adapted to hold a length of weft in a straight line, drawing means adapted to engage the lengths of weft so held and draw them into loops for insertion into the warps, and selector means adapted to bring about engagement between the drawing means and a particular weft held by the trapping means. An example is described in which each measuring apparatus comprises four differential-driven rotatable members, each carrying two trapping devices (one embodying a cutter), means for locking any three of the four rotatable members, an endless chain on which are mounted pairs of loop drawing carriers, and means under the control of the rotatable members to bring one of each pair of carriers into position to engage weft presented by the one rotating member. With a measuring apparatus at each side of the loom, as many as eight wefts can be presented in many orders, the wefts varying in colour, lustre, twist, and other properties. C.

Shuttleless Loom Weft-measuring Apparatus. British Celanese Ltd. (London) and W. Pool. E.P.412,937/8 of 31/12/1932 : 2/7/1934.

(1) Weft measuring is effected by a plurality of movable trapping means by each of which in turn the weft is carried across the path of loop-drawing means adapted to draw the weft into a succession of loops each substantially equal to a pick length, the loops being freed in turn for insertion into the warps and the weft being severed from the supply after the formation of each successive pair of loops so that the weft can be laid as pairs of picks in separate sheds and connected together at the edge of the fabric. A particularly convenient embodiment of the invention comprises an endless chain forming a common carrying member for a pair of loop-drawing carriers, a rotatable member carrying a pair of trapping devices, one incorporating a cutter, and a pair of releasing members spaced apart along the drawing run of the chain. (2) A weft-measuring mechanism comprises a drawing member, a single movable trapping device adapted to carry the weft across the path of the drawing member, and cutting means adapted to sever loops

thus drawn from the supply, the cutting means being disposed at some distance past the trapping device along the path of the drawing member so as to cut such loops with unequal limb lengths. Where each loop drawn is of length sufficient for two picks, the longer limb is first inserted as a pick in the fabric and then the shorter limb, together with an excess of thread from the longer limb, is inserted as a further pick. Where separate loops are drawn for successive picks, a loop having one limb of increased length is first inserted in the fabric to form a pick and then a loop having a limb of reduced length, together with an excess remaining from the previous loop is inserted to form a further pick. Where the loop is of length sufficient for a single pick only, the cutting takes place on alternate loops, so that (as with the two-pick loop) the picks are inserted in pairs which are connected together at the edge of the fabric and bind the edge to form a selvedge. C.

Circular Looms. British Celanese Ltd. (London) and J. Jabouley. E.P. 413,376/7/8/9 of 24/1/1933 : 19/7/1934.

(1) In a circular loom of the type employing vane wheels for positioning the shuttle within the warps and resisting the tendency of the shuttle and the warps to rotate during weaving, the vane wheels are adapted to make rolling contact with pairs of rollers carried by the shuttle while avoiding rubbing contact with the shuttle body, the danger of wear thereby being diminished. (2) Shedding is effected by means which press on the warps and tend to move them out of their normal path, locking means between such deflecting means and the shuttle path adapted to prevent such deflection from extending to the neighbourhood of a shuttle, and selector means adapted to free some of the deflected warps so as to permit the deflection thereof to extend as far as the shuttle. Thus, at each shedding point the warps may be engaged by a wheel projecting beyond the normal line of the warps so that they are pushed out of their normal line. Some distance from this wheel the warp threads pass through healds which are locked against movement. Selected healds are acted upon by suitable mechanism so as to free them from the locking devices. (3) Dragging round of the fabric is prevented by carrying the fabric over a cylindrical supporting ring which extends to the fell of the fabric, the outer surface of the ring being covered with fabric, felt, or the like, so that there is a firm gripping between the fabric being woven and the surface of the ring. (4) In an improved shedding mechanism the deflection of the threads is effected by means of rotatable wheels whose edges are covered with fabric, felt, or the like, so that when the warp threads are engaged by the wheels projecting beyond the normal line of the warps they are carried evenly round the periphery of the wheels, the covering resisting the tendency of the threads to slip along the edges of the wheels. C.

Shuttle Threading Device. G. Rondelaere (Watrelos, France). E.P.413,594 of 5/2/1934 : 19/7/1934.

A weft threading device for all kinds of shuttles for automatic looms that can be used with cops unwinding to the right or to the left and adapted to prevent any hooking of the knots and to ensure, after each change of cop, upon the passage of the second weft, the descent of the weft to the base of its lodgment so that it can pass out invariably by running along the lateral side groove of the shuttle, is characterised by a weft chamber or lodgment having an inlet groove suitably arranged so that it lies approximately in the axis of the shuttle, the end of this chamber being formed so that the front part is higher than the back part (through which the weft passes out into the shuttle). The chamber is arranged so as to prevent the weft from leaving it once it has been inserted, by the action of a front flange and inlet groove with an incurved wall partly masking this groove, whilst a rear point on the inclined inlet plane of the groove corresponds to a recess in the opposite wall, whereby the weft is compelled to pass round this point and then descend to the end of the lodgment in a lower position towards its outlet. C.

Warp Beaming Machine Driving Mechanism. Gebrüder Sucker G.m.b.H. (Munchen-Gladbach, Germany). E.P.413,592 of 26/1/1934 : 19/7/1934.

Beam driving mechanism for warp beaming machines comprises a friction disc clutch with a lever compressing the clutch discs with pressure automatically regulated by a presser in contact with the warp on the beam, the presser imparting to the fulcrum of the lever a movement whereby the thrust of the lever is directly increased. C.

4—CHEMICAL AND FINISHING PROCESSES

(A)—Preparatory Processes

Detergent Properties of Suint Solutions. E. Stott and K. P. Mengi. *J. Soc. Chem. Ind.*, 1934, 53, T211-T213.

Whilst the density remains sensibly constant in suint samples of different origin, the surface activity varies considerably. On this account it might be advisable, in commercial wool scouring, to supplement determinations of the density of suint liquors with those of some other property such as drop number. Although suint in adequate concentration proves as efficient as soap in its ability to lower the tension at an oil-water interface, soap is decidedly superior with regard to stabilisation, and is therefore the more powerful detergent. In view of the resemblance in behaviour between soap and suint, the surface activity of the latter is attributed to the presence of salts of fatty acids, a conclusion which is substantiated by the results of a recent chemical analysis of suint. W.

Rayon Fabrics: Desizing, Bleaching, and Dyeing. *See* Section 4I.

Notes on the Colorimetric Determination of *p*H of Surface Active Solutions of Textile Assistants. *See* Section 9.

(B)—Boiling, Scouring, Degumming, and Washing

The Scouring of Piece Goods. *Wool Rec.*, 1934, 45, 1551-1553.

The conditions for producing the optimum results from the scouring of wool pieces of different kinds are discussed, and the methods of dealing with pieces which have faults due to bad scouring described. W.

Scouring of Wool Fibre. III—Effect of Alkali. H. Sobue and S. Masuyama. *J. Soc. Chem. Ind., Japan*, 1934, 37, 204-205B (through *Brit. Chem. Abs. B*, 1934, 712).

When wool is scoured with aq. Na_2CO_3 the maximum amount of grease is removed at a concentration of 2N, but when Na_2CO_3 is added to 0·3% Na oleate the optimum concentration is 0·03 N. (For Parts I and II see *J. Text. Inst.*, 1933, A564.) W.

(D)—Milling

Prevention of Felting of Wool. *Wool Rec.*, 1934, 45, 1559-1561.

A survey of Speakman's work on milling (*J. Text. Inst.*, 1931, **22**, T339-T348, and 1933, **24**, T273-T292). It is recommended that, to avoid the felting of wool in raw wool scouring, the use of soap should be replaced by suint scouring, or by Igepone or a similar body, at as high a temperature as is practicable with regard to the appearance of wool and possibly with the addition of Perminal NF. W.

Acid Milling of Mordant Dyed Woollens. W. Jockers. *Text. Mfr.*, 1934, 60, 287 and 290.

Experiments have been made with two woollen cloths, one made from fine botany, noils, the other from coarse crossbred wool. One section of each was mordanted and dyed with Erio Chrome Bordeaux BGO. The dyed and undyed sections were then submitted to five hours' acid milling in the fulling stocks. Prior to milling, each piece of cloth (3·6 lb.) was soaked for 24 hrs. in 14 litres of 1·34 N/10 sulphuric acid. Milling was in each case carried out with 2·5 litres of the equilibrium solution as milling agent, this amount being put on the cloth in the beginning of milling after it had been whizzed for one minute. Another 250 c.c. of solution were added after the second and fourth hour to compensate for evaporation. Measurements of the shrinkage in area of the cloths were taken at intervals of one hour. The results show that the milling capacity of the mordant-dyed fibres is 10% to 15% less than that of the undyed fibres, owing possibly to the fact that mordant dyeing hardens the fibres and modifies their elastic properties. The addition of a lubricant such as sulphonated castor oil to the milling liquor increases the rate of shrinkage of mordant-dyed cloths. Experiments with sulphonated castor oil were carried out under the same conditions as above, except that 0·5 litres of oil were made up to 14 litres with the correct amount of acid. Other advantages of the use of sulphonated castor oil in milling are reduction or elimination of colour modification in mordant-dyed fabrics, and improvement in handle. W.

(E)—Drying and Conditioning

"Allen-Buell" Turbo Dryer. Buell Combustion Co. Ltd. and E. Allen & Co. Ltd. *Text. Weekly*, 1934, 13, 558.

The "Allen-Buell" turbo dryer for the treatment of textile fabrics consists of a tensioner and rotary widener, over which the folded or reeled cloth passes to the drum of the dryer. The surface of the drum is formed of pendulum bars coated with rubber, the purpose of which is the constant changing of the supporting surfaces, as well as the compensation for differences in length due to any shrinkage in the cloth. This form of construction, together with a highly efficient drying and air-circulating system, enables finished fabrics to be treated in one continuous operation. Prior to entering the dryer the fabric may, if necessary, pass over a straightener to the finishing machine. After the fabric leaves the dryer, it is passed through an "Allen-Buell" humidifying machine, which operates on similar principles to the dryer, the only difference being that instead of warm air, cool air saturated with moisture impinges on the surface of the fabric. The moistening is effected in a uniform and thorough manner, and the fabric may, after the process, be passed immediately to the breaker and thence to the calender. The dryer may also be used for drying loose fibres, slivers, and yarn on bobbins or in hanks. C.

(G)—Bleaching

Aluminium Bleaching Apparatus: Advantages. R. W. Müller. *Deut. Färber-Ztg.*, 1934, 70, 327-328.

The disadvantages of the materials generally used for the construction of bleaching apparatus are discussed and a brief account is given of laboratory tests of the value of aluminium for the construction of apparatus for the hydrogen peroxide bleaching process. The tests showed that aluminium is only attacked to a very slight extent by dilute ammonia solutions of *p*H of the order of 8. Commercial hydrogen peroxide solutions which are slightly acid produce a small loss in weight at first but further attack is prevented or retarded by the formation of a protective film of oxide. The addition of dilute ammonia reduces the attack and addition of sodium silicate encourages the formation of the protective film. No attack of the metal occurs when the silicate and alkali amounts are adjusted to give a *p*H of 7·5-9 in solutions containing 1-6% by volume of hydrogen peroxide even when heated to 90-95°. Determinations of the oxygen loss from hydrogen peroxide solutions stored in different types of vessels showed that the solutions were as stable in aluminium vessels as in porcelain vessels and more stable in these than in glass vessels. Large losses of oxygen were observed on storing in iron and copper vessels. C.

Cotton Goods: Bleaching. W. Kershaw and F. L. Barrett. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 90-98.

A general article reviewing the developments in bleaching during the last 50 years. C.

Soda Chemic: Effect of Dilution and Ratio to Cloth. L. Lompe. *Dissertation*, Stuttgart, 1931, pp. 61.

The author describes a number of experiments on the tendering of cotton by alkaline soda chemic in which the principal variations made were in concentration, ratio of chemic to cloth ("Flotten Länge"), time, and temperature. Tendering was assessed quantitatively by means of Kauffmann's "boiling-off number", and qualitatively by dyeing with methylene blue. The main conclusions are summarised as follows—(1) Tendering diminishes with dilution of the chemic, although according to the Law of Mass Action the concentration of hypochlorous acid should remain constant. (2) With a high ratio of chemic to cloth, the boil-off number increases rapidly during the first few days but after about 120 hours remains fairly constant. The explanation offered is that the substances that cause the reduction of permanganate in the boil-off test are partly lost to this test by dissolving in the alkaline chemic. (3) The methylene blue test is only applicable when the tendering is slight. (4) The cellulose remaining after the boil-off of badly tendered cotton is more soluble in alkali than the untendered. Besides oxycellulose, considerable proportions of unchanged cellulose are dissolved in the boil-off test. (5) When the ratio of chemic to cloth is low (e.g. when the cloth is mangled) the tendering is more severe than with a greater ratio. Carbon dioxide from the air is not responsible for this. (6) Scoured cotton is less severely attacked when the ratio is low than pure cellulose. Scoured cotton is

tendered but little when the ratio of liquor containing 1·5-2 g. active chlorine per l. is very low. (7) There is little tendering in 5 hours when a high ratio of chemic containing 2 g. Cl per l. is used. (8) At 50° C. tendering by such technical chemics is apparent in half an hour. C.

Rayon Fabrics: Desizing, Bleaching, and Dyeing. *See* Section 4I.

(I)—DYEING

Cotton Goods: Dyeing. A. Singer. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 99-105.

The history of the development of the various dye groups is reviewed and methods for their application are described. C.

Cotton Goods: Dyeing and Finishing. F. Scholefield. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 106-114.

