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The Journal of the
TEXTILE INSTITUTE

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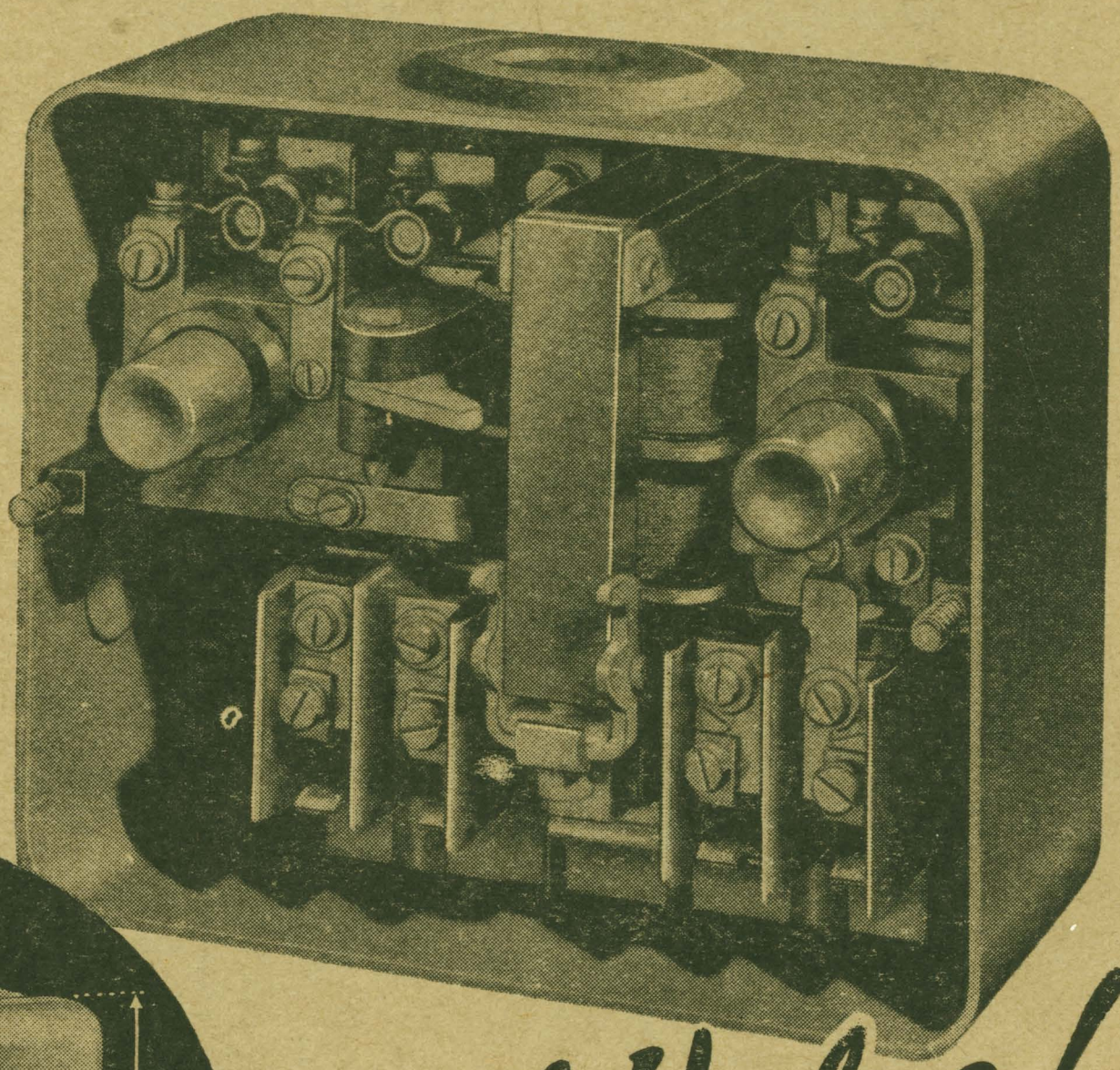

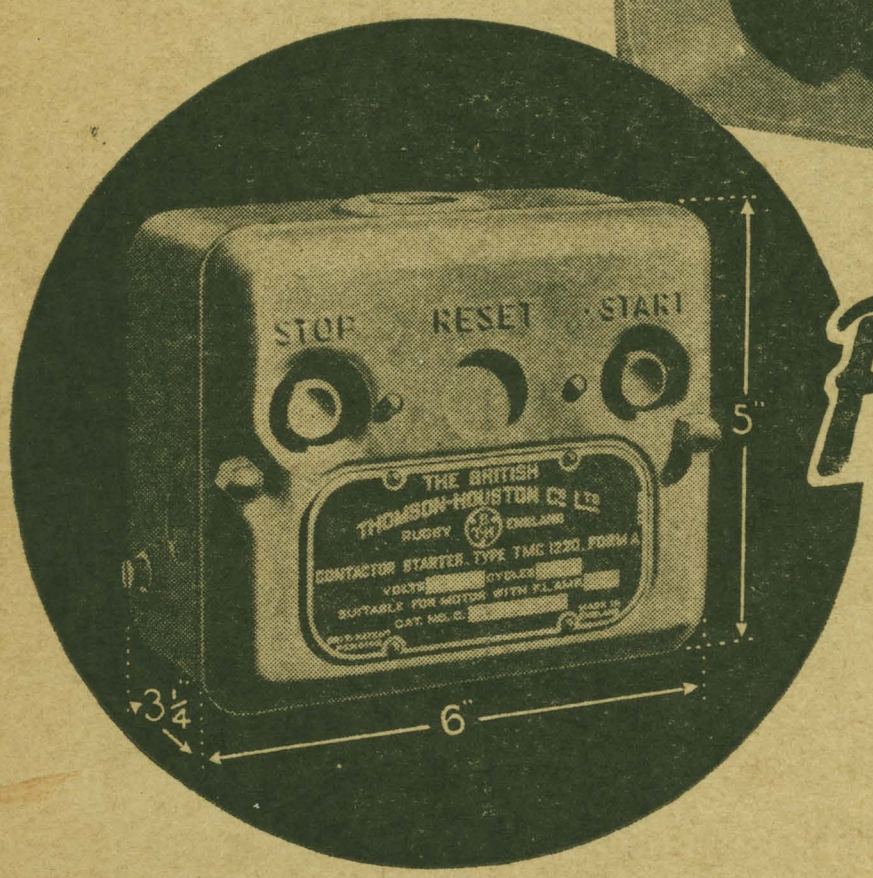

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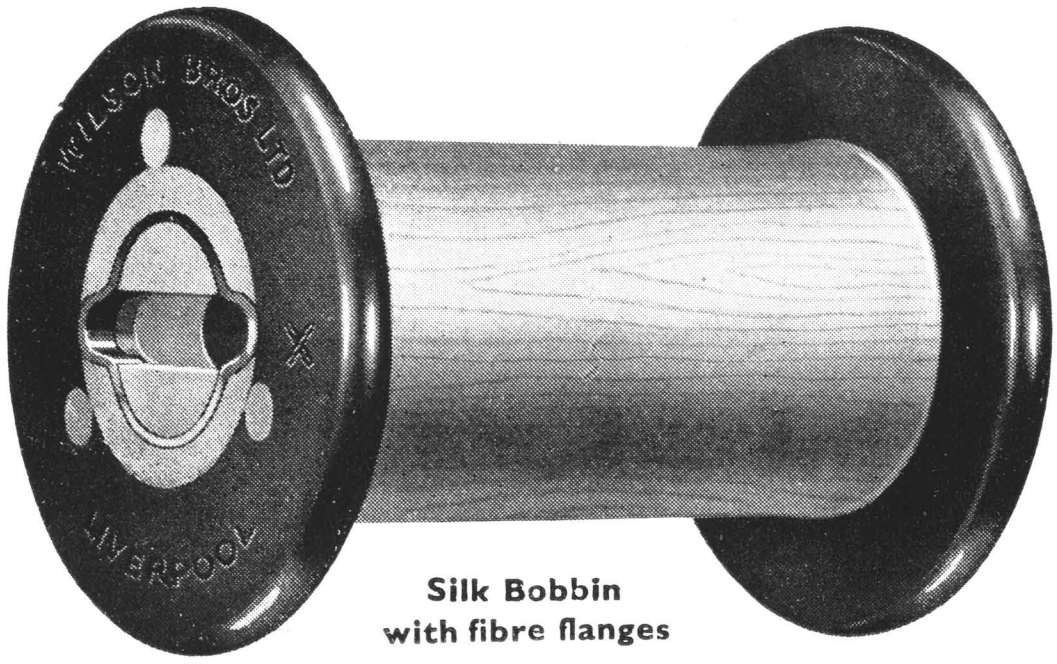

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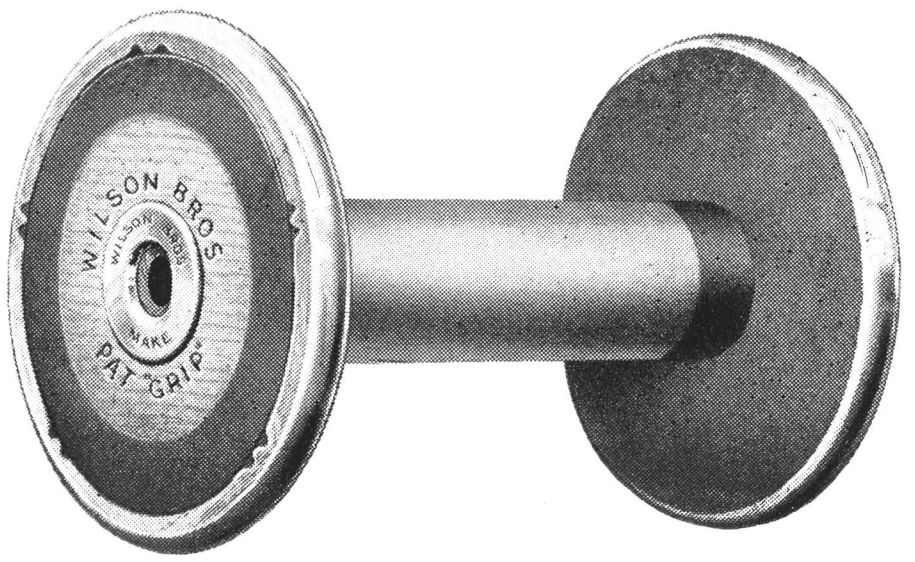

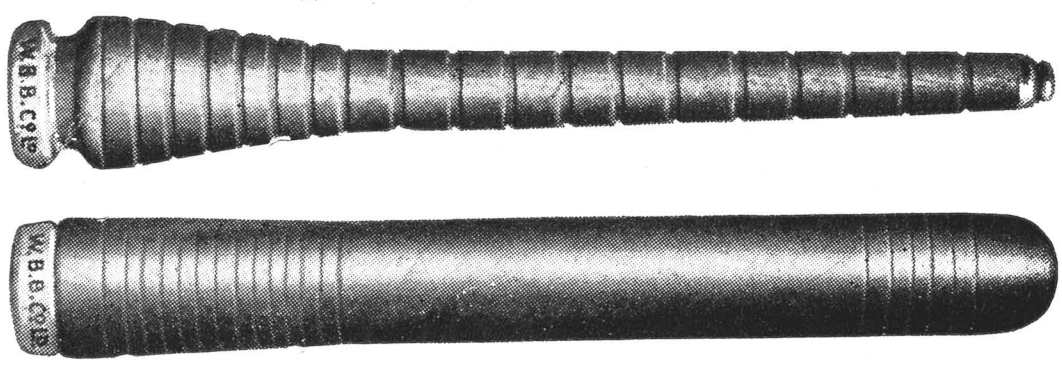

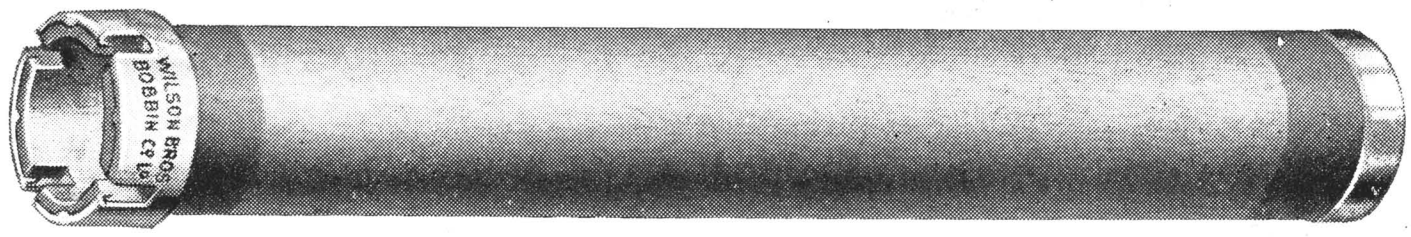

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THE JOURNAL *of the* TEXTILE INSTITUTE

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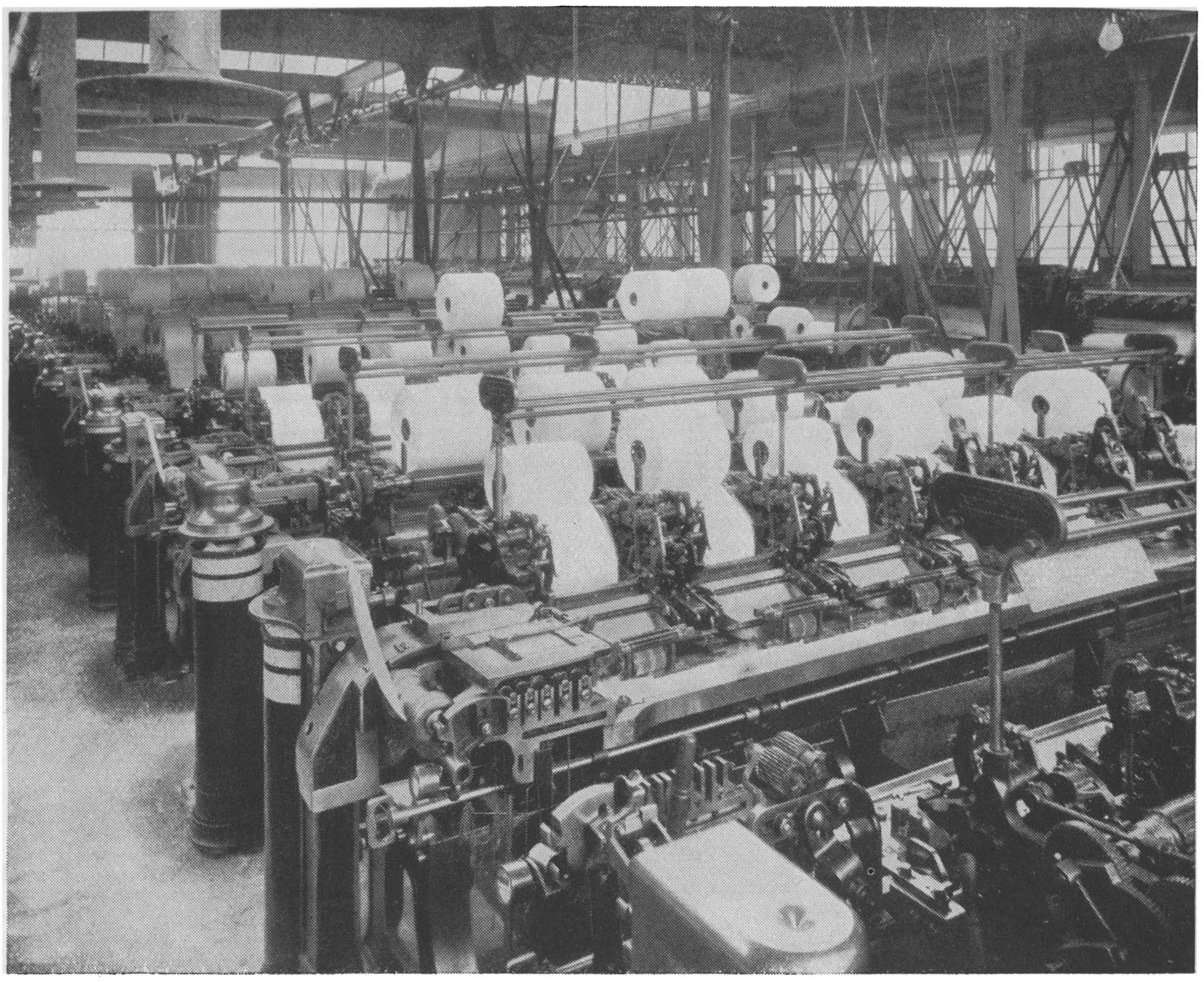

The illustration above shows an Installation of new Model Nasmith Combing Machines in a Lancashire Mill.

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THE JOURNAL OF THE
TEXTILE INSTITUTE

Vol. XXVIII DECEMBER 1937 No. 12

PROCEEDINGS

NOTES AND ANNOUNCEMENTS

Institute's Examinations

The Examinations conducted by the Diplomas Committee in connection with the award of the Associateship Diploma are to be held in May, 1938. The exact dates are:—

Part I, Wednesday, May 18th ;
Part II, Wednesday, May 25th.

Part I will be held in Manchester only, except under special circumstances. Part II will be held in Manchester and such other centres, at home and abroad, as the number of candidates warrants.

Annual Conference, 1938

This event has now definitely taken shape. It is to be held in Scotland and the headquarters chosen is the Hydro, Peebles. The period will be 18th to 25th June and special transport facilities are being arranged. One day of the period will be devoted to a visit by motor coach to the Empire Exhibition in Bellahouston Park, Glasgow. Lunch will be taken in the Exhibition. Mr. J. W. Peck, Secretary to the Committee of Council on Education for Scotland has accepted the Institute's invitation to be principal guest at the Conference banquet. A preliminary announcement with attendance forms will be issued in January and all members are asked to consider very seriously whether they should not make Scotland—and the Institute's Conference—their holiday venue this coming year. Accommodation at the Hotel has been reserved but if not taken up early cannot be guaranteed as " all the world and his wife " are going to the Empire Exhibition in 1938.

Textile Technology, Textbooks and Monographs

At its November meeting Council considered four resolutions from most responsible sources all to the effect that the present position in regard to the availability of up-to-date text books in textile technology is most unsatisfactory. In December further consideration was given to certain definite proposals designed to remedy the unsatisfactory position referred to above. It was agreed that the Institute should undertake the task of preparing suitable pamphlets or monographs at prices well within the reach of students. It was further agreed that the work should be entrusted to an Editorial Board. It is hoped to make a further announcement in this matter early in the New Year.

Annual Meeting, 1938

The President, Mr. John Crompton, at the December meeting of Council urged that the Annual Meeting in 1938 should be held in some town other than Manchester. He suggested that the venue should be Halifax. This received unanimous approval and the date was also fixed for Wednesday, 27th April. It is hoped that a good attendance will be secured, particularly of Yorkshire section members.

TEXTILE INSTITUTE DIPLOMAS

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

ASSOCIATESHIP

CROPPER, Ernest (Bradford)
DUCKWORTH, Robert Hartley (London)
GOKSON, Allen (Shanghai)
ROSS, W. Heaton (Belfast)
SUGDEN, Ernest H. D. (Leicester)

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. 140—Young man, 29 years of age, desires position as Manager in Woollen Mill, able to take full control. At present employed by firm making all types of Fancy Woollen Cloths—worsted warp/woollen weft, cotton warp/woollen weft, suitings, overcoatings, ladies' dress and coating, etc. Conversant with designing and all processes from raw material to finished cloth, and with customers' requirements. Holder of City and Guild Certs. and Diplomas. Excellent references. Experienced in handling workpeople.

No. 172—A.T.I. requires Managerial or Executive position. Full Tech. Cert. in Manufacture of Hosiery and Knitted Goods. 4 years' apprenticeship with Knitting firm, 1 year Nottingham University. Knowledge of costing, labour control and modern knitting machinery.

No. 174—Desires position of responsibility, preferably in India. Practical experience in erection of machines. 1st Class Diploma of City and Guilds of London Institute in Plain Weaving (Final). Full Technological Diploma of Bolton Technical College.

No. 175—Applicant desires position as Head Carder at a large Mill or inside Manager. Full Technological Certificate. 2nd Prize for Bolton Master Spinners on Cardroom processes. A.T.I. 5 years' experience as Head Carder. Age 34 years.

No. 176—Young man, 28 years of age, desires position as Manufacturers' City or London Representative, City and Guilds Cert. in Textiles and Distribution. Chamber of Commerce Certificate in Silk and Rayon. Ten years' experience in furnishing fabrics.

Institute Membership

At the December meeting of Council, the following were elected to Membership of the Institute:—

Ordinary

J. Atack, 66, St. James's Road, Carlisle, Cumberland (Sales Manager, Robert R. Buck & Sons Ltd., Carlisle).
B. Flitcroft, Peru (Weaving Master).
H. H. Gauntlett, " Selborne," Harrow Road, Wembley (Drapery Salesman).
E. W. Goodale, Warner & Sons Ltd., 10, Newgate Street, London, E.C.1 (Managing Director).
F. O. Howitt, M.Sc., Ph.D. (Lond.), F.I.C., 1, Vaudrey Drive, Cheadle Hulme, Cheshire (Head of Silk Section, British Cotton Industry Research Association, Didsbury, Manchester).
C. Whatmough, 2, Hilltop Avenue, Cheadle Hulme, Stockport, Cheshire.
H. Wood, 8, Stonegate Farm Road, Meanwood, Leeds, 7 (Cloth Finishing Instructor, The University, Leeds).
J. F. Wood, B.Sc. Eng. (London), 51, Melrose Avenue, Bolton (Technical Assistant, Musgrave Spinning Co. Ltd.).
R. Wood, Arran Garth, Moorville Drive, Birkenshaw, nr. Bradford (Colour Matcher, Worsted Spinners).

Junior

H. A. Griffiths, 46, Glenhaven Avenue, Urmston, Manchester (Student).
P. B. Law, 9, Garden Lane, Heaton, Bradford, Yorks. (Textile Chemist).
A. Toft, 35, Wetherby Street, Higher Openshaw, Manchester, 11 (Cloth Salesman).

Lancashire Section

SOME ASPECTS OF THE RELATIONSHIP OF ART TO INDUSTRY

A Lecture delivered to the Lancashire Section of the Textile Industry on Saturday, 9th October, 1937, by W. Turnbull, Esq., J.P.

Mr. Turnbull said: It is not my intention, nor have I the knowledge to deal with the question of Industrial Art in its wider sense, and I shall therefore confine myself to those aspects of the subject with which my daily work brings me in contact, and so I speak as a young calico printer to young designers. If in doing so I appear to be dogmatic, will you please take it that every such statement should be prefaced by " it seems to me "!

It will offer a good starting point if we consider for a moment how the calico printing trade supplies itself with designs and (what is of equal importance) colourings, these being what it lives on. I say of equal importance for I am certain that many a poor design has achieved success through good colour, just as many good designs have been rendered useless by bad colouring. Well, your calico printer sells printing, sometimes he buys cloth and sells cloth and printing, and the great bulk is sold to merchants who sell to other merchants who sell to the retailers who sell to the public. Often the merchant supplies the design; sometimes the printer gets designs from free lance designers, commercial studios or, if he has one, from his own studio. If it is the dress trade it is fairly certain that the source of the inspiration is French. Shirtings are almost certain to be English. Furnishing fabrics, cretonnes, etc., are generally English though Continental studios have easy entry into England; and one finds French, German and occasionally Austrian designers showing their rolls in considerable numbers.

Whatever the sources of the designs, they require engraving or cutting or screen making. Some of the larger firms do this important work themselves—for those who don't, there are the " jobbing " engravers, etc., who do it for them. Whoever does it, it is costly and skilful, requiring co-operation between printer and engraver. Often the " designs " are just sketches or " croquis " and need licking into shape as regards correct repeat, etc. Etches and strengths of engraving also need discussion. Sometimes the " croquis " are turned into the printer's studio, sometimes into the engraver's.

When the rollers reach the printer, sampling has to be done—if a multi-coloured design, preliminary colour sketches are done in the studio, whose head, acting in collaboration with the manager or art director, is responsible. These sketches are submitted to the merchants and are sometimes accepted by them in lieu of striking off the colourings on cloth. Whatever the method adopted, speed is increasingly a *sine quâ non*. The merchant is driven for delivery dates and he drives everyone else. Often he wants designs or sketches to a particular idea to clinch an order—and he wants it the next day! It is a sign of the times and reflects the increasing attention being given to design and colouring that in some cases the merchants are employing a designer themselves as a whole time job. An excellent move this, and one which should help them to be considerate to the efforts of others.

Multi-coloured cretonnes, linens and chintzes require careful sampling, and inquests on them are usual. Where the designer is directly employed by the printer, he is called in, though his views generally get short shrift if they are in opposition to the art director's or, more generally, the sales manager's, who naturally feels he knows what is required. Sometimes indeed he knows himself to be a better colourist than the designer—not every designer is a colourist.

Now if the printer is selling printing (or cloth and printing) to a distributor on commission, he has to submit his results to him to get his order and again there is an inquest. When the printer merchants the goods himself he usually

submits his trials to his London House which, in its turn, makes its comments. Having finally got everyone's ideas co-related, he proceeds to print stock. In the case of a furnishing fabric he finds that he has spent on design, engraving, sampling and stock between £500 and £1,000. If he has got a winner—well and good—if not, he obviously stands to lose heavily. It is easy to appreciate therefore why he plays for safety and is conservative!

The technical and scientific sides of the printer's job are involved and by no means automatic. Even when the pattern is set up in the machine, it requires all the printer's attention to keep it in fit. In his processes the cloth veritably passes though ordeals of fire and water. He must know how to deal with myriads of colours involving curious chemical changes, and he must do all this at a price and under merchanting conditions often little short of degrading. Let that be as it will, I claim for the calico printers of this country that they are second to none in the technical excellence and craftsmanship of their products! Of course, I do not claim that all their lines are equally worthy, but neither are those of the foreigners. Whether their " artistic " quality is equal to their " technical " merit is the subject of much heartburning. One thing is certain—there is always room for improvement and I take it that the *raison-d'être* of this Institute and its examinations and competitions is to help towards this goal.

From the designer's point of view the subject may be treated under four heads—Works Studios, English Outside Studios, Continental Studios or Ateliers, and Free Lance Designers.

Works Studios.

Designers employed by works sub-divide themselves into those doing more or less original work, and draughtsmen or women who are altering croquis to meet technical requirements, doing colour sketches and filling in their spare time with work of more or less original character. The head of the studio is a competent designer, capable of original work but who can direct others, and possesses a cultivated judgment. In some cases, such as the firm I represent, there is an artist who is kept away from the industry; from him we expect and get work of the highest artistic excellence, generally (but not always) of technical accuracy and a little ahead of the feeling of the moment. In addition, we have a designer of ordinary studio capacity working in our London sales-room doing original work and also colour sketches or altering those sent from the works.

It would appear that there is too much sub-division, but it is a mistake and one often made, not to recognise that in matters artistic as in most others, there are " hewers of wood and drawers of water ". My own experience is that this type of organisation fulfils its purpose of keeping the standard of work at once high artistically and yet practical technically. At the same time, your artist *qua* artist is better working away from the plant if he is to keep his ideas fresh, and he ought to be in a position to shove his head in the clouds occasionally. His occasional visits to the plant are good for him and refreshing for us!

English Outside Studios.

I have little first-hand knowledge of the inside of English studios, or less of Continental ones. I gather from my talks with some of the heads of these studios that there are much the same sub-divisions though probably not to the same extent as in the works studios—it is probable that the technical knowledge of the draughtsmen whilst adequate, is not too precise nor is it to be expected. In my experience with the work of the Manchester studios, what astonishes me most is the speed and accuracy with which they fulfil their rush jobs.

In dealing with the outside studios we ought not to overlook the engravers' studios—not all engravers have them, but there can be little doubt that for precision in such styles as trouserings, shirtings, etc., they are wonderful. I presume that in the extremely fine effects such as mottles, hair line

stripes, etc., they can avail themselves of existing dies. It is inevitable that this precision is sometimes offset by a too mechanical feeling in their work. Nevertheless their value to the trade is great. They are also past masters at turning a croquis into a working drawing and at taking out the unforeseen " strikes " in other designers' work—long may they flourish!

I am more at home with the products of the London studios working in the main for the furnishing section of the trade. It is not surprising that each studio develops and maintains its own handwriting—it is quite easy to recognise their work even though the designs be by many individual workers. Is this a good thing, I wonder? If it is *not,* is it inevitable? Within my own experience it sometimes results in one studio having a lean time whilst another is booming. Perhaps what they lose one year they gain the next—I don't know. Anyway, there can be no doubt of their ability in their own line. It will be realised that they have the advantage of the views which the head of the studio picks up in his interviews with the trade buyers. Not only so, but they have the Museums and Art Galleries at their door, not to mention the Exhibitions and the shops.

Continental Studios.

I should not be surprised if the very mention of these sends a shudder down the backs of designers present. Why, you may ask, does the Government allow them to bring their wares in free and so take the bread out of our mouths? But does it work quite this way? Is it not rather a fact that the French still take the lead, and deservedly so, in the dress trade? Whilst I am not primarily interested in this trade, those who are tell me that this is perfectly true. And is it not also a fact that without accusing the trade of plagiarism in its grosser manifestations, it yet picks the brains of the Frenchman (the German and the Austrian, too, for that matter). But as I hope not to be contentious, let us leave this aspect of the situation and look at it from another point of view. It is asserted very confidently in artistic circles that the Frenchman knows this trade inside out, that he has a flair for it and that he designs with due regard to the purpose, the material and the process—in a word, that his designs are the best in the world. Now if, as I contend, there are no better printers in the world than the English, and if the English buy French designs—the best in the world—the result should be that English dress goods are unequalled. Yet we are constantly told that this is far from being the case. Are we then driven to this conclusion—that the English buyers of French designs do not indeed buy the best of what the Frenchman offers? I do not express an opinion, but leave it with you. In arriving at your own conclusion, you ought I think to consider the psychological aspect of the question. For instance, Englishmen are not interested in the dress of their ladies—Frenchmen are. Again, Frenchwomen desire above all things to wear exclusive designs. I am far from being critical when I say that Englishwomen are only interested in exclusive designs after they have seen someone else wearing them and so feel they are in the fashion and not ahead of it.

As to the Continental furnishing designers, with one or two exceptions, I confidently place them below the English studios so far as prints are concerned, though there can be little doubt that they have been far ahead of the English studios in their presentation of woven designs. Their surprising ability to indicate in realistic fashion the incidence of the play of warp and weft has to be seen to be believed—and when, added to this, they supply you with a cutting of a previously woven fabric showing similar effects, it will be realised that they have been extremely thorough. On more than one occasion, I have found my firm's best sellers attached in this way to a design in a Frenchman's collection—I was torn between admiration for his perspicacity in recognising a good thing when he saw it, and annoyance that he should be offering me and my competitors a poor substitute for really good English work! On the whole, I think I felt flattered and did not even point out to him that he had committed

a " faux pas "! After all, as my grandfather used to say, you " cannot turn the mill with the water that is passed ", and so long as we have a lead, others are welcome to follow!

But, to return to the French studio in relation to decorative fabrics, in one respect only do I think they are ahead of the English and that is in showmanship. For instance, they are neither diffident nor aggressive. Their quiet efficiency in displaying their wares is in sharp contrast to the fumbling, knot-untying Englishman. Their designs are generally clean, with exactly the right amount of plain border for the amount of work. Nor do they fall into the error of so many young English designers of decrying their own goods. Let me add, though, that in general the designs themselves will not stand comparison with their English prototypes. For instance, they almost invariably adopt a drop repeat for a 30" cretonne—it achieves balance and entails the minimum of work. Most English designers design for the whole 30" width—a more difficult and tedious job, but infinitely more interesting. To my mind also they fall into two errors at either end of the scale—either they spoil their small designs through saving on the number of colours, or alternately, in their large designs they put far too many in. You will, I hope, take these remarks in their general sense, because there are notable exceptions.

Free Lance Design.

These designers are at once the hope and the despair of the printers. I noticed in one of my father's articles that he referred to them as the " unpaid research workers of the trade " in relation to design. Well, there is an obvious reason why this must be so. These unattached designers plough their lonely furrow. They have the great advantage of freedom from industry and are untrammelled by technical restrictions. Apart from the economic pressure of having to make a living, they can do exactly what they like when they like. The result is, sometimes, designs of a surprising freshness of outlook, though too often mixed with a preponderance of pot boilers. Few there are who can maintain their position of independence without some extraneous help, and many of the best have found their way out by joining the teaching profession or by writing a book, or both. It is a risky job and ought not to be lightly entered upon by the very young. If indeed you must do it, then try to find a partner who designs for some other branch of the trade. Pool your resources and your expenses—it will, at least, give you both the advantage of discussion and mutual assistance.

As to the Continental free lances I have had experience of only three, and they have all been good. Incidentally, they were all attached to schools and were interested more in " Kunstlerstoffe " than commercial propositions and they all faded out of our ken in a short time. Perhaps the economic pressure, or it may have been political pressure, operated to keep them in (or out of) England as the case may be.

I have not, so far, attempted to do more than describe the position of the designer and the calico printer in relation to each other, as I know it in practice. It would be pertinent to enquire into the results of their curious and somewhat haphazard co-operation. I do not intend to say very much about this aspect of it. Admittedly, our shops bear evidence of much that is commonplace and even tawdry; more that would be good, but for the too obvious signs of the derivative nature of the designs, and quite a respectable amount of really good fabrics. In addition there are always the novelties so frowned on, by the serious, and loved by the cheerful. I class myself amongst the latter—surely a little folly may be excused if it has the saving grace of humour and entertainment! This is by the way. Now I have in my short life had the pleasure of repeated visits to the Continent and to America, and it is my considered view that, if you compare like with like, this country produces by far and away the best printed fabrics. Sweden produces more interesting handwoven fabrics, and French silks and dress fabrics are unsurpassed. For economical

judicious use of vat colours, the German can teach us much. It may even be that U.S.A. has travelled much farther than some of us in the development of screen printing. In spite of all this, the time has gone by when England's participation in an international exhibition of printed goods, would do anything but add lustre to the rest; always please note if you compare like with like.

But lest we get too conceited, let me add that much of the products of the world's printing machines has nothing to do with Art. I hold no brief for it, but it is there—let us class all such rubbish amongst the things made for sale and not for use. It is not confined to our trade nor to our country, and its elimination lies in economics rather than in aesthetics.

I am not " au fait " at first hand with the efforts being made on all sides during this post-war period to improve the education of all concerned in the production of things in which good design is or should be a constituent. I do know that much effort and thought has been, and is being, put into this side of the question—indeed I am optimistic enough (or should I say young enough) to think there are already signs of results from these efforts.