A review of 50 years' development in the dyeing and finishing of cotton. C.

Cotton-Viscose Rayon Mixtures: Dyeing Solid Shades. *Text. Merc.*, 1934, 91, 33.

When dyeing cotton-viscose rayon mixtures in pale shades the cotton tends to dye deeper than the rayon, whilst in deep shades the rayon dyes deeper. Raw cotton tends to dye less deeply than bleached cotton and the dyeing properties of yarns are influenced by their degree of twist. When a light solid shade is required on a cotton-viscose rayon mixture, dyeing should be effected in a boiling liquor containing a high proportion of common salt or Glauber's salt. In very pale shades where the tendency of the cotton to dye deeper than the rayon is very pronounced, the addition of a very small amount of acetic acid to the dyebath is sometimes advisable. This method is not applicable to all direct dyes and small scale trials should first be carried out. Where a deep shade is required, the most solid effects are obtained by dyeing in a warm or even cold dyebath and it is advisable to reduce additions of common salt to a minimum. With navy and deep brown shades it is almost impossible to avoid colouring the rayon somewhat darker than the cotton but the results obtained by dyeing at low temperatures are acceptable. C.

Cotton Yarns: Dyeing with Vat Dyes. E. Duhem. *L'Ind. Text.*, 1934, 51, 321-324.

A general account is given of procedures for the dyeing of loose cotton and of cotton yarn in the form of hanks, pirns, cross-wound bobbins and beams with vat dyes. Formulæ, dyeing temperatures and fastness properties are given for various Solanthrene dyes. C.

Direct Dyes: Influence of Organic Solvents on Substantivity. Pyridine and Formamide Solutions: Swelling Effect. W. Dischreit. *Dissertation*, Dresden, 1930, pp. 64.

A systematic investigation is described into the effects of solvents such as pyridine on the substantivity of direct dyes. I—*Swelling effects*. Changes in cross-sectional area and length of viscose filaments were measured, and photomicrographs, tables of data and graphs are reproduced. In pyridine solutions of increasing concentration, swelling decreases slowly up to 80%, then rapidly, until at 95% it is zero. In formamide solutions, swelling reaches a minimum with 10%, but thereafter increases, pure formamide having a strong effect. In alcohol solutions, swelling decreases gradually to zero at 99%. Length changes are less pronounced than transverse swelling and elongations become less with increasing concentration of solvent. In pure formamide, rayon does not suffer change in length, and in pure pyridine it shrinks. II—*Effects of solvents on direct dyes.* Drop-number tests on 0·1% solutions of Brilliant Benzo Blue 6B indicate that surface tension decreases with increasing amount of pyridine or formamide in the dye liquor. A method is described for measuring the free diffusion of the dyes, leading to the calculation of particle size. The results with Brilliant Benzo Blue 6B and Erica 2GN indicate that the particles increase in size with increase in pyridine concentration up to 60% and then become smaller. III—*Experimental dyeings*. Tests on viscose and cuprammonium rayons and cotton are reported, the dyeings being matched against a series of standards prepared from known weights of dye as described. The effects of the various organic solvents are summarised as follows—(1) *Pyridine*. The adsorption of dye by cotton or rayon decreases with increasing pyridine content and is usually zero at about 40-60%. Dye is taken up again from more concentrated solutions, the absorption increasing from 80 to 95% of pyridine. (2) *Formamide*. Dye absorption is at a maximum when 5-10% is present, being then nearly three times the absorption from pure

aqueous dye liquor. (3) *Glycine*. With 0·01% of glycine in the liquor, absorption is increased five-fold. (4) *Alcohol*. Absorption increases to nearly three-fold from dye liquor containing 80% of alcohol. (5) *Acetamide* depresses dye absorption. C.

Direct Dyes: Constitution and Substantivity. P. Ruggli. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 77-82.

The influence of constitution in the substantivity of dyes of various groups is discussed with reference to recent work. The effect on substantivity of coupling with J acid, of the acid amide group, sulphur atoms, molecular weight, and the dipole moment is described. C.

Dye Industry: Progress, 1884-1934. A. G. Green. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 49-64.

Fifty years' progress in the dye industry is reviewed by discussing the history, manufacture, and applications of the different dye groups under separate headings. A short history of the economic and international development of the industry is also given. C.

Hosiery: Dyeing and Finishing. W. A. Edwards and G. F. Hardcastle. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 169-183.

A history of hosiery dyeing and finishing in the last 50 years. C.

Rayon Fabrics: Desizing, Bleaching, and Dyeing. P. Morand. *L'Ind. Text.*, 1934, **51**, 315-317.

Methods of desizing and bleaching rayon fabrics are outlined and some practical hints are given on the dyeing of rayon and fabrics containing rayon in combination with other textile fibres. C.

Rayon Goods: Dyeing. C. M. Whittaker. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 127-133.

Methods are reviewed for dyeing the various types of rayon yarns, straws, and sheet. C.

Sulphur Blacks: Application. *TIBA*, 1934, **12**, 457-459.

Some cotton fabrics dyed with sulphur black were deeper in shade along the selvedges than in the centre. This effect was accentuated when very dilute baths and short immersion periods were used. Investigations showed that the fault was due to rolling or folding up the pieces too soon after leaving the jigger with the result that oxidation by air was not complete and continued along the slevedges on storing. An increase in the path between the dyeing machine and the folding or rolling apparatus was found advantageous. Certain pieces showed a tendency to turn grey on storing. This effect was found to be due to the formation of deposits of sulphur. This finely divided sulphur oxidises rapidly to sulphuric acid which attacks the cotton. Treatment with a solution of sodium acetate prevents attack by sulphuric acid but does not prevent the grey appearance. A method of preventing this effect depends on the use with sulphur black dyes of vegetable colouring matters, particularly logwood. An alkaline bath and a proportion of logwood extract equivalent to 50-60% of the weight of sulphur black used should be employed. Details of the procedure are given. C.

Woollen and Union Goods: Dyeing. W. S. Stansfield. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 139-168.

A useful review of the history of the dyeing and finishing of worsted, woollen, and union piece goods during the last 50 years, under the headings—fabrics, dyewares and agents, dyeing processes, finishing, and general. C.

Indanthrene Dyes: Application to Rayon. G. Rudolph. *Kunstseide*, 1934, **16**, 225-229.

The general methods of dyeing rayon with Indanthrene dyes are described. C.

1:5-Naphthylaminesulphonic Acid Dyes: Preparation. S. F. Filipitschev and M. A. Tschekalin. *Anilinokras. Prom.*, 1932, **2**, No. 12, pp. 13-15 (through *Chem. Zentr.*, 1934, **i**, 2979).

The authors assign formulæ to Aniline Fast Blue 2N, Diamine Fast Violet 2BN (?), Benzo Fast Scarlet 6BA, and other dyes that they have prepared with 1:5-naphthylaminesulphonic acid as the common intermediate. C.

Correction of Faultily Dyed Wool Goods. V. D. Freedland and C. Robertson. *Text. Rec.*, 1934, **52**, No. 615, pp. 50-51.

Methods of stripping and stripping agents are discussed. W.

Copper in Textile Technology. A. H. Pettinger. *Amer. Dyes. Rep.*, 1934, **23**, 309-312 and 332.

A survey of the uses and also the disadvantages of copper in dyeing and other processes. W.

Stoved Shades on Fancy Yarns. *Wool Rec.*, 1934, **46**, 145-147.

A description of the stoving and bisulphite methods for the dyeing of delicate or stoved shades on zephyr or fancy yarns. When spoilt goods dyed by either of these methods are to be redyed, it is advisable to bleach them first with peroxide, and, for purer and cleaner shades, to after-bleach with a reducing bleach by means of hydrosulphite or Arostit. The newer method of dyeing these yarns is to dye on bleached wool. The wool is scoured with soap and a neutral foaming agent to reduce felting. Peroxide bleaching follows, with or without the addition of Biancal. A purer white is obtained by following the peroxide bleach with sodium sulphite solution of 6·4-6·8 *p*H value. Dyeing is then done by the brightest acid dyestuffs available to produce the desired shade. By this method good to excellent fastness properties may be obtained. The choice of dyestuffs is discussed. W.

Two-colour Effects on Wool-cotton Unions. *Wool Rec.*, 1934, **45**, 1491 and 1498-1499.

In dyeing two-colour effects on wool-cotton unions, the method which consists in dyeing the wool first and resisting the cotton colour is limited by the gaps in the range of cotton colours which resist wool satisfactorily. The agents employed for resisting the cotton colours are tannic acid, the Katanol type of synthetic tanning agent and formaldehyde. Tannic acid is used where the contrasting colours are not bright complementaries, and formaldehyde where the maximum brightness is required. Cotton colours recommended are Chlorazol Fast Pink BK, Direct Fast Scarlet SE, Chlorazol Fast Orange AG, Sun Yellow, Chlorantine Fast Green, Chlorazol Fast Blue FFK, Benzo Fast Heliotrope 5RH and the Sirius Supra Brown brands. In an alternative method, the cotton is dyed first, then fixed sufficiently to withstand acid cross-dyeing at a low temperature, the use of "Fixanol" being recommended. W.

(J)—Printing

Cotton Goods: Printing. J. B. Fothergill. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 115-126.

A review of 50 years' progress in calico printing, showing the gradual transition from vegetable to synthetic dyes. C.

Metal-illuminated Fabrics: Production. Mme. Pastarino. *RUSSA*, 1934, **9**, 435-437.

A process for the application to fabrics of precious metals to produce effects similar to old illuminated manuscripts depends on the use of mordants of linseed and other oils, diluted with turpentine and alcohol and containing astringent and resinous substances, on which or in which the metals are applied or incorporated in a very finely divided state. Formulæ are given and the methods of producing different effects are briefly described. C.

Silk and Rayon Fabrics: Printing. A. Nowak. *Monatsh. Seide u. Kunstseide*, 1934, 39, 239-248.

Various difficulties encountered in the printing of silk and rayon fabrics are discussed and methods of avoiding them are indicated. Many of these difficulties can be avoided by the use of a suitable thickening agent and a formula is given. The selection of dyes for printing silk and rayon is discussed and lists of suitable dyes are given. Methods of application are briefly described, and the production of discharge and reserve effects and of variations in lustre are reviewed. The printing of fabrics containing mixtures of different types of rayons and rayon in combination with cotton or wool is briefly discussed. C.

Calico Prints: Causes and Prevention of Faults. T. C. Hutchins. *Amer. Dyes. Rep.*, 1934, **23**, 365-368.

Causes and methods of preventing marking-off on chrome mordant blotch prints and the "tailing" of vat colours through printing at the side of azoic colours are described. Factors to be considered in the choice of dyes for printing certain types of blotch patterns are discussed. C.

(K)—FINISHING

Cotton Fabrics: Finishing. R. H. Wright. *Text. Mfr.*, 1934, **60**, 228 and 251.

The finishing of cotton fabrics is discussed and the need for co-operation between manufacturer and finisher is pointed out. It is shown that the final appearance and handle is affected by both the quality of the material and the nature of the finishing treatment. Samples of different poplins finished in the same way and of a warp satin after different finishing treatments are given. C.

Lecithin: Application. H. Tatu. *TIBA*, 1934, **12**, 427-431.

The origin, constitution, and properties of lecithin are briefly described and methods for its determination are outlined. Its application as an agent for making textile materials soft and supple is discussed. As a wetting or emulsifying agent, lecithin does not show any advantages over the products in general use. C.

Soaps and Auxiliary Finishing Agents: Properties and Uses. S. Postles. *Silk and Rayon*, 1934, 8, 319-321.

The properties and disadvantages of soaps are discussed and the advantages and uses in the textile industry of sulphonated oils, Cykloran, Colorans, Oranits, Meliorans, and Oraprets are described. C.

Finishing All-wool Gaberdines. G. L. Atkinson. *Text. Rec.*, 1934, **52**, No. 616, pp. 42-45.

Defects and their elimination or prevention in the finishing of all-wool gaberdines are dealt with, and the technique of the processes concerned discussed. W.

"Duplo" Cloth Shearing Machine. Livesey & Crowther Ltd. (Manchester). *Text. Rec.*, 1934, **52**, No. 614, pp. 34-35.

The machine, which is illustrated, is made with two spiral shearing knives, and the traverse of the cloth through the machine is arranged so that the face of the cloth is treated twice by one cutter, and the back of the cloth treated twice by the other cutter. The ledger blade is carried by the tube through which dust and fly resulting from the shearing operation are removed by air suction. The tube is formed with a slot running lengthwise, parallel with which is screwed the ledger blade. The tubes are cast in a light metal alloy, so that the whole arrangement can be lifted out and replaced without mechanical aid. The fabric is guided from below and above by hollow cutting beds, which can be accurately adjusted to guide the fabric to the shearing knives. The speed of the fabric can be 12, 18, 24, or 30 yards per minute. W.

Hosiery: Dyeing and Finishing. *See* Section 4I.

(L)—PROOFING

Antiseptics for Textile Use. *Dyer*, 1934, **72**, 89.

The uses are stated of zinc chloride, salicylic acid, copper sulphate, phenol, sodium fluoride, silicofluoride, "Shirlan" and thymol. W.

The Action of Mineral Oils on Rubber. H. J. Stern and F. J. Glibbery. *India Rubber Journal*, 1934, **88**, 74-76.

The importance of standardised conditions in determining the oil resistance of rubber is stressed. The exact grade of oil used is of great importance, and results obtained by a standardised method are given in graph form, showing the absorption of various commercial grades of oil by vulcanised rubber at room temperature, and at 50° C. Similar methods have been used for unvulcanised rubber, and a number of curves obtained at room temperature, are shown. In comparing various oils it is preferable to consider the boiling range, rather than the viscosity. C. J. W.

PATENTS

Bleaching Textiles. T. W. Holt and A. S. Kilpatrick. F.P.758,301 of 15/1/1934. (through *Chem. Abs.*, 1934, **28**, 3250).

Textile materials are passed through a bleaching liquid in a longitudinally plaited state. Ozonised air is injected into the liquor. An apparatus is described. W.

Dyeing Animal Fibres. Soc. anon. pour l'ind. chim. a Bale. G.P.592,362 of 6/2/1934 (through *Chem. Abs.*, 1934, **28**, 3596) (addn. to G.P.550,930, see *J. Text. Inst.*, 1932, A611).

The method of G.P.550,930 for fast-dyeing animal fibres by treating the fibres with a weakly acid bath of a metallic azo dye and developing in a strongly acid

bath, is modified by using aromatic acids in the first stage. Thus wool is introduced into a dye bath containing water, benzenemonosulphonic acid and the Cr compound of the dye from diazotised 4-nitro-2-amino-1-hydroxybenzene-6-sulphonic acid and acetic acid anilide. After boiling, H_2SO_4 is added and the wool reboiled, washed and dried. F.P.760,812 is also referred to. W.

Fireproofing Agent. I.G. Farbenindustrie A.-G. (Frankfort), K. Daimler, and M. Paquin. D.R.P.592,777 of 27/3/1932 : 14/2/1934 (through *Chem. Zentr.*, 1934, **i**, 2998).

A mixture of ammonium phosphate (75), sodium benzylnaphthalenesulphonate (10), and boric acid (15) is claimed. The boric acid is said to hinder crystallisation. C.

Protecting Wool, Fur, etc. against Pests. I.G. Farbend. A.-G. (T. Hermann, R. Seydel, and W. Retter, inventors). G.P.595,106 of 5/4/1934 (through *Chem. Abs.*, 1934, **28**, 4252).

The materials are treated with halogenated alkoxy- or aralkoxy-di- or -tri-arylmethanes or their sulphonic acids or other substitution products. Suitable compounds are, *e.g.* 2-sulpho-4-chloro-2′, 2″-dimethoxy-3′, 3″, 5′, 5″-tetrachlorotriphenylmethane and 2, 2′-dibutoxy-5, 5′-dichlorodiphenylmethane. W.

Treating Wool or other Animal Fibres in Order to facilitate Scouring, etc. E. V. Hayes-Gratze. U.S.P.1,927,588 of 19/9/1933 (through *Chem. Abs.*, 1933, **27**, 5990).

The material is treated with a reagent prepared by subjecting a neutralised sulphonated oil such as that derived from a castor or olive oil to an elec. ionisation process. W.

Carbonising Rags. K. Schubert (to Max Gessner). U.S.P.1,953,509 of 3/4/1934 (through *Chem. Abs.*, 1934, **28**, 3914).

The rags are heated to dry them, then treated with liquid HCl in a finely divided condition and the heating is continued up to a temperature not exceeding 140° while continuing the treatment with HCl (as by atomisation) until the rags are carbonised, and the carbonised rags are separated from the acid. Specification F.P.728,890 is referred to. Apparatus is described. W.

Mothproofing Compositions suitable for Use with Dry-cleaning Solvents. H. Stötter and T. Hermann (to I.G. Farbenind. A.-G.). U.S.P.1,955,207 of 17/4/1934 (through *Chem. Abs.*, 1934, **28**, 3914).

Arysulphonic acid amides such as 3, 4-dichloro-N-methylbenzenesulphonamide or the like, mixed with phosphoric esters such as diethyl butylglycol phosphate or triethyl or tritolyl phosphate, are used with customary dry-cleaning solvents, for treating wool, feathers, hair or other materials. Specification F.P.42,266, addition to 686,721 is referred to. *See also* E.P.324,926, *J. Text. Inst.*, 1930, A312. W.

Proofing Permeable Materials. A. R. Trist (London). E.P.405,987 of 11/8/1932.

Packing composed of a textile material in a matrix of india-rubber is treated to make it resistant to oil, acid, alkali, etc. by immersion in a liquid mixture, one liquid of which has a softening effect on the india-rubber and the other being a solvent for the resistant with which it is desired to treat the packing. After a proper time for treatment the packing is removed and the liquids are evaporated, the packing being left impregnated with the resistant substance. Treatment with shellac is used for an oil-resisting packing, bitumen for acid resisting and casein for high temperature resisting. Cellulose and synthetic resins of the phenol class may also be used. Solvents and softeners may be benzol, methyl or ethyl alcohol, acetone, amyl acetate, alcohol and ether, borax solution or ammonia. In some cases one liquid will act as both solvent and softener. W.

Cleansing Compositions. Deutsche Hydrierwerke A.-G. (Rodleben, Germany). E.P.406,565 of 14/7/1933.

Soap-like materials which are unaffected by lime and magnesia and will lather with sea water are formed by mixing salts of the reaction products of sulphuric acid on saturated aliphatic alcohols containing more than 8 carbon atoms with similar salts of higher unsaturated fatty alcohols. Instead of mixing the sulphonates, the alcohols may first be mixed and then sulphonated. Ordinary soaps may be added in an amount not exceeding 20%, together with disinfectants and scents and the soap like materials can be shaped into ribbons, flakes, needles, etc.

In an example, two parts of the sulphonates of the fatty alcohols obtained by the reduction of the acids of coconut or palm kernel oil are mixed with one part each of saturated and unsaturated fatty alcohol sulphonates having 16 or 18 carbon atoms. In a second example, 53 parts of a mixture of equal parts of olein alcohol sulphonate and a sulphonate of cetyl or octadecyl alcohol are mixed with 40 parts of lauric alcohol sulphonate and 7 parts of curd soap. W.

Drying Fabrics. W. Whiteley & Son Ltd. and J. Charlesworth (Huddersfield). E.P.408,400 of 20/12/1932.

In a machine for tentering and drying woven fabrics, of the type in which fabric, laterally extended between chains, is traversed through superposed compartments heated by means of steam pipes, each compartment is provided with a horizontal baffle which extends the full width and nearly the full length of the compartment, an air passage being left at each end of the baffle. Air enters centrally of the machine below a baffle, and after passing round the ends thereof, is withdrawn from a central position above the baffle into a duct provided with a fan which supplies the air in a similar manner to the next compartment. Two divisions divide the casing into three compartments. Baffles are provided in compartments and a row of steam pipes is provided between each two adjacent stretches of the fabric. Air admitted at the ends of the bottom compartment is drawn into openings provided in tubular members communicating with openings, past the fan, through other openings and tubular members, and into the space beneath the baffle. After passing round the ends of this baffle, the air is again drawn by a second fan and is supplied to the space beneath the baffle. From this upper compartment the air is exhausted through openings. Thus, on entering the drying chamber the fabric is treated with hot, moist air, and in passing through the machine encounters gradually cooler and drier air. The openings in the tubular members point respectively fore and aft of the machine, and are provided with midfeathers to divide and distribute the air streams. W.

Dyeing Textiles. Society of Chemical Industry in Basle (Basle). E.P.408,497 of 14/8/1932.

Acid Wool Dyes, dyeing with—Animal fibres are dyed in fast shades by treatment in a bath containing a chromiferous azo dyestuff and an aromatic organic acid followed by development in a bath containing a mineral acid. Alternatively, the whole or a portion of the mineral acid may be used in the bath containing the aromatic acid. The latter may be added to the bath in the form of a salt. Aromatic sulphonic, carboxylic or sulphocarboxylic acids may be used, including substitution products thereof, *e.g.* amino-acids, oxy-acids, amino-oxy-acids, halogenated acids, nitrated acids, *w*-benzylsulphuric acids of the type aryl-CH_2SO_3H, sulphamic acids of the type aryl-$NH{\cdot}SO_3H$ and oxamic acids. Examples are given. Specification 364,148 is referred to (see *J. Text. Inst.*, 1933, A327). W.

Patterned Coated Fabrics. E. Bemelmans (The Hague). E.P.408,562 of 4/7/1932.

Patterns are produced on articles of or containing rubber, e.g. floor and wall coverings, mats, tyres, etc. by applying a pattern, e.g. by printing, to a foundation layer for instance of unvulcanised rubber or fabric, applying a thin transparent protective layer of rubber, and then vulcanising. A backing layer of unvulcanised rubber may be provided to produce rubber articles of a considerable thickness, the whole being vulcanised together. The protective layer may be applied in the form of a rubber solution or dispersion, e.g. latex. C.

Washing Wool. J. Y. Johnson, London (I.G. Farbenind. A.-G.). E.P.408,708 of 28/10/1932.

Detergents comprise water-soluble metaphosphates, and sulphonic acids or sulphuric esters of compounds containing an aliphatic chain of at least 8 carbon atoms, or water-soluble salts of these acids or esters. The meta-phosphates and salts preferred are those of sodium, potassium, lithium, ammonium, and aliphatic amines, *e.g.* mono-, di- and tri-ethanol-amines. 10-200 lb. of meta-phosphate per 100 lb. of sulphonic acid may be used. There may be added—Glauber's salt; sodium carbonate; water glass; oxidising or reducing agents, *e.g.* sodium perborate or sodium hydrosulphite; and solvents, *e.g.* cyclohexanol, cyclohexanone, cresyl or xylenyl ethers of ethylene glycol, carbon tetrachloride, trichlorethylene. Sulphonic acids specified are those of—hydroxy-octo-decane mono- or poly-octyl-naphthalene, lauric, margaric or palmitic acid; fatty acid mixtures obtained by hydrolysis of coco-nut, palm kernel, soya bean or cottonseed oils; chlorinated

or otherwise halogenated fatty acids, salts specified are those of cetyl sulphonic acid, oleic hydroxyethane sulphonic acid, N-oleic-N-methyl taurine sulphuric esters of decyl, dodecyl, tetradecyl, octodecyl, and oleyl alcohols—or of the alcohols obtained by oxidation of paraffin wax. The sulphuric derivatives prepared as described in Specifications 306,116 (see *J. Text. Inst.*, 1929, A400), 341,053 (see *J. Text. Inst.*, 1931, A309), 343,899 (see *J. Text. Inst.*, 1931, A449), 364,104 (see *J. Text. Inst.*, 1932, A278), 366,916 (see *J. Text. Inst.*, 1932, A331), 389,543 (see *J. Text. Inst.*, 1933, A376), and 394,043 (see *J. Text. Inst.*, 1933, A522) are particularly mentioned. Examples are given. W.

Waterproofing Wool. Merkel & Kienlin Ges. (Germany). E.P. 408,985 of 20/10/1932.

Wool is waterproofed by first treating with an oxidising agent, and then impregnating it with a waterproofing agent or agents containing an aluminium salt. The oxidising agent is preferably chlorine, but hydrogen peroxide, sodium peroxide, per-sulphuric or per-boric acids, or oxidising acids such as permanganic, chromic, nitric or nitrous acids, or ozone, may be used. According to examples—(1) Wool yarn is treated in a bath containing hydrochloric acid and chloride of lime, respooled, and then steeped in a bath of aluminium acetate. It is then passed through a bath containing soap and a paraffin emulsion, centrifuged and dried. (2) Wool yarn is treated in a bath containing potassium permanganate and sulphuric acid, spooled, neutralised, and then treated with an aluminium soap or aluminium stearate. (3) Wool yarn is treated with weak alkaline hydrogen peroxide, and then treated with aluminium soap or aluminium stearate. W.

Cellulose Ester and Ether Rayons: Delustring. British Celanese Ltd. (London), G. H. Ellis, and E. W. Kirk. E.P.409,275/6/7 of 19/10/1932.

(1) Cellulose ester or ether materials are delustred by subjecting them to the action of hot aqueous media or moist steam in the presence of naphthalene or an alkyl or ether derivative thereof, e.g. α- and β-methyl naphthalene and β-naphthol methyl ether. The treatment may take only a few seconds so that the materials may be treated continuously, for example, on a jig. Alternatively, the materials may be first impregnated or printed with the naphthalene or the like, as by padding, using a relatively concentrated dispersion, and then passed through hot or boiling water. (2) The materials are delustred by uniformly impregnating with a solvent or solute for the cellulose ester or ether, which solvent or solute is insoluble or difficultly soluble in water, and thereafter subjecting the impregnated material to the action of a hot or boiling aqueous medium or moist steam. (3) Delustring is effected by subjecting the materials to the action of hot aqueous media or moist steam in the presence of an amide of a carboxylic or sulphonic acid. C.

Vat-dyed Textiles: Stripping. J. Y. Johnson, London (I.G. Farbenindustrie A.-G., Frankfort). E.P. 409,336 of 22/10/1932.

The colour is stripped from vat-dyed textiles by heating in an aqueous bath containing an alkaline reducing agent and adding a magnesium compound to the bath towards the end of the treatment. A protective colloid and/or a waxy polymerisation product obtained from ethylene oxide should be added. Suitable magnesium compounds, reducing agents and protective colloids are specified. C.

Washing and Dyeing Machine Bearings Lubricating Device. J. A. Whatton (Wolverhampton). E.P.409,390 of 14/7/1933.

For lubricating the bearing of the rotary receptacle of a washing, dry-cleaning or dyeing machine longitudinal troughs are provided on the inside of the stationary casing for catching and directing to ducts leading to sumps above the bearing drops of liquid thrown up by the rotary receptacle. The machine is provided with two driving spindles of which one is directly attached to the rotary receptacle and the other geared to the first by step gearing. With this arrangement it is possible to drive the receptacle at normal speed for washing, etc. and to rotate it rapidly for centrifugal drying. C.