To young designers I should be the last person in the world to preach. I have a very fellow-feeling with them as I realise their very great difficulties. On the one hand there is the difficulty of getting to know the legitimate demands of industry, and on the other, there is your keen desire to be allowed to express yourself in your own way. It is so terribly easy to let all one's ideals go. It is easier still to blame industry for it when it happens. But to those who make a fight for it, I would ask them to make up their minds as to what are the legitimate demands of industry, and to work to them. After all, one should not overlook the fact that criticisms come in many cases from well-informed people who have spent a lifetime at their jobs and are by no means uninstructed in the designer's art. May I just mention a few points of this kind?

(1) If in designing a 50" wide cretonne you do the obvious thing of putting your main motif bang in the centre of the cloth, you will very likely be told that this is wrong and that the pattern should have two centres, one in each half width, side by side. In other words, that your design should be 25" wide by 18" high and repeated side by side. The reason is that as 70 per cent. of cretonnes on a good cloth are used for loose covers, and as the 50" full width will cover a settee and the half width will cover an arm chair, it is necessary to have a centre for each—the settee having two, will at all events balance.

(2) If you design for a 30" cretonne intended for curtains, etc., and you so design it that it can only be used by cutting a lot of cloth to waste, it is a legitimate criticism to say so and to ask you to scheme things so that this waste will not occur.

(3) If your design involves the use of animals or figures, and you so design it that it has to be joined through these motifs in making up, you may legitimately be told that this should be avoided at all costs—it is impossible to join figures without distortion.

(4) If you are designing for reversible cretonnes and you use more than six colours you should thank your stars that someone goes to the trouble of pointing this out to you.

(5) If you have managed to get adventitious " strikes " in your design, in spite of your efforts to avoid it, you may well find some buyer who notes it immediately—just thank him if he points it out.

The great thing to remember is that if he shows the slightest interest in it, it is because there is about it something which attracts him. If you can get him to talk, listen intently.

As to the illegitimate demands of the trade, they are not so easy to define. Those which occur to me are all bound up with the appropriation of ideas to which unfortunately some designers, no less than some buyers, are prone.

Illicit copying is a slippery slope. But I have no doubt that all my young friends here will see to it that they do not place themselves on it. All our strivings for something better, all our efforts at self expression are worth nothing unless we see to it that they have their bases in common honesty. Honesty is not too common, and people who would disdain to pick your pocket, think it no crime to steal your ideas!

It was suggested to me that I should deal more particularly with the question of colour. It is quite outside the scope of my theme, nor am I competent to deal with colour in its scientific or chemical aspect. Nor do I consider it as so directly important to the designer—it is rather a matter for the chemist in conjunction with the art director. I might say though that in my opinion we in England have not been so logical as the Germans as regards designing for the proper use of vat colours. These colours are very costly and in this country they have been splashed about regardless of cost. For instance, we have not reduced the number of colours in our designs, and also we have actually based our colourings on the series which has meant giving a depth of shade without reference to the excessive cost. The German, on the other hand, has strictly limited both the number of colours in his designs for this series and also has adopted pastel-like shades, thereby effecting due collaboration between works and studio. But these are matters for the printer and his art director, as also the type of designs and colours for the naphthol series of colours.

In its aesthetic sense I find it difficult to discuss this colour question in relation to design. The trouble is that there are few criteria, except one's own feeling and personal reaction. Nevertheless, there are one or two things which a designer (particularly for multi-coloured designs) ought to have in mind. First, it is important that the colour scheme he adopts for his original design should be such as will not mislead the printer or his colourist when he comes to do alternate schemes. In other words, the original colour scheme should be a map which will pan out right when other colours are used in the same relative strengths.

Secondly, is it too much to hope that designers will not always stick so closely to the traditional type of colouring even for traditional designs? Every design seems to have the same pink, red, yellow, blue, green and black and the same old quantities and in relatively the same old positions. Why not be more adventuresome occasionally? You may say that other colourings are used, but I think it is true to say that these are usually the product of the works studios. I mean, for instance, the browns, russets, oranges, lime greens, sage greens and soft yellows, or again the blues, greys, the soft mauves and yellows, etc., etc. Young designers might well make a study of these types of colour schemes with advantage to themselves and all concerned.

When all is said and done imaginative form and sound drawing ought not to be constantly allied to a stereotyped colour scheme. If for no better reason " many a poor design has been made (and sold) by good colouring."

Just one word in a general sense—it would be interesting to know how artists begin their designs. Do they imagine them whole and complete before they begin, or do they sit at their easels and let the design flow from their finger tips like spirit writing? These are interesting speculations for a layman, but one thing I do know—I have seen many designs evolved from images created by a word, a phrase or a name. For instance, one of my sisters produced a real winner based on the phrase " industrial revolution." Other ideas which led to fruition were the " Dutch Bouquet ", " the Chinese Landscape ", " the Pleiades ", " Sea-foam ", " Alternating ", " Golden Triangles ", etc., etc. My point is that these were christened before they were born. May I suggest that this is an idea worth pursuing? One could think of a hundred titles from one's daily round, the streets, the theatres and the cinemas.. I leave it with you to think over.

The Lancashire Section of the Textile Institute met at the Municipal Technical College, Bolton, on November 24th. Mr. Thomas Dutton, F.T.I., presided and there was an extremely good attendance. In the unavoidable absence on the Continent of Mr. H. Hill, of Messrs. Howard & Bullough Ltd., his paper on " Recent Developments in Cotton and Staple Rayon Spinning Machinery " was ably read by his colleague Mr. Hunter. The lecture was copiously illustrated with slides. The paper provoked an interesting discussion which most of the questions dealt with the manipulation of " Fibro " artificial silk fibre.

A vote of thanks to the lecturer was proposed by Mr. F. P. Slater and seconded by Mr. B. Hesketh. Votes of thanks were also accorded to the Chairman and to the municipal authorities for the use of the lecture room.

Mr. Hill's lecture was printed with illustrations by Messrs. Howard and Bullough and distributed to those present.

Mechanical Irregularities and their Effect in Fabric Processing

Abstract of a lecture by Mr. E. Farrell, M.I.Mech.E., on Thursday, December 9th, to the Lancashire Section of the Textile Institute and the Manchester College of Technology Textile Society, at the College of Technology, Mr. W. A. Hanton, M.Sc.Tech., in the Chair.

Dealing with mechanical irregularities due to wear and tear, the lecturer said that they gave rise to very troublesome difficulties in finishing, such as weft distortion, warp extension, and bad stentering resulting in the damaging and " dog-legging " of selvedges. Examining some 20 or 30 machines for scouring cloth in rope form he invariably found grooving of the wooden rollers in the liquor box, the depths of the grooves increasing towards the ends of the rollers. This gave rise to differential slip between the cloth and the roller. Coupled with the roughness which soon develops on the best wooden rollers and the mode of contact between cloth rope and roller, this causes weft distortion. He therefore designed a roller covered with vulcanite and running in ball bearings which was successful in avoiding some of these defects. If greater attention were paid to preventing the occurrence of faults, it would not be neccesary to spend large sums on machines for such processes as pre-shrinking of cloth in order to avoid further shrinkage of garments made from it in the laundering processes. In somewhat similar fashion the wood lag wince, when speeded up in order to convey the cloth from one machine to another, can cause a good deal of weft distortion.

The weft straightener fixed at the delivery end of the stenter operated by accelerating or retarding the stenter clips. Its action invariably resulted in the weft becoming bowed rather than straight if the weft were behind. With leading weft the retardation of the clips gave approximately straight weft. Apparatus for correcting distorted weft before the cloth entered the stenter clips was now available, and constituted a far better arrangement than the older method of straightening weft while the cloth was under tension.

Dealing with " dog-legged " selvedges the lecturer, by means of a drawing, showed selvedge deformation to be due sometimes to tongues or grippers not being parallel to the line of connecting pins.

A very lively discussion followed and Mr. Farrell answered many questions put to him. He said he would like the opportunity to demonstrate his points on an actual stenter, showing how faults can arise and how they can be avoided as well as how they can be corrected.

Professor Morton of the College of Technology proposed a vote of thanks to Mr. Farrell. This was duly seconded by Mr. Barnes, Chairman of the Lancashire Section of the Textile Institute.

Reviews

Collins Textile Diary. Collins Clear-Type Press, London and Glasgow. 2/- net.

Messrs. Collins have added to their remarkable series of diaries a finely-produced pocket book containing information of considerable value and use to those engaged in the textile industry. The compiler has an unenviable task. Even with the help, which is not small, of good quality opaque thin paper and small clear type, the difficulties of deciding what must be included and yet keeping the size of the book within the necessary limits, are very great. Every user naturally desires to use the particular things in which he is most interested given special prominence. The balance between the many interests has been cleverly maintained and no branch of this extensive and many sided industry has been seriously neglected because of undue importance being attached to any particular section.

One superb opportunity has been missed. Page 45 devoted to a table dealing with twist in yarns could well have been sufficiently compressed to make room for the brilliantly clever designation of twist that has emanated from the States and has been sponsored by the American Society for Testing Materials. If the "S" and "Z" description does not ultimately supplant all others it will provide a wonderful example of the difficulty of changing customs hallowed by long usage. T.

Textile Testing. By James Lomax, F.I.C. (Longmans, Green & Co., London, New York, Toronto, pp. viii + 168. 7/6 net.)

Although the application of science to the textile industry is still increasing, the rate of increase is such that the appearance of a new book on textile testing is a matter of considerable importance. The industry covers a wide field, and the man who would be expert and authoritative in dealing with the wide variety of materials in the several branches of the trade would possess a very extensive knowledge indeed. He would have to be at once a mathematician or mathematical physicist, in order to deal with the interpretation of the mechanical and physical tests on raw materials and manufactured goods of high intrinsic variability, and a chemist with a profound knowledge of materials possessing extraordinarily complex structures. It is not suggested, for a moment, that the author has set himself up as such an authority. In fact, his preface clearly and succintly states that he deals with the elements of the subject in the hope that his book might be a useful guide to students, factory testers and others. Since some of the students of to-day may be the important figures in the industry of the future, it is of vital importance that works intended to assist them should be, as far as possible, beyond criticism.

The book that is beyond criticism has yet to be produced, and Mr. Lomax's book is welcome for several reasons. The parts that are good and sound will achieve the object he had in writing the book, and the work is such that the student may be encouraged to delve more deeply into the subject and study the original papers in the Literature. In another respect the appearance of the book is timely. The Textile Institute Standardisation Scheme, in which the foremost plank is the Unification of Testing Methods, has drawn to the whole subject of textile testing a considerable amount of attention. Mr. Lomax's book does the same thing, and since it thus hastens the day when testing will be far more widely applied, it serves a very useful purpose because it will convince some of its readers of the need for testing.

A reviewer must be pardoned if his criticism is confined mainly to the sections dealing with the materials with which he is most familiar. The photomicrographs (why does the author describe his pictures as "microphotographs" when the more correct term has been in use so long?) in section I are very good, though some of them might be accompanied by qualifying references. For example, Fig. 12, the cross-section of acetate rayon, is undoubtedly what is most generally found, and is what the manufacturer is endeavouring to get. But the many hundreds of cross-sections cut by the reviewer have shown every conceivable gradation between the forms shown in Fig. 12, and the "flat" dumb-bell type of which examples can be seen in

Fig. 13, which represents nitrocellulose rayon. " Flat " filaments of acetate rayon have given rise to so many fault in cloth that manufacturers have introduced modifications of spinning machinery in order to obtain some measure of control over the type of cross-section of filament produced.

The author's statement of p. 6 that the dulling of acetate rayon by means of boiling soap solutions is permanent is not correct. The lustre can be restored by appropriate treatment with acetic acid in an easily controllable fashion. It can also be restored by means of a hot iron and moisture, which goes a long way towards proving that the dulling process is a partial dispersion of the colloid rather than a simple conversion of the outer layers of the filaments to hydrated cellulose. A photomicrograph of acetate dulled by boiling in soap solution is instructive. Unfortunately it is not easy to obtain.

The best test in the world even if conducted by the most capable scientist will fail to give a true result for the consignment if the sampling is faulty. With materials of such high variability as textiles this point could well have been more heavily stressed. Dismissal in a couple of pages might leave the impression that truly representative results are more easily obtained than is actually the case. Nothing would have been lost and the importance of the sampling question would have been emphasized if a brief description of the sampling of bales of wool, tops, consignments of yarn, etc., had been given. This leads naturally to the statistical treatment of the results of tests. It is impossible not to feel that Mr. Lomax's treatment could easily have been improved by a perusal of the pamphlet published by the Shirley Institute in 1929, in which the particular needs of textile testing are adequately borne in mind. The loose arithmetical expressions on p. 92 are, to say the least, a poor example to students.

Mr. Lomax wisely advocates the replacement of the present confusion regarding twist nomenclature by the " S & Z " system which appears in the publications of the American Society for Testing Materials. Custom will undoubtedly die hard, as usual, but twist descriptions cannot be standardised too soon. " The sacred permanence of the printed word," to which Professor A. N. Whitehead refers in one of his books, may account for the frequent utilization of matter from older textbooks. Much of this has been proved to be wrong by the research work which has gone on since about 1920.

The book would have been improved, especially from the point of view of the student, by more copious references, and these would be more useful if they were collected at the ends of the various sections. Uniformity in the abbreviations of the names of Journals is desirable, and is not difficult to achieve. On p. 101 the Empire Board Publication No. 21 (" Wool, a Study of the Fibre ") has been attributed both to S. G. Barker and to A. F. Barker, which is all the more remarkable when the name of one of the gentlemen who read the manuscript is noted.

A final criticism deals with illustrations. Half-tone blocks cost more than blocks made from line drawings and frequently are far less instructive. As an example, the picture of the fibre comparator on p. 105 may be noted. A line drawing of the optical system of the instrument could easily have been substituted for a picture which conveys nothing. The explanation may lie in the saving which the publisher can effect by borrowing blocks from instrument makers, but the practice is still regrettable.

Mr. Lomax's task has been far from easy. When the call for a new edition comes, he will be able to rectify the shortcomings of the book. They have been dealt with in a manner which might appear somewhat drastic, but it is hoped that the criticism is constructive in every case. At the same time, it is felt that the book will prove of considerable use to many, and it is hoped that it will soon run to a second edition.

Industrial Fibres, 1937. Issued for the Imperial Economic Committee by H.M. Stationery Office. (Price 2s. 6d. net.)

The statistical data compiled in the Intelligence Branch of the Imperial Economic Committee show how the more important textiles have contributed to the trade revival of the immediate past. For the 1936-1937 season the production and consumption of cotton have broken all previous records. Wool production was the highest since 1929-30 and the clip was well absorbed by the markets of

the world. Rayon continues its expansion. World production of continuous filament yarn in 1936 was nearly 20 per cent. higher than in 1935 and the most notable feature was the advance of Japan to the position of largest producer. For the production of rayon staple fibre the statistics available are not so reliable. In Italy and in Germany phenomenal increases in production were recorded. World production of rayon (continuous filament and staple fibre) was about 1,300 millions of pounds in 1936 whilst cotton approached 18,000 millions of pounds. The British Empire is responsible for about 10-12 per cent. of the world's production of rayon, for nearly 20 per cent. of the world's cotton and for approximately 40 per cent. of the world's wool.

A study of the figures provided undoubtedly stimulates speculation on the trends in certain branches of the textile industry. A good example is provided by the import and export figures for wool for Japan, Italy and Germany, and their comparison with the corresponding figures for previous years. In these countries it would appear that the production and the use of rayon is likely to cause a considerable reduction in the consumption of natural fibres, whilst in this country and in the United States of America, rayon production is exerting a far smaller influence. It is as yet impossible to draw general conclusions and it would appear that rayon production must expand many times before any appreciable effect on the production of natural fibres can be felt.

It is impossible to overestimate the importance of publications of this character. The form in which the data is presented leaves nothing to be desired.

T.

Practical Loom Fixing. (Fourth Edition). By Thomas Nelson, Dean of Textile School, North Carolina State College of Agriculture and Engineering of the University of North Carolina, Raleigh, N.C. (Published by the Author.)

This useful handbook, as its title implies, is written for the guidance of loom fixers, or as they are called in this country, overlookers or tacklers. It deals, accordingly, mainly with the setting and timing of loom parts and with the causes of and remedies for faulty working of the loom. In addition, however, simple explanations are given of the working of the principal parts of the loom and reasons, wherever possible, for the loom construction described and the settings advocated.

The descriptions are simple and clearly written and are illustrated satisfactorily by easily understood line sketches.

A common fault of books of this type is that they deal in detail with only one or two particular makes of loom and are consequently of very limited interest. This fault has been avoided by the author, for whilst some of the best known American loom mechanisms, such as the Crompton & Knowles box motions are considered in detail in separate chapters, the bulk of the book deals with mechanisms common to different makes of loom.

The chapters on automatic looms of the ordinary bobbin changing and shuttle changing type are short and somewhat inadequate, which is rather surprising considering the wide use of the looms in the United States. On the other hand an interesting and full description, together with notes on its adjustment, is given of the new Crompton & Knowles super silk and rayon loom, which is of the non-stop shuttle changing type. There are also useful chapters on rayon preparation and weaving and on the simple calculations on yarns, cloths, healds and reeds which come within the scope of the overlooker's work.

The book is provided with a good index, but an unusual omission is a table of Chapters and their contents.

An interesting feature of the book from the point of view of the English reader, is the comparison it enables him to make between practice in weaving in this country and in the United States. In some respects the differences in practice may lead to some difficulty. For example, looms in America run in the opposite direction to those of English make, so that timings given for the American looms require to be adjusted accordingly. Again some mechanisms common to this country, such as the cone overpick motion, are not mentioned at all, picking being almost invariably done by underpick on American looms. A statement made by the author when dealing with the underpick motion shows the danger of being too dogmatic about loom mechanism. Referring to the

parallel motion used on American underpick looms to give horizontal movement to the picker he says " Without a parallel motion it would be impossible to run a loom because it is absolutely necessary to have the picker travel straight in the shuttle box. If the picker had to make an arc of a circle . . . . , the shuttle could not be driven across the (s)lay." This is true if the picker is fixed to the picking stick, but most English built underpick looms have the picker loose and have no parallel motion.

The author is on doubtful ground in his chapter on beating-up when he attributes eccentricity in slay movement to the relative positions of sword pin and crankshaft, ignoring the much greater effect of the relative lengths of crank and connecting arm.

In general, however, the author, if he does not go deeply into theory, is reliable, and not only overlookers, but all concerned with the working of looms, will find much of interest in this book. W.A.H.

Symposium on Wear of Metals. Held at a meeting sponsored by the American Society for Testing Materials (Philadelphia District Committee). (Published by the American Society for Testing Materials, 260 S. Broad Street, Philadelphia. Price $1.25.)

The report of this symposium contains 6 papers, one of which, by A. Palmer, Crompton & Knowles Loom Works, Worcester, Mass., is entitled " Wear of Metals in the Textile Industry."

Justice to Japan. By A. F. Barker. (Published by Jowett & Sowry Ltd., Leeds., pp. xvi + 184.)

Additions to the Library

Skinner's Cotton Trade Directory of the World, 1937-1938. Published by Thomas Skinner & Co. (Publishers) Ltd., Manchester. Price 20s. net.

According to the Preface the Hosiery and Knit Goods Manufacturers Section has been completely revised and extended.

Rayon and Silk Directory, 1937-1938. Published by the Harlequin Press Co. Ltd., Manchester. Price 21s. net.

Following closely the form of the previous issue of this valuable work of reference the new volume has increased its contents by approximately 10 per cent. New appendices giving Producers of Bleached Pulp and Rayon and Silk Production, Consumption, Imports and Exports have been added.

The British Launderers' Year Book, 1937-1938. Published by the Institution of British Launderers Ltd., London.

In the introduction to this volume attention is called to some new features. Details are given of the new Trade Order which came into operation on September 13th, 1937. The volume also contains the first published list of members of the Junior Section of the Institution of British Launderers which dates from January 1st, 1937. An appeal is made to Senior Members to help forward this new development.

Catalogues Received

The Lovibond Comparator. (The Tintometer Ltd., The Colour Laboratory, Milford, Salisbury.)

This catalogue gives the applications of the Lovibond Comparator to the determination of *p*H values for soils and solutions, phosphates, chlorine in swimming pools and many other purposes. It should find a place in every chemical, bacteriological and food and drugs laboratory.

General Items

BRITISH MANAGEMENT COUNCIL.

The Advisory Committee on Management appointed by the Governing Body of the International Labour Office, decided, in 1936, to take up again certain aspects of the work of the former International Management Institute and its second session was held on the 28th and 29th May, 1937. The International Committee of Scientific Management has requested the British

Management Council to give publicity to definitions adopted by the Advisory Committee at its second meeting, Geneva, 28th and 29th May, 1937.

It is felt that these definitions will help to remove the somewhat widespread confusion as to what Scientific Management really means.

I—MANAGEMENT, SCIENTIFIC MANAGEMENT.

(*a*) " Management " is the complex of the continuous co-ordinated activities by means of which any undertaking or any administrative or other service, public or private, is conducted.

(*b*) " Scientific Management " is management based on principles and methods that are the outcome of scientific research.

II—ORGANISATION. " Organisation scientifique (du Travail)."

(*a*) Organisation is the complex of activities the object of which is to achieve the optimum co-ordination of the functions of any undertaking, or any administrative or other service, public or private.

(*b*) " Organisation scientifique," is organisation based on principles and methods that are the outcome of scientific research.

(*c*) " Organisation scientifique du Travail," is the complex of the co-ordinated action the object of which is to achieve and maintain the optimum arrangement of work in any undertaking or any administrative or other service, public or private.

III—RATIONALISATION.

(*a*) Rationalisation in general is any reform tending to replace habitual antiquated practices by means or methods based on systematic reasoning.

(*b*) Rationalisation in the narrowest sense, is any reform of an undertaking, administrative or other service, public or private, tending to replace habitual, antiquated practices by means and methods based on systematic reasoning.

(*c*) Rationalisation in a wider sense, is a reform which takes a group of business undertakings as a unit and tends to reduce the waste and loss due to unbridled competition by concerted action based on systematic reasoning.

(*d*) Rationalisation in the widest sense, is a reform tending to apply means and methods based on systematic reasoning to the collective activities of large economic and social groups.

YORKSHIRE COUNCIL FOR FURTHER EDUCATION

Openings in the Textile Industry for Secondary School Students

In view of the wide variety of processes and the different systems operating in different branches of trade, it is difficult to make general statements on the subject of employment in the Wool Textile Industry. It may, therefore, be useful to give a brief outline of the structure of the industry in its various branches in order that references in subsequent paragraphs to types of employment may be understood in their proper perspective.

The division of the industry into the Woollen Section on the one hand, and the Worsted Section on the other, is fundamental, although it is true that there are a few firms which manufacture both woollen and worsted yarns and fabrics. Firms in both sections of the trade are to be found in most districts, but, speaking generally, it may be said that the woollen industry predominates in the Heavy Woollen Area, the Colne Valley, Morley and Leeds, while worsted yarn and cloth manufacture is carried out in Bradford, Halifax, Huddersfield, Keighley and Leeds districts.

The characteristic of the Woollen Industry from the point of view of employment is that all processes from the sorting of the wool to the finishing of the fabric are carried out by one and the same firm. The same firm may employ wool sorters, wool scourers, blenders and colour mixers, carding operatives, piecers, mule-spinners and spinning overlookers, weavers (male or female according to the locality), weaving overlookers and loom tuners, dyers and finishers, and cloth designers, in addition to a staff of wool buyers and office workers.

In the Worsted Industry, while a number of firms carry out all the various processes, most of the trade is divided into three main sections:—

(i) Wool Merchanting and Top Making, including Combing which is mainly done on commission ;
(ii) Spinning ;
(iii) Cloth Manufacturing—including Dyeing and Finishing which is mainly done on commission.

In the Wool Merchanting and Top Making section posts are available from time to time as wool buyers or top salesmen. The first step is to learn wool sorting which may entail premium apprenticeship. Salesmen are also employed in the Spinning and Cloth Manufacturing sections. In the latter section piece examiners are also required. For all salesmen attendance either at part-time day or evening technical courses is advisable. Overlookers and others in minor official positions in Wool Combing, Worsted Spinning and Manufacturing, are normally recruited from the operative staff. To prepare for these posts attendance at evening technical courses or, if possible, part-time day technical courses is necessary.

In some instances boys may have family connections in the industry and thus have no need to seek posts. Such boys might be advised to take full-time technical courses or, alternatively to spend part of their time in the works and the remainder at the technical college.

For boys who are well qualified in Mechanics and Chemistry there are fairly good prospects with Dyers and Finishers or in the Dyeworks of a Woollen Mill.

For boys and girls with creative imagination there are openings—either on the staff of a firm or as free-lance designers—in the design of decorative woven and printed fabrics and carpets. For this work a good art training is necessary and, in addition, sufficient technical knowledge to appreciate the limitations imposed by the methods of manufacture and reproduction. In this branch of work also contact with the industry as early as possible is highly desirable since the production of a design which meets the requirements of industry involves intimate acquaintance with prevailing fashions in the markets of the world.

There are also remunerative positions as designers of worsted fabrics for men's and women's wear. Since, however, the effect of these designs depends on such matters as the type and quality of fibre used, the twist of the yarn and the structure and treatment of the fabric, long experience at the mill coupled with a highly technical course of scientific training is essential.

Finally it should be remembered that there are fairly frequent and serious fluctuations in all branches of the textile trade from year to year and even over shorter periods. To keep pace with the state of trade it is necessary to be in regular contact with trade organisations and the suggestion is put forward that Head Masters should keep in close touch with local trade advisory committees to keep themselves informed of the demand from time to time in the different branches of the industry.

EDUCATION OFFICE, LEEDS. *October,* 1937.

Wool Industries Research Association. Report of the Director of Research, 1936-1937.

As in December, 1936, the Director of Research, Wool Industries Research Association, has issued a review of recent progress. The object is to acquaint the section of the industry not partaking in the Association's work with the activities of the Association and its scientific staff.

Regret is expressed that the scheme for a statutory levy on the industry, to be devoted to the financing of research work, met with insufficient support to justify the introduction of an enabling bill into Parliament. Though the proposition has had to be dropped for the present, the work of appealing to the industry for further support still goes forward. The late Lord Rutherford and Sir Clement Hindley addressed the Association in this respect on the occasion

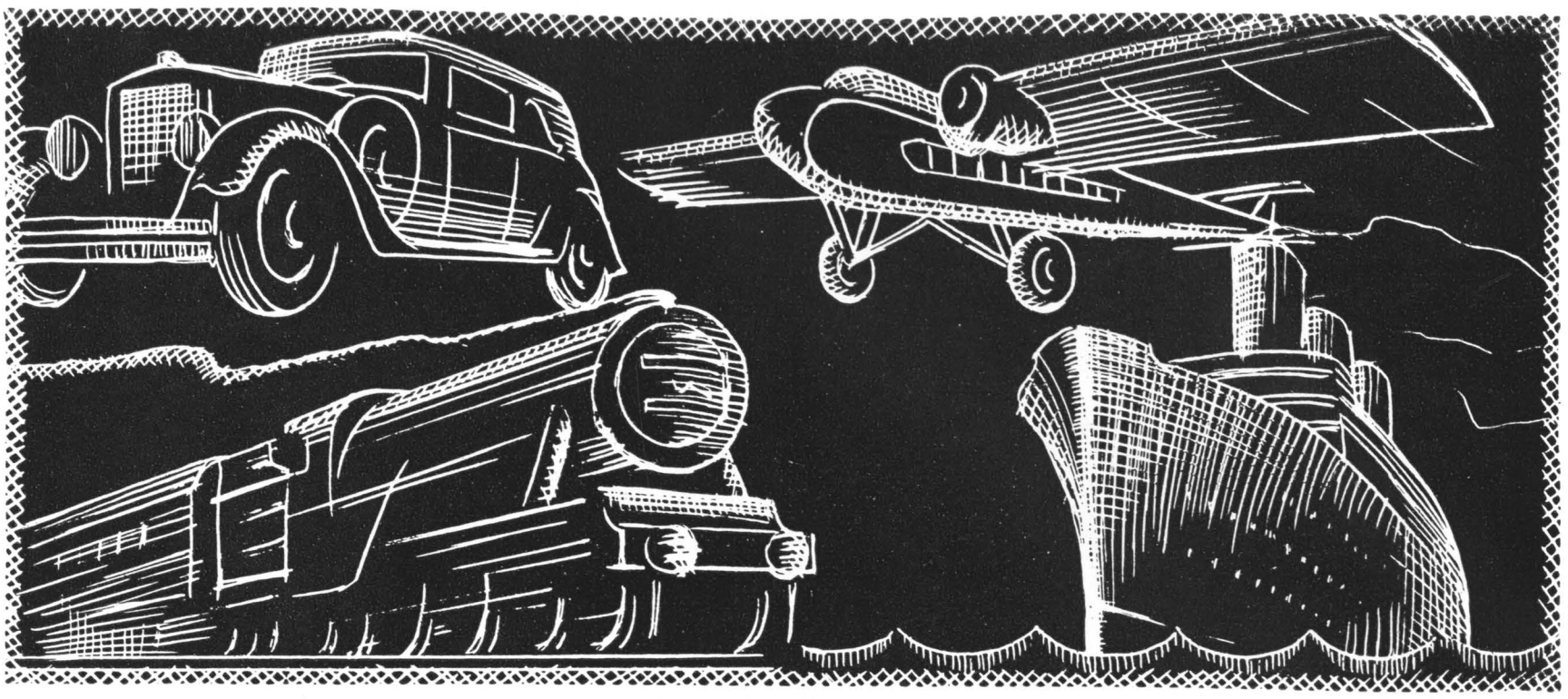
of the Annual Luncheon in April last. In August a manifesto was issued over the signatures of about one hundred prominent wool firms. The report ends with the following paragraph. " It is pleasant to be able to conclude this Report on a note of mild optimism. The voluntary shouldering of an increased burden in the financing of research by that part of the industry who are our convinced supporters is an incentive to redoubled efforts on the part of the staff, and at the same time an example to that section which refuses to participate."

The body of the report naturally deals with the progress of the work in the laboratories and its application in the mills. The processes designed to render wool unshrinkable are again discussed and their intrinsic empirical nature is stressed. Fundamental work on this subject is going forward. Wool bleaching comes into a somewhat similar category and here, also, even at the risk of being late in the field, the importance of pursuing strictly scientific work is stressed. Until the foundations have been securely laid satisfactory building cannot proceed.

Of considerable interest is the paragraph dealing with the rubberising of wool. Taking advantage of the fact that wool behaves as an acid or a base according to its treatment and environment, it has been found possible to combine wool and rubber. Application for patents to cover the rubberising of yarn in hank form without matting has been made. The processes permit of the production of strong yarns with low twist, water repellance, moth proofing, etc.

Fundamental investigation on the measurement of wool fineness proceeds, and work has begun on the difficult subject of woollen carding. Statistical criteria alone can determine the quality of the work in this important process and the collection of the necessary data will be a long and perhaps wearisome task.

The subject of oils which may be used instead of olive oil in the making of tops is still being actively studied. The translation of laboratory results into practice through the medium of large scale mill trials is essentially slow if it is to be thorough.



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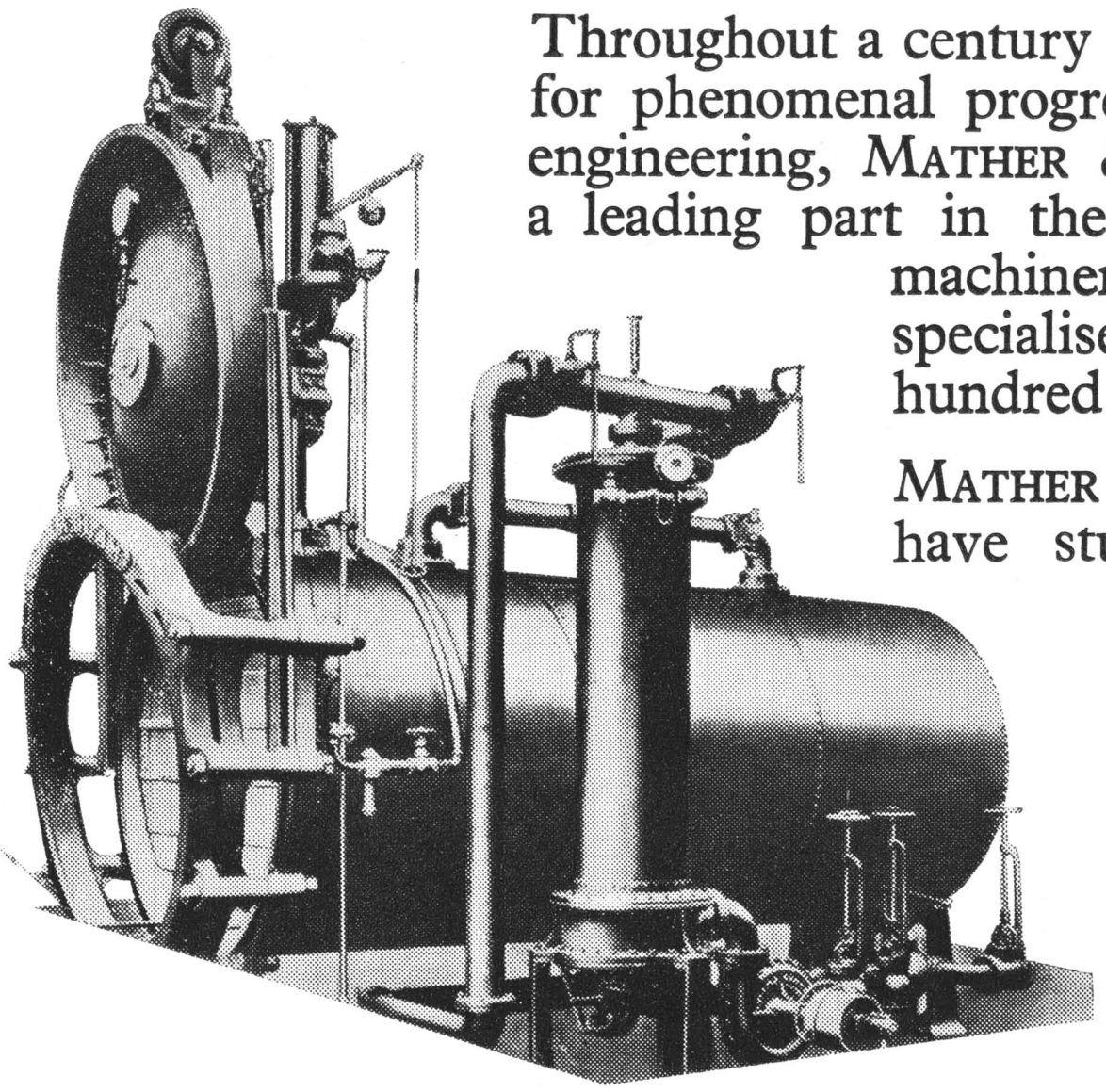

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THE JOURNAL OF THE
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TRANSACTIONS

22—A METHOD OF PRODUCING STANDARD ARTIFICIALLY SOILED WOOL FABRIC

By P. W. CUNLIFFE, Ph.D., F.I.C.
(*late* Wool Industries Research Association.)