Lecithin Emulsions: Preparation. F. W. Engelman, M. J. Brinkman, A. Mergell, A. Brinkman, and F. Mergell (trading as Harburger Oelwerke Brinkman and Mergell, Harburg, Germany. E.P.409,540 of 26/7/1933.

Aqueous emulsions of lecithin in a chemically stable, non-fermenting form are produced by treating the aqueous lecithin, in the cold or with only slight warming,

with a small proportion of alkaline reacting substance, such as an alkali or alkaline earth hydrate or peroxide, or an alkali carbonate, which reacts with the free acid present to form soap, and, when a peroxide, acts to retard fermentation. C.

Borated Wetting Agents: Preparation. H. T. Böhme A.-G. (Chemnitz, Germany). E.P. 409,598 of 31/10/1933.

Products useful as wetting, cleansing, emulsifying and bleaching agents are obtained by treating higher alcohols containing at least six atoms of carbon with boric acid and sulphonating or phosphatising agents. The products may be treated with hydrogen peroxide or reagents yielding the latter. In modifications, the alcohols may be esterified with the boric acid before the treatment with the sulphonating or phosphatising agents, or the latter may be treated first with boric acid and then with the higher alcohol. C.

Wetting Agents: Preparation. Rubber Service Laboratories Co. (Akron, Ohio, U.S.A.). E.P.409,773 of 10/11/1932.

Wetting, cleansing and penetrating agents suitable for use in the treatment of textiles, leather and other fibrous materials are obtained by condensing a hydroxydiphenyl with an alcohol and treating the product with sulphuric acid. The products may be used in carbonising, mercerising, cleansing and sizing, in impregnating textiles with latex and in bleaching with sodium hydrosulphite. C.

Dyeing Apparatus Roller Pressure Adjusting Device. D. R. H. Williams (Huddersfield) and J. W. Peace (Brockholes). E.P.409,869 of 22/2/1933.

In a scouring, milling, or like machine for treating fabrics with liquids, in which the fabric is passed between nip rollers, the pressure of the upper roller is varied by acting upon it, through connections including springs, by a weight adjustable along a lever which is pivoted between its ends on an axis offset from its connection to the roller. C.

Rayon Pile Fabrics: Wet Treatment. British Celanese Ltd. (London). E.P.409,916 of 12/6/1933.

In the treatment of fabrics having a pile consisting of or containing organic derivatives of cellulose with hot aqueous liquids, as in dyeing, scouring, and degumming operations, damage to the pile is minimised by effecting the treatment in the presence of a substantially neutral substance, e.g. a readily ionisable salt or a sugar capable of exerting osmotic pressure but having no substantial swelling action on the cellulose derivatives. The salt used may be, for example, a substantially neutral sulphate, chloride, nitrate, chromate, or acetate of sodium, potassium, magnesium, ammonium, or aluminium and the sugar may be, for example, cane sugar. The concentration of the substantially neutral substance is suitably 0·5-10%. C.

Dye-sticks. L. S. J. Thompson and W. A. Tatton (Leek). E.P.409,951 of 1/8/1933.

Hollow triangular dye-sticks constructed of sheet metal are made open at the ends, non-perforate at the bottom and sides, and with a longitudinal slot extending either from end to end along the top edge or in the bottom side, through which dye liquor can flow to reach the parts of the article in contact therewith. C.

Alcohol and Hydrocarbon Impregnating and Dressing Agents: Preparation. J. Y. Johnson, London (I.G. Farbenindustrie A.-G., Frankfort, Germany). E.P. 410,087 of 28/10/1932.

Wax-like substances are obtained by heating mixtures of higher aliphatic carboxylic acids or their anhydrides or esters to 100-450° C. at atmospheric or raised pressure and in the liquid phase with a decarboxylating catalyst, and subjecting the products to hydrogenation in the presence or absence of a catalyst. The starting materials are such that the product of the number of carbon atoms and the number of acid groups is at least 10; thus, mixtures of aliphatic monocarboxylic acids of at least 10 carbon atoms, or aliphatic dicarboxylic acids of at least 5 carbon atoms, may be treated. Specified starting materials are natural or synthetic waxes, acids obtainable from such waxes, esters of wax acids, conversion products of waxes, fatty oils and fats and the corresponding acids, and oxidation products of higher paraffin hydrocarbons. Specified decarboxylation catalysts are cobalt, nickel, iron, manganese, molybdenum, copper, zinc, chromium and tungsten, and alloys, oxides and sulphides of these metals, and aluminium oxide. The products contain

alcohols and/or hydrocarbons having more carbon atoms than the starting materials; they may be used, alone or with natural waxes or wax-like substances such as stearine and paraffin wax, for impregnating or dressing textile materials such as wool, cotton, silk, and rayon. C.

Cellulose Acid Ester Salts: Preparation. Kodak Ltd., London (Eastman Kodak Co., New York). E.P.410,126 of 10/8/1932.

The patent relates to the production of alkali, alkylolamine, and heavy metal salts of mixed acid esters such as cellulose acetate acid phthalate, heavy metal salts of the simple cellulose acid esters of dicarboxylic acids such as cellulose acid phthalate or succinate, and alkylolamine salts of the simple and mixed cellulose acid esters. The alkali metal salts, which are water-soluble, may be employed for the manufacture of transparent sheets or skins, for use in adhesive compositions, as sizing materials, and as vehicles for dyes and pigments. C.

Amide Mercerising Liquor Wetting Agents: Application. A. Carpmael, London (I.G. Farbenindustrie A.-G., Frankfort, Germany). E.P.410,164 of 9/11/1932.

Amides of dithiocarbonic acid, prepared from carbon disulphide and an aliphatic secondary amine containing an alkyl chain of at least three carbon atoms, are used as wetting agents in mercerising vegetable fibres with alkaline lyes. Dispersing agents such as phenols, sulphurised phenols, and sulphonated oils may be added as well as solvents and other insoluble substances. C.

Rolls of Fabric. J. Quarmby and N. Moorhouse (Huddersfield). E.P.410,302 of 25/3/1933.

Piece Boards—A board with flat end surfaces is made from a longitudinally corrugated sheet of paper secured to a card, the compound sheet being crimped and then bent at right angles at four places, and the ends secured by a strip of paper. The board may be made of two or more sheets, the adjacent ends of the sheets being jointed by paper strips near the ends of the board. A filler sheet with corrugations running transversely of the board may be inserted and the ends and edges bound by strips. W.

Lecithin: Preparation. Noblee & Thorl Ges. (Welhelmsburg, Germany). E.P. 410,357 of 28/7/1933.

A stable preparation of lecithin is prepared by treating a lecithin sludge from soya beans with glycerin or a strong solution of a sugar in water or glycerin to remove a part of the water. By centrifugal separation more of the water and some of the oil may be removed. C.

Cellulose Ester or Ether Rayon: Delustring. Imperial Chemical Industries Ltd. (London), C. Dunbar, and L. G. Lawrie. E.P.412,929 and 412,930 of 3/1/1933: 21/6/1934.

(1) A process for reducing the lustre of rayon consisting wholly or in part of alkyl or acyl derivatives of cellulose comprises treatment with hot aqueous solutions of water-soluble salts of primary, secondary, or tertiary amines or quaternary derivatives of tertiary amines, which are not heterocyclic derivatives, at least one substituent of which contains an aliphatic residue containing six or more carbon atoms, the residue being attached to the nitrogen atom either directly or by means of a bridge, for instance —$CO{\cdot}C_6H_4$—, —$CO{\cdot}NH{\cdot}C_6H_4$—, or —$CO{\cdot}NH{\cdot}CH_2{\cdot}CH_2$—. (2) This patent relates to delustring by heating with a solution of tannic acid, a tannin, a tannate, or a tannin substitute, in conjunction with a derivative of a tertiary amine of the type specified above. C.

Chromium Fluoride: Application to Protection of Animal Fibres. W. Lowe (Hayfield). (1) E.P.413,445 of 30/3/1933 : 19/7/1934. (2) E.P.413,529 of 5/10/1933: 19/7/1934.

(1) A process for protecting animal fibres, wool, felt, skins, etc. from moth larvæ, mould, and rotting consists in treating the material with a solution of chromium fluoride in such a manner that a definite quantity of chromium compounds (basic compounds, free oxides and fluorides), equivalent to 0·65% of chromium fluoride is permanently retained by the fibre. (2) The above process is improved by the addition of antimony fluoride to the chromium fluoride solution with which the material is impregnated. The antimony compounds precipitated with the chromium compounds nullify the pale green tint of the latter. C.

5—ANALYSIS, TESTING, GRADING, AND DEFECTS

(A)—Fibres

Fibres: Fluorescence Microscopy. E. Göthel. *Dissertation*, Dresden, 1933, pp. 63.

The author describes the Reichert fluorescence microscope (1931 model) and the appearances presented by various cottons, other plant hairs, bast fibres, wools and other animal fibres, silk, asbestos, rayons and gums, softeners, filling materials and antiseptics used in finishing textiles. Two chapters are also devoted to paper making materials. A review of previous work and a bibliogrpahy are provided. C.

Cotton Fibre: Effect of Growth Conditions on Dye Absorption. W. M. Mebane and A. A. O'Kelly. *Amer. Dyes. Rept.*, 1934, **23**, 393-395, 418-420.

Samples of unbleached, bleached, mercerised, unbleached and tendered, bleached and tendered, unbleached oxidised, and bleached and oxidised cotton cloth were dyed with a dye from each of the usual classes of dyes and studied under the microscope. The count of cotton hairs in the original cloth showed green hairs 4%, under-ripe hairs 20%, normal hairs 53%, over-ripe hairs 17%, and dead hairs 6%. An examination of the finished fabrics showed a slight decrease in the percentage of green and dead hairs. The green hairs failed to dye properly under any of the conditions given. The best results were obtained with the direct dye. The green hair seems to be composed mainly of unruptured cuticle offering no opportunity for adsorption other than on the outer surface. Under-ripe hairs dye better than green hairs, but not nearly as well as normal hairs. The effect of chemical treatment corresponded with the findings of previous investigators. In all types of hairs the unbleached showed more spottiness than the bleached. Oxidation caused a heavy increase in dyeing; mercerisation gave the expected results; tendering caused heavy dyeing by the basic dye. As in the case of the under-ripe hairs, most of the dye appeared in the lumen. All of the over-ripe hairs showed abnormally heavy dyeing, with the exception of the case of basic dye on the mercerised samples. The various chemical treatments tend to increase the ability of these hairs to absorb dye materials or lakes, and it may be concluded that over-ripe hairs possess a much greater porosity and more accessible lumen than normal fibres. The over-ripe hairs probably contain some cellulose decomposition products and other impurities. Dead hairs seem to be physically and chemically different from green hairs but give similar results on dyeing. The bleached, unbleached, and oxidised dead hairs were dyed by the basic dye, but tendering did not increase dyeing. C.

Iodine Vapour: Sorption by Fibres. E. Beutel and A. Kutzelnigg. *Monatsch. Chem.*, 1934, **64**, 41-52 (through *Brit. Chem. Abs. A*, 1934, 359).

Plant fibres absorb more iodine from a wet than from a dry atmosphere. The influence of moisture is ascribed to some non-cellulose constituent. The sorptive power of raw cotton is not altered by extraction with alcohol or ether but alkali scouring has a great effect. Flax, ramie, jute, and kapok take up iodine rapidly in a sealed tube at 120°, the product being grey and tender. Cotton becomes brown under these conditions but is not tendered. C.

Wool: Measurement of Harshness. P. Larose. *Canadian J. Res.*, 1934, **10**, 730-742.

Apparatus for measuring the ease or extent to which wool can be compressed consists of a cylinder for holding the sample and a piston provided with a helical spring for exerting pressure. Four samples of yarn differing in harshness have been tested with this apparatus and by the method described by Winson. The results show that when the wools are placed in order of decreasing harshness, they are also in order of increasing compressibility; the softer the wool the more easily it is compressed. Measurements have been made at 50% and 60% R.H. C.

Fixation of Metal Ions by Animal Hair. J. Caspe and W. E. Austin. *J. Tech. Assoc. Fur Ind.*, 1933, **4**, 12-18 (through *Chem. Abs.*, 1934, **28**, 3239).

Results indicate that the absorption of Fe as $FeSO_4$ by Australian rabbit hair increases with the concentration of $FeSO_4$ up to a concentration of 7% (where the absorption was 5·15%) and then decreases. At the higher concentrations evidence of the formation of a soluble Fe proteinate was obtained. Preliminary treatment of the hair with NH_4OH or the addition of NaCl to the $FeSO_4$ solution increases the absorptive capacity for Fe. Lowering the *p*H decreases the amount of Fe fixed by the hair. W.

(B)—YARNS

Roving Testers: Application. Southern Textile Association. *Cotton (U.S.)*, 1934, 98, No. 6, p. 61.

Unsatisfactory results obtained with a roving tester are reported. C.

Gherzi "Texhygrometer": Application. G. Porsche. *Leipz. Monats. Text. Ind.*, 1934, 49, *Fachheft II*, pp. 32-33.

The need for applying corrections for variations in humidity when testing samples for control purposes in cotton cleaning, drawing and spinning processes is discussed and examples showing the method of making the corrections and the errors arising from the neglect of such corrections are given. The Gherzi Texhygrometer and an accurate quadrant balance are shown. C.

Yarn Regularity Testing Devices. E. Viviani and G. Columbo. *Boll. R. Staz. Sper. Ind. Carta e Fibre Tess. Veg.*, 1934, **29**, 244-250.

The capillary tube method of investigating regularity is described and traces obtained for hemp and linen threads are compared with the curves obtained by direct weighing of successive short lengths. The variations shown by the two methods correspond. From a knowledge of the weight of a sample and the apparent volume determined by means of a mercury capillary tube it is possible to calculate the apparent specific gravity of the thread. The apparent specific gravity can also be determined by means of a mercury pycnometer. Diagrams and details of this apparatus are given. The weight of mercury displaced by the thread is determined directly. Results obtained for a variety of cotton and rayon yarns by the two methods are compared. It is suggested that the reciprocal of the specific gravity could be used as an index of covering power. C.

"Twittiness" in Worsted Yarns. *Wool Rec.*, 1934, 45, 1555-1557.

"Twittiness" is discussed with special reference to the mechanical manipulation of the material. W.

Determination of the Fineness, Length, and Curliness of Combed Wool and Classification of German Tops. I and II. E. Franz and H. Mendrzyk. *Textilber.*, 1934, **15**, 194-196 and 242-244.

A chronological survey is given of methods of measuring fineness. The authors used Doehner's lanameter, and also a special counting mechanism, electrically operated, which simultaneously records fibre thickness and counts the measurements. W.

(C)—FABRICS

Cloth Measuring Apparatus. Rossweiner Maschinenfabrik. *Leipz. Monats. Text. Ind.*, 1934, 49, *Fachheft II*, p. 50.

In the usual cloth measuring devices errors arise through the stretching, pressing and slipping of the cloth and may also be caused by the surface properties and thickness of the material being measured. A new measuring device in which these sources of error are eliminated is briefly described. The cloth passes to the measuring roller over a guide roller which is driven in a way designed to free the cloth from any existing tensions. Errors due to the thickness of the cloth are corrected by means of an auxiliary measuring roller which influences the counting device through a differential drive. C.

Cotton Fabric: Relation of Structure to Strength. W. E. Morton. *J. Text. Inst.*, 1934, **25**, P262-P265.

Cuprammonium Hydroxide Solutions: Preparation. W. F. A. Ermen and W. M. Lord. *Text. Mfr.*, 1934, 60, 247.

In a simplified method for the preparation of a cuprammonium hydroxide solution for fluidity determinations, a very small excess of ammonia solution (*D.* 0·880) is added to a cold saturated solution of copper sulphate, and when required for use the requisite amounts of caustic soda and ammonia are added. The further procedure is identical with the standard B.C.I.R.A. method. The results obtained in tests on a series of cottons which had been artificially tendered in solutions of sodium hypochlorite, using solutions prepared by the simplified method, were comparable with those obtained by the standard method, but the solutions were slightly more viscous. When tetramethyl-ammonium hydroxide was used instead of caustic soda the results obtained were satisfactory, but showed no improvement on the proposed method. C.

Dyed Fabrics: Reflection of Light. R. Guelke and M. M. Fitzsimons. *Trans. Faraday Soc.*, 1934, **30**, 512-519.

The diffuse reflection from dyed cloth conforms to the formula—

$$Bc=\log\left\{\frac{A-1}{A-I_0/I}\right\},$$

where A and B are constants, c is the concentration of the dye in the spaces between the reflecting planes in the fabric, and I_0 is the intensity of the incident light. The formula can be derived theoretically from the consideration of a simple formula involving alternate reflection and absorption of the incident light. C.

Fabrics: Physical Properties; Review. C. P. Black and J. A. Matthew. *J. Text. Inst.*, 1934, **25**, T197-T224.

Cellulose Acetate Rayon: Alkaline Hydrolysis. Marian W. Van Ess and Rachel Edgar. *Iowa State Coll. J. Sci.*, 1934, **8**, 397-408.

The alkaline hydrolysis of a fabric of cellulose acetate rayon (37·7% acetyl) in 15 minutes at 60° C. has been followed by determination of the loss in weight and in acetyl content. The decrease in weight agreed with that calculated from the decrease in acetyl content. Acetyl values corresponding with the diacetate and the monoacetate were obtained at 0·06 *N* and 0·142 *N* sodium hydroxide. Between these alkali concentrations and at greater concentrations the acetyl value of the residual fabric was a function of the alkali concentration of the form $y=ax^b$. A bibliography of 119 items is cited. C.

Chlorine and Hypochlorite Solutions; Tendering of Cotton by——. E. A. Wolff. *Dissertation*, Stuttgart, 1930, pp. 65.

In the opening part of this thesis the author describes the copper number (Schwalbe), Kauffmann's "boil-off" number, and Götze's silver number tests for assessing the extent of oxidising attack on cotton. He then describes unsuccessful attempts to find more simple tests based on the coloration of the oxidised cotton by phenylhydrazine or methylene blue; the differences were not sufficiently great to be of analytical value. The main part of the thesis deals with the kinetics of oxidation by chlorine in acid, neutral and alkaline solution. Chlorine water itself attacked cotton very slightly. With increasing addition of alkali, the attack rose to a maximum near the neutral point; the danger zone is marked by the limits 1-2 mol. NaOH to 1 Cl_2, with a maximum at 1·5 mol. NaOH. The tendering agent is held to be a complex ion [HClO, ClO], and not free hypochlorous acid, the hypochlorite ion, chlorine monoxide, the positive chlorine ion, or free chlorine. Finally, some experiments are described on the bleaching of solutions of Indigo carmine and four azo dyes which indicate that here free chlorine is the destructive agent. C.

Lustrous Fabrics: Testing. (1) and (3) E. Ristenpart; (2) A. Klughardt. *Leipz. Monats. Text. Ind.*, 1934, **49**, 110-111, 133-134, 134-135, 158-159.

(1) Ostwald's method of lustre measurement is briefly described and one or two of its deficiencies are pointed out. The author criticises Klughardt's method of lustre measurement and compares it unfavourably with that of Ostwald. (2) Klughardt replies to the criticisms. (3) Ristenpart's rejoinder. C.

Silk: Decomposition by Light. M. Harris. *Amer. Dyes. Rept.*, 1934, **23**, 403-405.

The strength of silk cloth decreased and its ammonia nitrogen content increased on exposure to sunlight. Samples of the cloth treated with 0·1 *N* sodium hydroxide showed smaller changes and samples treated with 0·1 *N* sulphuric acid greater changes than the untreated cloth under the same conditions. Similar results were obtained on exposure of samples to north skylight. Samples treated with sodium carbonate solution (1% or less) showed the greatest stability. The amino nitrogen content was the same for silk stored in the dark and for silk exposed to sunlight for 3 months. The rate of hydrolysis in 0·5 *N* sodium hydroxide solution, measured by the formation of amino nitrogen, was the same for both samples. The decrease in breaking strength and increase in ammonia nitrogen content of silk on exposure to light are brought about by atmospheric oxidation in the presence of light. The results of these experiments are in accord with those of accelerated ageing tests of silk, using the carbon arc lamp as a light source. C.

Fabric Bursting Strength Tester. A. Cassal. *Bull. Soc. Ind. Mulhouse*, 1934, **100**, 336-341.

The fabric is stretched between two hollow truncated cones as over a drum. A piston with a rectangular lower surface is pressed upon the centre of the circle of stretched fabric, and the pressure can be increased by allowing water to flow from a graduated flask into a vessel fixed to the upper end of the piston, so that the pressure at bursting point can be read off. C.

Weft Bar in Pieces. *Wool Rec.*, 1934, **45**, 1441.

The causes of weft bar in pieces are discussed with relation to take-up motions, weaving faults, winding, twist, varying conditions, loom drive, and weft mixing. W.

Durability of Blankets. K. Hess and D. Saville. *Text. World*, 1934, **84**, 1058.

The durability of blankets is discussed in relation to the strength of the yarns employed, and details given of an investigation in respect of six popular brands of all-wool blankets. W.

Stains Caused by Metallic Residues: Methods of Removal. *Wool Rec.*, 1934, **45**, 1315-1317.

"Silvatol" is recommended for removing rust stains from fabrics, and also iron stains due to iron soaps formed during scouring or milling. Tests are given for the detection of copper stains. The use of ammonium sulphocyanide as an assistant in the dyeing operation prevents the copper from forming a lake with the dyestuffs, except in the case of some mordant dyestuffs, when the copper may be removed by means of a cold dilute solution of sodium or potassium cyanide. W.

Faults Due to Inadequate Dye Penetration. *Wool Rec.*, 1934, **46**, 31-33.

A case is described in which one piece of a batch of four dyed in the same vessel showed bad penetration. The four pieces were all scoured together in one machine, and the defective piece developed crimps, which were removed by crabbing and wet blowing. The three pieces that had not been crabbed combined with the dyestuff much more quickly than the crabbed one, and in this way the fault was caused. In densely set pieces which are made from hard twisted yarns and crabbed prior to dyeing, poor penetration is sometimes obtained by raising the temperature of the dyebath too quickly. Reference is made to pattern dyeing in relation to bulk dyeing. W.

Cloudiness in Woollens and Worsteds. *Wool Rec.*, 1934, **45**, 1488-1489.

Insoluble soaps show as cloudiness in worsteds, and to a less degree in woollens, although woollens made from lime wool often suffer from this defect. If insufficient soap is present, large amounts of dirt and insoluble soaps are not properly dispersed. The addition of neutral foaming agents prevents cloudiness caused by insoluble soaps, but not cloudiness due to dirt and insoluble matter. Cloudy dyeing defects may be due to insoluble soaps formed within the fabric through the too rapid dilution of the scouring liquor with hard water. In such cases, the goods are cleared by the use of foaming agents that are stable in an acid bath, a higher degree of acidity being necessary. Cloudy defects in carbonised cloth are mainly due to inefficient breaking in the dry milling machine, the correction of such defects necessitating neutralisation and rescouring with soap. W.

Oils and Stains. H. R. Hirst. *J. Soc. Dyers and Col.*, 1934, **50**, 211-215.

Examined under ultra-violet rays, unpurified hydrocarbon oils show a bluish or blue-green fluorescence more or less strongly according to the degree of purity. Fairly rough quantitative comparisons can be made by diluting an oil with petroleum ether until it matches a standard oil. From the dyer's point of view a more satisfactory test for the staining value of hydrocarbon oils is to spot the oil on to white woollen or worsted cloth and then expose in the Fadeometer or the Fugitometer, allowing both sides of the cloth to have free access to air. The light from the arc falling on the oil-spot causes oxidation or polymerisation of the unsaturated components. The oil then shows on the cloth as a yellow or orange stain, the intensity of which varies with the purity of the oil or freedom from unsaturated compounds. To investigate the effect of light on oils and the manner in which it influences their behaviour to dyes, the oil is spotted as above and the pattern exposed for various periods of time, scoured by a standard method, rinsed and dyed. In the case of impure oils, a relatively short exposure

to light gives a light-coloured stain, while longer exposure, e.g. 20-30 hours, gives a dark-coloured stain. If such an exposed oiled pattern is scoured and dried, then laid on the surface of water, the place where the oil-spot originally existed wets out immediately, apparently owing to the presence of a thin layer of oxidised or polymerised oil which lowers the interfacial tension of the fibres. An excessive amount of atmospheric moisture inhibits the drying of fatty oil films. Another type of damage familiar in the hosiery trade is the presence of holes produced during bleaching with hydrogen peroxide. This fault is due to the presence of finely-divided metals or their oxides, which frequently accompany lubricating oil stains, derived from machine bearings of iron, brass, or similar copper alloys. For removing oil stains before scouring, a number of solvents were tested, benzene and pyridine proving more satisfactory than trichloroethylene. The method given for testing mineral oils has been adapted for fatty oils. The presence of metals in oils is discussed. Small traces of oils and metals spread out in thin layers on the surface of wool fibres, particularly in the case of worsted yarns. Mention is made of false oil stains and of fogged yarn. W.

(D)—Other Materials

Effect on Copper, Nickel, and Copper-Nickel alloys of Washing and Bleaching Materials. O. Bauer and H. Arndt. *Metallwirtschaft*, 1934, **13**, 241-245 (through *Chem. Abs.*, 1934, **28**, 4355).

Sheets of pure Cu, Cu-Ni alloy containing 48·8% Ni, Nicorros containing 66·13% Ni, Monel metal, and pure Ni in the hot-rolled, annealed, and cold-worked condition were immersed in solutions of eight washing and two bleaching materials. The tests were made at room temperature for 300 days and at 75° for 50 days and the loss in weight of the samples was determined. The washing solutions were 1%, the commercial bleaching compound solution 0·5%, and the chlorinated lime solution 0·25%. The preliminary treatment of the metals had no effect on their corrosion resistance. The corrosive attack at 75° was greater in all cases than at room temperature. Pure Cu was considerably attacked by the soap, one of the commercial washing materials, soda ash plus perborate, and soda ash solutions, and very strongly by the two bleaching solutions. The perborate, soap plus perborate, and the other two commercial washing material solutions had very little effect on pure Cu. The Cu-Ni alloys and pure Ni were attacked very slightly by the eight washing solutions but were strongly attacked by the two bleaching solutions containing Cl. With few exceptions the amount of corrosion decreased with increase in Ni content. W.

Patents

Yarn Fault Detecting Device. W. J. Tennant, London (Universal Winding Co. Boston, Massachusetts, U.S.A.). E.P.412,424 of 17/7/1933 : 28/6/1934.