INTRODUCTION AND SUMMARY

There is a constant demand for fabrics, soiled in a standard manner, for use in experimental work on laundry processes, the relative detergency of soap and soap-like substances, the influence of alkalis, and other related problems. The uses to which such a fabric may be put are well illustrated by the considerable volume of literature devoted to this subject. A review of work published to 1928 has been given by Rhodes and Brainard.[1] The most generally used method of soiling has been to immerse the fabric—which has usually been a cotton fabric—in a mixture of lamp-black, one or more oils or fats, and benzene or carbon tetrachloride. Numerous methods of standardising the procedure have been given, although most have depended on hand treatment. Other soiling media which have been used are carbon black, carbon and graphite, "Aquadag," "Oildag," benzol soot, ferric oxide, manganese dioxide, Indian ink and pigments, whilst stains have included fruit juice, tea, coffee, etc. The added fatty matter has included lanoline, tallow, mineral oils of various types, olive oil and cottonseed oil.

Morgan[2] (1932) has used a modified form of the soiling medium recommended by the Detergents Committee of the American Oil Chemists' Society. His formula is 2 grams lampblack; 10 grams "Nujol" (a medicinal paraffin oil); 3 grams Russian Tallow and 2 litres carbon tetrachloride. He has constructed a simple machine for soiling, in which an endless piece of cloth, 14ft. by 9ins., passes through a trough containing the soiling medium, through a domestic wringer weighted with a known load, over a series of rollers, and back to the trough. He states that the cloth can be uniformly and reproducibly soiled to a reflectivity of 11·5 per cent., using baryta as the standard.

The method of Rhodes and Brainard and the modifications introduced by Morgan have been used by several workers subsequently (c.f. Snell[3]).

Although the use of fabric soiled in a standard manner is of considerable help in many investigations, it should always be remembered that the soil which is found in actual wear is of a varied nature, so that one type of artificial soil is not likely to represent all the conditions which may occur in practice.

In the present work, preliminary tests showed the need for a constant pressure on the fabric during soiling, in order to obtain level and reproducible results. A description is given of the soiling machine used,

it being a modification of that designed by Morgan. In place of lampblack or other similar black, which has been frequently employed in the past, there is used a crystalline pigment, namely, Ilmenite, which has the advantage that it is obtainable in more definite particle size. It is negatively charged in aqueous suspensions, and its application to cloth in carbon tetrachloride suspensions follows the same lines as that of lampblack.

In soiling in an organic medium, the solvent is lost by evaporation. A new process has been devised, therefore, in which the soil is applied in the form of an aqueous emulsion containing lanoline and paraffin oil, with Ilmenite in suspension. The degree of soiling, as measured by the brightness of the reflected light, can be reproduced in successive batches to within 2 per cent., and the rate of removal of soil on washing is similarly reproducible. When the fabric after soiling is dried at 56°C., the soil is fixed on the fibres rather more tenaciously than when the drying is carried out at room temperature (c.f. Hill[4]). After storage for some months, the soil on the fabric dried at the ordinary temperature becomes more resistant and approaches the fastness of that on the heated fabric, while after 12 months, the two become identical, the heated fabric having become only slightly faster than it was originally. It is recommended, therefore, that drying should be carried out at 50-60°C. in order to prevent any appreciable change in fastness of the soil with prolonged storage.

The knitted fabric soiled in the above manner contains about 3 per cent. of lanoline and paraffin oil, but the greater part of this is removed in the early stages of washing, that is, before all the pigment has been removed.

The rate of cleansing of the soiled knitted fabric, as determined by the brightness measurements, is found to be almost constant over a range of soap concentrations, which includes those normally employed in washing, viz., 0·1 per cent. to 0·4 per cent. soap, in the presence of 0·1 per cent. or less sodium carbonate.

As is well known, the removal of soil by a detergent solution is greatly influenced by the mechanical action to which the fabric is subjected. The original object of the present work was in connection with the standard washing test for the determination of the resistance to shrinkage of wool fabrics. It was hoped that the use of a standard soiled fabric would obviate the need for specifying the type, and the conditions of running of the machine, in which the shrinkage test was carried out. This object was not achieved, there being no satisfactory correlation between the removal of soil and the shrinkage produced in different types of commercial machines. It is thought, however, that the description of the new method of producing artificially soiled fabrics, and of the behaviour of such fabrics on washing and storage, will be of use to others engaged on problems of detergency.

EXPERIMENTAL

Soiling Machine

Preliminary trials were made on the soiling of small pieces of worsted cloth by immersing in the medium in a flat dish, and subjecting to pressure by a hand roller. By these means a fairly uniform soiling could be obtained, but the degree of soiling could not be repeated very accurately.

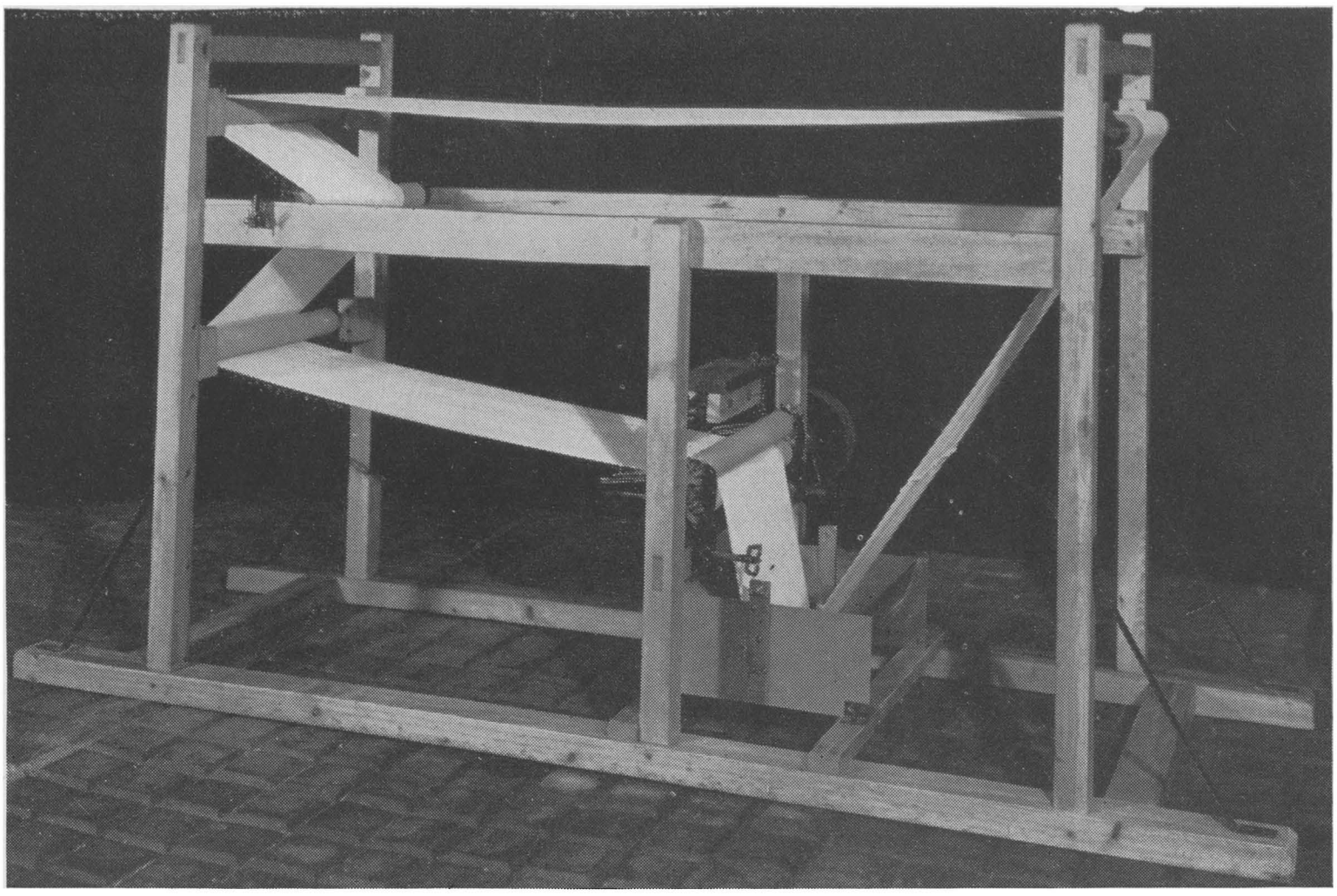

Fig. 1

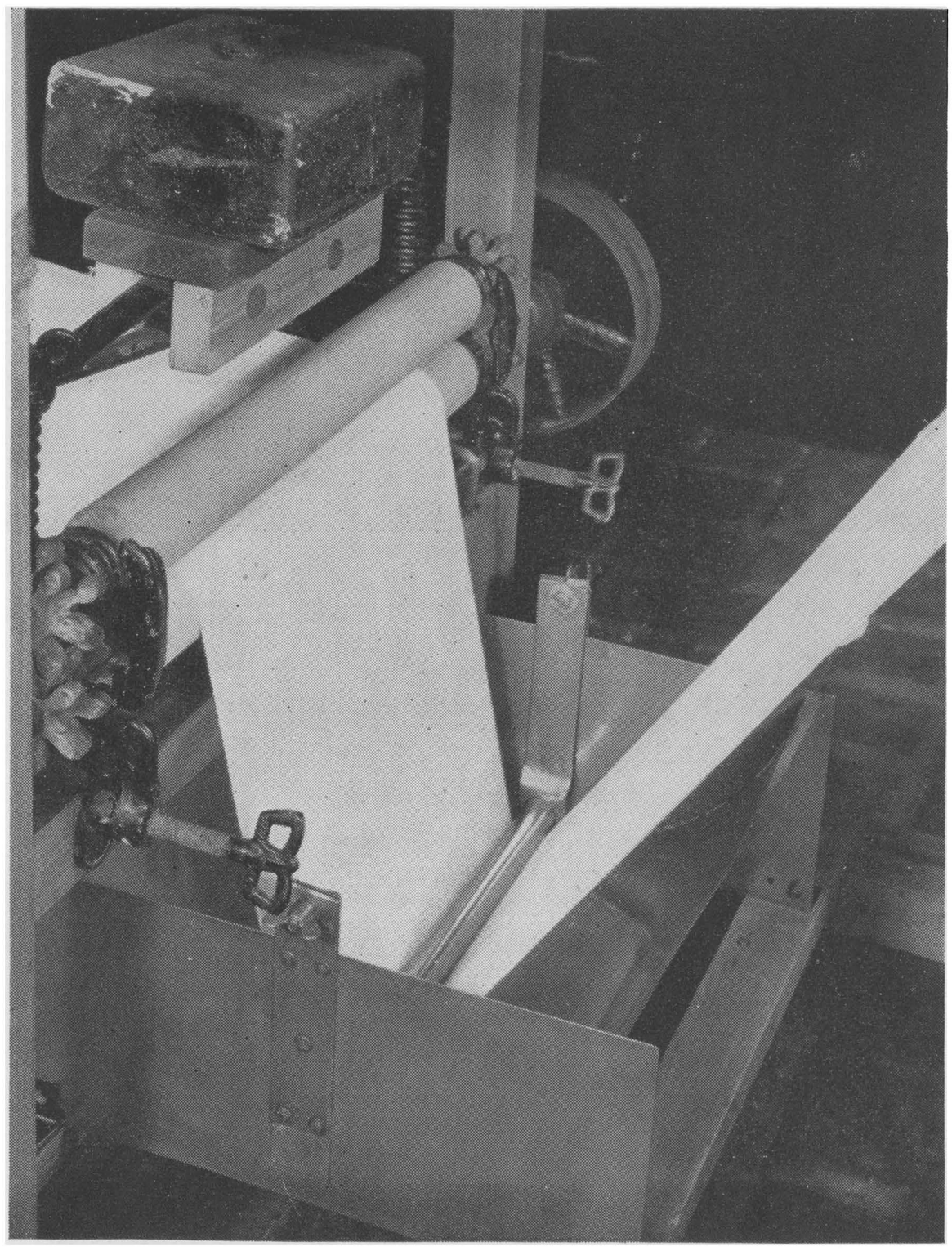

Fig. 2

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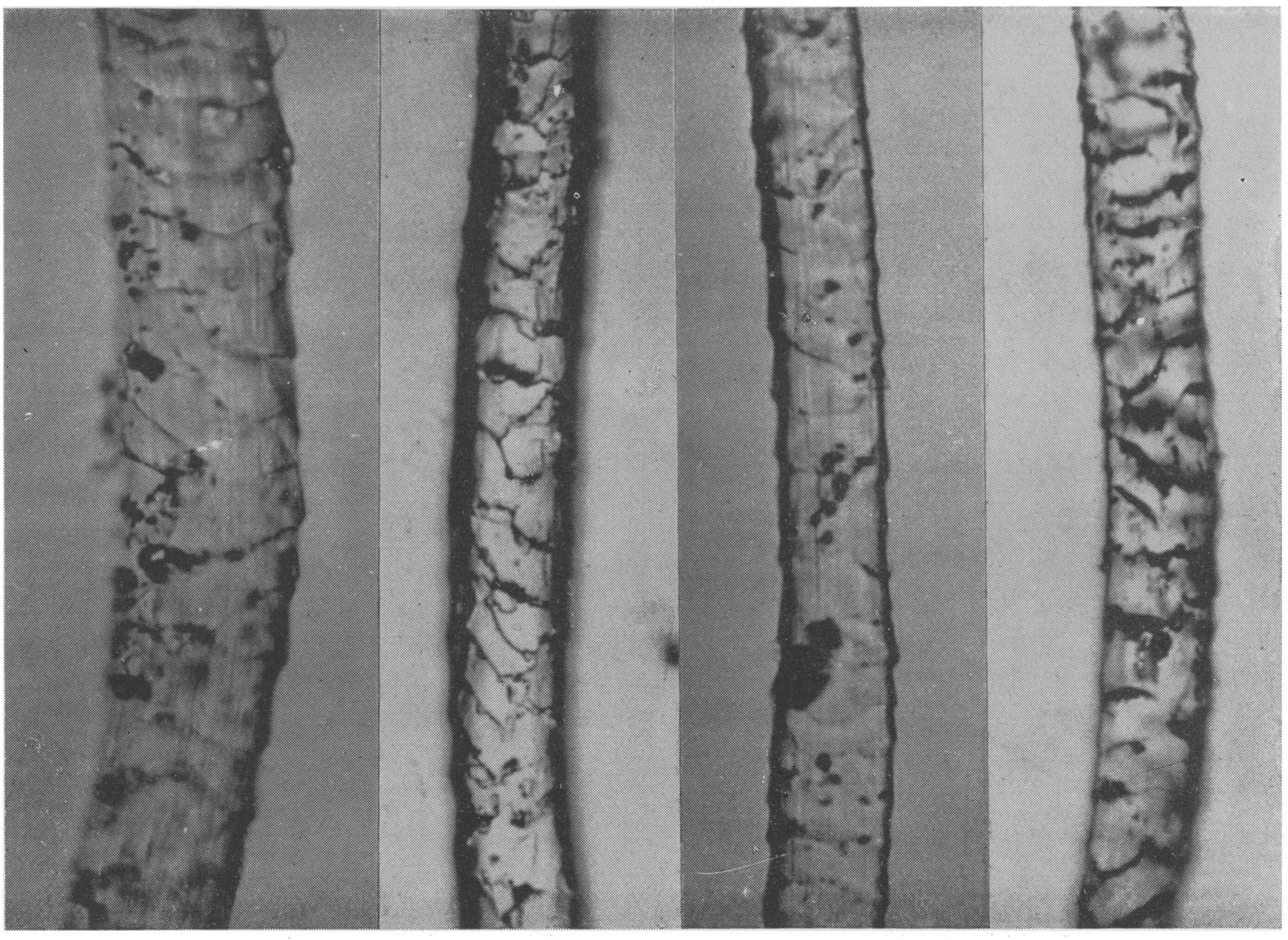

a. b. c. d.

Fig. 3

It seemed apparent that the use of a simple machine would overcome the difficulty, as the cloth could be subjected to a definite pressure, and the soiling process could be prolonged in order to give more level results.

The device which was used, was based on that used by Morgan. It consists of a stout wooden frame, about 6ft. long, 2ft. wide, and 3ft. 6in. high at the ends (Fig. 1). Rubber covered rollers, 16in. long by 2in., support the cloth, three being fixed and one adjustable. Within the framework is fitted a domestic wringer having separate end pressure screws. On the crossbar of the wringer is fixed a simple platform, on which a known weight can be placed, the end screws being left slack so that the pressure on the rollers can be varied in a known manner (Fig. 2). A monel metal trough of semi-circular cross-section is fixed below the wringer, but readily removable, and carries a 1in. stainless steel rod, free to move through about $\frac{1}{4}$in. vertically, and which serves to carry the cloth below the surface of the soiling medium.

The cloth to be soiled may be 5 to 7 yards long and 12in. or less wide, and is passed through the trough, wringer and rollers, as illustrated. Sufficient slack is given to allow the ends to be sewn together by sliding the adjustable roller to the side.

The wringer is power driven, a convenient peripheral speed being 3in. per sec., which completes one passage of cloth in one minute with a 5-yard length.

In carrying out the soiling operation, the drive is started, the soiling medium is poured quickly into the trough behind the cloth, and a definite number of passages given, depending on the degree of soiling required. When the required depth of soil is obtained, the cloth is cut at the seam when about to enter the trough, with the machine still running, and gathered up; this method eliminates standing of the cloth in the soiling medium.

Soiling Media

The media used in the preliminary work contained lampblack and several grades of carbon black. It was intended to determine the particle size in the blacks used, and to this end the advice was sought of Dr. L. A. Jordan, Director of Research, the Research Association of British Paint, Colour and Varnish Manufacturers. Dr. Jordan pointed out the difficulties of such determinations, and suggested that a more uniform product would be a crystalline black material, such as Ilmenite powder, a titanium ore, obtainable in definite particle sizes. Tests were made on various grades, the one selected finally being " air-floated Ilmenite pigment " of British Titan Products Co., Ltd., Billingham.

The pigment was first applied by the method of Morgan, using a medium of the following composition:—

Lanoline	...	...	1·5 grams
Paraffin oil (" Nujol ")		...	5 ,,
Ilmenite	...	...	5 ,,
Carbon tetrachloride	...	...	1 litre

A length of worsted serge, 5 yards by 10in., was soiled in the machine, using 1$\frac{1}{2}$ litres of the above medium, 42-lbs. on the top roller, and giving 16 passages occupying about 16 minutes. The cloth before soiling had a brightness of 76 per cent., and after soiling 13 per cent., relative to magnesium carbonate.

This procedure presented no difficulty, but had the disadvantage that the solvent was lost by evaporation. Cheaper solvents were tried, but none was able to keep the Ilmenite in suspension so well as the carbon tetrachloride.

Attention was then given to the production of aqueous emulsions, and no great difficulty was experienced in holding up the Ilmenite, provided that a stabiliser, viz., gelatine, was present. The emulsifying agent used was " Amoa A.1.," manufactured by Messrs. Amoa Chemical Co., Ltd., Grove Park, London, S.E.12. Such an emulsion was used successfully to soil a length of knitted fabric, but the soil was very readily removed on immersing the fabric in soap solution. This difficulty was overcome by treating the dried soiled fabric with a solution of sodium chloride to break the emulsion.

The following section describes the process in detail, the quantities stated being satisfactory for about 5 yards by 10in. of the double-knitted fabric used extensively in the present work.

Emulsion Soiling Process

The soiling medium is prepared immediately before use from the following substances:—

Gelatine	...	...	...	12 grams
Paraffin oil (" Nujol ")			...	30 ,,
Lanoline	...	...	...	9 ,,
Amoa A.1	...	...	...	60 ,,
Ilmenite	...	...	...	30 ,,
Water to	...	...	...	3 litres

The gelatine is dissolved in, say, 500 c.c.'s water on a water bath. The Nujol (proprietary brand of paraffin oil) is warmed and the lanoline is stirred in until homogeneous. The emulsifying agent is added, followed by the Ilmenite, and the whole is stirred for 10-15 minutes. To the mixture is then added the hot gelatine solution, and the volume made up to 3 litres with hot water, stirring constantly.

The fabric being in position on the soiling machine, with a weight of, say, 40-lbs. on the roller, the drive is started and the emulsion is poured into the trough behind the fabric. A run of 20 minutes is suitable for soiling to the extent given below.

After the soiled fabric has been dried, it is gently worked in about 10 litres of 2 per cent. sodium chloride solution for 10 minutes, rinsed in water until all the chloride is removed and again dried. (For conditions of drying, see later section.)

Several lengths of knitted web about 3 yards by 12 inches were soiled by the above procedure from an initial brightness of 64 per cent. to 11-12 per cent. The soiled fabric was almost neutral, measurements of diffuse reflection through tri-colour red, green and blue filters, giving 12.8 per cent., 12.3 per cent. and 11.3 per cent. respectively.

A length of cricket flannel was also soiled on the machine, but this, as also the serge soiled by the carbon tetrachloride method, was not considered so good as the knitted fabric. With both these fabrics, the removal of soil proceeded somewhat differently from that found with the knitted, being relatively slower in the early stages and faster in the later stages of washing.

Properties of the Soiled Fabric

A sample of the soiled knitted fabric was extracted with methylated ether and found to contain 3·0 per cent. of mixed oils and fats, the original oil content of the unsoiled fabric being 0·40 per cent. Large test pieces, weighing about 70 grams, which had been washed in commercial machines, were also extracted. It was found that the oils were removed quickly, but the pigment of the soil was retained much more tenaciously. For example, after two washes in a posser type machine, the oil content was 0·82 per cent. and the brightness 31·9 per cent., the original brightness of the soiled fabric being 11·8 per cent. A second sample was washed 4 times in the posser machine, giving an oil content of 0·58 per cent. and a brightness of 53 per cent. It is concluded that the greater part of the oils is removed in a comparatively short time of washing.

Appearance of Soiled Fibres

Photomicrographs of fibres removed from soiled fabrics show that the pigment particles are held on the fibre mainly by the edges of the scales (Fig. 3). Some fibres show a local concentration (Fig. 3a) of particles, such fibres being, no doubt, the outer ones of the fabric. On washing, the particles are gradually removed, leaving a fibre indistinguishable microscopically from the unsoiled.

Washing Tests on Soiled Fabrics. (a) Reproducibility

Two lengths of knitted web were soiled on consecutive days by the emulsion method (laboratory references AS.3 and AS.4) to almost identical values of brightness, drying being carried out at room temperature. Samples of each were given a series of washes in separate containers in an experimental wash wheel, and the brightness measured after each wash. The wash consisted of 0·2 per cent. sodium oleate and 0·1 per cent. sodium carbonate ; ratio of liquor to sample was 12:1 ; temperature 35°C., and two liquors were given for 10 and 6 minutes, respectively, followed by 3 rinses of 2 minutes each.

Table I. Washing of Soiled Knitted Fabrics

No. of Washes	Brightness	
	AS.3	AS.4
	%	%
0	11·1	12·1
1	26·6	23·9
2	43·9	39·1
3	46·7	45·0
4	45·7	48·4
5	51·1	47·8
6	53·6	50·2

After an interval of three months, another length of web was soiled (laboratory reference AS.5), but this was dried over heated rollers at about 56°C., the fabric being kept in motion.

The following values were obtained in a series of washes on the soiled fabrics AS.4 and AS.5.

The soil on Fabric AS.5 is slightly more resistant than on AS.4. The conditions of these washes were not quite the same as those detailed in Table I, but it would appear that the soil has become rather more firmly fixed on fabric AS.4, during the interval of 3 months.

Table II. Washing of Soiled Knitted Fabrics

No. of Washes	Brightness	
	AS.4	AS.5
	%	%
0	12·1	11·4
1	27·5	24·7
2	33·9	29·5
3	37·9	30·6
4	40·6	34·8
5	42·6	36·6

After an interval of 12 months from the date of soiling of the AS.3 and AS.4 fabrics, a series of 10 washes was carried out on the AS.4 and AS.5 fabrics, by each of two processes. Both processes were with 0·2 per cent. sodium oleate and 0·1 per cent. sodium carbonate, but whereas the first was a very mild wash, the second was made more severe by including 6 steel balls with each sample. The following values of brightness were obtained:

Table III. Comparison of Rates of Removal of Soil

No. of Washes	Mild Wash		Severe Wash	
	AS.4	AS.5	AS.4	AS.5
	%	%	%	%
0	11·6	12·5	11·7	12·5
1	18·3	19·6	21·1	22·2
2	20·3	21·7	25·7	26·6
3	22·4	23·5	27·5	29·4
4	24·2	25·0	31·6	31·9
5	24·9	26·3	34·7	35·7
6	26·4	27·7	36·1	38·8
7	28·3	29·4	39·5	40·2
8	28·7	31·2	41·1	42·1
9	30·7	31·5	41·3	42·9
10	31·4	33·1	44·6	45·2

The agreement between the two fabrics is good. The conditions of the "severe wash" in this test were identical with those of Table II; comparison of the brightness values in the two tables shows that the soil of fabric AS.5 is only slightly more resistant after the period of storing. Fabric AS.4, however, has become appreciably more resistant. In using the soiled fabric dried at room temperature, it is thus necessary to employ freshly soiled material, or alternatively to carry out a control test under standard conditions each time the fabric is used. From this point of view there is advantage in using the heat treatment for drying the soiled fabric, as once the soil is so fixed very little further change takes place. It is essential, however, to control the heat carefully as higher temperatures, e.g., 120°C., fix the soil very firmly. As previously stated, the fabric AS.5 was dried at 56°C., and lacking further investigation, this should be regarded as a suitable temperature.

(b) Influence of Soap and Soda Concentration on Detergent Action

In the work of Rhodes and Brainard,[1] it was shown that only a slight increase in detergent efficiency is obtained by increasing the soap concentration above 0·1 per cent. Morgan,[2] on the other hand, found a definite increase in efficiency until a maximum is reached at 0·25 per

cent. In the present work, a series of washes in the wash wheel with different concentrations of soap and soda gave the following increases in the value of brightness over that of the unwashed fabric, the soap being sodium oleate and the alkali sodium carbonate.

Table IV

Wash Liquor.	Brightness Increase
0·1% soap + 0·1% alkali	30·7%
0·2% soap + 0·1% alkali	31·9%
0·4% soap + 0·1% alkali	31·9%

The detergent efficiency does not vary appreciably over this range of soap concentrations.

These results were checked by a series of washes in a 24 by 36in. rotary machine, kindly carried out by a co-operating firm, Table V showing the increases in brightness obtained.

Table V. Influence of Soap Concentration on Detergency

Wash Liquor	Number of Washes					
	1	2	3	4	5	10
Water only (i)	1	3	6	6	7	9
Water only (ii)	2	3	4	4	5	—
0·15% soap + 0·04% alkali (i)	12	23	27	27	27	31
0·15% soap + 0·04% alkali (ii)	12	18	20	23	25	—
0·1% soap + 0·1% alkali	13	20	25	29	31	32
0·4% soap + 0·1% alkali	14	19	23	26	28	28

It may be noted that the increase in brightness obtained in the laboratory tests (Table IV) is almost identical with that obtained in 10 washes in the rotary machine (Table V).

The increases in brightness obtained in the rotary machine are not so regular as those found with the wash wheel, but allowing for the difficulties of giving uniform treatment to a sample forming but a small proportion of the total load, it is concluded that over the range of soap concentrations investigated, the rate of removal of soil is constant.

(c) Influence of Mechanical Action

It was hoped that the soiled fabric could be used as a means of calibrating commercial laundry machines in an investigation designed to set up a standard method for testing the resistance to shrinkage of wool fabrics. It was realised that the different types of machine subject the goods to different degrees of mechanical action. If, however, a time of treatment for each machine could be given, such that a piece of standard soiled fabric increased in brightness by a given amount, the peculiarities of the machine would be eliminated.

The influence of mechanical action on the rate of removal of soil and its relation to shrinkage was investigated on the wash wheel. Two identical samples of unsoiled knitted fabric, which had received no treatment other than scouring, were washed at the same time and with the same amount of soap and soda, but in different vessels. In one of the vessels, six stainless steel balls, $\frac{3}{4}$in. in diameter, were added, in order to increase the mechanical action. In the other, no addition was made. A small sample of the soiled fabric AS.5 was included in each test. After

2½ hours, the shrinkages in area were 6·1 per cent. without steel balls and 28·4 per cent. with steel balls, while the increases in brightness of the soiled samples were 15·2 per cent. and 30·2 per cent., respectively. This and other similar results indicated that it might be possible to use the standard soiled fabric in the desired manner, although there was no simple relation between the rate of shrinkage and the rate of increase in brightness.

When similar tests were carried out in five commercial laundry machines of three different types, it was found that a given increase in brightness was accompanied by widely differing amounts of shrinkage. It was concluded, therefore, that the soiled fabric could not be used to standardise the commercial machines. Nevertheless, there would appear in this connection to be a use for the soiled fabric when a particular machine is under investigation with the object of establishing the conditions under which minimum shrinkage may be obtained consistent with reasonable cleansing.

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23—METHODS FOR THE ESTIMATION OF MEDULLATION IN WOOL SAMPLES

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INTRODUCTION

The requirements of the manufacturer in regard to freedom from medullated fibre (hairiness) in wools destined for use in standard fabrics in both the woollen and worsted trades have been widely discussed at various times from the viewpoints of both the consumer and the producer of the raw material. Unfortunately, up to the present time, no satisfactory method for the quantitative expression of the defect has been available, and while it is well known that coarse medullation has an effect on the value and potential uses of wool, exact research into the problem has not been possible owing to the lack of a means of measurement. Medullation can be detected by hand and eye only when it exceeds a certain coarseness, and the effects of fine medullation on the behaviour of material during processing and in wear seem to be entirely unknown; it seems reasonable to expect that the exact expression of this defect may have an important bearing on the problem of " quality " specification. Further, from the animal husbandry aspect, consideration of wool and carcase quality as both contributing to the breeding value of an animal make essential a finer discrimination than can be achieved by traditional methods if economic wool improvement is to be realised.

The " Benzol " Test

Studies of medullation undertaken in New Zealand made apparent the need for an accurate and rapid technique capable of giving a numerical index to the medullation of a sample of wool, and the " Benzol " test was introduced by Elphick (1932). In this test a small staple of wool is cleansed in petrol, teased out into a thin film of fibres and immersed in benzene in a flat dish over a black background. Medullated fibres stand out white and chalky while pure wool becomes almost invisible. The quantitative application of the test proved difficult; discussing the evaluation of the medullation revealed, Elphick has pointed out that there are four factors which must be taken into consideration in an estimation of the percentage volume of medulla, which he regarded as the ideal index:

(1) The percentage of fibres medullated.
(2) The average distance down the fibres which medullation extends.
(3) The average diameter or coarseness of the medullation.
(4) The average diameter of the fibres in the sample.

In order to arrive at an empirical index, he estimated the first two of these visually, calculated the percentage of medullated fibre in the staple, and weighted the result arbitrarily according to the type or grossness of the medulla. Effects of variation in fibre diameter were small compared with the total range of values and were neglected. Thus a sample considered to contain 50 per cent. of its fibres medullated for a distance of half their length was scored as $50 \times \frac{1}{2} \times 3 = 75/300$ if the medullation was

" coarse ", as 50 × ½ × 2 = 50/300 if the medullation was " medium ", or as 50 × ½ × 1 = 25/300 if the medullation was " fine ".

After using the method in work on fleece mapping, Elphick came to the conclusion that while it was the best means then available for classifying the large number of staples under examination, it could not be regarded as satisfactory owing to the personal element involved, especially as the method of weighting the result on the basis of medulla diameter masked the comparatively accurate estimation which could be made of the first two factors. It was recognised, also, that the method used was purely empirical, and Elphick proposed to relate the figures to the percentage volume of medulla determined by some absolute means. Preliminary investigations on the determination of the specific gravity of the wool samples had been commenced when unforeseen circumstances brought the work to a standstill.

EXPERIMENTAL

The Evaluation of Medullation. —1. Visual Estimation in Benzene. The Percentage Volume of Medulla

At the commencement of the present work, a number of estimations were made using Elphick's technique, but repeats on the same samples, even after quite short intervals, shewed that considerably more experience than that gained by the testing of a few hundred samples would be necessary before any degree of reliability could be achieved. In an analysis of the sources of error, it was found that different persons using the same samples varied very considerably in their estimations of the percentage of fibres medullated, while microscopic counts of samples carefully examined by Elphick shewed that even with an experienced observer the percentages estimated did not necessarily coincide with the microscopic values. It was obvious, too, that unaided visual estimation of the percentage of medullated fibres was affected by medulla diameter to a much greater extent than had been expected. Finally, it seems that the estimation of the coarseness of the medulla, which Elphick points out can only be divided into four groups visually, must be the limiting factor in evaluation by this method, even assuming reasonably fine discrimination in the case of the first two factors and an accurate estimation of fibre diameter.

The Evaluation of Medullation.—1. Visual Estimation in Benzene. The Percentage Total Fibre Length affected by Medullation

While not of such a fundamental nature as the percentage volume of medulla, the percentage of the total fibre length in the sample affected by medullation offers a sound basis for estimation and selection of animals for breeding purposes. As a temporary measure a method for its visual estimation was developed, the figures being supplemented with a brief description of the type and distribution of the medullation. A photographic standard was prepared having narrow zones shewing the appearance in benzene of various percentages of medullated fibre at a standard degree of teasing of 300 fibres to the inch. Samples teased to this thickness, which could be readily reproduced to within 5 per cent., were immersed in benzene and estimations of percentage medullation were made by comparison with the standard at intervals equally spaced down the staple. For routine work seven estimations were made on each staple, corresponding to one inch intervals on the average Romney staple

of about seven inches. Results obtained by this method were found to be in good agreement with checks made by direct counting, and it was found that provided attention was concentrated on the average distance between adjacent medullated fibres when making comparisons, variation in medulla diameter did not affect the accuracy of the result.

The method proved slow in routine use and modifications have been made by other workers at this college, but it is not known how completely the effect of medulla coarseness on the estimation of percentage has been eliminated in the amended technique. While the simplicity of this visual method was a very strong recommendation, making it available to the individual sheep breeder without modification, the fact that accuracy could be obtained only with considerable sacrifice of speed of working made the exploration of other possibilities desirable.

The Evaluation of Medullation.—2. Estimation by Optical Methods

Since hair reflects considerably more light than pure wool when in benzene, an integration of the amount of light reflected, i.e., the apparent whiteness of the sample, might be expected to serve as an index of the degree of medullation. At first sight it might appear probable that this amount of light would be a function of the surface area of the medullae, in which case a linear relation between light reflected and percentage volume of medulla would not obtain. Thus a given amount of fine medulla would have a greater surface area, and hence reflect more light, than the same amount of coarse medulla. There are, however, such a large number of factors affecting the issue, that one cannot regard such a relation as being established on *a priori* grounds. The effect of the internal structure of the medulla upon its apparent whiteness, the distorting effect on apparent diameter due to the cortex of the fibre acting as a lens, reflection from the ends of small sections when the medulla is discontinuous, and probably many other factors, would all require careful evaluation. Actually, however, a linear relationship has been established between measurements of light reflected and the percentage *volume* of medulla calculated from specific gravity measurements. (See Table V.)

Preliminary Experiments

A first attempt was made to measure the amount of light reflected from a moderately hairy sample in benzene, when placed in the beam from a projection lantern, with a Lumner-Brodhun cube, but the intensity of illumination was too low for the instrument to be applied successfully. Further experiments were next made by means of a photo cell of the " blocking layer " type (Weston, " Photronic "), and the results indicated that if used in conjunction with a suitable registering instrument, it would be capable of measuring the light reflected from the wool with considerable accuracy. A constant source of illumination, capable of producing an evenly distributed luminous flux over the tray, was essential if a given amount of medulla were to give a constant reading without reference to its position in the tray.

During the development of the photo-electric apparatus, such difficulty was experienced in obtaining uniform illumination of the tray surface, while at the same time maintaining sufficient intensity to give the required sensitivity, that attempts were made to measure the amount of light *absorbed* by the medullated fibres. It was concluded, however, that any

method relying on the measurement of light absorbed by the medullation, while at the same time retaining the physical condition of the sample necessary for its visual description, could not give satisfactory results. In the case of experiments with transmitted light, the variations in light flux falling on the photometric surface, due to fluctuations in the source arising from line voltage variations, are superimposed on the variations due to the actual absorption. In the case of measurement of light reflected by the medullation, on the other hand, the fluctuations bear a constant ratio to the quantity being measured, since the light reflected by the tray filled with benzene is almost negligible. Thus in the former arrangement the ratio of the changes due to absorption to the other sources of variation in the quantity measured is not sufficiently high; the possibility of error being between 5 and 10 per cent. of the actual absorption.

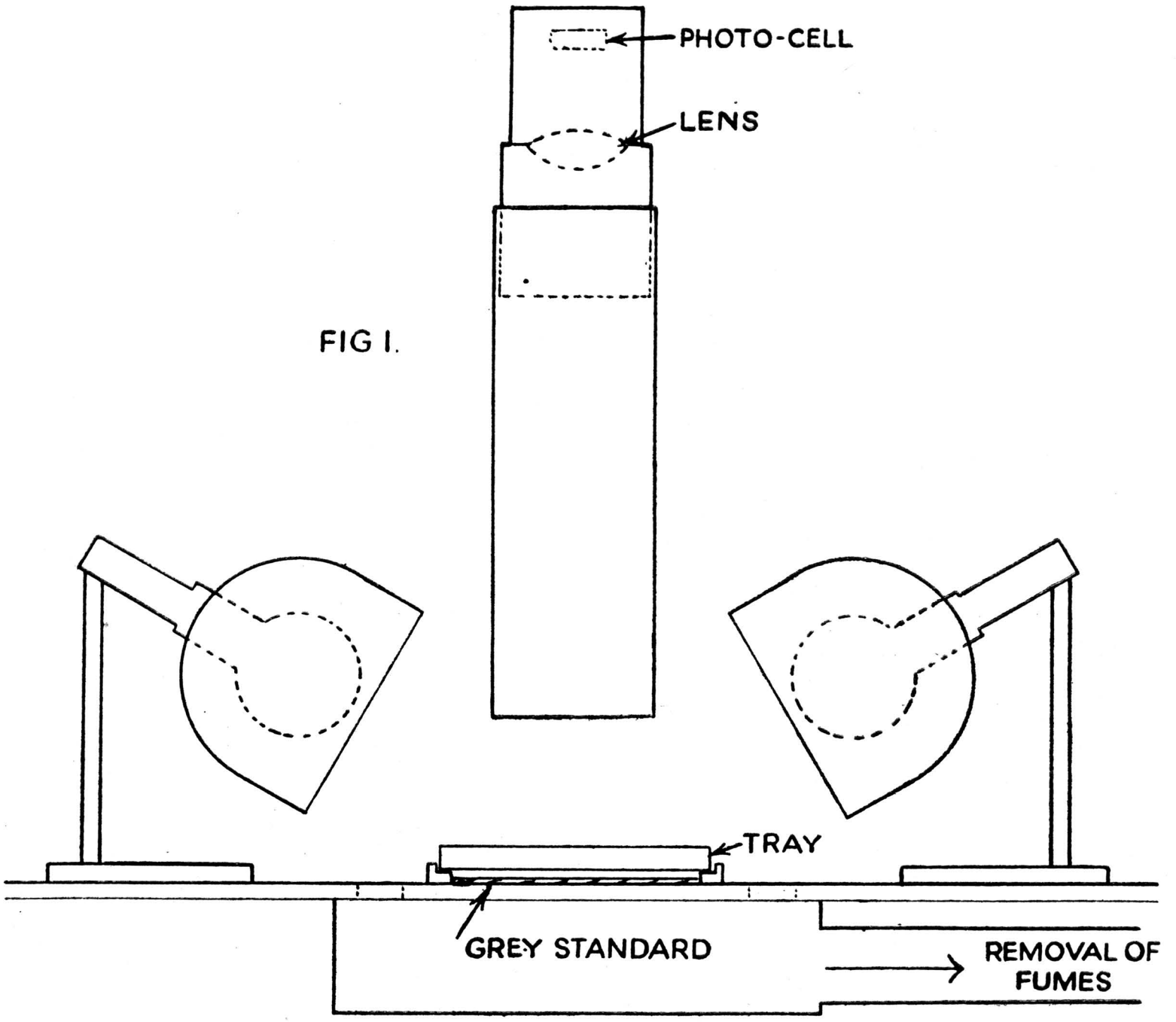


FIG I.

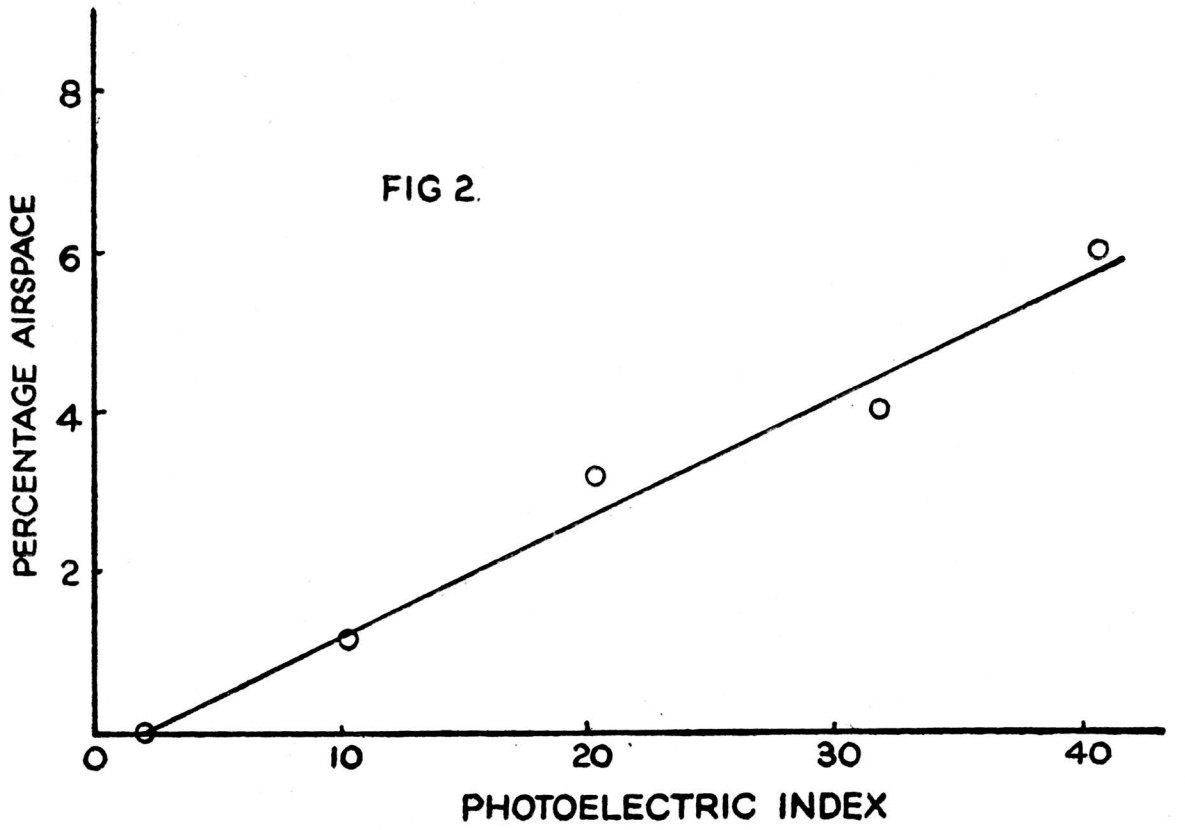
The Final Apparatus.

(*a*) *General.* The form taken by the final apparatus is illustrated in Plate I and shewn diagrammatically in Fig. I. It will be seen that the instrument consists essentially of a system of lighting which illuminates the wool, lying immersed in benzene, and a simple optical arrangement by means of which an image of the illuminated sample is produced on the light sensitive surface of a photo-cell. A direct reading is obtained on the galvanometer scale, the instrument being standardised between readings by means of a grey enamel plate. The latter lies directly under the tray, and is exposed to the lamps and cell when the tray is withdrawn for the purpose of changing the sample.

(*b*) *The lighting system.* Difficulty experienced in obtaining intense yet even illumination, due to the action of the inverse square law, was obviated by resort to light sources having large emitting area relative to

their distance from the surface to be illuminated. Supplemented by suitable matt surface reflectors, four 200-Watt Phillips' "Argenta" lamps were found to give the desired conditions. With the present arrangement fine control of line voltage was not essential, and manual control by means of a rheostat and voltmeter were found satisfactory. An attempt to use ballast lamps for the stabilisation of power supply proved unsuccessful.

(*c*) *The tray*. Some difficulty was experienced in obtaining a suitable background for the wool in the tray, fulfilling the requirements of blackness and permanence under routine conditions. The angle of illumination being necessarily low, a dead black surface was not suitable owing to the high diffuse reflection produced. In practice a slab of "flashed black on opal" glass was found to be the most satisfactory medium, especially



as it allowed a convenient means of marking out the area actually scanned by the cell by drilling through the black surface until a small dot of opal was visible.

(*d*) *The benzene*. The refractive index of the benzene used was not found to be extremely critical, and the manufacturers found no difficulty in supplying a product with refractive index between the permissible limits of 1·490 and 1·495 (20°C.) (Table I).

Table I. Effect of variations in refractive index of benzene on photo-electric index

Refractive Index 20° C.		1·4797	1·4900	1·4952	1·5000
Sample	Weight	Photo-electric Index			
	gr.	cm./gr.	cm./gr.	cm./gr.	cm./gr.
Pure wool	0·520	3·2	2·4	1·8	1·4
Few hairs	0·465	5·0	3·9	3·4	3·4
Hairy tip	0·555	5·7	4·3	3·6	3·0
Hair throughout	0·475	56·0	52·5	51·2	52·5

(*e*) *The optical system*. This consists of a velvet-lined box, supported at an adjustable height above the tray surface and having a telescoping section, which supports the lens and cell. Various combinations of lenses were tried, a Bausch and Lomb projection condenser (PM 25, diameter $5\frac{1}{4}$ inches, focal length 4 inches) being found to be the most suitable of those economically practicable. Fortunately, since the measurements were concerned with the total light quantity, extreme perfection of the image

was not essential although a certain degree of definition was necessary in order to permit limitation, by means of a mask on the cell surface, of the area of the tray actually scanned.

(*f*) *The photo-cell and galvanometer.* The photo-cell used is a Weston "Photronic" of high sensitivity, suitably supported in a black-lined, light-tight compartment immediately over the lens. The galvanometer is a standard Cambridge instrument, suitable resistors being incorporated into the circuit for the control of sensitivity and damping.

(*g*) *Adjustment and empirical standardisation.* After focussing an image of the required portion of the tray on to the cell surface, the galvanometer is switched in and, with the aid of a bright object of suitable size, the angle and position of the lamps, reflectors, and the lower edge of the box supporting the lens, are all varied until the deflection of the galvanometer is independent of the position of the object in the tray. The lamp voltage is now fixed at a convenient value (220 volts) and the galvanometer scale brought to zero reading when the tray, containing benzene and the glass plate used to hold the wool samples in position, is exposed to the cell. The tray is then withdrawn, exposing the grey standard surface, and the sensitivity of the galvanometer adjusted to give a certain fixed deflection (20 cm.). Finally, as a reference standard, a grey enamel plaque is placed *in* the benzene, occupying the exact position of the wool samples, the deflection obtained bearing a definite ratio to the value set for the sub-tray standard if all the foregoing adjustments have been correctly made. In practice, the actual sensitivity level was arbitrarily fixed by sorting a quantity of coarse kempy fibres and adjusting to give a photo-electric index of 100 cm./gr. for such material. Regarding this sample as 100 per cent. coarse hair, it thus becomes convenient to refer to subsequent values as "medullation equivalent to *n* per cent. coarse kemp".

Owing to the phenomenon of infilling described by Elphick (1932), wool samples do not accurately retain a given degree of medullation for an indefinite time. Table II gives data for certain samples re-examined after storage over $CaCl_2$ for five months, and gives some idea of the irregular nature of the changes due to infilling of the medulla, even under conditions regarded by workers at this college as being the optimum for stability. Attention was, therefore, devoted to the possibility of obtaining an easily reproducible means of standardising the sensitivity of the instrument, but no suitable substance was found. A compromise was effected by the use of the grey enamel plaque calibrated by comparison with wools having known degrees of medullation determined by specific gravity measurements described later in the paper.

(*h*) *Method of experiment.* In brief, the routine of examination is as follows: Sub-samples of approximately 0·4 grams are rinsed in petrol to remove grease and dirt, teased to a roughly constant thickness (see Table III), and allowed to stand for a short time in order that traces of petrol may evaporate. The samples are now submerged in the benzene with a glass plate, care being taken to avoid air bubbles, and a visual examination is made, simple abbrevations being used to record the occurrence and distribution of medullation over the staple. Should there be no medullation present, no further measurements need be made on the sample. In the case of medullated samples, after checking the deflection

Table II. Changes in degree of medullation in wool samples stored over calcium chloride for five months

Sample	Photo-electric Index	
	April, 1935.	August, 1935
	cm./gr.	cm./gr.
1	2·1	2·2
2	2·7	2·2
3	4·3	3·9
4	6·3	5·5
5	8·1	6·8
6	9·6	9·0
7	10·1	8·4
9	13·8	10·5
10	15·3	14·6
11	19·0	12·2

Table III. Effect of variations in thickness of spreading on photo-electric index

Sample	Treatment	Weight	Photo-electric Index
		gr.	cm./gr.
A.—Pure wool	Average spreading	0·715	1·6
	Folded to cover half usual area	...	1·8
B.—Hairy tip	Average spreading	0·555	3·9
	Folded to cover half usual area	...	4·3
	Folded to cover quarter usual area	...	4·7
	Opened to original area ...	...	3·9
C.—Hairy	Average spreading	0·270	38·5
	Opened to one and a half usual area	...	37·5
	Folded to quarter usual area ...	...	39·4

from the sub-tray standard, the operator places the tray in position under the lamps and optical apparatus, the steady galvanometer reading being recorded after a few seconds. Tray and sample are now withdrawn, and the deflection from the grey standard again checked in preparation for the next staple. Following examination in benzene, the samples are allowed to dry and condition in the atmosphere of the laboratory prior to weighing. Although facilities have not been available for more accurate control of moisture content of the samples, the local atmospheric conditions are such that only under very extreme conditions could an error greater than 5 per cent. arise; moreover, this error would only be appreciable in the strongly medullated samples where extreme accuracy is not essential. It is hoped that suitable controlled humidity storage space will become accessible in the future. For the weighing, a Bunge damped balance was adapted to work with a 5 decigram rider, and the weights recorded to the nearest 5 milligram (1 per cent.).

From the point of view of time required to complete an estimation, the photometric method has proved particularly satisfactory, a necessity in such routine determinations where the value of the work is dependent upon the ability of the organisation economically to handle a large number of samples. The present technique has proved more rapid in practice than visual methods previously in use, due largely to the smaller degree of care necessary in obtaining a constant degree of teasing, and to the rapid despatch of pure wool samples, which may be classed visually.

In routine work at the Massey College, a staff of four has been found adequate for the testing of over 400 samples per day, equivalent to some 60 sheep.

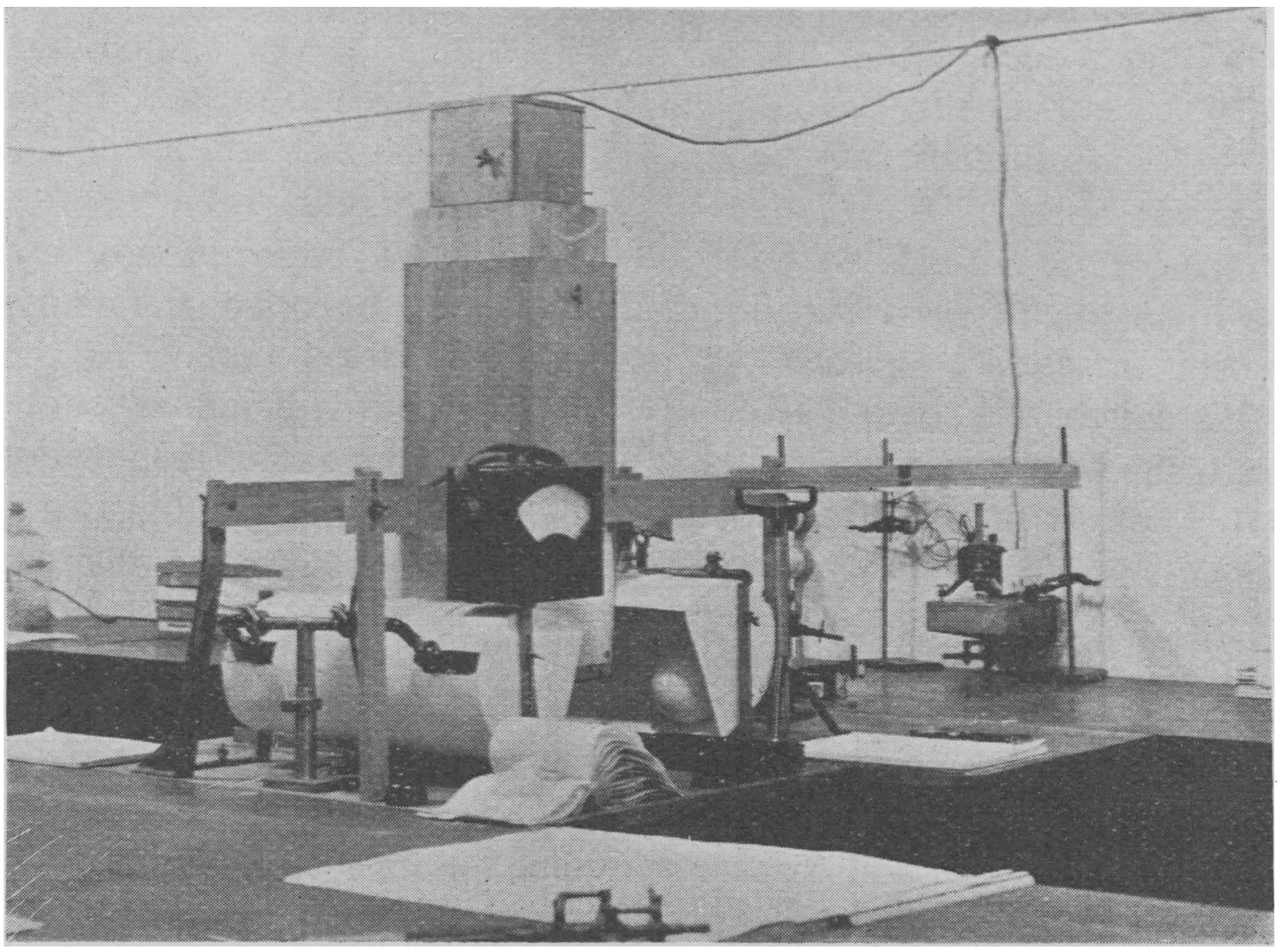


Plate I

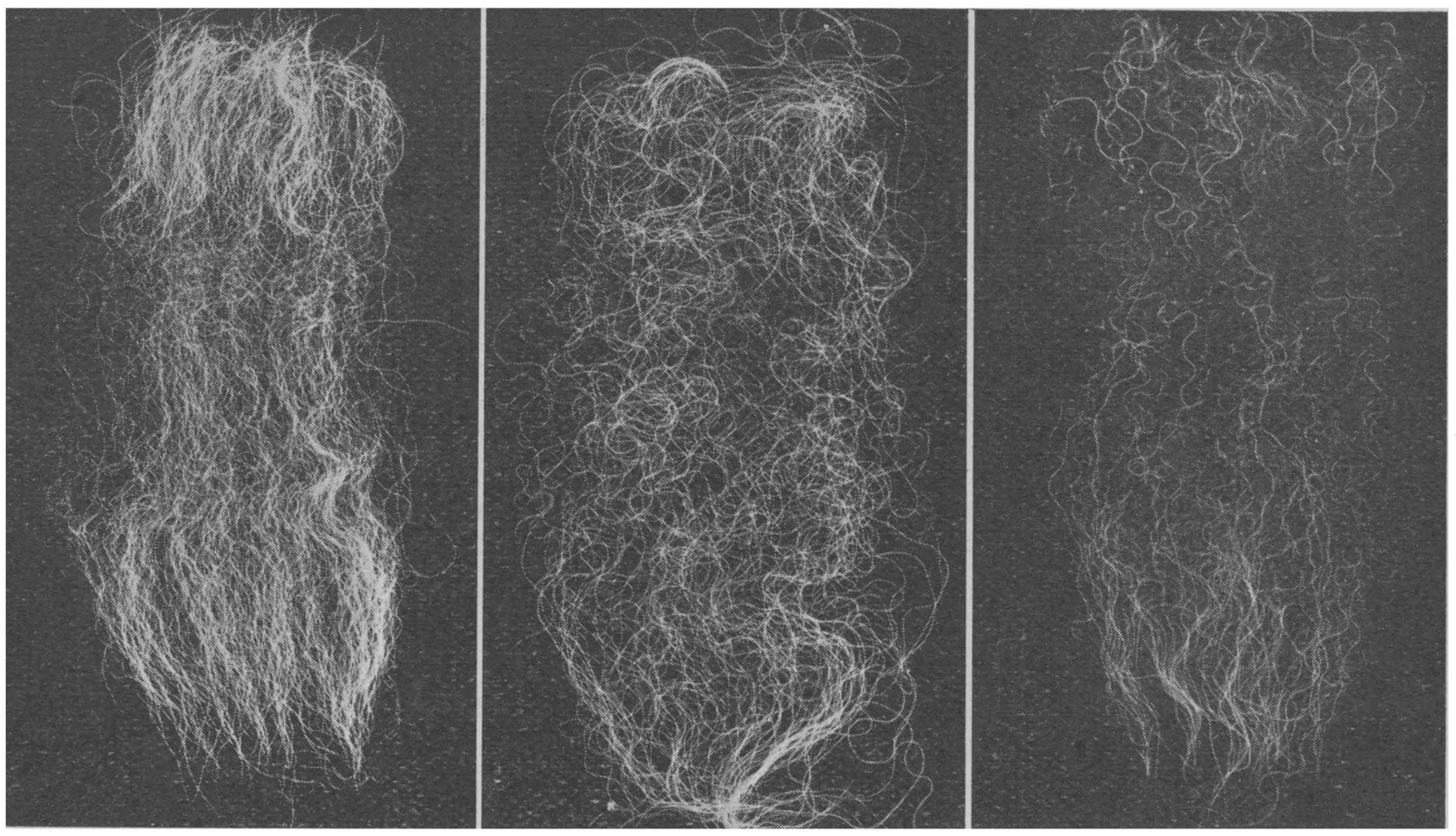


Plate II. Romney Wool Staples in benzene (× 1/3)

A. 3·8 cm./gr. B. 18·0 cm./gr. C. 54·9 cm./gr.

(NOTE: The degree of photographic contrast necessary for satisfactory reproduction of these illustrations has increased the apparent medullation of the samples.)

(*i*) *Results.* As a basis of comparison between samples, the deflection per gram of wool, termed the photo-electric index of medullation, has been found satisfactory. For routine calculation of this figure a slide rule was found more rapid and less subject to error than either nomographic

or tabular methods. Typical results are shewn in Table IV, some of the samples being shewn in Plate II. The approximate range of values encountered in practice lies between a deflection per gram of 2·0 cm. for pure wool samples and of the order of 50 cm. for very hairy material. An indication of the degree of reproducibility of results under routine conditions is also shewn in Table IV. These samples are typical of a series which was examined and then used for demonstration purposes, standing exposed in trays on the laboratory bench away from direct sunlight for a period of some three weeks before re-examination. Variation in the case of sample 3 is due to infilling.

Table IV. Typical results and reproducibility after three weeks' interval

Sample	Series *a*			Series *b*		
	Weight	Deflection	Photo-electric Index	Weight	Deflection	Photo-electric Index
	gr.	cm.	cm./gr.	gr.	cm.	cm./gr.
1	0·410	1·1	2·8	0·415	1·0	2·4
2	0·390	1·5	3·8	0·390	1·4	3·6
3	0·275	2·0	7·3	0·275	1·5	5·5
4	0·300	5·4	18·0	0·295	5·2	17·6
5	0·190	7·4	39·0	0·190	7·4	39·0
6	0·295	16·2	54·9	0·295	16·5	55·9

The Evaluation of Medullation.—3. Estimation by Specific Gravity Determination

As explained above, the light reflected from a sample of wool in benzene can only be an empirical index of medullation, and following Elphick's lead, the possibility of determining the specific gravity of wool in a liquid not absorbed by the fibre has been investigated. If King (1926) is correct in maintaining that the density of medulla-free wool is constant, regardless of origin, then a simple calculation gives the percentage air-space in the fibre, and hence a reasonable index of the degree of medullation.

It was at first considered that the results would be of the greatest value if the comparisons were made over the range of photo-electric indices most important in practice, i.e., 2·0—10·0 cm./gr., where, moreover, error due to penetration of the density liquid into coarse medullae would be small. Accordingly, considerable time was spent in the development of a technique sufficiently precise to give reliable differences within these limits. Approximate computation shewed that the accuracy required would be of the order of 0·1 per cent.

Technique of specific gravity determination

The samples were cleansed in three changes, each of 15 minutes, of benzene and distilled water at 45° and 55° C., respectively, according to the method advocated by Roberts (1930), save that no saponin was added to any of the distilled water washes. After a preliminary drying, the samples were transferred to specific gravity bottles and dried at 105° C. to constant weight, a slow current of dry air, also at 105° C., being blown through the wool. No difficulty was experienced in achieving constant weight to within 0·1 milligram on a 2 gram sample.

The determinations were made in a specially selected specific gravity bottle (50 c.c.), to the neck of which was fitted a carefully ground glass cap

to prevent loss of benzene by evaporation during weighing. The volume of the bottle was determined in the usual way, and was found to remain constant during the course of the experiments to within 3 parts in 500,000.

"Pure, Crystallizable" benzene, dried over calcium chloride, was used as the density liquid, and was introduced slowly into the specific gravity bottle, containing the dry wool, in an atmosphere freed from water vapour. The purpose of these estimations being the determination of the amount of air-space actually contained in the fibre, removal of air adhering to the fibres externally by the usual process of boiling under reduced pressure was not possible. In actual practice, the tendency to retain air was found to be considerably reduced by loose packing of the wool in the bottle, and it was possible to remove any traces of gas by means of a long hypodermic syringe. This simple method was found to be entirely satisfactory, as even the smallest bubbles were visible on account of the curvature of the vessel.

An important feature observed throughout the investigation was the standardization of the force used in inserting the stopper of the bottle, a spring balance being utilized to secure uniformity.

All determinations were made at a temperature of 25° C. on a standardized Beckmann thermometer, 60 minutes being allowed for the equilibration of the temperatures of bath and bottle contents.

Errors in weighing due to irregular condensation of a film of moisture on the outer surfaces of the glass vessel were eliminated by the use of a glass counterpoise. All weights were calculated to weight in vacuo, allowance being made for the effect of variations in temperature and barometric pressure on the density of the air in the balance case at the time of weighing.

Results.

With these precautions it was found possible to reduce the error of the estimation to approximately 0·05 per cent. On applying these methods to wool free from medulla, it was found that the specific gravity of wool samples from three different Romney fleeces varied significantly from fleece to fleece from 1·300 to 1·296 gr./c.c. 25°/4°, the higher values being associated with high medullation in other portions of the fleece. In view of this result attempts to secure an exact and detailed determination of the relation between the percentage air-space and the photo-electric index over a range of low medullation values was abandoned and a series of determinations made to give a more approximate standardization over a greater range, 2·0 to 40 cm./gr. Estimations of percentage air-space from these results are shewn together with the average photo-electric index of the wool in Table V (Fig. 2). These former figures were calculated from the formula: Air-space $= 100(D_k - D_m)/D_k$
where D_k is the specific gravity of pure keratin, assumed constant at a value of 1·3008 gr./c.c., 25°/4°, and D_m is the specific gravity of the medullated sample.

Owing to the errors involved in the assumption of a constant value for D_k in the above equation, and a further uncontrollable error which would arise in determinations of coarse medullation due to penetration of the density liquid into the medullae, great accuracy cannot be claimed for the calculated percentages of air-space. In view of these considerations,

deviations from the linear relationship between the photo-electric index and calculated air-space cannot be regarded as due to fundamental shortcomings of the optical method. The realisation of an approximately linear relation between the quantities measured indicates that the light reflected from medullated wool in benzene is more closely related to the volume than to the surface area of the medullae, owing to the complications discussed earlier in the paper.

Table V. Relation of photo-electric index to percentage air space in medullated samples

Sample		Specific Gravity 25°/4° C.	Percentage Air space	Photo-electric Index
				cm./gr.
1	Pure wool	1·3008	0·00	2·1
2	Hair throughout	1·2860	1·14	10·4
3	,, ,, ...	1·2593	3·19	20·4
4	,, ,, ...	1·2492	3·97	31·9
5	,, ,, ...	1·2230	5·99	40·6

PRACTICAL APPLICATIONS

The fact that the photo-electric method can distinguish and measure finer grades of difference in degree of medullation than the human eye is capable of recognising, combined with its advantageous speed of working, has enabled the instrument to become the basis of a scheme of large scale flock testing. In the twelve months ending 30th November, 1935, a total of 8,599 registered sheep had been examined by the organisation, and at that time a further 6,680 were already booked for future testing. (Waters, 1936). It is hoped to give details of the sampling and grading methods adopted in a later communication. In addition to the information supplied to the breeder, many valuable data are accumulating relating to the development and distribution of medullation in the fleece and the interrelation of genetic and environmental influences. Further extension of the activities of the organisation to include measurement and recording of other important fleece characters is taking place as rapidly as facilities permit.

It is important to note that whilst the instrument described in the present paper was originally designed for use with fleece wool, it has been found quite suitable for the examination of tops without any further modification.

SUMMARY

Elphick's visual method for the evaluation of medullation revealed by the " Benzol " test has been shewn to possess certain inherent failings, and a more accurate technique developed on a visual basis proved too slow for routine application.

A photo-electric apparatus has been constructed which is capable of measuring degrees of medullation rapidly and with considerable accuracy. An approximately linear relation has been found between the index so obtained, and the percentage air-space in the fibre calculated from accurate specific gravity determinations in benzene.

The apparatus has proved satisfactory under routine conditions, and has been used on an economic basis by an official fleece testing organisation in New Zealand during the past two years.

ACKNOWLEDGMENTS

My best thanks are due to the Physics Department of Victoria University College, Wellington, N.Z., for the loan of apparatus, and in particular to Mr. G. A. Peddie, without whose advice and assistance this work could not have been initiated. I wish also to thank the Principal and members of the Staff of Massey Agricultural College and the Dairy Research Institute for helpful criticism and opportunities for discussion of sundry problems. Finally, I wish to express my indebtedness to Dr. J. B. Speakman of The Textile Department, Leeds University, who kindly provided facilities for some of the specific gravity determinations, and has given much valuable criticism during the preparation of this paper.

Certain of the photo-electric indices quoted were carefully determined by Miss D. Cleary.

The latter part of this work was carried out with the aid of a grant from the Farmers' Union Scholarship Fund.