A device for detecting thin places in yarns comprises a gauging device and seizing means, the gauging device being distinct from the seizing means and serving normally to hold the yarn out of engagement therewith and being arranged to release the yarn when a thin place occurs in it, thereby causing the yarn to change its course and engage the seizing means. The gauging device has an unobstructed opening (e.g. slit) extending through it from one side to the opposite side, through which opening a thin part of the yarn can pass. The seizing means comprises a pivoted seizing member which is mounted to swing towards a yarn guide for seizing the yarn against it when the latter is permitted by the gauging member to engage the seizing member. The seizing means may comprise a seizing member arranged to be engaged by an enlargement on the yarn to seize the latter and thereby arrest its travel. C.

Fabric Moisture Content Electric Indicating Device. Calico Printers' Association Ltd. (Manchester) and J. F. Field. *E.P.*412,565 of 26/10/1932 : 26/6/1934.

The variation in the electrical resistance of fabric due to variations in its moisture content as the material passes a fixed pair of electric contacts is utilised to cause variations in the luminosity of a neon or other lamp capable of indicating the passage of very minute currents with the ability to stand heavy overloads. The application of the method to a fabric drying machine is described. C.

7—LAUNDERING, AND DRY-CLEANING

(A)—Cleaning

Garments: Cleaning and Dyeing. F. W Walker. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 190-202.

A review of past and present methods and problems in dry cleaning, wet cleaning, and dyeing of fabrics, leathers, etc. dealing especially with machines, solvents, solvent recovery, and dry cleaning soaps. C.

"Nascent" Soap: Detergent Action. A. Rayner. *Chem. and Ind.*, 1934, 589-593.

Washing tests with soap powders containing different proportions of soap and soda ash gave the unexpected result that the detergent action tended to decrease with increasing soap content and that soda without soap removed almost half of the dirt whilst water alone removed no dirt at all. When olive oil used in the soil on the fabric was replaced by mineral oil the powders with least soap had the least cleansing action. The higher detergency observed in the first series of tests is attributed to soap formed in the fabric by the reaction of the soda with the olive oil or the free fatty acids in the olive oil. Further tests showed that, weight for weight, fatty acid converted into soap in the fibre has a cleansing power of over 20 times that of the same amount of fatty acid used as soap under normal conditions. Tests of the effect of soap concentration on detergent action showed that this result is due to nascent soap action rather than to concentration of soap in the fabric. A suggestion that the effect may be due to the liberation of bubbles of carbon dioxide gas has been discounted in view of the fact that neutralisation with ammonia was found to give results equal to those obtained with sodium carbonate. An emulsion of oleic acid in water containing sulphonated castor oil and glue is recommended for practical purposes. The emulsion is diluted to give a content of about 0·2% of fatty acids and the articles to be washed are dipped in this solution, and the surplus liquid is squeezed. On putting the articles in a dilute solution of sodium carbonate or, preferably, sesquicarbonate and stirring gently, the formation of soap and the immediate liberation of the dirt is very apparent. C.

Patents

Soaps and Solvents for Dry Cleaning. Roessler & Hasslacher Chemical Co. (New York). E.P.407,088 of 15/9/1932.

Soaps for use with dry cleaning solvents, especially carbon tetrachloride or trichlorethylene, consist of a fatty acid soap with a content of a polyglycol, and with or without a chlorinated aliphatic hydrocarbon. For example, 14·2 gm. of caustic soda is dissolved in 25 c.c. of water and stirred into 100 gm. of oleic acid in 100 c.c. of trichlorethylene; 70 gm. of triethylene-glycol or 50 c.c. of diethylene glycol is added; the product is dissolved in trichlorethylene for dry cleaning. W.

Cleaning Carpets, etc.; Brushes, etc.; Vacuum Cleaners. G. Fischer and H. Frey (Berlin). E.P.410,079 of 4/8/1932.

A method of and apparatus for dusting carpets, cushions, garments, fabrics, etc. consists in the use of an electrifiable non-conductor as the dusting member to which the dust is attracted and then transferred to the upper surface of the member through perforations. Various forms are described. In all forms, the electrostatic dusting member comprises a hard rubber or celluloid plate which is perforated. The plate is curved over a casing so that it can be detached for cleaning. Dust is attracted by rubbing the surface and is passed upwards through the perforations where it is collected for removal. The perforations may be of various shapes and have upstanding upper edges. Dust traps may be arranged inside the casing above the surface. Dust is passed through a funnel by tilting the apparatus upside down. In a modification, a hand brush mounted on rollers is provided beneath the plate. A pawl prevents reverse movement of the rollers. When the brush is moved in one direction the rollers remain stationary and usual brushing takes place. When the movement is reversed, the rollers turn and dust is attracted to the plate and collects above it. In another modification, brushes, rubber sponges, or the like are set in the plate to act mechanically to loosen the dust. In a further modification, a casing is pivoted to a handle away from the centre of gravity so that when lifted from the floor it collects dust at the rear. The casing wall is removable. In a still further modification, a handle leads to a suction apparatus. The suction may be continuous or intermittent. W.

8—BUILDINGS, AND ENGINEERING

(A)—Construction of Buildings

Building Materials: Acoustic Properties. F. Spandöck. *Ann. Physik*, 1934, **20**, 328-344.

Chlorinated Rubber: Properties and Uses. *Silk and Rayon*, 1934, 8, 305.

"Tornesit" Chlorinated Rubber Paints: Properties. R. A. Coolahan. *Chem. and Ind.*, 1934, pp. 630-632.

Double-glazed Windows: Insulating Effect. Else Früholz. *Arch. Hyg. u. Bakt.*, 1934, **112**, 20-47 (through *Bull. Hyg.*, 1934, 9, 478).

(B)—Fire Prevention

Chemical Fire Extinguishers: Classification. C. Dufraisse and J. Le Braz. *C. r. Acad. Sci.*, 1934, **199**, 75-77.

Experiments are mentioned that lead the authors to classify fire extinguishers into those that exhaust the oxygen supply of the gases and those that do not. Ethyl bromide is an example of the former; without being classed as inflammable under ordinary conditions, it nevertheless consumes oxygen when poured on a fire and efficiently extinguishes the flames. Carbon tetrachloride is an example of the second class; it smothers the flames without reducing the oxygen supply. C.

(C)—Steam Raising and Power Supply

Steam and Hot-water Heating Systems: Comparison. H. Stenger. *Spinn. u. Web.*, 1934, **52**, No. 30, pp. 9-12.

A general discussion of the sources of heat loss in steam heating systems and of the advantages of the use in textile mills of heating systems employing hot water under pressure. C.

(D)—Power Transmission

Calico Printing Machine Dual-voltage Driving Motors: Application. C. J. E. Harte and C. F. Head. *Text. World*, 1934, **84**, 1266-1267.

As a result of tests on various motors it was decided to use 40 h.p., 3-to-1 speed, 230 volt d.c. Westinghouse motors with automatic dual-voltage control for driving multi-colour printing machines. The factors influencing the selection of this equipment and the advantages of this type of drive are discussed. C.

(F)—Lighting

Textile Factories: Lighting. A. F. Rodger and E. Wittig. *Siemens Zeitschr.*, 1934, **14**, 142-147 (through *Sci. Abs.*, 1934, **B37**, 360).

Between 60 and 150 lux are required for spinning and 150-300 lux for weaving. General lighting is preferred where possible, owing to the better distribution and higher efficiency of the larger lamps. Semi-direct or indirect lighting is best for high rooms, and direct for low rooms. Polar curves are given (in the original) for several typical reflectors with 1,000-lumen lamps, and also photographs of a number of installations. C.

Lighting Applied to Wool Industries. E. L. Elliott. *Amer. Wool and Cotton Rep.*, 1934, **48**, No. 21, pp. 13-14 and No. 26, pp. 7-8.

In the lighting of the weaving room, intensity of illumination must be considered in conjunction with the general reflecting power of the objects seen, and the shadows cast by the operative and the machine. Colour vision is discussed with reference to the inspection of raw wool. W.

(G)—Heating, Ventilation, and Humidification

Automatic Temperature Control Instruments: Application. W. R. Clendinning. *Text. World*, 1934, **84**, 1269-1272.

A general account is given of the application of automatic temperature control instruments in cotton and rayon sizing, wool scouring, silk degumming, desizing, scouring, crêping, mercerising, dyeing, weighting, printing and other textile processes. C.

Dusty Air: Analysis: T. Hatch and E. W. Thompson. *J. Indust. Hyg.*, 1934, **16**, 92-99 (through *Bull. Hyg.*, 1934, 9, 449).

Hair Hygrometers: Application. *Kunstseide*, 1934, **16**, 222-223.

Water: Evaporation; Effect of Humidity. P. F. Hammond and R. Goslin. *Ecology*, 1933, **14**, 411-413 (through *Exp. Sta. Rec.*, 1934, **70**, 600).

Dust Separation and Air Conditioning. Lodge-Cottrell. *Text. Rec.*, 1934, **52**, No. 616, p. 39.

Hot dust-laden air being continually discharged is treated in an electrostatic precipitation plant and the whole of the dust removed, giving a product equal in this respect to the original pure air. The cleaned air, which is still warm and in an almost moisture-laden condition, can be recirculated to the mill. W.

(H)—Water Purification

Water: Softening; Precipitation and Settling Processes. C. L. Moore. *Silk and Rayon*, 1934, **8**, 308-310.

The conditions determining the rate of settling of precipitates are explained, and precipitation and settling processes involved in the softening of water by addition of a mixture of lime and soda ash, and the improvement effected by the addition of sodium aluminate, are discussed. C.

Textile Mill Water and Wastes: Purification. E. B. Besselievre. *Amer. Dyes. Rept.*, 1934, **23**, 397-402.

The treatment of water for textile mills is discussed and suitable flocculators and clarifiers are briefly described and shown in diagrams. The treatment of textile mill wastes is also briefly discussed. C.

Patents

Rayon Treatment Water Supply: Sterilisation. Vereinigte Glanzstoff Fabriken A.-G. (Wuppertal-Elberfeld). D.R.P.598,069 of 5/11/1931 : 17/5/1934.

Water for the wet treatment, sizing, or dyeing of rayon is protected from micro-organisms by the addition of quite small quantities of powdered metals, especially silver or copper. C.

Dielectric Loss Moisture Content Measurement Apparatus. British Thomson-Houston Co. Ltd. (London). E.P.408,414 of 13/1/1933.

The moisture content of a material is determined by bringing the material into proximity with the electrodes of a condenser connected to a source of high-frequency currents, and determining the dielectric losses due to the presence of moisture in the material. In one arrangement, a continuously moving strip of material, e.g. paper, passes over a pair of plates forming a condenser, connected in the secondary circuit of a transformer supplied with high-frequency oscillations from a tube oscillator. The frequency of the circuit is stabilised at a desired value by means of a condenser. The increase in the output of the oscillator due to dielectric losses in the strip is a measure of the moisture content, and may be determined by a watt-meter. The latter may be replaced by contact-making devices which serve to control apparatus for regulating the moisture content of the material. In a modified arrangement for measuring the moisture content of material in bulk, the material is placed in a vessel of conducting material which forms one electrode of the condenser, the other electrode being formed by an insulated plate. C.

Hygrometer. Bristol's Instrument Co. Ltd. (London). E.P.413,584 of 19/1/1934 : 19/7/1934.

The hygroscopic member is a thin strip of wood so disposed that its fibres lie substantially parallel to its shortest dimension. This hygroscopic member is arranged to be initially constrained to an arched conformation by being pivotally attached at its opposite ends to a rigid non-hygroscopic frame or block and arched or bowed between movable abutments provided thereon. Means are secured to the apex of the arch for transmitting to a suitable measuring element the effect of elongation or contraction of the member under humidity variations of the surrounding atmosphere. C.

9—PURE SCIENCE

Shirlan: Application in Spray Fluids. H. Martin and E. S. Salmon. *J. Agric. Sci.*, 1934, **24**, 469-490.

Tables are given showing the fungicidal properties (against the downy mildew of hops) of a large number of sprays containing hydrocarbons, alcohols, phenols, esters, etc. Shirlan was effective under conditions such that a high proportion goes into solution (e.g. as the sodium salt). C.

Hydrogen Ion Concentration Determination Apparatus. A. Kufferath. *Papierfabrikant* (*V.Z.I.*), 1934, **32**, 317-318.

Hydrogen ion concentration may be determined by connecting two vessels, one containing the sample and the other a solution of known *p*H, with a siphon tube filled with potassium chloride and agar. The bases of the vessels are perforated by electrodes, the other ends of which connect with a modified Lippmann electrometer. Acid or alkali is added to the sample solution from a burette till the *p*H in both vessels is equal and the electrometer indicates zero. The burette can be specially graduated so that *p*H can be read off from it rapidly and easily. C.

Cellulose: Constitution. W. N. Haworth. *J. Soc. Dyers and Col.*, 1934, *Jubilee Issue*, 16-23.

A concise account of recent work on the structural formulæ and molecular models of starch, cellulose, sugars, and other allied substances. C.

Starch Grains: Dye Adsorption. J. R. Katz and A. Weidinger. *Z. physikal. Chem.*, 1934, **A169**, 143-146.

Dye adsorption from an 0·008% solution of Congo red has been investigated for a number of natural starches. Considerable differences were found for the different kinds of starch, and no parallels existed between dye adsorption and X-ray spectra or the acidity of the amylopectin. Dye adsorption is, however, closely paralleled by the quantity of *a*-amylose. C.

Starch Grains: Variability of Pasting Temperature. J. R. Katz and E. A. Hanson. *Z. physikal. Chem.*, 1934, **A168**, 321-333.