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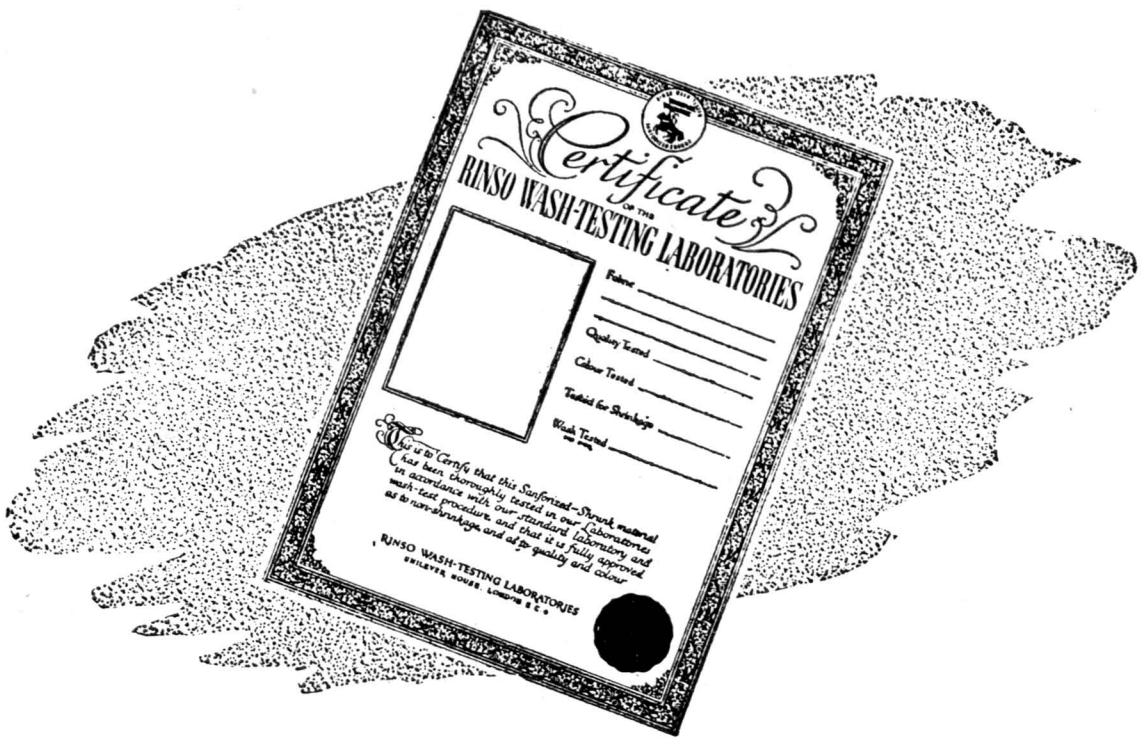
Received 24/8/37



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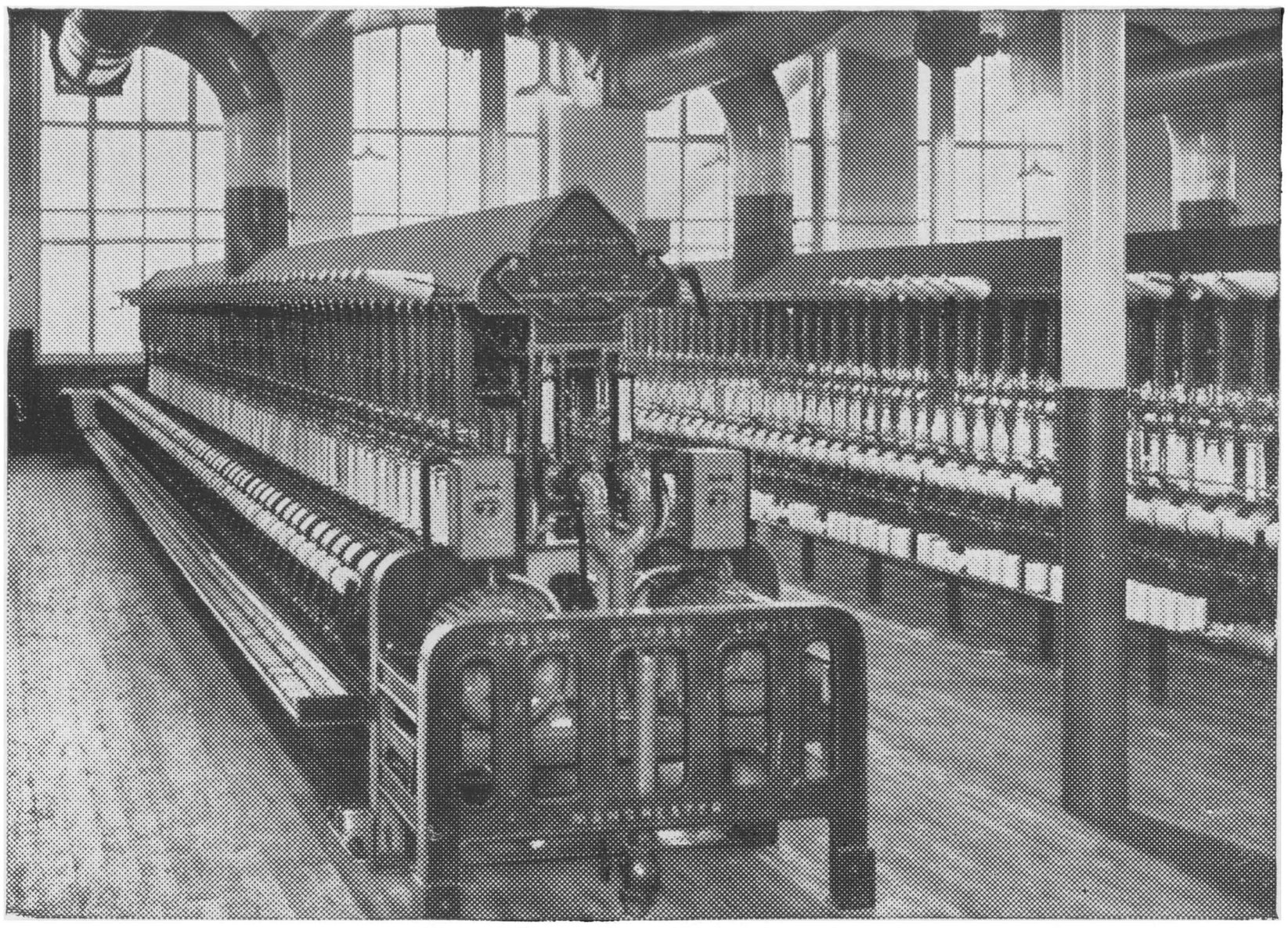


The use of GAS in the Textile Industry

The outsider is always surprised to learn what a very big consumer of gas the textile industry is; but those in the industry who have seen the improvement in working conditions, in efficiency, in lower costs and in convenience since the coming of gas-fired plant will probably be surprised only by the fact that some mills still rely on the old, dirty and cumbersome solid fuels.

Wherever town gas is used, all the space wasted by fuel-storage and ash-disposal is saved—all the dirt and discomfort of stoking and drawing coal fires are gone—all the time spent in bringing the plant up to temperature is turned to more productive use. Where, for instance, it took 2 to 3 hours to get a cloth singeing plate into action, it now takes but 30 minutes, Added to which, of course, there is the great speeding up in output, and consequent reduction in cost, brought about by the simplicity of gas as a fuel, and the accuracy with which it can be controlled.

The modern high-speed vertical burner gassing frame shown above is a fine example of the latest technique in modern textile machinery. Those who would like more information or advice on textile problems and their modern solutions are invited to write to the British Commercial Gas Association, Gas Industry House, 1 Grosvenor Place, London, S.W.1,. who will put them in touch with the organisation that is best equipped to help them.

THE JOURNAL OF THE
TEXTILE INSTITUTE
ABSTRACTS

LIST OF ABSTRACTORS

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

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

1.—FIBRES AND THEIR PRODUCTION

(B)—ANIMAL

Studies on the Sheep Blowfly Problem. *Dept. Agric. New South Wales: Sci. Bull.* No. 54, 1937, 126 pp.

This comprises the following papers:

I. Review of the Sheep Blowfly Problem in New South Wales. H. G. Belschner, pp. 1-60.

II. Observations on Fleece Rot and Body Strike, particularly in regard to their Incidence, Type of Sheep Susceptible and Economic Importance. H. G. Belschner, pp. 61-95.

III. Bacterial Colouration of Wool. H. R. Seddon, pp. 91-110.

IV. Classification of Sheep according to Susceptibility to Strike. H. R. Seddon and H. G. Belschner, pp. 111-122.

V. Relationship of Rainfall to Crutch Strike, pp. 123-126.

The sub-titles clearly indicate the scope of this review of one of the most serious problems facing the sheep raising industry in Australia. The degree of susceptibility of individual animals to body strike and the association of the latter with pre-existing fleece rot is fully discussed for the first time. Apart from special environmental conditions, stress is laid on observations regarding undesirable types of body conformation and fleece characters. For example, animals with highly developed breech wrinkes (C type) appear to possess many undesirable fleece characters apart from their susceptibility to fly strike. Similarly, sheep with special types of wither conformation and inferior quality, slack, harsh-handling fleeces appear to be most prone to fleece rot. These observations indicate promising lines of attack on problems of wool production in the Dominions. W.

Human Hair as a Textile Raw Material. E. Wagner. *Deut. Wollen-Gewerbe,* 1937, **69**, 915 (through *Chem. Abs.*, 1937, **31**, 7655).

Human hair was utilized during the World War for various textile purposes and its industrial utilization does not involve any particular difficulties. The chemical properties of human hair are reviewed and its possible textile uses are described. W.

Care of Ewes and Lambs. D. J. Sidey. *New Zealand Farmer Weekly,* 1937, **58**, No. 28, pp. 6-7 and 33.

A broadcast talk dealing with New Zealand requirements in the feeding and management of ewes at lambing time. W.

Fly Repellent and Blowfly Dressing: Preliminary Report. H. O. Mönnig. *Onderstepoort J.*, 1936, 7, 419-430.

It is shown that the steam-distilled oil of the plant *Tagetes minima* has strong repellent properties for blowflies and that it is suitable for use in a blowfly dressing. Carbon tetrachloride and tetrachlorethylene are excellent larvicides for use against blowfly maggots, but tetrachlorethylene is irritating on wounds. Both these drugs are distinctly more effective than benzine. Emulsions of the above-mentioned substances are suitable as blowfly dressings and wool grease was found to be the most satisfactory emulsifier. Particulars are given for the preparation of a suitable emulsion. W.

Studies in Mineral Metabolism. XXXV. The Role of Iodine in the Nutrition of Sheep. A. I. Malan, P. J. du Toit and J. W. Groenewald. *Onderstepoort J.*, 1936, 7, 523-532.

When the daily ration of merino ewes contained 0·05 g. KI for a period of about 12 months, no effects were observed in body-weights and food consumption. Reproduction was, however, abnormal in all the groups receiving the KI supplement, the effects of which were more pronouncedly deleterious in sheep on a carotene low diet than when 200 g. green feed were supplied daily. The response to increased protein feeding in the form of bloodmeal was marked by the detrimental effect of KI on reproduction. As all the rations can easily be improved both in quality and palatability, it cannot be inferred that the quantity of KI given will affect reproduction in sheep adversely under ideal feeding conditions. The conclusion is justified, however, that when green feed is absent or inadequate as frequently happens in practice, and good quality protein is not available, the incorporation of KI in sheep licks is distinctly dangerous and may even cause losses due to abnormal reproduction. W.

Practicable Method of Dealing with the Blowfly. "Jetter." *Pastoral Rev.*, 1937, 47, 889-891.

The benefits of jetting are stressed, and an effective procedure and jetting plant described. W.

Jetting and the Blowfly. H. R. Eastman. *Pastoral Rev.*, 1937, 47, 1009-1010.

A discussion on "Jetter's" letter is given (see preceding abstract), together with plans of a jetting race. W.

Grazing of Sheep on Improved Pastures: Its Effect on Superfine Wool. I. C. Ross, N. P. H. Graham, H. N. Turner, H. B. Carter and H. Munz. *Australia: Council Sci. and Ind. Res., Pamphlet* No. 71, 1937.

It is possible for superfine merino sheep maintained on improved pastures to make much better average gains of weight and to grow an average of 2 lb. more wool per head than similar sheep maintained on natural pasture, the wool production per acre being more than trebled. There is no evidence that the higher plane of nutrition on improved pastures results in progressive coarsening of the wool fibre nor in any deterioration in colour, handle or value of the wool. Previous indications that the increased risk of parasitism owing to heavier stocking on improved pastures is compensated for by the greater resistance resulting from the higher plane of nutrition are confirmed. W.

Inherited Hairlessness in the Goat. D. Kislovsky. *J. Heredity*, 1937, 28, 265-267.

A brief outline of present knowledge of hairlessness in the goat, suggesting that the condition is probably recessive in its mode of inheritance. W.

Recent Changes in Sheep Breeding in the Arable Areas of England and Wales. R. P. Askew. *J. Min. Agric.*, 1937, 44, 450-457 and 562-571.

The present confusion of breeding policy is due to the following causes: (1) The change from the arable to the grassland ewe; (2) The decline in Longwool breeds; (3) The change in numbers and distribution of Down breeds; (4) The increase in cross-breeding at the expense of pure breeds for commercial production. W.

Sheep Marking. *J. Min. Agric.*, 1937, 44, 517-518.

The Ministry of Agriculture has issued a warning against the use of tar for sheep marking, and recommends for use in this country the following preparation, suggested by The Wool Industries Research Association: Wool fat, 150, carnauba wax, 10, barytes, 70 and colour, 17·5 parts by weight, and white spirit to consistency. W.

Preparing the Lamb Clip. P. D. Rose. *Farmer's Weekly,* 1937, **53,** 1599.

An account is given of the practical difficulties experienced in classing lambs' wool. Classing prior to shearing is a definite advantage, as hairy tips are more easily seen while the fleece is on the lamb's back. Locks, stained wool and short pieces should be removed before shearing. W.

Karakul Curl Types. P. J. Viljoen. *Farmer's Weekly,* 1937, **53,** 1679.

A description is given of Karakul curl types, both desirable (" pipe," " walnut " and " water-silk ") and undesirable (" corkscrew " and " nigger "). Woolliness should be avoided. The question of selective breeding is discussed, and it is stated that only in the third cross can one reasonably expect a high percentage of saleable pelts. W.

Preparation of Karakul Pelts. P. J. Viljoen. *Farmers' Weekly,* 1937, **54,** p. 57.

Methods are described for flaying, washing, drying, and brushing and packing. Precautions should be taken to carry out all killing, washing and drying in the shade, and to avoid blood stains on the pelt. It is recommended that pelts should be placed in cold water immediately after removal and left there till washed. W.

(C)—Vegetable

Cotton Plant: Spacing Experiments. *Alabama Sta. Circ.* No. 76, 1937, 8 pages (through *Exp. Sta. Rec.,* 1937, **77,** 329).

Recommendations are made on suitable row widths, distances between " hills " and number of plants per " hill " as the result of ten years' experimental work. Yield is influenced by these three factors and boll size was increased by wide spacing and decreased by close spacing. C.

Cotton Plant Nitrogen Supply: Efficiency Trials. K. T. Holley and T. G. Dulin. *Georgia Sta. Bul.,* No. 197, 1937, 24 pages (through *Exp. Sta. Rec.,* 1937, **77,** 328).

Experiments are reported on the efficiency of nitrates and ammonium salts, in some instances with additions of boric acid, as sources of nitrogen for cotton plants in culture solutions. C.

Cotton Root Rot Disease: Control. C. J. King. *U.S. Dept. Agric. Circ.* 425, 1937, 10 pages.

The characteristic features of root rot disease due to *Phymatotrichum omnivorum* are described. In Arizona it is combated by burying large quantities of organic manure during the winter in deep furrows in the affected areas and irrigating to promote vigorous rotting. The root rot fungus does not thrive in the presence of active saprophytic organisms. C.

Cotton Sore-shin Disease: Etiology. C. H. Arndt and J. R. Christie. *Phytopathology,* 1937, **27,** 569-572 (through *Exp. Sta. Rec.,* 1937, **77,** 348 ; *Rev. Appl. Mycol.,* 1937, **16,** 606).

Cotton seedlings were grown in soil cultures infected separately by three species of fungi (two of *Fusarium*) and four of nematodes and in soils infected by each fungus and each nematode in pairs, and by each fungus with all four nematodes. The nematodes did not produce typical damping-off or sore-shin lesions, nor did they increase the effects produced by the fungi. *Glomerella gossypii* caused the typical disease but not the *Fusarium* species. C.

Cotton Wilt Disease: Occurrence in Brazil (Parahyba). H. V. S. Grillo. *Rodriguésia,* 1936, ii, 7, pp. 319-327 (through *Rev. Appl. Mycol.,* 1937, **16,** 607).

Wilt infection is noted from a few limited areas in the State of Parahyba. Control measures are discussed. C.

Cotton Flea Hopper: Control. K. P. Ewing and R. L. McGarr. *J. Econ. Entomol.,* 1937, **30,** 125-130, 130-134 (through *Exp. Sta. Rec.,* 1937, 77, 71, 72).

(1) Trials of various insecticides gave best results with mixtures of Paris green and sulphur. One experiment showed a gain of 596 lb. of seed cotton per acre from two applications of the mixture. (2) Large-scale trials with sulphur dust are reported. C.

Cotton: Effects of Exposure on Grade. M. A. Grimes. *Texas Sta. Bul.*, No. 538, 1936, 35 pages (through *Exp. Sta. Rec.*, 1937, 77, 41).

Ferguson Triumph 406 cotton was picked after opening and after intervals of exposure ranging from 1 to 33 weeks, and then ginned, classed and tested for strength and colour. A drop of one grade occurred in less than four weeks and the loss in value of the cotton reached as much as 50 per cent. Cotton should be harvested within a week or two after opening. Three lots of lint cotton stored in a vault lost 7, 15 and 18 per cent. of their strength after one year and as much as 33 per cent in two years. C.

Egyptian Cotton: Improvement of Grade. W. L. Balls and H. A. Hancock. *Min. Agric., Egypt ; Techn. Sci. Serv. Bull.*, No. 187 ; 11 pages.

Experiments on the multiple picking of Giza 26 cotton were carried out with the object of improving the grade. The highest-valued crop, judged by grade or yarn, was obtained by picking at three-weekly intervals. The conventional method of picking in Egypt is the four-weeks system, which gives a 4 per cent. lower cash return than the three-weeks system. Improvement of grade was also tried by " Mabruma sorting," that is removal of bolls that are not fully opened. It was found that the removal of 8 per cent. of the Mabruma (or Scarto) improves the sorted cotton by half a grade, but on account of the low price of Mabruma the cultivator loses 17$ per 100 kantars. Similar experiments carried out on Mabruma sorting with Sakel and with Giza 12 cotton, though not as extensive as those done with Giza 26 gave the same results. Grade, being to a large extent simply a measure of the proportion of damaged bolls, was found not to depreciate when the cotton is left on the plant. A genuine and typical F.G.F. cotton cannot be obtained simply by adding leaf and similar impurity to a Fully Good cotton but it can be produced by adding Mabruma to F.G. cotton. Conversely, late-maturing low-grade cotton can be made equal to early high grades by removing Mabruma. Low-grade differs from high-grade cotton not merely in the percentage of impurity present but the character of the staple is changed, because of the increased proportion of short, broken or immature hairs from damaged bolls in the lower grades. This cotton makes up a large part of card waste. The association of irregular staple with low grade has given rise to the belief that regularity of staple is an essential character to work for in plant breeding research. Actually, differences in irregularity of staple normally found between varieties are of little importance, excepting that from bolls damaged by pests. C.

American Cotton: Grade, Staple and Tenderability. *U.S. Dept. Agric. Statistical Bulletins*, No. 52, 1936, 121 pages ; No. 56, 1937, 63 pages.

Full particulars are given in tables and maps of the quantities of cotton of various grades and staples produced in the U.S.A. in the seasons (1) 1928/9 to 1933/4 and (2) 1928/9 to 1934/5. C.

Louisiana Cotton: Grade and Staple, 1928-1934. W. B. Lanham, C. C. McWhorter and I. M. Skinner. *U.S. Dept. Agric. Bur. Agric Econ.*, 1936, 41 pages (through *Exp. Sta. Rec.*, 1937, 77, 120).

A mass of data is assembled, with tables, maps and charts, on the grades and staples produced in Louisiana, the quality of cotton ginned during different periods of the cotton season, and the premiums and discounts for grade and staple operative in central and local markets. About 77 per cent. of the cotton was extra white or white, and middling or better, and 42 per cent. was of 1-inch or longer staple. C.

American Cotton: Production, 1866-1935. *U.S. Dept. Agric., Bur. Agric. Econ., Crop Reporting Bd.*, 1936, 34 pages (through *Exp. Sta. Rec.*, 1937, 77, 123).

Tables show for the U.S.A. as a whole, by States, and for Lower California, by years, the acreages of cotton harvested, yields per acre, production of lint cotton and seed and, from 1899, the ginnings reported by the Bureau of the Census. C.

Raw Cotton and Linters: World Trade, 1921-1935. C. G. Gries and A. T. Turner. *U.S. Dept. Agric., Bur. Agric. Econ.*, 1936, F.S.67, 89 pages (through *Exp. Sta. Rec.*, 1937, 77, 123).

Statistics are compiled from official sources of the export and import trade in raw cotton and linters, average figures for 1909-1913 being included in the summaries. C.

Cotton: Production in Paraguay. *Wirtschaftsdienst,* 1937, **22**, 1494-5.

The economic position of Paraguay is reviewed. Recovery in exports since the Chaco war is largely due to a record cotton harvest ; this season it has reached about 15,000 tons, against 5,600 and 8,300 in previous years, and the quality is exceptionally good. C.

Empire Cotton: Production. Sir W. H. Himbury. *Cotton* (M/cr.), 1937, **43**, No. 2084, 21-22.

Particulars are given of the present position of cotton growing under the auspices of the British Cotton Growing Association, with the latest available statistics. The total crop for 1936 reached 752,800 bales (400 lb.) exclusive of India which produced 5,933,000 bales. C.

Indian Cotton: Supply and Distribution. Indian Central Cotton Committee. *I.C.C.C. Statistical Bulletin,* No. 6, August, 1937.

The following tables give the supply and distribution of the various types of Indian cotton for the season 1935-36. (I.) The area under improved varieties of cotton for 1934-35 and 1935-36. (II.) The supply and distribution of various types of Indian cotton for 1934-35 and 1935-36. (III.) The crop classified according to length of staple (1935-36). (IV.) Stocks of Indian raw cotton held in India by the mills and the trade (1935-36). (V.) Mill stocks of Indian cotton in the Madras Presidency (1935-36-37). (VI.) Receipts at mills in India of raw cotton classified by varieties (1935-36). (VII.) Exports by sea of Indian raw cotton classified by varieties (1935-36). For comparison with previous years the following appendices are given. (*A*) Indian cotton crop classified according to length of staple (1915-1936). (*B*) Stocks of Indian cotton (raw) held by the mills and trade (1933-1936). (*C*) Receipts at mills in India of raw cotton classified by varieties (1928-1936). (*D*) Indian raw cotton consumed in Indian mills (1923-36). (*E*) Monthly statement of Indian cotton consumed in mills in India (1926-36). (*F*) Exports by sea of Indian cotton classified by varieties (1928-36). (*G*) Exports of Indian cotton and prices (1921-36). C.

Ramie Fibre: Isolation and Spinning. J. B. Pears. *Textile Manufacturer,* 1937, **63**, 303, 410, 460.

An illustrated general account of the production and processing of ramie fibre under the headings history, ramie culture and harvesting, grading and marketing, degumming, dressing, spreading, drawing and doubling. Processing usually follows the plan used in waste silk spinning. C.

Structure and Development of the Hemp Plant, *Cannabis sativa* L., with Special Regard to the Fibre. A. Menzel. *Faserforsch,* 1937, **13**, 1-14.

The cross-sections of stems of young and of fully grown hemp plants at different heights from the base are described and illustrated. The primary fibre bundles which preponderate in the upper part of the stem gradually give place farther down to secondary fibre bundles, which form a ring inside the former. After working up, the secondary fibre bundles appear almost exclusively in the tow. The strength of fibres in the primary fibre bundles is low at the base of the stem but rises rapidly on proceeding upwards, and falls again more slowly in the upper half of the stem. This is in agreement with the microscopic appearance of the fibre bundles. The fibre length also varies in approximately the same manner. The length is a maximum somewhat below the middle of the stem, and in all respects the stem shows the greatest development at this point. Variations exist in the woody matter, particularly with regard to its hardness, according to the nature of the soil, and the development of the fibre bundles also depends on the conditions of growth of the plant. The fibre strengths of a number of technical hemp fibres of different origin are given and these again can be correlated with the microscopic appearance of the fibres. The dimensions and germination of hemp seeds of various origin are tabulated. The size of seed does not determine the size of the plant. L.

Fungal Diseases of Flax. P. Esmarch. *Kranke Pflanze,* 1937, **14**, No. 4, 66-71 (through *Rev. Appl. Mycol.,* 1937, **16**, 612).

Popular notes are given of the symptoms, mode of infection, and the control of the following diseases affecting flax in Germany (where the acreage under this crop is stated to have increased from 4,800 hect. in 1933 to 45,000 hect. in 1936) and elsewhere; wilt (*Fusarium lini*), anthracnose (*Colletotrichum lini*),

grey mould (*Botrytis cinerea*), rust (*Melampsori lini*), and *Cladosporium herbarum* (R.A.M., ix, 246), which covers the stems both of growing and stored plants, and may considerably impair the value of the crop. L.

The " Pasmo " Disease of Flax in Europe Caused by *Septoria linicola* (Speg.) Garassini. H. Rost. *Angew. Bot.*, 1937, **19**, 2, 163-171 (through *Rev. Appl. Mycol.*, 1937, **16**, 676).

The " pasmo " (spasm) disease of flax caused by *Septoria* (Phlyctaena) *linicola* (R.A.M., xv, p. 441) was observed for the first time in Europe in 1936, when it was responsible for heavy damages in Yugoslavia. In inoculation experiments at the Biological Institute, Berlin-Dahlem, with material of the fungus from the Banat, flax-seed sown in infested soil was largely destroyed. The most conspicuous feature of the disease is a brown spotting, sometimes commencing at the cotyledonary stage and involving the leaves, stems, sepals, and ovaries. Control should be based on field sanitation, crop rotation, and the use of healthy seed, disinfection of the seed by fungicidal dusts having proved ineffectual. L.

Perennial Flax. P. V. Zukov. *Bull. Appl. Bot. Leningrad*, 1936, Ser. A (20), 149-150 (through *Plant Breeding Abstracts*, 1937, 8, No. 1, 57).

A description of *Linum sibiricum* D.C. under cultivation at the Barnaul'skaja Experiment Station since 1930. Seed is obtainable only by cross-pollination. Attempts to inbreed it or to cross it with ordinary flax have failed. Though no breeding work has been done with it so far, in view of its resistance to frost and drought and its hardiness as regards soil conditions, it is regarded as promising material from which non-shedding varieties with good yields of fibre and oil might be obtained. L.

An Experimental Study of Some Fungi Injurious to Seedling Flax. I. W. Tervet. *Phytopathology*, 1937, **27**, No. 4, 531-546 (through *Exp. Sta. Rec.*, 1937, **77**, p. 348).

It is concluded that several soil organisms may be factors in the development of " flax sick " soil and that fungi other than *Fusarium lini* may blight the seedlings or injure the flax roots and thus account for an apparent loss of resistance to wilt. Six isolates of *Helminthosporium* (2 from flax roots, 2 from barley, 1 from wheat, and 1 from rye) proved extremely virulent on Winona flax seedlings in the greenhouse. The pathogenicity of two isolates was high at 80° F. but negligible or low at 70°, while that of the other four was not affected by the temperature range used. Some isolates of *Rhizoctonia solani* from flax, sugar beet, legumes, tomato, eggplant, and barley caused severe damping-off in flax, but isolates from potato usually were not so injurious. One strain of Phythium, isolated from wilt-sick soil, also caused damping-off of flax, but five species of Phytophthora failed to injure it. Root lesions, root rot, and occasionally stunting of the plant occurred when flax was attacked by *Thielavia basicola, Ophiobolus cariceti,* and a few isolates of *Alternaria*. The type and severity of injury to flax by these fungi varied according to soil type and flora. *Ophiobolus* and *Thielavia* caused greatest injury in steamed soil. *F. lini* was extremly virulent throughout and *Helminthosporium* was also virulent on all soils, but the type of injury varied somewhat. L.

Japanese Linen Enterprise. *Linen Trade Circ.*, 1937, **23**, No. 1244, 6.

Refers to the steady development of the Japanese flax and linen industry. A five-year plan has been drawn up to increase the present acreage under cultivation in Manchuria, namely 36,000 to 215,000. Japanese flax spinners have been studying the market in the United States for the coarse types of flax products and one of the large flax spinning concerns in Japan has decided to double the present production capacity of its plant which is approximately 1,500 tons per annum.

Lithuanian Flax Programme. *Irish Textile J.*, 1937, **3**, No. 10, 3.

Refers to the development of the Lithuanian flax industry. Steps have been taken to develop fibre processing, the mechanism of which is being pushed forward with all speed. New retteries have been erected. L.

Promising New Flax Puller. *Irish Text. J.*, 1937, **3**, No. 10, 15.

Refers to a new flax pulling machine demonstrated in France. Weighing only 600 lbs. it quickly pulled a difficult crop. The machine, which is horse-

drawn, will pull 7 acres in one day, attended only by a driver and two assistants. The pulling mechanism is actuated by a small motor which may be detached for use in other agricultural operations. The manufacturing rights have already been sold to France, Belgium and Germany. The machine will be marketed at a price in the region of £100. L.

Use of Sisal for Marine Cordage in the Navy. *Bull. Imp. Inst.*, 1937, **35**, 355-356.

Details (supplied by the Admiralty) are given, stating the services for which the use of sisal cordage (tarred, untarred, tarred or untarred) is at present authorised. W.

Turkish Flax. T. Esberk. *Faserforsch*, 1937, **13**, 21-28.

Flax is being replaced by cotton in Turkey and is now cultivated mainly for seed. The flax straw investigated was highly contaminated with the fungus *Melampsora lini*. The characteristics of the plant are compared with those of other European varieties and it is concluded that it is of medium quality. In the dimensions of its seeds it inclines towards an oil-flax type. Microscopic examination shows that the fibre bundles are loosely constructed, and in accordance with this the fibre strength is low. The fibre content of the stem is 17·56 per cent. and is rather below normal. Some fabrics purporting to be linen were found on examination to contain an admixture of cotton or even to consist entirely of cotton. L.

(D)—ARTIFICIAL.

Phrix Staple Fibre Products: Characteristics. *Kunstseide*, 1937, **19**, 343-345.

Phrix BM is particularly suitable for mixing with cotton. It has a soft handle and a somewhat yellowish tone similar to that of most raw cotton. Phrix BR consists of white fibres of not more than 1·5 den. and can be spun alone on cotton spinning machinery to 60's. For finer yarns Phrix BF with fibres of 1·1 den. is used. Phrix KN is a crimped viscose staple fibre similar to wool in staple length and appearance and Phrix TW is designed for use in the carpet industry. Phrix BH has water-repelling properties which persist after dyeing and washing. It can be obtained in different lengths suitable for use in the cotton and woollen industries. C.

American Rayon Plant and Machinery. *Textile World*, 1937, **87**, 1987-1993.

A useful, illustrated review of recent American contributions to viscose production plant, twisting and winding machines (including soaking equipment), conditioning plant, staple fibre cutting and drying machines, warp preparation and sizing machines, rayon looms and accessories, and dyeing and finishing plant. C.

Viscose-Casein-Soap Mixture: Spinning. S. Kobinata and H. Ishikawa. *J. Soc. Chem. Ind. Japan*, 1937, **40**, 298B.

Experiments are described by tabulated data in which casein and soap were added to viscose (0·25 g. of casein to 20 gm. of original cellulose) and the mixtures were ripened for various periods and then spun in acid baths containing 10 per cent. of sulphuric acid, 20 per cent. of sodium sulphate and Zn and Al sulphates in three different proportions. The results indicate that viscose rayon of good wet strength can be spun by a suitable admixture of casein. C.

Viscose Rayons: Spinning Tension and Micellar Orientation. N. Matsumoto. *J. Soc. Chem. Ind. Japan*, 1937, **40**, 298B.

X-ray examination shows that the orientation of the micelles of viscose rayon improves as the tension increases under which the threads are spun, washed, desulphurised, bleached and dried. C.

Preparation of Casein Wool Fibres. A. Schpitalni and A. Valeschkevitsch. *Prom. Org. Chim.*, 1937, **3**, 344-349 (through *Brit. Chem. Abs. B.*, 1937, **56**, 1032).

Casein (I) is dissolved in 2 per cent. aqueous caustic soda containing 2 per cent. of carbon disulphide, and the solution spun in a precipitating bath containing sulphuric acid 120-420, sodium sulphate 240, and formalin 40 g. per litre; the fibres should be washed alternately with water and aqueous formalin. Fibres containing any desired proportion of (I) are obtained by adding a 50 per cent. (I)-water paste to viscose; the strength of the fibres is slightly lowered by inclusion of (I), to an extent increasing with the (I) content. W.

Staple Fibre and some Nitrogenous Fibres. W. Wagner. *Osterr. Chem.-Ztg.*, 1937, **40**, 369-373 (through *Brit. Chem. Abs. B.*, 1937, **56**, 1032).

A summary. Carnofil consists of the natural fibres of flesh. After chemical preparation flesh is broken down mechanically to fine threads resembling vegetable fibres. It can be spun in admixture with wool or used to replace catgut. It is soluble in alkalis and is digested by enzymes such as pepsin, but is unaffected by external influences and can be steeped in water for long periods without decay. W.

PATENTS.

Rayon Spinning Machine Thread Waste Support. British Celanese Ltd., C. W. Addy, R. H. J. Riley and R. J. Grinnell. E.P.467,913 of 24/12/1935.

A fixed waste support is mounted adjacent to delivery or feed rollers for threads, particularly in the manufacture of artificial filaments by extrusion, so as to receive waste material slid from the rollers upon which it is wound, for example, during starting or restarting operations. The supports are in the form of waisted rollers immovably mounted on the roller shaft by brackets, and the delivery rollers are tapered to facilitate removal of the waste. C.

Rayon Cake or Package Support. Ateliers Brugger. E.P.468,609 of 17/12/1936.

In a holder for cakes or packages of rayon yarn during unwinding, comprising a yarn-holding surface connected by two series of arms to a collar fixed to a central spindle and a sleeve slidable thereon for contracting or expanding the yarn-holding surface of the holder, such surface is formed of a number of channel-shaped rods assembled back to back and pivoted together in pairs at their centres and at their ends to adjacent rods by rivets, the rods being supported at one end by one series of arms pivoted to the collar fixed to the spindle and, at the other end, by the arms carried by the slidable sleeve. C.

Rayon Spinning Pot. H. E. Ashdown (Birmingham), Ltd. and A. G. Snell. E.P.469,623 of 25/2/1936.

A rayon spinning pot comprises a metal shell, preferably of aluminium, and a body of a phenol formaldehyde condensation product or other synthetic mouldable substance moulded therein so as to form an effective union. Holes are provided in the shell to afford a key connection for the body which is provided at these parts with the usual draining holes, the construction preventing creeping of acid between the parts. C.

Nitrocellulose: Stabilising. E. Berl. E.P.469,663 of 29/1/1936.

Nitrates of carbohydrates, particularly nitrates of cellulose, are stabilised during manufacture by continuous extraction at ordinary temperatures with agents that exert a swelling but non-dissolving action and which are always in a fresh uncontaminated condition when applied to the nitrate material. The extraction may be carried out at raised temperature and pressure. Swelling agents specified are methyl, ethyl, propyl and butyl alcohol, and mixtures thereof, and mixtures of solvents and non-solvents such as acetone with water, gasoline or benzene. C.

Cellulose Ester and Ether Filaments: Stretching. H. Dreyfus. E.P.469,749 of 24/1/1936.