The behaviour of individual starch grains when heated with water has been studied by observing (*a*) the disappearance of optical anisotropy and (*b*) staining by Congo red. About 300 grains were observed each time and counts were made of the grains that were perceptibly stained (locally or wholly) and also of the grains that had become completely isotropic. The pasting temperatures are expressed as frequency curves, the form of which is characteristic for a given type of starch. Such curves are reproduced for (1) wheat, (2) potato, and (3) arrowroot starches, for which the minimum, mean and maximum points increase in the order (1) to (3). The curve is much more symmetrical for arrowroot than for the other starches. The microscopical inspection gave the impression that large grains "pasted" at a lower temperature than the smaller ones and the unsymmetrical frequency curve of size, with a wide scatter over the larger dimensions, proved, with potato starch, to be roughly the mirror image of the frequency curve of pasting temperatures, with its scatter over the lower temperatures. It was further observed that a few grains retained their anisotropy even after heating for 1½ hours although partially "pasted" or capable of staining with Congo red, but on the whole affinity for the dye and loss of anisotropy coincided. The evidence points to a structure in the starch grain that resists swelling. C.

Retrograded Starch: Pasting Temperature. J. R. Katz and J. C. Derksen. *Z. physikal. Chem.*, 1934, **A168**, 334-338.

Pasted and subsequently retrograded starch, in which the structure of the natural starch grain is completely destroyed, shows, on heating with water, the change to another X-ray spectrum that is characteristic of the pasting transition at a much lower temperature than for natural starch. The authors suggest that pasting is determined by two factors, a phase transition to a larger phase richer in water, and the breaking of a structure that inhibits swelling. The pasting temperature is determined by the combined action of both factors. C.

Starch Grains: Microscopic Structure. E. A. Hanson and J. R. Katz. *Z. physikal. Chem.*, 1934, **A168**, 339-352; **A169**, 135-142.

Experiments on the maceration of starch grains in 7·5% hydrochloric acid at room temperature are described that indicate that starch grains are composed

of doubly refracting crystalline blocks 1 μ in size, showing regular radial and tangential arrangement. These units are connected with an intermediate substance, and are best seen by slightly crushing the grain under the cover glass. The best preparations are obtained by swelling the grains in 2 *M*. calcium nitrate solution after maceration for 7-8 days, when the tangential layers and their units are visible. Photographs are reproduced. C.

Surface Tension Dynamometer. H. V. Hughes. *Trans. Inst. Rubber Ind.*, 1933, 8, 473-477.

A surface tension balance suitable for rubber latex is described. A platinum strip fixed to a balance arm is placed in contact throughout its length with the liquid to be tested, and the weight on the other balance arm necessary to raise the strip free from the liquid is produced by raising a sinker (by rotating a vernier dial) in a paraffin bath so as to increase the apparent mass of the counterpoise on the balance arm which is immersed in the same bath. The vernier dial is graduated so that one rotation corresponds to a definite increase in apparent mass. Data for rubber latex are tabulated. C.

Gelatin Gels; Diffusion of Non-electrolytes in—. L. Friedman and W. N. Shearer. *J. Amer. Chem. Soc.*, 1934, 56, 1323-1324.

The effect of methanol, urea, glycerol, glucose, and sucrose on the diffusion velocity of urea in gelatin gels is to cause an increase in diffusion velocity at low concentrations up to a maximum at 0·006-0·04 *M*, when the effect lessens until finally a decrease is observed at concentrations greater than 0·08-0·18 *M*. These results are explained by assuming that non-electrolytes influence diffusion in gels (1) by increasing the radii of the pores within the gel due to a decrease in the hydration of the solid phase, and (2) by increasing the viscosity of the medium through which diffusion takes place. C.

Gas Discharge Lamps. S. Dushman. *Gen. Elec. Rev.*, 1934, 37, 260-268.

A general discussion of the visibility factor of radiation, luminous efficiencies of incandescent solids and gases, discharges, the theory of the origin of spectral lines, resonance radiation, the life of excited states, excitation and ionisation probabilities, metastable states and electrical phenomena in gas discharges. C.

Photo-electric Photometer. G. Brauer. *Z. physikal. Chem.*, 1934, **26B**, 71-80.

A photometer for the determination of rapid changes in concentration operates with two photo-cells, a variable light, and resistance amplification, and attains an accuracy of 0·05%. Measurements can be carried out in a lighted room even when spectral light of low intensity is used. A diagram is given. C.

Reflection Polariscope. R. D. Mindlin. *Rev. Sci. Instr.*, 1934, 5, 224-228.

A polariscope for photo-elastic investigations is applicable to the analysis of stress distributions in parallel plates and to Mesnager's modified three-dimensional analysis. The chief characteristic of the optical arrangement is that the light, after passing through the usual arrangement of polarising prism, retardation plate, and model, is reflected directly back through the same system. C.

Rotating Flashometer. W. E. Forsythe and M. A. Easley. *Rev. Sci. Instr.*, 1934, 5, 216-217.

Sodium Vapour Lamps: Properties. C. G. Found. *Gen. Elec. Rev.*, 1934, 37, 269-277.

Ultra-violet Vacuum Spectrograph. K. T. Compton and J. C. Boyce. *Rev. Sci. Instr.*, 1934, 5, 218-224.

A vacuum spectrograph is described which covers on one plate the whole range from the zero orders up to the first order of λ 2,500. The glass grating, 30,000 lines per inch, gives a dispersion of about 4·27 Å per mm. and strong spectra are obtained even at λ 300, lines a little below λ 200 showing on long exposures. The body of the spectrograph is exhausted to a pressure of 2×10^{-5} mm., a vacuum guard ring device of double rubber gaskets being used to seal the end covers. The instrument is particularly suitable for the establishment of short wavelength standards and for the study of line and band spectra from gas discharges and the study of absorption spectra in gases. C.

Compound Light: Photo-chemical Action. C. Winter. *Z. wiss. Phot.*, 1934, **33**, 52-56.
Further evidence is produced to confirm the author's previous criticism of Padoa and Vita's values for the separate photo-chemical action of light of single colours compared with that of complex white light. C.

Fluorescent Dyes; Effect of Viscosity on——. J. Bouchard. *C. r. Acad. Sci.*, 1934, **199**, 43-45.
Results are presented for uranine which shows that the coefficient of fluorescence decreases with increase in viscosity of the solution (effected by additions of glycerol) and tends towards a limiting value. C.

Light Sources: Photographic Comparison of Intensities. J. T. Lay and J. C. Cornog. *J. Optic. Soc. Amer.*, 1934, **24**, 149-154.
The chief sources of error in the photographic method of comparing light intensities of the same wave length are the variations in density over the plate caused by its irregular structure and uneven development. The causes and magnitudes of these errors have been studied by exposing 81 plates, of two different emulsion numbers to a field of illumination, the uniformity of intensity of which was measured with a photo-cell and amplifier. The main objections and difficulties associated with the photographic method are briefly discussed, and methods are suggested for their control and correction. C.

Turbulent Flowing Fluid: Theory. G. F. P. Trubridge. *Science Progress*, 1934, **29**, 61-72.
A useful review is given of the work of Reynolds, Burgers, Prandtl, Karman and others on turbulent flow. C.

Experimental Data: Integration. T. Smith. *Proc. Phys. Soc.*, 1934, **46**, 365-371.
The following mathematical deductions concern a general problem of physics as exemplified by the determination by a "standard observer" of the luminosity of the light from a given source transmitted by a filter. "The integral of a product of quantities known only for discrete values of a variable is given correctly by the single sum of the products for uniformly distributed values of the variable. Nothing is gained by increasing the number of component products beyond the number of observed values of either factor." C.

Photo-electric Colorimeter. F. and M. Lautenschläger. *Silk and Rayon*, 1934, **8**, 303-304.

***Aspergillus Niger*: Nitrogen Assimilation.** H. Härdtl. *Biochem. Z.*, 1934, **268**, 104-115.
The assimilation of nitrogen by *Aspergillus niger* increases in proportion to the mycelial growth and reaches a maximum in the first few days. The rate and amount vary with the amount of nitrogen and carbon sources. After a short time the percentage nitrogen content decreases, the decrease being greater the greater the amounts of nitrogen and carbon sources. The nitrogen of the nutrient solution is never completely used up. At high nitrogen concentrations the sugar consumption is high, probably due to intensive respiration. When the nitrogen supply is small the production of citric acid continues throughout the growth period, but when the supply is large, citric acid is only produced in the early stages. C.

Benzoic Acid Antiseptics: Utilisation by Moulds. W. Liese. *Arch. Hyg.*, 1933, **110**, 355-364 (through *Rev. Appl. Mycol.*, 1934, **13**, 371).
Attention is called to the possibility of food spoilage organisms using benzoic derivatives as a source of carbon. *Penicillium glaucum* and *P. brevicaule* grew satisfactorily in media containing 0·1% of benzoic acid, more than 0·2% of Na benzoate, 0·5% of *p*-hydroxybenzoic acid, over 2% of the Na salt of this acid, and 0·013% of its Me, Et, or Pr esters. No growth was made in the presence of Na *p*-chlorobenzoate. C.

Pancreas, Saliva, and *Aspergillus* Amylases; Presence of Two Kinds of Amylase in——. F. A. F. C. Went. *Proc. Koninkl. Akad. Wetens. Amsterdam*, 1934, **37**, 336-342.
The evidence for the existence of α- and β-amylases in malt amylase and methods of separating the two by diffusion and absorption processes are briefly

discussed. Experimental investigations of the limits of decomposition of starch by the two malt amylases have confirmed the main results obtained by van Klinkenberg. With both pancreas and saliva amylases and with taka-diastase (*Aspergillus* amylase) it is possible to hydrolyse more than 36% of starch and these results together with the results of diffusion experiments suggest that these amylases, like malt amylase, contain both α- and β-amylases. C.

The Oxidation-reduction Potential. *Wool Rec.*, 1934, **46**, 89-91.

An article dealing with *p*H and *r*H values, and with oxidation-reduction indicators. The following indicators are arranged in increasing order of oxidation-reduction potential—Neutral Red, Phenosafranine, Potassium indigo monosulphonate, Potassium indigo trisulphonate, methylene blue, Lauth's violet, Naphthol-2-sodium sulphonate indophenol and Thymol indophenol. These are used as a rule in about N/20 strength. W.

Notes on the Colorimetric Determination of *p*H of Surface Active Solutions of Textile Assistants. H. L. Jones and J. E. Smith (Delaware). *Am. Dyestuff Rep.*, 1934, **23**, 423-427.

Textile assistants which form solutions having a pronounced surface activity exert a specific effect on indicators which may cause errors in the colorimetric determination of *p*H. Measurements of the effect of a variety of synthetic organic products on a number of common indicators are presented in tabular form. The data may be used for the correction of observed *p*H values for solutions, A simple method employing dialysis through a cellophane membrane is described for the colorimetric determination of the *p*H of solutions containing textile assistants. W.

Paper: Air Permeability Measurement. F. T. Carson. *Bur. Standards J. Res.*, 1934, **12**, 587-608.

A study is described of the relation of the rate of flow of air through paper to the experimental conditions. The results show that, with few exceptions, the flow of air is directly proportional to the time of flow and to the effective area of the specimen, and inversely proportional to the thickness of the material. With the type of measuring instrument used, the results do not depend upon the viscosity of the air. The effect of relative humidity is unpredictable. The air permeability of paper was found to increase somewhat with decreasing absolute pressure, an unexpected behaviour which may be associated with an elastic expansion of the structure. Except for the absolute-pressure results, all the data agree with Meyer's equation for the flow of a gas through a long capillary tube, and indicate that the air passages in paper behave as if they were a group of capillary tubes having an average length of many times the thickness of the sheet. A definition of air permeability in relation to paper and fibre board is presented, and suggestions are made relative to a standard testing method. C.

Dew Point Apparatus. E. B. Moss. *Proc. Phys. Soc.*, 1934, **46**, 450-458.

The author describes an optical system in which diffraction by the dew droplets on a mirror aids greatly the visual detection of dew formation. An account is given of the application of this system to an automatic photo-electric apparatus for maintaining a mirror at the dew point. Results are given of experiments made to find the effect on the accuracy obtainable of the difference between atmospheric temperature and the dew point, and of varying air velocities round the apparatus. The apparatus described permits the determination of the dew point with a possible error not greater than —0·1° C., provided that the air velocity parallel to the mirror is greater than 200 cm. per sec. and that the electrical controls are correctly adjusted. C.

Patent

Amino Acids. C. F. Ferstl (Wettingen Aargau, Switzerland). E.P.411,009 of 29/9/1933.

Amino acids are obtained from substances containing keratin by heating with strontium oxide or hydroxide at over 100° C., with or without excess pressure, the strontium being subsequently precipitated with alkali carbonate and the solution neutralised by boric or phosphoric acid. A high yield of cystine, tyrosine, and tryptophane is referred to. According to examples, hair substance is treated with strontium hydroxide with or without pressure, and the product further treated as described above. G.P.378,214 is referred to. W.

10—ECONOMICS

Chinese Textile Industry: Expansion. *Spinn. u. Web.*, 1934, **52**, No. 27, pp. 14-17.

The textile industry in China has developed considerably during the last 16 years. European and Japanese firms have erected mills in China and Chinese concerns have also been established. Cotton cultivation is increasing in the province of Kiangsu and there are 35 ginneries. There are 84 cotton spinning mills in China producing chiefly 10, 12, 14 and 20's yarns. The larger concerns spin up to 60's, American and Egyptian cottons being used for higher counts than 32's. There are 231 weaving mills in Kiangsu, in addition to weaving departments run by some of the spinning companies. The large concerns run 1,000-1,476 looms. Silk, rayon and woollen mills have been established and hand-woven products of the old home industries still find a market. Knitted goods, lace and towels are produced in considerable quantities and there is a small sewing cotton industry. About 221 modern plants for bleaching, dyeing, finishing and printing are now in operation. C.