Artificial filaments, foils, films and similar materials made of organic derivatives of cellulose containing plasticizers are subjected to stretching in wet steam or hot water at a temperature above 100° C. The plasticizer may be incorporated in a spinning solution or it may be incorporated in the filaments after they have been formed. Stretching may be carried out on hanks or while the materials are travelling. C.

Viscose Rayon: Spinning. N. V. Onderzoekings-instituut Research. E.P. 469,817 of 31/1/1936 (Conv. 15/2/1935 and 15/4/1935).

In spinning viscose rayon, a proportion of an organic substance, the molecule of which has a surface active cation derived from an organic base substituted by an aliphatic chain of high molecular weight (e.g. containing more than 6 carbon atoms) is added to the spinning bath or spinning solution. A particularly suitable substance for this purpose is lauryl pyridinium sulphate. C.

Cellulose Esters: Preparation. E. I. Du Pont de Nemours & Co. E.P.469,901 of 3/2/1936 (Conv. 1/2/1935).

Cellulose ethers of low ether content suitable for working up into threads, films, plastic masses, and the like, are obtained by steeping cellulose in an

aqueous solution of a water-soluble etherifying agent, pressing to remove excess of solution, shredding or otherwise disintegrating the pressed material and then treating it with caustic alkali solution, the etherification being continued until the product is capable of being brought into solution in dilute aqueous solutions of caustic alkali. The etherifying agent may be a water-soluble organic halogen compound such as an alkali metal chloroacetate, or glyceryl mono-chlorohydrin, or it may be an alkylating agent such as an alkali metal sulphate. The product may be aged. C.

Crimped Viscose Rayon: Production. W. W. Groves (I. G. Farbenindustrie A.-G.) E.P.469,905 of 2/5/1935.

Endless threads of woolly character are obtained by extruding viscose into a coagulating bath, passing the cellulose xanthate threads to a take-up device, and then conducting them in a continuous manner and free from tension through a bath or baths heated above 70° C. and comprising an organic liquid or salt solution which effects decomposition of the cellulose xanthate, the threads remaining in the bath or baths until decomposition to cellulose hydrate is completed. Preferably, the xanthate filaments are drawn from the precipitating bath by squeezing rollers, or a godet and are then passed into the decomposing bath free from tension. The foaming effect of the decomposing bath disturbs the parallel formation of the filaments and produces strong crimping. The viscose may have a high alkali content and may contain pigments, matting agents and other additions. C.

Nitrocellulose: Preparation. E. Berl. E.P.470,292 of 7/4/1936.

Stable nitrocelluloses with high nitrogen content are obtained by treating cellulose with a mixed acid containing nitric acid, phosphoric acid and phosphoric anhydride, removing and washing out the acid from the resulting nitrocellulose, boiling the latter once or several times with a reagent which exerts a swelling but not a dissolving action, and finally removing the swelling agent. If desired, small amounts of hydrochloric or perchloric acid may be added to the swelling agent. C.

Cellulose: Isolation. H. Dreyfus. E.P.470,341 of 11/2/1936.

Spruce, poplar, pine or other wood or other lignocellulosic material, e.g. chemical pulp or semi-pulp is immersed in a dilute alkali solution at a temperature not substantially in excess of room temperature, chlorine is passed through the solution, and the material is then heated with a further alkali solution. If desired some chlorine may be added to the dilute alkali solution before immersion of the material. The material may be softened before chlorination, e.g. by boiling with a dilute alkali solution, or with water under atmospheric or higher pressure. The more resinous types of wood may be treated with cold dilute alkali or an organic solvent, e.g. turpentine, to remove the resin, or the resin may be removed by the softening treatment. The alkali solution of the first treatment may be caustic alkali of less than 5 per cent. Other alkalis, e.g. sodium carbonate or lime, may be used. The after-treatment may be carried out by boiling under atmospheric pressure with dilute alkali. The chlorinated material may be boiled with a 1 or 2 per cent. solution of sodium sulphite to which caustic soda is added or a simple caustic soda solution may be used. The material may then be given a final bleach. C.

Rayon Spinning Funnel. British Bemberg Ltd. B.P.470,622 of 4/3/1937 (Conv. 3/7/1936).

In the production of artificial filaments from cuprammonium cellulose solutions by stretch spinning methods wherein the extruded filaments and the coagulating liquid pass down a funnel device, eddying of the coagulating liquid is avoided or minimized when producing filaments of a total titre of less than 60 deniers by using a funnel with an upper opening not exceeding 40 mm. in diameter. Preferably, the upper opening of the funnel does not exceed a value of $5\sqrt{d}$ mm., d being the total titre in deniers. Preferably, the spinning funnels used differ only slightly from the tubular form and flare very little in an upward direction. The outer cylindrical vessel surrounding the funnel or the upper rim of the funnel, through which coagulating liquid is caused to flow from below to the upper rim of the funnel, should be made as small as possible so as to leave only a narrow annular gap for passage of the liquid. C.

Cellulose Ether Coagulating Baths. L. Lilienfeld. E.P.470,746 of 15/11/1935.

For the working up of alkali soluble cellulose ethers in the manufacture of rayon, films, plastic masses, coatings, etc., there is employed as the coagulant for the cellulose ether solution, particularly the liquid solution, or to assist in such coagulation, a medium containing an alkali metal secondary carbonate, in particular sodium carbonate. The shaped structure such as a thread may be introduced directly into the medium, or it may be preliminarily coagulated in a neutral or alkaline bath. The alkali carbonate coagulant may also contain an inorganic or organic neutral salt and another alkali metal salt of alkaline reaction, and also glycerine, glucose, turkey red oil, etc., it may be used at temperatures above 40° C., and the caustic alkali introduced during the coagulation may be neutralised by passing carbon dioxide into the bath. After treatment with the alkali carbonate, the product may be washed with water or may be treated with an acid, neutral or alkaline bath. The cellulose ethers employed may contain less than one ether group per 1-2 $C_6H_{10}O_5$ units, and the ether groups may be alkyl, hydroxyalkyl or alkyl hydroxyalkyl. C.

Cellulose Ether-Viscose Spinning Mixtures. L. Lilienfeld. E.P.470,747 of 16/11/1935.

Cellulosic compositions to be used as parent materials for the manufacture of shaped structures are made from alkali-soluble cellulose ethers in the solution, paste or undissolved form admixed with a viscose which either because of an appropriately long maturing period or by the use in its preparation of a restricted proportion of carbon bisulphide, preferably not exceeding 10 per cent. of the cellulose, has a degree of xanthation corresponding to C_{24} or higher, preferably to C_{30}, the proportions of the ingredients used in making the mixture being such that the proportion of carbon bisulphide is substantially smaller than 20 per cent., preferably smaller than 15 per cent. of the sum of the weights of the cellulose in the viscose and of the cellulose ether. As cellulose ethers there may be used alkyl, aralkyl, hydroxy-alkyl and hydroxy-acid derivatives of cellulose. The shaped structures may be filaments, films, plastic masses, finishes, coatings, etc. C.

Ethylene Polymer Fibres: Production. M. W. Perrin, J. G. Paton, E. G. Williams and Imperial Chemical Industries Ltd. (London). E.P.472,051 of 16/3/1936: 16/9/1937.

Threads or fibres of a solid ethylene polymer, obtained by subjecting ethylene to very high pressure at a moderately elevated temperature, are manufactured by extruding or drawing the material in the fluid state under such conditions that the material solidifies immediately it becomes attenuated. The material to be spun may be molten or it may be in the form of a hot concentrated solution of the polymer in a volatile organic solvent which is readily removable by evaporation, e.g. benzene. Threads or fibres of very high strength can be obtained by selecting as the initial material a polymer of relatively high molecular weight, e.g. over 6,000, and/or by stretching the threads or fibres in the cold. The single threads may be gathered into bundles and cut to form staple fibres of any desired length, which may be spun by the usual methods. The threads and fibres and the yarns and fabrics produced from them are highly resistant to water and many chemicals and are characterised by strength, elasticity, cohesion and lightness. They can be dyed but should not generally be exposed to uses or treatments at temperatures above about 100° C. C.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—Preparatory Processes.

Cotton Waste Yarns: Production. Platt Bros., Oldham. *Textile Weekly*, 1937, **19**, 717, 777; **20**, 15, 24, 165.

A general account of the sources of "soft" and "hard" waste, the uses of waste yarns, waste preparing machinery, and the treatment of hard waste. C.

Modern Flax Drawing Methods. S. A. G. Caldwell. *Irish Text. J.*, 1937, **3**, No. 10, 2-3.

Discusses the advantages and limitations of modern flax dressing methods with special reference to the "breaking and ending" section now fitted to flax hackling machines. From figures given here a saving in cost is effected by

machine dressing as against the older hand method of 1·71 pence per pound, which would equal between ninepence and a shilling per bundle in the case of a 40's lea yarn. L.

Advance in Flax Machinery Design. *Irish Text J.*, 1937, 3, No. 11, 1-4.

Discusses the gradual development in flax machinery design, and refers to some recent improvements which bear testimony to the energy of those connected with the linen industry. Mention is made of the following developments: 1. The L.I.R.A. pedigree seed. 2. L.I.R.A. machinery to decorticate green straw. 3. The Eves patent pushbar drawing frame. 4. Improvements in tow combing, automatic hackling and spreading, gill spinning, automatic doffing dry spinning frames. 5. Extension of the use of hydrogen peroxide in yarn bleaching. 6. Cheese winding and yarn drying. 7. Automatic pirn changing and shuttle changing looms. 8. The Haughton beetling system. L.

Degumming, Drawing and Preparing Ramie. J. B. Pears. *Text. Mfr.*, 1937, **63**, 460-461.

Describes the waste silk preparing and spinning methods in use in the production of ramie yarn. The spreading, drawing and roving operations are discussed and the basis used for the regulation of drafts and doublings for the production of any given count of yarn. L.

Oils for Wool Oiling. *Bull. Lab. Anal. Rech. Ind., Roubaix,* 1936, No. 32, pp. 5-8, and 1937, No. 34, pp. 14-19.

A short review is given of the types of oils used for wool oiling, and the necessity for their control stressed. A table is given showing the density, degree of refraction and saponification and iodine numbers for olive, arachis, castor, cottonseed and maize oils and melting points of the corresponding fatty acids. Methods are described for determining oils in mixtures, especially mixtures of olive and arachis. An analysis is given of an unsatisfactory emulsion, and methods described for testing oxidation and ease of removal. W.

Combing Fine Crossbred Wools. K. L. Stephens. *Text. Mfr.*, 1937, **63**, 304.

Botany Noble combs can be adapted for combing fine crossbred wools. Details of speeds, settings, etc., are given. W.

Noble Comb Drawing-off Rollers. W. B. Lee & Co. *Text. Mfr.*, 1937, **63**, 322.

A description of Layland's patent drawing-off roller pressure compensating device for Noble combs. The device applied to drawing-off stands of the " torpedo " type, in which the movable roller is supported in slidable bearings held down by spiral springs in the tubular heads. Each spring is compressed at the outer end by a plug or plunger positioned by a screw, thus adjusting the pressure on that end of the roller. The plug element is slidable and held down by two studs at the sides. The studs are straddled above their enlarged heads by the fork ends of an equalising lever, which is shaped to lie alongside the usual connecting bar or bracket. Either regulating screw can be adjusted and the pressure cannot be put on unevenly. W.

Production in Wool Combing. " D.W." *Wool Rec.*, 1937, **52**, 401-405.

A description of the working and the uses of the Noble, Square Motion, Lister's Nip and Rectilinear combing machines. W.

(B)—Spinning and Doubling.

Spinning Mule Carriage: Analysis of " Draw." W. J. Guy. *Textile Recorder*, 1937, **55**, No. 653, 20, 26.

The draw of the " variable spindle speed " waste mule is analysed and gain and twist curves are given. The idea of variable spindle speed as applied to waste mules is shown to be a correct principle and it is pointed out that the wider application of variable spindle speed is worthy of attention. C.

Band or Tape Tensioning Device. M. Sato. *L'Industrie Textile*, 1937, **54**, 430-1.

In an arrangement for regulating the tension of bands, belts or tapes driving the spindles of spinning or doubling machines, the tape guide-pulley is mounted on a horizontal support which is attached to the top of a vertical lever and the lower end of this lever is connected to a shaft and support carrying a mobile weight. Any displacement of the guide-pulley caused by elongation or contraction of the tape results in movement of the weight in such a way that the tension of the tape is maintained constant. C.

" Cutler " Spindle Driving Tape. *Tex. Merc.*, 1937, **97**, 358.

Driving tape commonly used in the U.S.A. is $\frac{5}{8}$-inch wide and 43 to 66 thousandths of an inch thick. The makers of the " Cutler " tape claim that much power is lost through the resistance to bending of such thick tape, especially at a join. The " Cutler " tape is woven of extra-long combed cotton and is only 31/1000 inch thick. It is impregnated with a preservative. A saving of 10-20 per cent. in power cost is claimed, which far outweighs the extra cost due to the somewhat shorter life of the thin belt. C.

Large Bobbins: Spinning. A. K. Landau (Saco-Lowell Shops). *Textile World*, 1937, **87**, 2010-11.

Various factors involved in the spinning of large packages are discussed, including ring size, traveller speed, diameter of the bare bobbin, and traverse of the yarn. A line from the outer circumference of the bobbin (i.e. the ring) tangential to the inner circumference (i.e. the bobbin barrel) should make an angle of not less than 23° with a line passing through the centre when the yarn is spun with twist-factor 4·75, or not less than 27° for softer yarns. Practical ranges of ring and bobbin sizes are tabulated. C.

Mechanical Doffer Cap Spinning Frame. Prince-Smith and Stells Ltd. *Textile Manufacturer*, 1937, **63**, 361-362.

In a cap spinning frame fitted with mechanical doffing arrangements, the doffing mechanism is operated by means of a number of hand wheels and levers at the end of the frame. Two girls or youths are able to doff all the frames in a section as quickly as, if not more quickly than, a number of hand doffers. The time taken to doff a machine is on an average 1½ minutes. Existing frames can be fitted with mechanical doffing arrangements without any difficulty. C.

Mule Spindle Oil: Selection. *Textile Manufacturer*, 1937, **63**, 395.

A recent statement is reported that only about half the mule spindle oils examined come within the gravity-refractivity specification of reasonable freedom from cancer-promoting constituents, and that most that pass the test only just do so. The meaning of the specification is illustrated simply by some numerical examples and it is pointed out that high-gravity, low-viscosity mineral oils are most suspect. Oils from Ecuador, Peru, Russia, Pennsylvania and most of the Texas oils are reasonably safe but Mid-U.S.A., Mexican, Californian, Persian, Rumanian, Borneo, Venezuelan and shale oils should be avoided. C.

Nomograms: Construction and Application to Spinning Calculations. W. Oeser. *Textilberichte*, 1937, **18**, 413-419, 488-494, 687-689.

The construction of nomograms for the determination of drafts, doublings and change wheels in drawing mechanisms of drawing, speed and spinning frames, and the productions of cards, drawing, speed and spinning frames is described and the use of the nomograms is explained and illustrated by examples. C.

Spinning Mule: Adjustment. E. Taylor. *Textile Manufacturer*, 1937, **63**, 394, 395, 420.

Directions are given for re-setting the roller beam, carriage, fallers and tin-rollers and lining and heighting the spindles on a mule, with illustrations of various gauges. C.

Spot Yarn Doubling Frame. J. J. Benet (Hijo de F. Junyent). *Cataluña Textil*, 1936, **30**, 102-104.

In a doubling frame for the production of yarns having spots, thick places or similar effects distributed irregularly throughout their length the motion of the thread guide for the secondary yarn is controlled by a cam fixed to a ratchet wheel which is connected by means of catches to another wheel or organ actuated by the feed roller of the machine, in such a way that motion is transmitted normally and continuously to the cam through the catches and the ratchet wheel, provision being made so that the cam, at a given moment, can be forced to turn together with its ratchet wheel at a speed greater than that communicated to it by the feed roller of the machine in order to destroy the co-ordinated rhythm between the running of the cam itself and the general uniform running of the machine. This periodic increase in the speed of the cam is produced by a special catch which acts on the ratchet wheel at suitable

moments and is governed by a cam driven by the machine. A typical arrangement is described in detail and shown in diagrams. C.

Individual Drives for Spinning Machinery. *See* Section 8D.

Advance in Flax Machinery Design. *See* Section 2A.

(C)—Subsequent Processes.

Glacé Yarns: Production. — Caumont. *Revue Textile,* 1937, **35**, 381-383.

In the production of glacé threads, yarns from the spinning room are reeled, dyed or bleached, finished and glazed in hank form, and then wound on to bobbins. These operations are briefly discussed and different types of reels for supporting the hanks in the winding process are described and shown in diagrams. C.

Yarns: Gassing. G. Galley. *Revue Textile,* 1937, **35**, 377-379.

A general discussion of the gassing of yarns, the unwinding and rewinding operations, types of burners used, devices for removing the yarn from the flame on breakage of the yarn, the ventilation of gassing rooms, and the loss in weight produced by gassing. C.

Winding Machine Production: Mathematical Analysis. L. H. Leedham. *Hosiery Tr. J.*, 1937, **44**, No. 525, pp. 38-42. W.

(D)—Yarns and Cords.

Vistra XT Chenille Yarns: Production. *Spinner u. Weber,* 1937, **55**, No. 36, 5-7.

The two methods of preparing chenille yarns are briefly described and the suitability of Vistra XT for use in the production of chenille yarns is pointed out. Vistra XT fibres have a twisted and curled structure and yarns and fabrics produced from them are similar to woollen materials. Tufts of these fibres in chenille yarns adhere well without requiring a specially strong binding by the core threads. Fabrics prepared from the chenille yarns are particularly suitable for bathing wraps. C.

Chenille: Production. R. T. Pil. *Revue Textile,* 1937, **35**, 383-387.

Chenille is usually made either by cutting up woven fabric into strips or by twisting together two core yarns and an effect thread in such a way that the latter forms loops which are cut as they are formed by means of a suitable cutting device. A new and cheaper method consists in cutting strips from a fabric composed of warp yarns of chain structure, formed on a crochet device, and weft yarns which pass through the loops of the warp threads. The production of this type of fabric is briefly discussed and diagrams of crochet and weft-inserting devices are given. C.

Viscose-Rubber Elastic Yarns and Fabrics: Applications. Viscolax Yarn Distributors. *Textile Weekly,* 1937, **20**, 317-318 ; *Textile Recorder,* 1937, **55**, No. 655, 22.

Illustrations are given of " Viscolax " yarns spun from a mixture of viscose and rubber latex (R. & J. Pickles Ltd., B.P.440,623) and of swimming costume fabrics incorporating these yarns. The same agents market " Raylaxicon " yarns. Mention is made of spun rubber yarns (some with fibre covering) and a method of sizing them so that they can be wound, woven and knitted in the stretched condition. C.

Yarns and their Relation to Specifications and Tariffs. " B.W.R." *Wool Rec.*, 1937, **52**, 407,463, 531, 589 and 651.

The classification of yarns of or containing wool is described and examples given for calculating the wool, cotton and oil contents of greasy angola yarns. For ply yarns, factors of prime importance are the counts of component yarns, the relative rates of delivery of components and the scouring losses. The most common yarns and their systems of counting, as used in the West Riding, are stated. Tables and examples are given for converting English into metric weights and measures for length, weight and number of threads. A method is described for estimating the permissible number of silk threads in addition to ground yarns and as replacing ground yarns. W.

Patents.

Winding Machine Driving System. Barmer Maschinenfabrik A.-G. E.P. 467,473 of 14/12/1936.

The drum of a yarn or thread drum winding machine is driven by a shaft disposed in a large bore in the drum. When at rest, the shaft does not engage

the drum, and when starting up, the arm is lowered on to the shaft which drives it by rolling friction and gives a gentle and gradual drive so that breakage of the thread is prevented. The drum and bobbin are raised to stop the drive by a lever carrying a roller beneath the drum and the lever also carries a rod, brake or the like engaging the thread and lifting it out of the traversing guide. C.

Spindle Driving Arrangements. Siemens-Schuckertwerke A.-G. E.P.467,478 of 12/2/1937 (Conv. 12/2/1936).

High-speed vertical spindles such as those used for rayon spinning cans and twisting spindles, comprising a spindle of such length and diameter that it is sufficiently flexible to allow of adjustment to the axis of the centre of gravity during rotation and fixed at its lower end in a driven hollow spindle carried by elastically supported bearings, are driven by a belt or cord pulley carried by the hollow spindle at the level of an upper bearing, and the roller bearings contacting directly with the hollow spindle, are carried in a housing which serves as an oil container and is carried by a rubber block of a height approximating to the distance between the bearings. C.

Yarn Tube End Cover. A. S. Lowry. E.P.468,139 of 25/11/1935.

In a flangeless tube or spool upon which yarn or thread has been wound and which projects from the yarn windings, the end of the tube, if it has been damaged by roughening or by deposition of oil thereon, is provided with a removable member which covers that end only and prevents contact of such end with adjacent yarn packages in a container in which a number of packages are packed. The removable member may be of conical or cylindrical form and slit longitudinally so that the sections formed by the slits can be turned up around the end of the tube. C.

Spindle Driving Arrangements. Prince-Smith and Stells Ltd. and W. Prince-Smith. E.P.468,202 of 16/2/1937.

In spindle driving arrangements for spinning, twisting, and like machines wherein two or more oppositely mounted spindles are tape-driven from a reversible cylinder in association with an idler roller or individual idler pulleys, and tension pulleys, the tension pulleys are arranged towards one side of the machine and are adjustable collectively, and an idler roller or a series of idler pulleys is arranged between them and the driving cylinder to increase the driving contact, the run of the tape being such that its driving length extends directly from the cylinder to the spindle for each direction of rotation. C.

Continuous Filament Sliver Drawing and Breaking Apparatus. R. A. Wolstenholme (Whitin Machine Works). E.P.468,682 of 2/12/1935.

In apparatus for drawing and breaking slivers of silk or rayon or other filaments of continuous or substantial length, of the kind comprising means for applying tension to the filaments, front delivery rollers and intermediate co-operating holding rollers, the lower holding and delivery rollers being driven, the upper holding roller is provided with a yielding surface of relatively soft natural or synthetic rubber, and the lower holding roller has an unyielding surface. The holding rollers are adjustable relatively to the delivery rollers which are driven at the necessary increased speed to effect the drawing and breaking of the filaments. Three holding rollers may be provided of which only the middle has a yielding surface. Slivers may be doubled, and a preliminary breaking apparatus consisting of all steel rollers, excepting the top delivery roller, may be employed. C.

Spindle Driving Band. J. M. Marti. E.P.468,717 of 25/2/1936.

A driving band for spindles comprises a multi-strand endless rubber core enclosed in one or more endless plaited or braided tubes, which enclose the core loosely when the band is unstretched. The core may be made from a single strand of rubber knotted together, made into a figure 8 and folded on itself several times. The knot is untied after part of the cover has been made. The band may be impregnated with rubber and vulcanized. C.

Rubber Threads: Covering with Gelatin Tapes. T. L. Shepherd. E.P.469,433 of 19/2/1936.

Rubber threads are made relatively inextensible by supplying them, while stretched or unstretched, with a braiding or helical winding of filaments or tapes of gelatin or other substance soluble in a medium that does not destroy rubber or vulcanized rubber, and simultaneously or later causing the covering to adhere

to the thread by the use of water or other solvent. After weaving into fabric the covering of the thread may be washed or dissolved away. C.

Washing and Lubricating Textiles. L. P. Antrobus (trading as J. Briggs & Sons). E.P.470,870 of 21/3/1936.

Wool or the like is lubricated by introducing the lubricant, emulsion or solution thereof into a washing or like vessel of a series whilst washing is taking place, the material then being dried. The lubricant is preferably arranged to be passed to a preceding vessel in opposite direction to the travel of the material. The material is fed into the first vessel containing alkali, thence by conveyors to a second containing soap with or without alkali, to a third containing a more dilute soap solution, and then to a fourth containing water and so to the drying chamber. W.

Winding Machine Winding Starting Device. Schärer-Nussbaumer & Co. (Erlenbach, Switzerland). E.P.472,570 of 17/10/1936:27/9/1937.

A device for starting the winding operation in machines for winding yarn or thread, in which, owing to circular travelling movement, the completely wound spool or cop tube leaves the winding position and an empty spool or cop tube is moved to the winding position, the thread passing over from the full spool or cop tube to the empty one and then being servered on the intermediate stretch, is characterised by the feature that before the thread from the full spool or cop tube arrives at the winding position of the empty spool or cop tube it passes over a uniformly reciprocated thread guide in order to be brought, by a temporarily shifted thread transferer, into the range of movement of a thread catch, which rotates with the empty spool or cop tube, and to be fixed on the spool or cop tube by the thread catch, whereupon the thread is torn by the pull between the two spools or cop tubes which is effected owing to their rotation. C.

Yarn Winding Frame. W. Reiners (W. Schlafhorst & Co. ; Munchen-Gladbach, Germany). E.P.472,678 of 23/3/1937:28/9/1937.

In a yarn winding frame having for guiding the yarn to the yarn receiving cop a rotating drum with crossed helical guide grooves and an auxiliary swinging or rocking yarn guide in front of the drum, the auxiliary yarn guide is arranged to rock in an approximately horizontal plane at such distance from the drum that the distance between its turning points is approximately equal to the distance between the crossing points, or the two outside crossing points of the grooves in the drum. C.

Winding Machine. W. Reiners (W. Schlafhorst & Co. ; Munchen-Gladbach, Germany). E.P.472,731 of 14/12/1936:29/9/1937.

In a winding machine of the kind in which a series of winding units travel round an endless track, the driving of the take-up bobbin of the winding units is effected by means of an endless belt travelling round the machine, the term " belt " being here used to apply either to a belt engaging by friction or to a gear chain engaging sprocket wheels. The belt may act directly on the shafts of driving drums rotating the take-up bobbins if the drums are so disposed that pulleys or sprocket wheels can be fixed to their shafts for that purpose, or it may effect the drive by means of intermediate gearing. Ribbon winding may be prevented on machines wherein the take-up bobbin is driven by frictional contact with a driving drum by providing a control rail parallel with the track, having rises which act on lever arms carried by the winding units, so that while a winding unit is travelling past a rise the take-up bobbin is temporarily lifted off the drum and a periodical interruption of the drive thus effected. C.

Combing Machine Piecing Mechanism. J. W. Nasmith (Manchester). E.P. 472,904 of 1/4/1936:1/10/1937.

A piecing roller mechanism for combing machines comprises an arrangement in which the piecing point of a piecing roller pair is positively moved in a direction away from the detaching point and combing cylinder for the backing off of an end of fleece for piecing purposes, and again arrives at its original position for piecing after such backing off, with guide and control means moved in synchronism with the movements of the end to engage and control the same during the backing off and subsequent piecing. Two forms of construction are described. C.

Double Twist Twisting Spindle. Barmer Maschinenfabrik A.-G. (Wuppertal-Oberbarmen, Germany). E.P.472,998 of 3/4/1936: 4/10/1937.

Inclined double twist twisting spindles driven by an endless driving element and oscillatably mounted independently of one another in individual bearing arms are suspended on a common support so that the wharves bear by gravity of the spindles against the driving element. Brake surfaces are preferably provided against which the individual spindles are pressed for stopping their rotation, and holding devices are also provided for maintaining the spindles in disengaged position and out of contact with brake surfaces so that the spindles can be rotated freely by hand. C.

Hopper Feed Machine. Platt Bros. & Co. Ltd. (Oldham) and C. W. Barnett. E.P.473,432 of 20/4/1936: 13/10/1937.

Scale pan mechanism for automatic feeding machines for carding engines, etc., as set forth in B.P.281,470, is further distinguished in that, for the purposes of instantly disengaging the drive mechanism for the lifting lattice and for permitting closing of the known flap against droppings (if used) and for stopping the known vibrating comb, the over-balancing or actuation of the scale beam is utilised, the scale beam being combined with co-operating loaded lever mechanism for effecting this disengagement, other combing levers being provided and mechanically operated in such manner as to automatically re-set the loaded lever mechanism at the proper time. C.

Yarn Twisting Apparatus. British Celanese Ltd., London. E.P.473,436 of 24/4/1936: 13/10/1937.

A process for twisting yarn comprises drawing yarn from a rotating supply package, passing the yarn through a device adapted to assist the twisting, then passing the yarn in engagement with a guide and on to a take-up package, and, as changes occur in the tension in the yarn during the unwinding of the supply package, employing the tension to move the guide towards or away from the axial line of the rotating supply package so as to alter the direction of the yarn as it leaves the twist-assisting device, and so increase or decrease the tension placed upon the yarn, whereby the variations in tension in the part of the yarn receiving twist are reduced. Apparatus for this purpose comprises a rotating spindle adapted to support a yarn supply package, a take-up device, means for assisting the twisting of the yarn leaving the spindle, and a movable guide between the take-up device and the twist-assisting means adapted to be moved by changes of tension in the yarn and to alter the direction of travel of the yarn as it leaves the twist-assisting means so as to produce in the yarn leaving the twist-assisting means variations in tension which are opposed to the changes. These arrangements may be used for the twisting of yarns of all kinds and are particularly suitable for the twisting of yarns of fine denier and/or low tenacity made of cellulose ester or ether filaments of substantially continuous lengths. C.

Staple Fibre Yarns: Production from Continuous Filaments. J. L. Lohrke Thornbury, Pennsylvania, U.S.A.). E.P.473,552 of 14/4/1936: 14/10/1937.

A sliver of substantially continuous or endless fibres is first tensioned, as by drafting rollers, to break the fibres to produce over-size staple lengths, that is staple lengths substantially greater than desired for the yarn, and the resulting sliver is thereafter subjected to one or more tensioning operations, as by drafting rollers, to reduce the over-size staple lengths so that the same are not greater than, and so far as possible are substantially equal to, the staple length desired for the production of the finished yarn, the continuity of the sliver and the parallelism of the fibres being maintained throughout the successive operations. After the second breaking and drafting operation, the resulting sliver is twisted in any suitable manner. C.

Fibre Stapling and Combing or Dressing Apparatus. K. Tutihasi (Tokyo). E.P.473,560 of 7/7/1936: 15/10/1937.

Apparatus for stapling and combing or dressing continuous fibre comprises an endless chain of grooved square bars stretched on a pair of revolving cylinders, semi-circular or U-shaped rods for keeping fibre between the bars, a drum for unwinding continuous artificial fibre, a needled or spiked stapling drum arranged angularly to the bars at the straight side of the endless chain, and a combing or dressing drum arranged next to the stapling drum. C.

Spinning or Twisting Machine Stop Motion. E. Stutz-Benz (Landsberg, Germany). E.P.473,584 of 22/2/1937: 15/10/1937.

A device for stopping the feed of the material upon breakage of the thread in spinning, twisting and like machines comprises, between the feed device and the spinning or twisting means, a feeler adapted to bear on the thread and to stop the feed on breakage of the thread and a member adapted to engage the thread and prevent excessive displacement thereof by the pressure of the feeler. A stopping device of this type can be used with fine yarns. C.

3—CONVERSION OF YARNS INTO FABRICS

(A)—Preparatory Processes.

Cross Wound Bobbins: Structure and Advantages. — Weizel. *Monatsh. Seide u. Kunstseide,* 1937, **42**, 350-353.

The structure and advantages of cross wound bobbins and their use on modern warping and weft winding machines are discussed. C.

" Leesona " Winding Machine Straight Belt Drive. Universal Winding Co. *Textile Weekly,* 1937, **20**, 453.

An illustration is given of the straight belt drive and gear gain mechanism on the " Leesona No. 50 " winder. The spindle has a fixed pulley over which the driving belt passes and this is pressed down to drive the spindle by means of an idler pulley. No clutches are required and the spindle can be started very slowly. A great economy in belts is claimed. C.

" Walda " High-speed Pirn Winder. Arthur Davy Ltd. (Bradford) and Thomas Holt Ltd. (Rochdale). *Textile Manufacturer,* 1937, **63**, 405, 408.

Some particulars are given of a new pirn winder with vertical Rabbeth-type spindles run normally at 8,000 r.p.m. The builder shaft is screw-threaded, and is driven slowly, raising the lifter slide bracket, traverse guide and cam. The lift is positive, there being nothing in contact with the yarn on the pirn. Pirns up to 10 inches long and from 1 to 3 inches diameter can be made. C.

Warp Beam. J. W. Hutchinson. *Textile Manufacturer,* 1937, **63**, 408.

A detailed description is given of the flanged beam patented by G. R. Kilburn, and its advantages are pointed out. C.

(B)—Sizing

Cellulose Ether Yarn Dressing: Application. P. Allman and S. F. Stocks. *Textile Weekly,* 1937, **20**, 417.

Brief notes are given of a process (patent applied for) for the dressing of yarns with cellulose ethers. The machine unit consists of a bath, a doctor and wiping blade, and a hot plate. It is particularly adaptable for dressing yarn before doubling on the multiple-end winding frame or on the up-twister. Dye may be added to the solution. C.

Gelatin Size: Application to Rayon. W. L. Bentley. *Rayon Textile Monthly,* 1937, **18**, 597-598.

General remarks on the use of gelatin in rayon sizing include warnings about the choice of the oil component. Sometimes oils are used that waterproof the gelatin. Other size ingredients may caramelize it. Defects in finished cloth may be traced to these causes. C.

Rayon Cakes or Hanks: Sizing. G. E. Wilson. *Textile Weekly,* 1937, **20**, 424, 433.

An outline is given of a French method of sizing rayon in the hank or cake form as delivered. The packages are steeped in the size (the " Gamma " type is preferred) and then centrifuged. A preliminary run is made to determine how much liquid is held after whizzing for different periods and the size concentration is calculated accordingly. C.

Rayon Staple Fibre Warp: Sizing. I. J. Saxl. *Textile World,* 1937, **87**, 1982-3.

Reasons are given for the view that the chief reason for sizing staple fibre warp is to bind loose fibre. Suitable recipes are provided (gelatin, sulphonated coconut oil or soap, and glycerin) and speeds and temperatures (seven drying cans) are recommended. C.

(C)—WEAVING.

Boat Selvedges: Application in Rayon Weaving. J. H. Strong. *Silk and Rayon,* 1937, **11**, 806.

The utility of the boat selvedge device for producing a selvedge very near a plain cloth weave with an interlacing to relieve heavy tension on the selvedge threads is discussed with diagrams. C.

Fast Reed Looms: "Banging-off"; Causes and Prevention. S. Major. *Textile Recorder,* 1937, **55**, No. 653, 29-30, 45.

The causes of "banging-off" on fast reed looms are grouped into defects of the warp protector motion, defects of the picking motion, faulty sley and sley fittings, defective shuttles, and miscellaneous defects, and are discussed. Methods of detecting and rectifying the various causes are indicated. C.

Looms; Principles and History. (1-4) G. Schaefer. (5) W. Born. *Ciba-Rundschau,* 1937, No. 16, 554-557, 558-570, 571-576, 579-581, 582-583.

(1) The principles of the loom are explained and the development of early forms of hand looms is briefly discussed. (2) An account is given of the looms of ancient Egypt, Greece and Rome and the hand looms of the middle ages. (3) A review of the history of the mechanization of the loom. (4) Representations of looms in Asiatic art are described. (5) A brief account is given of representations of looms in Japanese works of art of the eighteenth and nineteenth centuries. C.

Narrow Fabric Loom Jacquards. E. J. Gibbons. *Rayon Textile Monthly,* 1937, **18**, 400-401, 471-472, 541-543.

The construction and operation of 200-hook and 400-hook jacquard heads for narrow fabric looms are discussed and the New England and Philadelphia methods of stringing up are explained. The methods of cutting, lacing and wiring the cards are described. C.

Nogamy Automatic Warp Let-off Motion. Y. Nogamy. *Textile Recorder,* 1937, **55**, No. 653, 49-50.

In the Nogamy warp let-off motion the delivery of the warp yarn from the beam is automatically controlled and a uniform tension is maintained on the sheet of warp threads irrespective of the diameter of the beam. Motion is transmitted to the warp beam by the worm and worm wheel and lets off the warp yarn positively. Two round back rests linked together are provided, the warp being tensioned by a weight which may be adjusted to any position on a lever at the commencement of a new beam. After once being adjusted in the desired position, the weight is not moved again during the weaving of the whole warp. The movement of the back rests, produced by changes of tension on the warp threads, causes a quicker or slower unwinding of the beam and this is brought about by a link arrangement. This link apparatus is described and shown in diagrams and directions for setting the let-off motion are given. C.

Selvedge Weaves. E. Schmidt. *Kunstseide,* 1937, **19**, 327-328.

Suitable weaves for the selvedges of different types of fabrics are shown and a method of developing weaves by combining the four positions of a standard weave obtained by rotating through angles of 90° is explained. C.

Weaving Mills: Production Determination. W. Schulze. *Spinner u. Weber,* 1937, **55**, No. 36, 1-4.

The value of production and efficiency determinations is discussed and methods of carrying out and recording observations on production and on time lost in repairs, etc., in mills where pick counters are in use and in mills where such counters are not available, are described. Comparisons between different sections and graded premiums for high productions are recommended. Production determinations in sizing are also briefly discussed. C.

Drop Box Loom: Boxing Control. W. Shuttleworth. *Textile Weekly,* 1937, **20**, 419-423.

Practical hints are given on box planning, with examples of (1) weft mixing, (2) novelty mohair overcheck, (3) quick change wefting for worsteds. C.

Loom: Automatic Lubrication. H. Reppmann. *Textilberichte,* 1937, **18**, 693-4.

Faults and damages due to unsatisfactory lubrication of the loom are discussed and the use of an automatic grease lubrication system is recommended.

The grease, FJ4, is suitable for looms. The mounting of the lubricating devices on the loom is discussed and a complete system comprising 39 lubricating nipples and 2 high-pressure grease cups is outlined. The costs of grease lubrication are about one sixth those of oil lubrication. C.

Looms: Adjusting. B. H. Hawkins. *Cotton (U.S.)*, 1937, **101**, No. 9, 78-81.

Practical hints are given on " boxing the shuttle," including setting the protector rods, binder springs and check straps. Several causes of faulty cloth are also discussed. C.

Loom Shedding Motions: Structure. W. Wilkinson. *Textile Manufacturer*, 1937, 63, 401-3.

Details are given of shedding motions employing tappets under the healds, beginning with a standard pattern of the 1860's, evolved from Todd's invention of 1803. Rules for finding the stroke of the tappet for plain roller motions are given and adaptations on " Continental " silk looms are described. C.

Rayon Fabrics: Weaving in the Cotton Industry. *Silk J. Rayon World*, 1937, 14, No. 160, 15.

Figures from the International Federation loom census of the number of cotton looms engaged in the manufacture of rayon goods in 1936 and 1933 are given for all manufacturing countries to show the extent to which the depression in the cotton weaving trade has been mitigated by the employment of cotton looms for the weaving of rayon fabrics. C.

Rayon Looms: Development. J. Starkie. *Textile Manufacturer*, 1937, **63**, 355, 398, 427.

A general review of recent developments in loom constructions and motions evolved for rayon weaving, under the headings control of the warp, control of the cloth, take-up motions, shedding, dobbies, Jacquards, picking, multiple-shuttle-box looms, and weft stop motions. C.

Selvedge Thread-trimming Machine. C. Weicken Co. (Dresden). *Textile Weekly*, 1937, **20**, 497.

A separate machine for trimming selvedges has a " preliminary cutter " that clips off long loops and loose threads, followed by a " cutting motion " with circular knives to complete the work. As the cloth is fed to the clippers, the loops are automatically slackened and a suction device lifts them into position to be cut. C.

Shuttles: Causes and Prevention of Defects in ——. A. Widmann. *Textil-berichte*, 1937, **18**, 697.

The author discusses various faults in the shuttles of automatic cotton looms, including defects due to incorrect settings of various loom parts, and indicates methods by means of which the defects may be removed. C.

Smalley's Tappet Motion: Uses, Advantages and Drawbacks. W. Wilkinson. *Textile Manufacturer*, 1937, **63**, 358-359.

The author explains the construction and action of Smalley's barrel type motion and discusses the uses, advantages and drawbacks of this type of tappet shedding mechanism. C.

Tender Cotton Warp: Weaving. *Textile Weekly*, 1937, **20**, 499, 529.

Practical hints are given on overcoming difficulties in the weaving of tender warps, under the headings (1) reducing the strain of shedding, (2) ensuring even tension on warp ends, (3) the shape of the shedding tappets, and (4) reducing the ends and picks per inch. C.

Methods of Selecting, Testing and Fitting New Shuttles. " Mecanic." *Text. Merc.*, 1937, **97**, 155 and 163.

The merits of different types of woods are discussed, cornel being generally preferred. Diagrams are given showing a gauge for testing the width and bevel of shuttles and a method for testing their balance. The question of wear and tear is discussed. W.

(D)—KNITTING.

Circular Knitting Machine Selecting Mechanisms. J. B. Lancashire. *Textile Recorder*, 1937, **55**, No. 653, 38-39.

A form of selecting mechanism which functions in the same way as a large wheel but can be accommodated much more easily is the cut ribbon, tape or band.

Ribbons are used on sinker wheel frames and on latch needle circular rib machines. Another system of pattern building makes use of automatically-controlled selecting bits arranged so that the set-out of the bits can be altered during the knitting action. The application of these different types of selecting means is discussed and details are given of a modern design produced on a "Spensa-purl" machine equipped with selecting bits. C.

Knitted Fabrics; Insertion of Weft Threads in——. *Textil Lloyd,* 1937, 11, No. 18, 25-35.

It is pointed out that the elasticity of knitted fabrics can be improved by incorporating in the fabrics rubber weft threads or reduced by the incorporation of inelastic weft yarns and an account is given of the production of knitted goods with elastic and inelastic zones, the method of fixing rubber weft threads in the fabric, the preparation of ankle bandages, the joining of fabrics containing rubber threads, the introduction of rubber weft threads on Cotton machines and on flat rib machines, the preparation of fabrics containing wefts composed of textile fibres, and thread guides for flat knitting machines for the preparation of fabrics containing textile weft yarns. Various patent systems are explained and numerous diagrams are given. C.

Stocking Welts: Production. *Spinner u. Weber,* 1937, 55, No. 38, 6-8.

A discussion of various patent knitted structures, including structures containing elastic threads, for the welts of stockings knitted on Cotton machines, the use of woven or braided elastic bands as stocking tops, and the methods of joining these bands to the knitted leg sections. C.

Warp Knitting Machines. C. Vouldy. *L'Industrie Textile,* 1936, 53, 335-336, 441-443, 496-497, 548-549, 597-599; 1937, 54, 22-23, 181-182, 336-338.

An account is given of the principles of the Raschel machine and of recent improvements in this type of machine and in Milanese warp knitting machines. C.

Circular Knitting Machine Presser Wheel Patterning Mechanism: Application. A. Elster. *Textil Lloyd,* 1937, 11, No. 19, 24-29.

A detailed discussion is given, with the help of diagrams, of various pattern effects produced by the use of special presser wheels on circular knitting machines. C.

Full-fashioned Hosiery Machine: Alignment. W. A. Simond. *Textile World,* 1937, 87, 2009-2010.

Faulty action of the catch bar is traced to misalignment of the verge-plates and a device is illustrated which, with a horizontal holder for a dial gauge described previously, makes true alignment a simple matter. C.

Hosiery Costing Schedules. W. Davis. *Textile Recorder,* 1937, 55, No. 654, 42-43.

Typical costing schedules under present wage agreements are given for manufacturing (a) men's pullovers on circular rib machines, (b) wool outerwear on power Jacquard machines and (c) women's underwear on the Raschel warp loom. C.

Knitted Yarns: Production on Raschel Machines. E. Lesur. *L'Industrie Textile,* 1937, 54, 444.

Four methods of producing knitted yarns having simple or compound chain structures are briefly described. C.

"Wirth" Milanese Loom: Application. *Silk J. Rayon World,* 1937, 14, No. 160, 24-25.

An illustrated description is given of the Wirth milanese loom, in which the warp bobbins or beams are located above the needle bed instead of on the floor, this position being due to the fact that the machine is fitted with travelling needles with eyes into which the threads are positively introduced, thereby increasing the production by about 150 per cent.; 250 courses can be knitted per minute. The machine is more accessible and there is less risk of entanglement of threads by catching on hands and sleeves. Increased speed is achieved by shortening the bars connecting the needle bars with their cams, and shortening the needle in the machine with more exact and precise cam and chain construction. Methods of weaving several patterns are given with illustrations. C.

(E)—LACEMAKING AND EMBROIDERING.

Rayon Curtains: Production by Lace Knitting. W. H. Brown. *Rayon Textile Monthly,* 1937, **18**, 467-469.

Knitted curtains are usually made on lace machines. Lace knitting is a form of warp knitting which combines the principles of both knitting and plaiting and differs from ordinary warp knitting in the manner in which the needle set-up is made and in the use of weft yarns in addition to warp yarns. The yarns are knitted from spools instead of warp beams. In the fabric mesh the warp consists of a series of independently knitted chains, each of which is formed from a separate yarn and by a separate needle. The weft consists of yarn carried from side to side and inter-knitted with the warp yarns to bind the two elements. Loop formation in the warp element is a continuous process, while the shifting of the weft yarns from side to side occurs at intervals, depending on the size and shape of the mesh. Diagrams of the knitting elements of a lace knitting machine and the mechanism for shifting the weft are given and the modes of operation are outlined. Gimp, a twist yarn of several plies having a very tight twist and a high strength is used as weft for the basic mesh. Gimp of a different colour, chenille, and certain types of braids are used as design yarns. These form a sub-division of the weft and must be threaded through yarn guides mounted on guide bars independent of the mesh weft guide bars. C.

Power-driven Embroidery Machine. H. Dunn. *Textile Recorder,* 1937, **55**, No. 653, 48-49.

The construction and operation of a power-driven embroidery machine are explained with the aid of diagrams. C.

(G)—FABRICS.

Three-bar Warp Loom Rayon Fabrics: Design. W. Davis. *Silk and Rayon,* 1937, **11**, 802.

Examples of three-bar warp loom rayon fabrics are given, showing the method of lapping for (1) a fancy ogee pattern, (2) a twill effect, (3) a raised pattern, (4) a ribbed knitted surface effect for excellent service in wear, and (5) a lustre stripe on a plain ground. C.

" Downproof " Fabric: Structure. *M/cr. Gdn. Commercial,* 1937, **35**, 284.

The writer discusses the trade interpretation of the term " downproof." A common structure for downproof sateen is: 33 in. wide in the grey, 31 in. finished ; ends per inch, 100 grey, 106 dyed and finished ; picks, 208 grey, 204-205 dyed and finished ; warp 50's Egyptian, combed Sakel or Uppers ; weft 50's Egyptian, carded uppers or carded or combed Sakel. Other particulars given are selected from the low and high-class ends of the trade and from printed qualities. Downproof cambrics in use are also described ; a popular structure is 33 inches grey to finish 31 inches, 100 ends per inch of 60's Egyptian combed warp, 124 picks per inch of 50's Egyptian carded weft. An empirical index of " density value " (x) is given by the formula $(a.\ b)/\sqrt{c.\ d.}$ where a and b are ends and picks per inch, finished, and c and d are counts of warp and weft. Thus, for the above sateen, $x = 424 \cdot 32$. C.

Matelassé Fabrics. J. Thiriot. *L'Industrie Textile,* 1937, **54**, 432-434.

Ordinary matelassé fabrics comprise two sets of warp and three sets of weft yarns and the relief or embossed effects obtained are due to the presence of padding wefts and to the difference in tension between the two sets of warps in weaving. In cloqué fabrics the patterns are produced by the shrinkage of crepe yarns. In modern matelassé fabrics these two methods are combined, crepe yarns being used for the binding warp, so that the pattern effects are due as much, if not more, to the shrinkage of the crepe yarns on scouring, as to the difference in tension between ground and binding warps. The padding weft is usually of wool and the weight of the fabric may be varied by using yarns of different thicknesses. The other yarns may be of silk or rayon. Another method of producing embossed effects depends on the use of Lastex yarns. In another method two fabrics are glued together according to a given design, the lower fabric being stretched while the other is applied to it loosely so that raised portions appear between the glued areas. C.

Rayon Voiles and Ninons: Construction. W. A. Harper. *Textile Weekly*, 1937, **20**, 455-456.

Practical hints are given on the weaving of rayon voiles, ninons, georgettes and chiffons and typical constructions are tabulated. Reference is made to selvedge construction and to the tendency of voile warp ends to roll together ; this is overcome by placing the lease rods well back towards the beam. C.

Staple Cotton Fabrics: Structure. J. Hoye. *Textile World*, 1937, **87**, 2014.

Particulars and illustrations are given of typical bird's-eye diaper, Madras curtain and rice cloths. C.

Transparent Rayon Velvet: Structure. *Rayon Textile Monthly*, 1937, **18**, 608-9.

Details of the structure of " transparent velvet," in which the pile is produced by an extra, separate warp in addition to the foundation warp, are given with point-paper diagrams. C.

Woven Felts: Application. A. Litschgi. *Spinner u. Weber*, 1937, **55**, No. 42, 1-6.

A general account is given of the types of woven worsted felts used for the following purposes: (1) spinning ; roller covers and clearing cloths, (2) sizing ; size roller blankets, (3) printing and finishing ; back cloths, calender felts, (4) carpet printing ; endless back cloths and tubular felts, (5) filtration, (6) miscellaneous ; tennis balls, felts for leather presses, laundry calenders, newspaper printing machines. C.

Quality in Worsted Serges. R.W.R. *Text. Mfr.*, 1937, **63**, 311.

This article deals with the quality and make of worsted serges varying in weight from 15-22 oz. Particulars are given of settings for 2/2 twill weave for qualities ranging from 58's to 70's. Reference is also made to the process of London shrinking. W.

Flu-resisting Fabric. *Linen Trade Circ.*, 1937, **23**, No. 1244, 5.

A new germproof shirting fabric has been introduced by Burgess Ledward. Bearing the trade name " Vi-Giene ", it is said to be impregnated by a special process which eliminates risk of disease carrying through factories, workshops and warehouses. L.

PATENTS.

Composite Knitting Yarns: Production. M. A. Alex. E.P.467,577 of 16/12/1935 (Conv. 15/12/1934 and 17/10/1935).

A composite yarn for knitting purposes is produced by twisting together a number of yarns having different degrees and/or directions of twist to constitute a component element, a number of such components being twisted together in the opposite direction of their individual twists to form a composite yarn of low twist of which the components have a low or moderate twist and consist of yarns twisted to different degrees and in different directions. The composite yarn is loose, soft and full, and is capable of stretch of the order of 50 per cent. of its normal length. The initial yarns may be formed of silk or rayon, alone or combined with yarns of animal or vegetable material. C.

Pile Fabrics: Production. W. C. Fairweather (Singer Manufacturing Co.). E.P. 467,949 of 2/7/1936.

Pile fabrics are formed by stitching rows of loops of yarn to a backing fabric after the manner described in E.P.456,633 and cutting the loops to form a softer pile. C.

Loom Drop-box Motion. Soc. Anon. A. Saurer. E.P.468,107 of 10/8/1936 (Conv. 12/9/1935).

A drop-box motion comprises one or more mutilated pinions which are movable axially under control of pattern mechanism so as to co-operate with a reciprocating rack or an oscillating segmental driving gear, each pinion having flat toothless portions arranged diametrically on opposite faces to free the driver at the end of its stroke. Each rotary movement of the pinion is supplemented to half a revolution by one or other of two wide teeth according to whether the pinion is oscillated to operate boxes at both ends of the loom or rotated intermittently in one direction only, the pinion being locked in the final position by a spring-loaded plunger engaging one or other of two eccentric discs. C.

Warps: Connection to Beams. G. R. Kilburn. E.P.468,194 of 6/1/1937.

A strip of canvas is attached to the warp by means of loops and rods and to the beam by means of tacking at one edge whilst auxiliary canvas strips can be

attached when required by hanks on looped tongs engageable in holes drilled in tubular end pieces, the holes being other than T-shaped. These are provided with counter-sunk sockets to facilitate adjustment of each beam flange which is threaded to receive a screw for entering one of the sockets, a lock-nut securing the flange. C.

Loom Pile Wire. W. Merkens E.P.468,232 of 2/1/1936.

The pile-forming wire or rod has a head-piece with a longitudinal groove to receive a knife. C.

Flat-frame Knitting Machine. G. Hilscher. E.P.468,385 of 2/1/1936 (Conv. 9/1/1935 and 2/7/1935).

The thread carriers of a flat-frame knitting machine are driven from the slur-cock bar by means of a chain passing over wheels. A portion of the chain carries a block which slides in a slotted bracket attached to the thread carrier driving bar. The wheels are mounted on slides which can be racked in and out to vary the traverse of the thread carriers. C.

Multi-ply Fabric. Harding, Tilton and Hartley Ltd. and R. E. Dunlop. E.P. 469,116 of 21/1/1936.

A one-piece multi-ply double collar or cuff having a woven-in fold line is provided with a woven-in reinforcement adjacent to the fold line. The reinforcement may be formed by increasing the number or thickness of the packet warp threads or by the employment of additional or thicker face, back or binder warp threads. C.

Circular Knitting Machine. W. E. Booton. E.P.469,507 of 24/12/1935.

In addition to the usual pickers, a circular machine has one or more movable pickers that can be moved circumferentially of the needle cylinder and the cam ring during rotary knitting in order to introduce or remove needles, etc. from the knitting track for fashioning or mock fashioning purposes, e.g. in the production of the leg and foot portions of a stocking. The invention is described in connection with the production of a stocking with fashioned edges and mock fashioning marks extending parallel therewith, the needle cylinder having a portion devoid of needles across which the yarn is floated during rotary knitting. C.

Loom Jacquard or Card Punching Machine Operating Device. N. Jones. E.P.469,654 of 15/2/1936.

A device in which a pattern or design is scanned by a point of light and the reflected light controls electric circuits actuating electromagnets for operating the needles of a loom Jacquard or dobbie or of a Jacquard used in a punching machine is described. C.

Elastic Fabric. A. A. Thornton (H. W. Gossard Co.). E.P.469,853 of 12/6/1936.

A foundation garment is made wholly or in part from a known two-way stretch fabric comprising elastic threads running in one direction and inelastic threads wrapped around the elastic threads, and extending from one to the other in staggered relation, the fabric being so arranged in the garment that the elastic threads run only in a horizontal direction. C.

Elastic Fabric. T. J. Smith & Nephew Ltd. and H. R. Spencer. E.P.470,017 of 6/2/1936.

An elastic fabric for bandages, etc. has rubber warp threads and intermediate warp threads of cotton, etc. preferably in fours or multiples of four, the cotton threads being highly twisted and woven in under tension but crinkling up after weaving. The cotton threads are arranged in pairs of opposite twist and may be weft way, twist way, single or doubled yarns doubled twist or weft ways. The fabric is woven so that it can be cut up into strips and lengths. The wefts are inelastic. C.

Tyre Fabric. Preston Tyre Fabric Manufacturing Co., Ltd. and F. Chadwick. E.P.470,198 of 16/4/1936.

A woven fabric for tyres, etc. has spaced weft threads of uncovered rubber which may be made by extruding a latex dispersion, and cord warp threads of plied or cabled yarn. The rubber threads engage with and become incorporated with the rubber which is applied as a coating. C.

Electric Warp Stop Motion. Grob & Co. Ltd. (Horgen, Switzerland). E.P. 472,341 of 20/5/1936: 22/9/1937.

An electric warp stop motion for mechanical looms, adapted to be removed from the loom and comprising one or more shaft frames provided with shaft staves or rods holding arrayed droppers having closed contact slots and open-ended thread engaging slots for insertion over lower shaft staves and serving for stopping the loom on thread breakage is distinguished by shaft staves which are supported at their ends only and by means for preventing deflection of the shaft staves in their positions on the loom and auxiliary means for supporting the shaft staves during transportation. C.

Loom Lag Barrel Controlling Device. G. Schebesta (Burnley). E.P.472,851 of 23/4/1936: 1/10/1937.

In a lag barrel controlling device for controlling a change box motion when weaving with two or four shuttles, or for use as a cross border motion, or for fringing, cramming, putting extra weight on the beam and selvedge motion work, either of two lag barrels rotatably mounted in stationary bearings is adapted to be rotated as and when required by two catches fulcrummed on an operating lever, the position of such catches being controlled by lateral projections thereon resting on the two arms of a catch controlling lever which is moved in one direction by a weight and in the other direction by a projecting surface on an indicator barrel or chain which is put into and out of action by an indicator lever controlled by lags or other projecting surfaces on one or other of the lag barrels or chains. C.

Circular Loom. J. Balsach (Sabadell, Spain). E.P.472,943 of 11/3/1936: 4/10/1937.

In a circular loom with rotating shuttles actuated by gears, the warp unwinds from a single beam arranged in the lower part of the loom, and on leaving this beam passes through a reed or comb situated along a diameter of the loom, and is afterwards distributed into uniformly spaced bands which pass through guide reeds and guiding rollers arranged on the periphery of the loom and directed to form the shed, the yarns of each of these bands being parallel with each other in all that part which corresponds to the formation of the shed. The heddles actuate each of the bands of warp yarns separately and are operated by mechanism which reduces the weight of the parts in motion to a minimum, and consequently also reduces the effects of inertia. The reeds can be operated at high speeds and adapted for producing fabrics of largely different diameters. A warp tension compensating mechanism is provided. The loom has only two eccentrics for the operation of all the movable parts. An additional mechanism weaves a couple of inside selvedges in the tubular fabric along one of the generating lines and cuts the fabric as it is formed. C.

Circular Loom Faulty Shed Detecting Device. British Celanese Ltd. (London) and W. Pool. E.P.473,196 of 7/4/1936: 7/10/1937.

A device for detecting faulty shedding on a circular loom comprises a detector finger carried by the shuttle, means to urge the finger into contact with one sheet of a warp shed in which the shuttle lies, so as to detect warp threads missing from that sheet, and a member adapted to be moved by the finger upon such detection into contact with the other sheet of the warp shed and by such contact to be moved towards the rear of the shuttle to operate a stop mechanism. C.

4—CHEMICAL AND FINISHING PROCESSES

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

Notes on the Non-soap Detergents. H. A. Compston. *Soap*, 1937, **13**, No. 8, pp. 17-19 and 67.

A review of the chemical and deterrent aspects of the sulphated fatty alcohols, Igepons, organic sulphides and mercaptan compounds and quaternary ammonium compounds and of their uses in the textile industry. W.

(D)—Milling.

Uniform Cover in Milling. *Wool Rec.*, 1937, **52**, 642-645.

Instructions are given for obtaining even cover and finish in cross bred and low quality cloths 16-20 oz. weight and 56 in. finished width, with particulars of scours before and after milling. W.

(E)—Drying and Conditioning.

Paper: Theory of Drying. E. Cowan and B. Cowan. *Paper Trade J.*, 1937, **105**, *TAPPI*, 157-163.

Theoretical formulae are given for predicting the performance of paper-drying machines and the results obtained by using these formulae are compared with those given by representative machines. A theoretical solution of the problems in the paper-making industry by predicting the performance of drying machines is given, with fundamental equations for the design of new equipment. C.

Proctor Multi-pass Air-lay Drying Machine. J. Dalglish & Sons, Pollokshaws. *Silk and Rayon*, 1937, **11**, 844, 840.

A tensionless drying machine is described and illustrated in which the material is passed through a well-insulated drying enclosure and against cork-faced slats by the pressure differential between adjacent air chambers, the air serving the double purpose of drying the material and helping to carry it. This is the " Air-lay " feature—a new principle in dryer design. It assures a uniform distribution of air over all the material resulting in rapid drying and uniformity of shrinkage, colour and feel. No marking is caused on delicate colours and the machines does not wrinkle or crease the material. It is suitable for rayons and crêpes. C.

Cloth Damping and Conditioning Machine. Hunt & Moscrop Ltd. (Middleton). *Textile Manufacturer*, 1937, **63**, 409.

An illustration and line drawing are given of a cloth damping machine in which water under a pressure of, say, 60 lb. is projected from a motor-driven multi-stage centrifugal pump through a line of jets on to baffles formed of Monel wire gauze backed by a stainless steel plate, and is thence deflected as a mist on to the cloth. C.

Standard of Regain for Worsted Yarns. *Wool Rec.*, 1937, **52**, 829-835.

The dangers of excessive moisture content (especially mildew development) would be diminished by reducing the figure for the international standard regain for worsted yarns (at present 18¼ per cent.). In 1925 the Wool Industries Research Association suggested 12·62 per cent., and this year (1937) at the international Wool Conference M. Burlet suggested 16 per cent. The merits of these two suggestions are discussed. W.

(G)—Bleaching.

Peroxide Bleach: Application to Cotton. (1) V. I. Minaev and N. N. Kuzub. (2) N. N. Kuzub. *Byull. IvNITI*, 1936, **12**, No. 6, 3-19, 19-21 (through *Chem Abstr.*, 1937, **31**, 3288[7]).

(1) Experiments are described on the bleaching of cotton goods with peroxide in stationary kiers. Optimum conditions were: 0·9-1·5 per cent. of hydrogen peroxide on the weight of the cotton ; temperature rapidly raised to 80° and bleaching carried out at 90° for 1½-2 hours ; total alkalinity equivalent to 0·6 per cent. of caustic soda ; water glass added with slightly more than one part of SiO_2 to one of Na_2O. The kier was lined by applying a mixture of 6 kilo. of lime, 6 litres of milk and 5 eggs, followed by treatment with water glass (96 kilo. in 4000 l. water) at 1-1½ atm. for 4-5 hours. (2) In a continuous method of peroxide bleaching the cotton is saturated with a slightly acid peroxide in a kier and then treated with caustic soda at 90-95° C. C.

Silk Stockings: Bleaching. C. C. Downie. *Silk and Rayon*, 1937, **11**, 836.

The author describes a rapid method of bleaching silk stockings by exposing them to a continuous stream of peroxide. The plant consists of a small tank equipped with net bags of phosphor-nickel alloy and holding 400 gallons of liquor. A centrifugal pump of the same alloy thrusts the liquor through the bags. The temperature is maintained within limits by gas heating and an electric mercury thermometer, and the hydrogen peroxide is maintained at 1-volume strength to the end of the operation. C.

German Linen Bleaching Method. *Irish Text. J.*, 1937, 3, No. 10, 6.

It is stated that the usual process for the bleaching of linen involves a lime boil, six alkali boils, four bleaching treatments with hypochlorites, and a series of acid treatments and generally occupies 15 to 20 days. It is shown that the usual slow boil with alkali under pressure can be replaced by a short boil of 1-2 hours without pressure with constant alkali concentration if suitable emulsify-

ing agents and assistants are added to the alkali. The most suitable conditons for the hypochlorite bleaching operation are discussed and it is pointed out the concentration should be kept constant by adding sodium hypochlorite. In this way it is possible to reduce the total time required from 15 to 20 days to 1 to 2 days. L.

Hydrogen Peroxide Stabilisers in Wool Bleaching: Influence of Hard Water. R. Folgner. *Textilber.*, 1937, 18, 619-621.

The effect of hydrogen peroxide is to diminish the power of the stabiliser Igepon T ; old bleaching baths must therefore receive additions of Igepon T. Its period of action is dependent on time, temperature and oxygen concentration. As a general rule, the addition of hardness-forming substances diminishes its stabilising power, the order in which these additions are made influencing the degree of decomposition of the bleaching bath. Usually calcium salts are more harmful than magnesium salts and sulphates less harmful than chlorides, with the exception of calcium chloride. W.

(H)—MERCERISING.

Staple Fibre Yarns: Mercerisation. K. Heide. *Kunstseide*, 1937, 19, 314-323.

Caustic soda of 20-30° Bé has practically the same swelling action on regenerated cellulose staple fibres as caustic soda of 5-10 Bé but in concentrations of 20-30° Bé the swelling is much greater and results in destruction of the fibre. When staple fibre and staple fibre-cotton mixture yarns are subjected to the mercerising treatment with caustic soda of 28-32° Bé used for cotton yarns there is a danger of damaging the staple fibre, especially in the rinsing process. Staple fibre in the loose state may be given a light mercerisation treatment with caustic soda of 6-10° Bé in order to increase its curl, diminish its lustre and improve its affinity for dyes. The treatment may also be applied to yarns and fabrics and in the case of the latter gives a denser appearance to the material owing to the closing up of the spaces between the yarns by the swelling of the fibres. When it is desired to mercerise staple fibre-cotton mixture yarns in such a way that the cotton is fully mercerised the treatment should be carried out with caustic soda of 28-32° Bé, to which is added a suitable wetting agent and also sodium chloride (40-50 g. per litre), at a temperature of about 30° C. High squeezing pressures and high shrinkages in the alkali should be avoided. Washing should be carried out with water at a temperature of 50-60° C., and the yarn should then be treated in a bath containing a clearing agent at 30° C. and finally soured. Details of the procedure are given and the effects of the treatment on lustre, strength and dyeing properties are discussed. This method may be used for the mercerisation of staple fibre alone but better results are obtained by treatment with a caustic soda-caustic potash mixture. This method may also be used for staple fibre-cotton mixtures, the proportions of the two alkalis varying with the proportions of the two fibres. For the mercerisation of cuprammonium staple fibre yarns, caustic soda of 10° Bé at 15-20° C. should be used. Tables are given showing the most suitable processes for the mercerisation of various staple fibre-cotton mixture yarns and the changes in breaking loads and extension produced. Various mercerisation faults are briefly discussed. C.

(I)—DYEING.

Preventing Shrinkage of Flannel and Felt Goods during Dyeing. S. H. Warrass. *Text. Col.*, 1937, **59**, 520-521 and 560.

Mechanical improvements are suggested for piece dye kettles of the type which have reels to secure circulation of the fabric, with the object of preventing the shrinkage of felt and similar fabrics during dyeing in an acidified dyebath. W.

" Atnas " Hank Dyeing and Cloth Folding Machines. Ateliers de Construction " Atnas." *Teintex*, 1937, **2**, 434-436, 509-511.

" Atnas " hank shaking and hank dyeing machines and machines for folding and rolling cloth are described with illustrations. C.

Cotton Fibre: Affinity for Dyes. P. P. Viktorov and E. O. Vil'dt. *J. Appl. Chem.* (U.S.S.R.), 1936, **9**, 1649-60 (through *Chem. Abstr.*, 1937, **31**, 2825[9]).

The influence of the minor ingredients in cotton on its affinity for dyes is discussed. Removal of fat and wax by solvents had no effect on dyeing

properties. Boiling with water until the reaction for sugar was negative was the most effective means of increasing the adsorption. A subsequent treatment with Na hypochlorite caused a fall in N- content and also in dye adsorption. C.

Indigosols: Single-bath Application Processes. K. Neumann. *Kunstseide,* 1937, **19**, 329-330.

Procedures for the application of Indigosols by single-bath processes in the dyeing of cotton and rayon hanks and piece-goods are described. C.

Naphthol Solution Applying Device. *Ciba-Rundschau,* 1937, No. 16, 577.

In a device for the impregnation of fabrics with naphthol solutions the fabric passes round a guide roller in a trough containing the solution and then round a cylinder which is covered with felt. Squeezing rollers are not used but as the fabric leaves the cylinder it passes under a small roller, placed near the cylinder, which exerts a light pressure. The liquid pressed out is taken up by the felt and the excess liquid is removed from the felt by a squeezing roller placed below the small roller. The liquid squeezed out of the felt is collected and returned to the trough. The method is economical and gives a uniform impregnation of the fabric. C.

Percales and Cotton Poplins: Preliminary Treatment, Dyeing and Finishing. P. Colomb. *Teintex,* 1937, **2**, 492-495.

A general account is given of the desizing, mercerising, bleaching, dyeing and finishing of percales and cotton poplins. C.

Staple Fibre and Staple Fibre Mixture Yarns: Dyeing. W. Bruckhaus. *Kunstseide,* 1937, **19**, 330-334.

The properties and advantages of staple fibre and yarns containing staple fibre mixed with other textile fibres are discussed and an account is given of the methods of bleaching and dyeing staple fibre, staple fibre-cotton and staple fibre-wool yarns. The dyeing of fabrics containing staple fibre is also briefly discussed. C.

Vat Dyes: Adsorption Analysis. I. Bilik. *Novosti Tekhniki,* 1936, No. 42/3, p. 42 (through *Chem. Abstr.*, 1937, **31**, 2823[9]).

The fresh dye solution (0·1 gm. in 100 c.c. of warm alkaline hydrosulphite solution) is added to an adsorbent consisting of a 2 cm. layer of washed alumina in a porous funnel, covered with filter paper and several mm. of a 1·5 per cent. solution of hydrosulphite in 1·5 per cent. alkali. After a partial adsorption of the dye, 1·5 per cent. hydrosulphite solution is added and the differently coloured zones on the adsorbent are observed. C.

Violanthrone Vat Dyes: Constitution. T. Maki and Y. Nagai. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 1867-1872, 1872-1874.

(1) Dichloro-isoviolanthrone, a red-violet dye has been produced by the chlorination of isoviolanthrone with sulphuryl chloride and converted into the violet-blue dimethoxy derivative and the dark-blue-violet diamino derivative by substitution. Experimental evidence on the constitution of these dyes is described. They belong to the Bz-3, Bz-3′ series. (2) The production of Bz-2, Bz-2′-dinitroisoviolanthrone and its reduction to the diaminoderivative are described. C.

Mineral Khaki: Application. *Textile Manufacturer,* 1937, **63**, 417, 419.