Cotton Machinery: Obsolescence. (1) T. Spencer. (2) British Northrop Loom Co. Ltd. *Text. Weekly*, 1934, **13**, 408-409.

(1) Spencer produces cost figures showing that the weekly cost of production for 181 yards of 36-inch fabric is 171·92 pence in a mill with six looms per weaver, and 183·5 pence in one equipped with fully automatic looms (20 per weaver). The chief extra expense allowed for the automatic looms is interest on capital and depreciation. (2) British Northrop Loom Co. Ltd. point out that these figures are based on the first year, that the loom speed for a modern automatic is 180, not 170 as stated, and that the number of looms per weaver and per overlooker are too small. They state that obsolescence, not low efficiency, is Lancashire's chief trouble. C.

Textile Price Indices. W. H. Slater. *Text. Weekly*, 1934, **13**, 507.

The index number for the cotton trade group of prices (based on 1913 prices as 100) stood at 106·2 in June 1934, compared with 103·2 in May, 101·1 a year ago, and 97·6 for the last gold standard period in September 1931. American raw cotton jumped from 86 in May to 94 in June and fell below 90 in July. American yarns, after the coarse counts price breakdown, became more stable and recovered about 5%. Fine yarn prices are now relatively 13·5% cheaper than the coarser American yarns. Egyptian cotton is remarkably cheap compared with any other cotton. Whilst American raw cotton has increased over 71% since 1931, cotton piece-goods have only gone up by 13%. Rayon prices, after a long period of stability, have shown an all-round reduction through the new excise duties, averaging 6d. per lb. C.

American Cotton: Price Estimate for 1935. W. H. Slater. *Text. Weekly*, 1934, **13**, 531 and 534.

The author gives a table forecasting American cotton prices for 1935 based on various sizes of American cotton crops and all other known factors at present available. Whilst American conditions and intensive propaganda favour a rise in price, yet the increasing production of outside growths (particularly Brazilian) may frustrate the plan. C.

Japanese Textile Industry: Recent Progress. *Text. Weekly*, 1934, **13**, 556-557.

Financial and trading results of the Japanese textile industry for 1931, 1932, and 1933 are shown. Despite the rise in the price of imported raw materials, the Japanese cotton spinning industry is operating at a very high standard of efficiency. Prices have risen, but the increase in the gross earnings during 1933 and the net profits remaining to the companies show that the industry has prospered since 1931. In the rayon industry production and exports have been brisk, and though the price level has been kept high for Japanese products, rayon prices were still far below the relative position of other textile products. New plants for the production and processing of staple fibre are now running and others are in course of erection. C.

Spinning Wage Lists: Anomalies. *Text. Weekly*, 1934, **13**, 512-513 and 532.

A discussion of the Oldham, Ashton, and Bolton, lists and the anomalies existing in them. C.

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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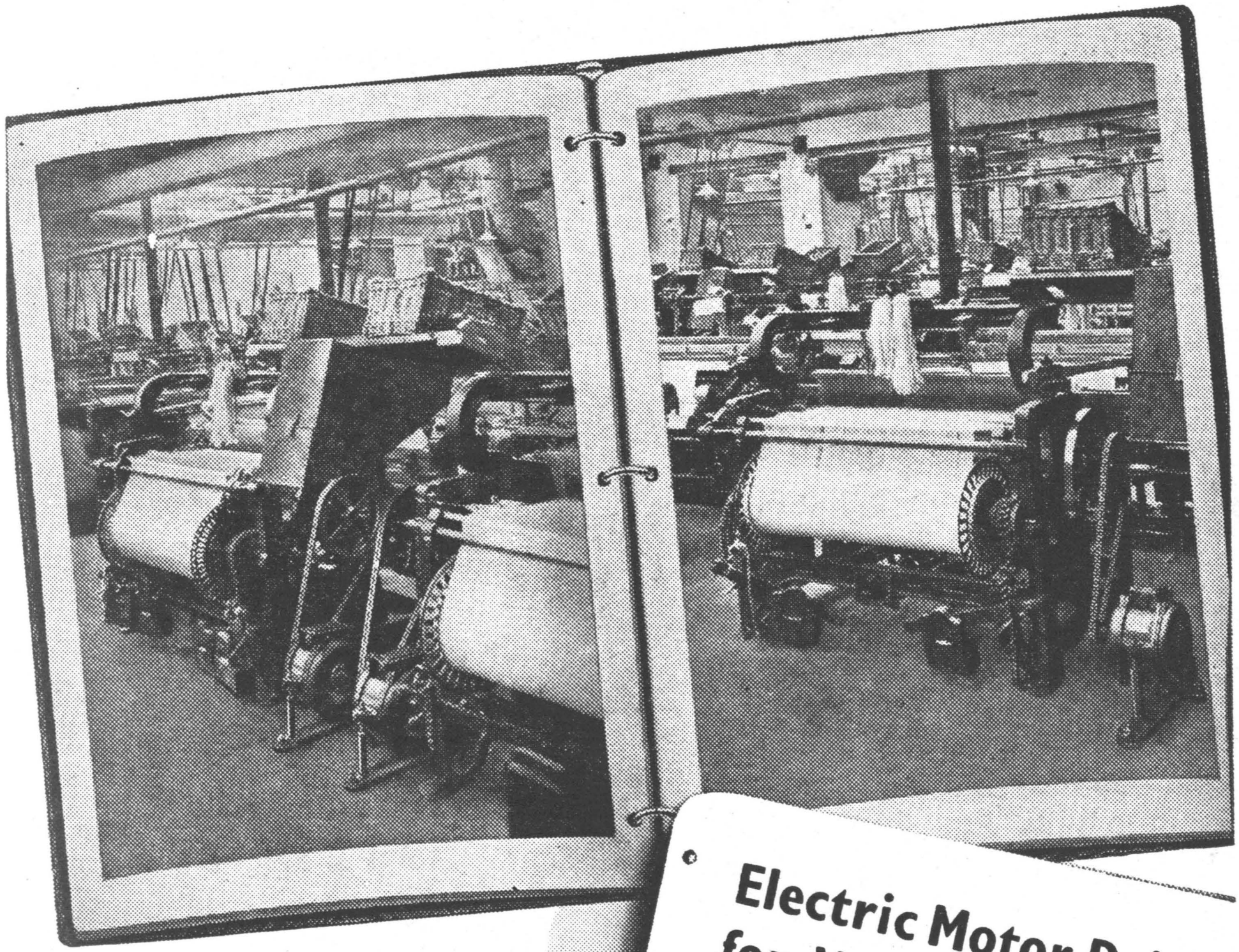

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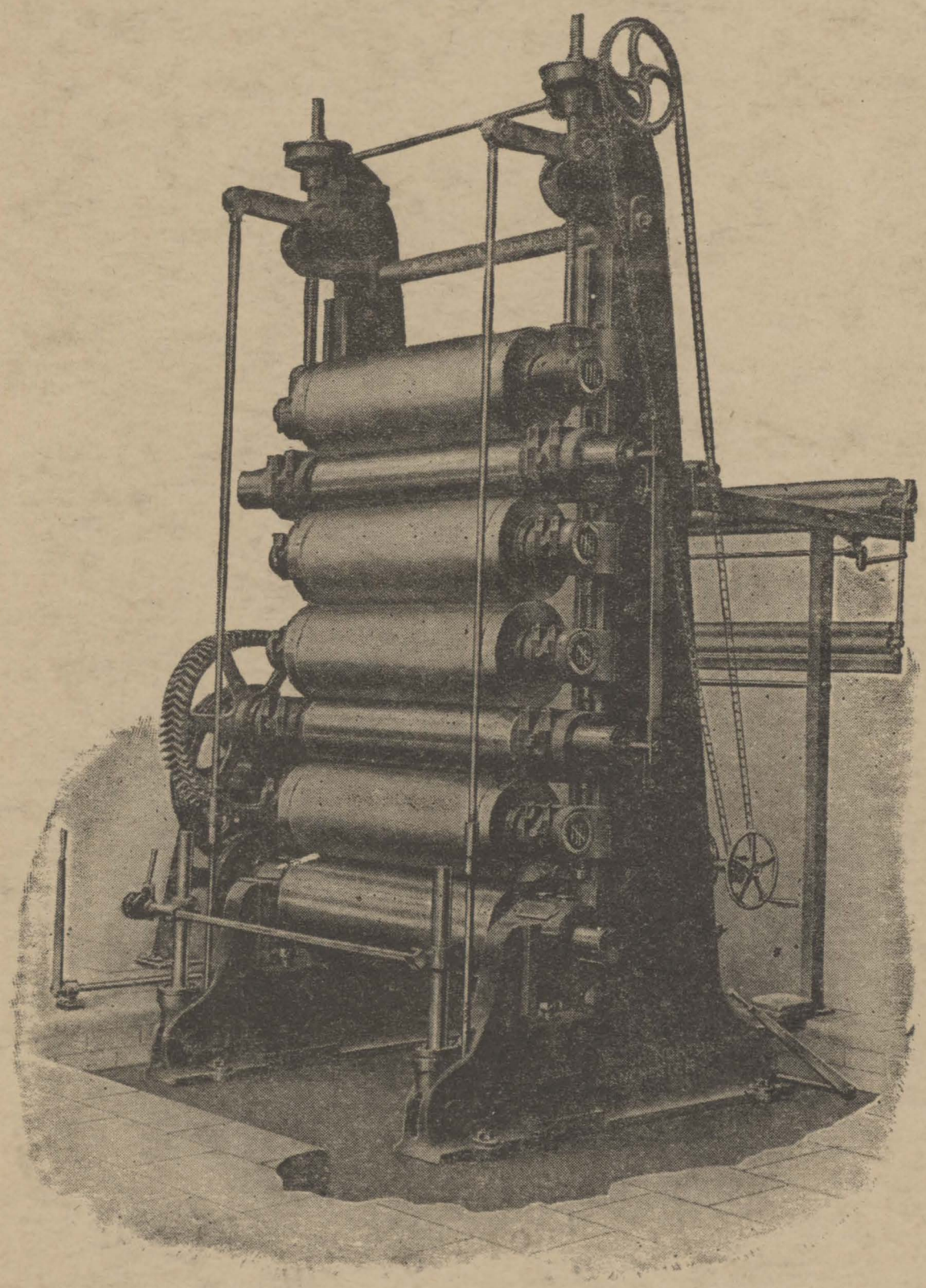

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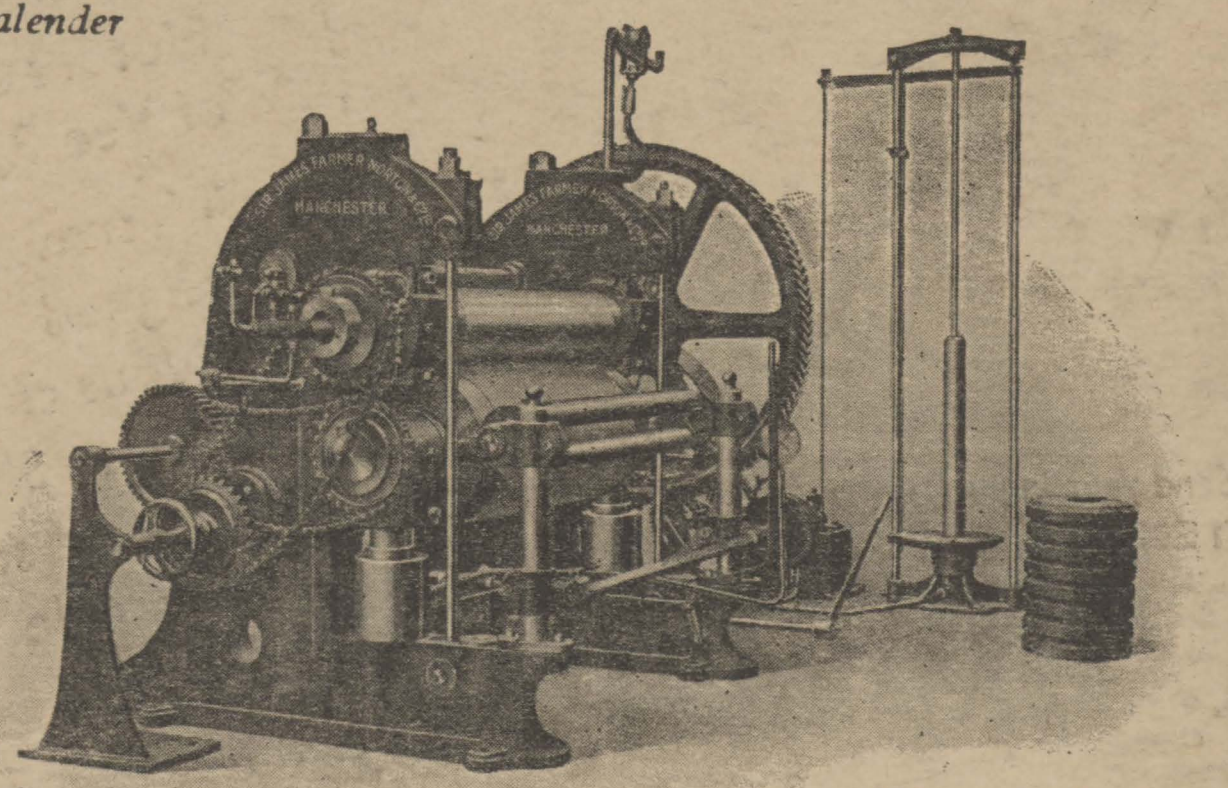

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