General directions are given for the scouring, bleaching, padding, drying, stiffening and finishing of cotton drills, jeans and twills dyed mineral khaki. C.

Monel Metal Dyeing and Finishing Plant. F. Scholefield and H. A. Turner. *Textile Manufacturer,* 1937, **63**, 119, 164, 206, 248.

A general, illustrated review of the uses of Monel metal in dyeing plant and utensils, mercerising, drying and finishing, printing, sizing and auxiliary plant. C.

Paper-making Fibres: Affinity for Dyes. W. D. Harrison. *Paper Trade J.*, 1937, **105**, *TAPPI,* 179-185.

Experiments on dye retention by paper-making fibres with the aid of a spectro-photometer and the application of Beer's law showed that (1) on increasing the concentration of the dye the amount held by the fibre increases but at much less than a linear rate ; (2) with basic dyes, the fibre is the chief factor of influence but with acid dyes the fibre variable is not so important and the H-ion concentration is the chief factor, whilst with direct dyes the retention

of dye is governed mainly by the type of pulp, the time of reaction, the consistency and the "freeness." The Kubelka and Munk equation for reflectance and the Freundlich adsorption equation are applicable to the dye retention data. C.

Rayon Staple Fibre: Dyeing. H. O. Kennette. *Rayon Textile Monthly,* 1937, 18, 610-611.

In the stock dyeing of rayon staple fibre the following points are important:—(1) Thorough opening and fluffing of the fibre before dyeing. (2) The loading of the dyeing machine must be uniform. (3) Uniform wetting-out with dye liquor before starting the circulating system. (4) The application of a new finish to the dyed fibre to replace that washed off during dyeing. (5) Uniform drying at the proper temperature and thorough conditioning before opening, carding and spinning. C.

Silk Milanese Fabrics: Dyeing and Finishing. *Silk J. Rayon World,* 1937, 14, No. 160, 26-29.

A general account is given of the methods employed for degumming, dyeing, finishing and bleaching silk milanese fabric. The fabric is first sewn into tube form because of the great tendency of the selvedges to curl. C.

Turkey Red: Application. E. Pinkas. *L'Industrie Textile,* 1937, **54**, 451-453.

The superiority of Turkey red dyeings over those obtained with more recently developed types of dyes is discussed and the excellent fastness of a Turkey red dyed, heavy raised cotton fabric formerly widely used in Poland and Russia is pointed out. A detailed account is given of the production of black prints on red grounds on fabrics of this type and of black and blue prints on red flannels. C.

Vat Dye Leuco Compounds: Oxidation. F. Henesey. *J. Soc. Dyers and Colourists,* 1937, **53**, 345.

Several examples are cited to show the variable effects produced by different oxidising agents or methods of applying the agent, in the oxidation of leuco compounds. For example, in the oxidation of an alkaline solution of indoxyl by air, hydrogen peroxide is formed in varying amounts according to the state of division of the air supply, and this causes over-oxidation to anthranilic acid, the yield of indigo suffering. C.

Wool: Affinity for Acid Dyes. A. L. Smith and M. Harris. *J. Res. Natl. Bur. Stnds.*, 1937, **19**, 81-87.

The dye-combining capacity of untreated wool has been determined for the typical acid dye, Orange II, and shown to be equal to the acid-combining capacity. Treatments with nitrous acid, hydrogen peroxide, sodium hypochlorite, and strong solutions of sulphuric acid decrease the basicity of the wool and correspondingly decrease the affinity for acid dyes. Chlorinated wool absorbs acid dyes at a greater initial rate than untreated wool, but at equilibrium the latter absorbs more dye. The resistance to acid dyes produced in the sulphuric acid-carbonizing process is caused by the conversion of basic amino groups to sulphamic acid derivatives. The results of this investigation constitute further evidence in favour of the chemical theory of acid dyeing. C.

Resistance of Dyestuffs to Heat. *Wool Rec.*, 1937, **52**, 337-339 and 352.

A discussion of alterations in shade due to low (below 100° C.) and high (above 100° C.) dry and moist treatments. W.

Some Causes of Bad Matches. *Wool Rec.*, 1937, **52**, 396-398.

An enumeration of personal and other factors liable to cause faulty colour matching in dyeing. W.

Fastness to Rubbing. *Wool Rec.*, 1937, **52**, 521-523.

A discussion of cases of bad fastness to rubbing caused by the type of dyestuffs employed, or by the presence of grease or oil due to uneven scouring. W.

Dyeing and Finishing Carriage Cloths for Motor Cars and Airplanes. G. Rice. *Text. Col.*, 1937, **59**, 631-632.

Methods are described for the dyeing and rubber proofing of cotton-wool carriage cloths and for the dyeing of mohair carriage cloths. W.

Dyes: Identification. *Klepzig's Text. Z.*, 1937, **40**, 552-553 and 562-563.

Methods are described for identifying dyes on vegetable fibres, animal fibres, acetate silk, and the following mixtures:—Cotton-staple fibre, cotton-acetate staple fibre, wool-staple fibre, wool-acetate staple fibre. Tables are given showing (1) general tests, (2) tests for red dyes on vegetable fibres, and (3) tests on black dyes. W.

Dyestuffs: Unusual Uses. B. A. Harold. *Text. Col.*, 1937, **59**, 590-592.

A review of the literature on the applications of dyestuffs in the medicine, rubber, metal, petroleum, ink and photographic industries. W.

(J)—PRINTING.

Block Printed Fabrics: Colour Unevenness; Causes and Prevention. *Textile Recorder*, 1937, **55**, No. 653, 44-45.

The author discusses block printing procedures, explains how unevenness of colour may arise, and gives practical hints on the elimination of this fault. C.

Coloured Discharges: Production on Rayon. G. Weiszmann. *RUSTA*, 1937, **12**, 265-271, 365-373.

Coloured discharges on rayon goods may be produced by printing with pastes containing tin salts and basic dyes or pigments, pastes containing zinc powder and basic or vat dyes, or pastes containing hydrosulphite and basic, vat, chromium, sulphur or direct dyes or pigments. Procedures for the discharging of direct, vat and naphthol dyes are described and discharge paste recipes are given. C.

Reserves under Ice Colours: Production. *Ciba-Rundschau*, 1937, No. 16, 577-578

White reserves are obtained by printing the naphthol-treated goods with a paste containing potassium xanthate and starch-tragacanth thickening and then passing through the diazo solution, washing and soaping in the usual way. For the production of coloured reserves, the naphthol-treated goods are printed with a paste containing a suitable vat dye, potassium carbonate, Hydrosulphite R, potassium xanthate and British gum-tragacanth thickening, steamed in the Mather-Platt, and then passed into a diazo solution. C.

Screen Printing; Causes of Colour Unevenness in ——. *Amer. Silk and Rayon J.*, 1937, **56**, No. 9, 23-25, 43-44.

A general account is given of the causes of unevenness in screen printing having their origin in (1) thickenings, (2) materials, (3) colours, (4) printing foundations and (5) squeegees, and screen printing equipment is briefly described. C.

(K)—FINISHING.

Cotton and Cotton-Rayon Upholstery Sateens: Finishing. P. Colomb. *Teintex*, 1937, **2**, 543-561.

A general account is given of the singeing, scouring, mercerising, bleaching, dyeing and finishing of cotton and cotton-rayon upholstery sateens. C.

Sanforizing Plant: Application. J. G. Cluett. *Rayon Textile Monthly*, 1937, **18**, 516-519.

The shrinkage of different types of textile materials on wetting and drying, the influence of fabric construction and finish on shrinkage, and the technique of shrinking by the Sanforizing process are discussed. Some of the more important improvements in Sanforizing equipment introduced since 1931 and the two general types of Sanforizing ranges used at the present time are briefly described. Details are given of the CCC-T-191 standard wash test for determining the shrinkage of washable cotton fabrics and a modified wash test for determining the shrinkage of silk, rayon, wool and mixture fabrics. C.

Silk Felt: Production. S. Gandini. *Textilia*, 1936, **12**, 279-280.

The felting of wool is discussed and the dependence of this property on the presence of a protein, "elasticum," of high hygroscopic capacity is pointed out. Felting properties may be imparted to silk by mixing with wool or with rabbit hair which has been rendered capable of felting by suitable chemical treatment. Felts for hats and for industrial purposes have been prepared from silk-hair mixtures containing up to 70 per cent. of silk, and silk-wool mixtures containing up to 50 per cent. of silk. The utilisation of silk waste in this way as a means of reducing wool imports and the supply and cost of silk waste in Italy are discussed. C.

Tracing Cloth: Production. E. Herzinger. *Leipz. Monats. Text. Ind.*, 1937, **52**, 239-240.

For the production of tracing cloth, cotton cambric is coated on both sides with a mixture containing starch, gelatin and various oils and, if desired, ultramarine or other blue dyes. The treated fabric is dried and cooled and later subjected to hot calendering with friction. Details of the procedure and the compositions of suitable coating mixtures are given. C.

Cloth Perching Machine. G. L. Atkinson. *Silk and Rayon*, 1937, **11**, 813-816.

The author gives a list of the faults passed over by the use of the old fashioned perch and shows how these can be avoided by suitable adjustments to the perch as now used. The board of the machine should be cut out, close to the sides near to the top and bottom of the board, this aperture being wide enough to allow mounting of two pairs of suction guiders. These guiders are mounted on adjusting threads so that they may be turned to accommodate any width of goods normally met with, stretching the cloth out in width. Care should be taken to see that the cloth travel through the openers is just clear of the board of the machine, to prevent rubbing of the fabric or glazing. Preferably the board should be painted black. A diagram is given. C.

Cellulose Ethers: Application in Finishing. Flaxyl Products Ltd. *Textile Recorder*, 1937, **55**, No. 655, 18.

The above firm are distributors of cellulose ether powder for the Lilienfeld finishes. It is claimed that wearability of fabrics is increased by 250-600 per cent. C.

Grey Cotton Cloth: Finishing. *Textile Manufacturer*, 1937, **63**, 376-378.

A general account is given of the aims of grey finishing and the methods, materials and equipment used. C.

Rubber Latex: Application. E. A. Hauser. *Rayon Textile Monthly*, 1937, **18**, 617-619.

The author gives a short historical review of latex and its present day uses for backings (recipes provided), dipping in the manufacture of "weftless" cord for automobile tyres, impregnating textiles and as circular spun thread. Latex is also being applied to discharge pastes and in pigment printing and flock printing of textiles. C.

Waxes: Application in Finishing. *Monatsh. Seide u. Kunstseide*, 1937, **42**, 339-343.

A general account is given of the properties of various waxes and wax-like products and their uses in the finishing of textile materials. C.

The Safest Treatment of Wool. E. Elöd. *Deut. Wollen-Gewerbe*, 1937, **69**, 864 (through *Chem. Abs.*, 1937, **31**, 7656).

Damage in wool can best be recognized by studies of the velocity of the absorption of dyes. Woollens of different origin differ in velocity of dye absorption owing to variations in macroscopic structure. Woollens of the same origin act alike with regard to amount of dye absorbed. The valuable properties of wool are best preserved during washing, dyeing and carbonizing by careful control of *p*H, time and temperature. The velocity of diffusion increases with the coarseness of the wool. All treatments of wool should be carried out as close as possible to the isoelectric point (*p*H 4·7). W.

Chlorination of Wool. G. Rordorf. *Spinner u. Weber*, 1937, **55**, No. 22, pp. 20-21 (through *Chem. Abs.*, 1937, **31**, 7656).

The new chlorination method called Hypak process is based on the following principle: In addition to alkali hypochlorites organic chlorine compounds are used as buffering agents which absorb the chlorine liberated on acidification and then deliver it slowly to the textile fibre ; this decreases the aggressiveness of chlorine. For 10 kg. wool are used 300 litres of water containing 1·5 kg. 66° Be. sulphuric acid. The Hypak bath is prepared by dissolving 200 g. Hypak in 10 litres of water. The precleaned wool is placed into the sulphuric acid bath for 10 minutes and is then removed. 4 litres of Hypak solution are added to the acid bath and the wool is immersed again for 15 minutes with constant agitation. After the removal of the wool 3 litres of Hypak solution are added and the wool is immersed again for 15 minutes. The wool is removed a third time, the

residue of the Hypak solution is added and the wool is immersed for a final 15-minute period. After removing the excess water the chlorinated wool is subjected to an anti-chlorine bath in the usual manner. This method causes less damage to wool than other chlorination methods. W.

Oxidation and Reduction Reactions in the Finishing of Textiles. K. Volz. *Spinner u. Weber,* 1937, **55**, No. 28, pp. 6-8 (through *Chem. Abs.*, 1937, **31**, 7655).

A review of the chemical oxidation and reduction reactions involved in bleaching, dyeing, printing and removal of dyeings. W.

New uses, excepting Anticrease, for Synthetic Resins in Textile Treatment. A. J. Hall. *Silk J. Rayon World,* 1937, **14**, No. 159, p. 30 (through *Chem. Abs.*, 1937, **31**, 7655).

The resins give embossed finishes resistant to washing. They increase the attraction and fixation of acid dyes to cotton. Since formaldehyde-urea resins are best formed under acid conditions, the use of hexamethylenetetramine in hindering their rapid formation provides softer fabrics and also better acid-dye attraction. Similarly, softer fabrics are to be obtained if substances liberating acid are used with the resins, instead of direct acid, under heating, by avoiding premature formation of the resins. W.

New American Glazed Chintz. *Irish Text. J.*, 1937, **3**, No. 10, 8.

Refers to a new washable glazed chintz which, after repeated washings, will retain its original gloss and crispness. The new finish is not a mere coating, as in the ordinary process, but an actual impregnation of the yarn that ensures against fading or spotting for the life of the fabric. L.

Synthetic Fibre Mixtures: Processing. E. W. Pierce. *Canadian Text. J.*, 1937, **54**, No. 16, pp. 36-37.

Practical observations are given on the scouring and dyeing of acetate-viscose mixtures and the dyeing of staple rayon-wool piece goods and slubbing. W.

Treatment of Wool with Quinone. *Wool Rec.*, 1937, **52**, 703-705.

The properties of quinone are described and the precautions necessary in its handling. Quinone-treated wool (0·7-1·0 per cent. quinone is used on the weight of wool) has increased dyeing affinity, weight and strength, lustre, and stability to both bacterial and chemical attack. Quinone does not confer full unshrinkability, but reduces felting. The two methods of treatment (with aqueous solutions and with vapour) are described. W.

Finishing Light-weight Dress Velours. *Wool Rec.*, 1937, **52**, 765-767.

The finishing processes are described, with particular reference to the before- and after-milling scours. W.

Knitted Wool Underwear Fabric: Processing. *Text. Mfr.*, 1937, **63**, 334-335.

A description of the processes of scouring, milling, chlorinating and bleaching and of their significance in the finishing of knitted wool underwear fabric. W.

Felting Capacity of Carrotted Hare and Rabbit Hair. G. Berg. *Textilber.*, 1937, **18**, 438-440.

A progressive microscopic examination is made of the mercury-nitric acid carrotting process, and especially of the mechanical action of the fibres. Single fibres sealed in capillary tubes in water, and heated either by a continuous stream of glycerine or in a waterbath, are examined under the microscope. A method of determining the milling power of carrotted hairs is proposed using this microscopic examination of the effect of boiling water. Little is said on the chemical process involved in carrotting or subsequent milling, beyond the suggestion that the mercury is attached to and prevents the breakdown of protein matter by boiling water. W.

Unshrinkability in Wool Goods. J. and J. C. Schofield. *Textilber.*, 1937, **18**, 589-592 ; No. 4E, pp. 160-162.

A discussion of the changes produced in wool fibres and fabrics by processes which render wool unshrinkable. The various chlorination processes are described and their merits discussed and compared with those of the sulphuryl chloride process. W.

Corduroy. T. Nelson. *Text. World,* 1937, **87,** 1578-1579.
The finishing of corduroy is briefly described, and designs and details of construction given. W.

Effect of Indiscriminate Raising. E. M. *Text. Rec.,* 1937, **55,** No. 653, p. 35.
An investigation is described on the effects of indiscriminate raising, especially over raising, on the wearing properties of fabrics identical in structure. A table is given showing comparative cloth strengths. W.

Preparation and Finishing of Low Quality Serges. G. L. Atkinson. *Text. Merc.,* 1937, **97,** 180-181.
Methods are described for avoiding faults, especially crimping and " crow-footing " in the preparing and finishing of light-weight low quality serges. W.

Finishing Pinhead Cloths. G. L. Atkinson. *Text. Merc.,* 1937, **97,** 202 and 204.
The crabbing, scouring and decatising processes are described. W.

Advance in Flax Machinery Design. *See* Section 2A.

Percalio and Cotton Poplins. *See* Section 4I.

(L)—PROOFING.

Immunised Cotton: Production. Ssokolowa. *Chloptschatobumashnaja Prom.,* 1937, 7, 38-40 (through *Chem. Zentr.,* 1937, ii, 319).
The process of Karrer and Wehrli (1926) is described ; alkali-cellulose is treated with *p*-toluenesulphonyl chloride and then with ammonia or pyridine. " Immunisation " by acetylation is effected by treating cellulose (1) with acetic anhydride (4), acetic acid (4) and zinc chloride (0·8) at 18° for 18 hours or 25° for 10 hours. The product has 0·8 OAc per $C_6H_{10}O_5$, the increase in weight is 19 per cent. and the decrease in viscosity 1·8 per cent. C.

PATENTS.

Treatment of Dyed Wool. Soc. pour l'ind. chim. à Bâle. D.R.P.648,176 of 23/7/1937 (through *Chem. Abs.,* 1937, **31,** 7262).
In fulling or acid-boiling wool (or fabrics containing wool) which has been dyed in a bath containing sulphuric acid, the tendency of the dye to dissolve out or bleed from the wool is restrained by adding to the fulling or acid-boiling bath a substance which reduces the affinity of wool for dyes. Suitable substances are sulphurized phenol derivatives, alkylated naphthalenesulphonic acids, condensation products of aromatic sulphonic acids with benzoin, and natural or synthetic tanning agents. Specific processes are described. W.

Waterproofing Paper or Fabrics. P. Fautrier. Belg. P.419,076 of 31/1/1937 through *Chem. Abs.,* 1937, **31,** 7648).
Paper, fabrics, etc., are waterproofed by treating with a mixture of gum, animal glue, potash alum, tannin, ether, potassium oxycyanide, formaldehyde, sodium sulphoricinate, $NaMnO_4$, glycol, talc and distilled water. W.

Fabrics Fluorescent to Ultra-violet Light. C. Paine, J. A. Radley and L. P. Rendell (to Imperial Chemical Industries Ltd.). U.S.P.2,089,413 of 10/8/1937 (through *Chem. Abs.,* 1937, **31,** 7264).
A textile material such as cotton or woollen yarn is provided with a sufficient content of an aminostilbenesulphonic acid to be fluorescent when subjected to ultra-violet light in the substantial absence of light in the visible portion of the spectrum. W.

Mothproofing Compositions for Use on Yarns, Fabrics, etc. B. L. Landers (to Philipp Bros.). U.S.P.2,091,075 of 24/8/1937 (through *Chem. Abs.,* 1937, **31,** 7672).
Major proportions of an alkali metal fluoride and sodium chloride are used with sodium silicate, sodium phosphate and " Nekal " in such proportions as to provide a composition forming an aqueous solution of a *p*H slightly greater than 7·0. W.

Halogen Compounds. W. W. Groves (I. G. Farbenind. A.-G.). E.P.465,885 of 15/11/1935.
A benzene derivative containing at least two methyl groups and having two methyl groups in *o*-position is chlorinated so as to exchange five hydrogen atoms of the two *o*-methyl groups for chlorine, the chlorine is exchanged for fluorine, and the product again chlorinated to give an *o*-trifluoromethyl-difluorochloro-methylbenzene, in which the chlorine may be again replaced by fluorine to give

an *o*-dimethylbenzene hexafluoride. The products are intermediates for dyestuffs, fungicides and insecticides. Examples are given. W.

Mothproofing. J. R. Geigy A.-G. E.P.467,701 of 15/6/1936.

Textiles, furs, feathers, wool, hair, etc., are proofed against moth, by treatment with a solution of mixture containing thianthrene or a derivative or substitution product thereof, for example, by brushing, spraying or immersion. The thianthrenes may be dissolved in water, hydrocarbons, chlorinated hydrocarbons, alcohols, ketones, etc., or mixtures thereof, or emulsified in oils, fats or creams, or added to powders or used in any of the forms usual for mothproofing compositions. They may be used in combination with other mothproofing agents. Suitable thianthrene compounds are 2:6-dimethylthianthrene; 1:3:5:7-tetramethylthianthrene; 2-chlorothianthrene; 2:7-dichlorothianthrene; 2:7-dichloro-3:6-dimethyl thianthrene; 4:5-dichloro-1:8-dimethyl thianthrene; thianthrene dicarboxylic acid; dimethoxythianthrene; 2:3:6:7-tetramethoxydianthrene; dinitrothianthrene; 3-nitro-6-methylthianthrene; 3-nitro-8-methoxy-5-methylthianthrene; 6-chloro-3-nitrothianthrene; 5:8-dichloro-3-nitrothianthrene;3-amino-6-methylthianthrene hydrochloride; thianthrene sulphonic acid; naphthianthrene; thianthrene-S-oxide; thianthrene-S-dioxide; thianthrene monosulphone; thianthrene disulphone; 2:6-dimethylthianthrene-S-oxides; 2:3:6:7-tetramethoxythianthrene-S-oxides; 3 : 7-dimethyoxy-2 : 6-dioxythianthrene disulphide. W.

Stocking Liquid-treatment Rubber-covered Roller. F. Schuster. E.P.468,400 of 5/2/1936 (Conv. 10/12/1935).

A hollow metal roller with an exchangeable rubber facing for treating textile goods particularly stockings is characterised by perforations in the cylinder which allow moisture to pass into the interior. The layer of rubber forms with the hollow cylinder, which may be of thin sheet steel or iron, a unit which can be readily transported and is not affected by heat during vulcanization. C.

Fabric Winding Apparatus. P. Vandenput. E.P.468,479 of 22/6/1936 (Conv. 30/11/1935).

In apparatus for winding a web of paper, cardboard, fabric, rubber, sheet metal, etc., under constant tension, in which the winding spindle is driven through a differential gear controlled by a brake, the differential gear casing, which is driven by a driving shaft and gears, is mounted in a housing fixed between aligned tubular members parallel to the driving shaft, one member rotatably supporting a brake pulley and the other a gear wheel meshing with a pinion on the winding spindle. C.

Agglutinated Fibre Sheet Materials: Production. J. H. Goldman. E.P. 468,529 of 10/3/1936 (Conv. 15/3/1935).

A web of carded fibres is strengthened by bonding substantially all the fibres together by impregnation with a binder applied locally into the body of the web, the area of the web occupied by the binder being only a small fraction of the total area of the web. The binder may be applied in narrow lines running transversely of the fibre direction, or both transversely and longitudinally, and spaced apart at distances not exceeding the average fibre length. A number of treated webs may be superposed, or a multiple web wherein the fibres in adjacent plies cross at an angle may be impregnated along criss-cross lines. The binder may comprise rubber solution or latex, viscose, cellulose esters, synthetic resins, gums, waxes, starch, etc. Cotton fibres, freed from natural waxes, resins and oils as by boiling with alkali, may be used, or sisal, flax, hemp, jute or silk. The product is used for surgical dressings and bandages, filter media or padding. C.

Artificial Leather: Production. Dynamit A.-G. vorm. A. Nobel & Co. E.P. 469,090 of 10/10/1935 (Conv. 10/10/1934).

A leather substitute suitable for soles, harness, and driving belts is made by hot-pressing thin layers of fabric, e.g. cotton or rayon, alternating with thin layers of a polyvinyl compound, e.g. polyvinyl chloride or acetate. C.

Coated and Compound Fabrics: Production. E. and P. Gheysens. E.P.469,271 of 8/5/1936 (Conv. 8/5/1935).

Tailors' canvas for stiffening fabrics comprises a thin layer of vegetable fibres or animal hairs connected together by a substantially continuous layer of rubber or other elastic binding agent, which unites the bonded fibre or hair

layer on one or both sides to a layer of a flexible cloth, such as a large mesh fabric. The product is made by spreading on a cloth fixed to a table a shower of fibres in a thin sheet by a reciprocating sieve and coating with rubber latex by a spray or roller. After slight drying, the product is calendered and vulcanized. Alternatively, the cloth may be unrolled below the sieve and passed under sprayers. Before calendering, a second fabric may be superposed on the fibre or hair layer. C.

Dryer Felts of Paper-Machines. T. Hindle & S. Lord. E.P.469,336 of 7/2/1936.

In joining the ends of a dryer felt of a paper-making machine, the felt ends are folded back and sewn, wire loops or links of smaller overall thickness than that of the felt at the seam being inserted at regular intervals at the fold, and interlaced by a flexible rod, wire cord, etc. The loops may be inserted as staples, the prongs clinched over, and flexible rods, etc., may pass through the loops within the folds of the felt. W.

Dipyrazoleanthronyl Derivative Dyes: Production. Society of Chemical Industry in Basle. E.P.469,491 of 9/3/1936 (Conv. 8/3/1935).

N:N′-Dialkoxyalkyl or N:N′-alkyl-alkoxyalkyl dipyrazoleanthronyls are made by (a) treating a dipyrazoleanthronyl or an N-alkyl dipyrazoleanthronyl with an ester of an ether of a polyhydric alcohol, or (b) treating a dipyrazoleanthronyl simultaneously or in succession with esters of two different polyhydric alcohol ethers to introduce two different alkoxyalkyl groups, or (c) treating a dipyrazoleanthronyl with an ester of an ether of a polyhydric alcohol and then with an alkylating agent. The products may be treated with halogenating agents or converted to their leuco-derivatives, such as their leuco sulphuric acid esters. The products are dyes or dye intermediates, and as dyes may be used, if desired in admixture with N:N′-dimethyl or -diethyl-2.2′-dipyrazoleanthronyls, for dyeing or printing vegetable fibres (red tints are obtained on cotton), or for colouring lacquers and plastic masses, as well as rayon, such as cellulose acetate rayon. C.

Azo Dyes Fast to Sea Water: Production. I. G. Farbenindustrie A.-G. E.P. 469,537 of 28/11/1936 (Conv. 2/12/1935).

A diazotised N-acetyl-N-alkyl-*p*-phenylene-diamine, containing up to four carbon atoms in the alkyl group, is coupled with 1-acetylamino-8-naphthol-3:6- or -4:6-disulphonic acid. Dyes which yield bluish red shades fast to sea-water on animal fibres are obtained. C.

Polyazo Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). E.P. 469,562 of 27/1/1936.

Polyazo dyes are made by coupling a diazo or diazoazo compound with a *p*-coupling amine, and if the amine is of the naphthalene series, free from hydroxy or substituted hydroxy groups, further diazotising, coupling with an aminoaroylaminonaphthol mono or disulphonic acid, further diazotising and coupling with an aminoaryl pyrazolone. They may be further diazotised and coupled in substance or after-treated on the fibre with diazo compounds. Brown shades of good dischargeability are obtained. C.

Azo Dyes: Production. Society of Chemical Industry in Basle. E.P.469,578 of 19/10/1936 (Conv. 19/10/1935 and 5/10/1936).

Azo dyes are made on the fibre by applying to the material a mixture of an anti-diazotate or a diazoamino compound and a coupling component, treating with a cold acid, preferably a mineral acid, and then with an acid-binding agent, preferably at a raised temperature. C.

Polyazo Dyes: Production. Society of Chemical Industry in Basle. E.P.469,646 of 11/1/1937 (Conv. 9/1/1936 and 4/1/1937).

Polyazo dyes are made by coupling diazotised primuline (1 mol.) and a diazotised *p*-aminoazo dye of the general formula $R_1.N:N.R_2.NH_2$ in which R_1 and R_2 are the same or different benzene or naphthalene nuclei (1 mol.) in any order with resorcinol (1 mol.). They give neutral brown shades on cotton. C.

Pyrene Vat Dyes: Production. Society of Chemical Industry in Basle. E.P. 469,638 of 4/2/1936 (Conv. 4/2/1935 and 15/1/1936).

A vat dye is made by reacting pyrene-monophthaloylic acid and phthalic anhydride in equimolecular proportions at a raised temperature in presence of a condensing agent, such as aluminium or ferric chloride, and advantageously in

presence of a neutral alkali salt such as sodium or potassium chloride. The product dyes cotton yellow-orange shades of good fastness. C.

Polymethine Dyes: Production. G. W. Johnson (I. G. Farbenindustrie A.-G.). E.P.469,748 of 30/1/1936.

Polymethine dyes are made by causing polynuclear heterocyclic nitrogen compounds containing an aldehyde group in *p*-position to the nitrogen atom in an aryl nucleus to react with compounds containing reactive methyl or methylene groups, e.g. 3-methyl-5-pyrazolones, quinaldine, 2-methyleneindolines, and cyanoacetic acid esters. They dye tannin-mordanted cotton and cellulose acetate rayon and the sulphonated products dye wool. C.

Coating and Printing Compositions. E. I. Du Pont de Nemours & Co. E.P. 469,754 of 28/10/1935 (Conv. 26/10/1934 and 8/11/1934).

Coating, printing and oil-proofing compositions comprise formamide and an adhesive and/or oil resisting substance, e.g. casein, dried milk, cellulose acetate, glue, gelatin, starch or rubber latex. Additional ingredients include methanol, benzene, ammonia, linseed oil, castor oil, waxes, dextrine, albumin, cumaron resin, lacquers, pigments such as carbon black, aluminium powder and aluminium bronze, ground quartz and dyes. C.

Casein-Aluminium Formate Waterproofing Composition. Victor Chemical Works. E.P.469,824 of 1/2/1936 (Conv. 29/3/1935).

Casein and alumium formate are mixed and dissolved by heating with water. The solution on cooling sets to a gel, or it may be evaporated to dryness to produce the complex in the form of flakes. The product in the form of a 1-3 per cent. aqueous solution is used for waterproofing cellulose or protein fibres or fabrics such as paper, cotton, wool or silk. When a soft pliable fabric is required, the fabric may be treated with soap solution after or preferably before the waterproofing treatment, and if the material is to be sized, the sizing should preferably follow the waterproofing treatment. If the waterproofing solution is to be kept, a small quantity of borax may be added as a preservative. C.

Coloured Resist Prints: Production. Durand & Huguenin A.-G. E.P.469,843 of 23/3/1936.

Resists coloured by means of ester salts of leuco vat dyes under dyeings from ester salts of leuco vat dyes are produced by printing on the white material a resist colour containing an ester salt of a leuco vat dye, a gum, a covering agent, and an oxidising agent which becomes active in an acid bath, drying the material, padding it in a bath containing an ester salt of a leuco vat dye and an oxidising agent, as above described, and finally treating in an acid bath. The material may also be printed with an ice-colour preparation which can be developed by acid. Covering agents specified are zinc oxide, kaolin and lithopone. C.

Fabric Liquid Treatment Apparatus. British Celanese Ltd., A. Mellor and W. Pool. E.P.469,908 of 6/2/1936.

Apparatus for applying liquid to a web or sheet of material comprises a trough for the liquid, a pair of mangle rolls mounted side by side and dipping into the liquid to form a nip close to the level of the liquid, a liquid supply, a feed pipe connecting the supply to the trough and means for controlling the liquid feed to maintain a constant level in the trough. In a modification, the rolls may serve to support endless bands passing through the liquid and the nip may be arranged so as to have the effect of upwardly extending the nip above the rolls. C.

Dinitrobenzene Dyes: Production. G. W. Johnson (I. G. Farbenindustrie A.-G.). E.P.469,936 of 30/1/1936.

Dyes are made by reacting dinitrobenzenes containing substituents which can be replaced by amino groups by reaction with amines and sulphonic or carboxylic groups, preferably in presence of acid binding agents, with amines of the type of 1-dimethylamino-4-aminobenzene and its 3-sulphonic or thiosulphonic acid. The products dye leather, wool and silk. C.

Vat Dyes: Production. I. G. Farbenindustrie A.-G. and G. W. Johnson. E.P. 469,969 of 19/2/1936.

Vat dyes are manufactured by causing aluminium to act in the presence of

sulphuric acid on 1 : 2′-dianthraquinonyl sulphide, the compounds of the nature of 1 : 2′-dianthraquinonyl sulphoxide obtainable therefrom by oxidation, or halogen or alkyl derivatives of these substances, advantageously in the presence of nitrosyl sulphuric acid or the oxides and acids of V, Cr, W or Mn. The products may be purified by precipitation in stages from sulphuric acid, which process may be combined with the preparation of the dyes. C.

Waterproofing. Drigard Products Corporation. E.P.470,041 of 5/8/36.

A liquid waterproofing-composition, suitable for brick, stone, wood, leather, textiles, and paper, comprises a mobile colloidal dispersion of a water-insoluble soap, an alcohol dispersing-agent and hydrocarbon solvent intimately admixed with a normally substantially solid fatty acid glyceride. The composition may be prepared by heating the soap with the hydrocarbon to form a gel, adding the alcohol to convert the gel into a mobile liquid and dissolving therein the glyceride; alternatively, all the ingredients may be heated together. The volatile constituents may be evaporated to leave a solid residue of soap and glyceride which is re-dispersed for use. Specified water-insoluble soaps are the stearates, oleates and palmitates of aluminium, copper, zinc and calcium. The solid glyceride may be a natural fat, e.g. lard, tallow, stearin, or spermaceti; or an hydrogenated oil, e.g. hydrogenated menhaden, whale, sardine, cod, cod liver, porgy, sperm, corn, cottonseed, soya bean, peanut, almond, rape, castor, sesame, olive, linseed or tung oils. Solvents include naphtha and hydrogenated naphtha, xylene, gasolene and toluol. Suitable alcoholic dispersing agents, which are added in a small amount, e.g. 1 per cent., are ethyl, methyl, amyl, butyl and denatured alcohol. Examples are given. W.

Alkyl Ether Wetting Agents: Preparation. W. W. Groves (I. G. Farbenindustrie A.-G.). E.P.470,181 of 31/12/1935.

An aromatic hydroxy compound substituted in the nucleus by at least one hydrocarbon or acyl radical of at least four carbon atoms, or a hydro-aromatic hydroxy compound substituted in the nucleus by at least one hydrocarbon radical (other than an aliphatic radical) of at least four carbon atoms, is treated with one or more mols. of an α, β-alkylene oxide or a corresponding halogenhydrin, the term " α, β-alkylene oxide " meaning alkylene oxides in which the oxide oxygen atom is linked to adjacent carbon atoms of an alkylene residue but not necessarily to the ultimate and penultimate carbon atoms. Alternatively, an aromatic or hydroaromatic hydroxy compound substituted as above, or a hydroaromatic hydroxy compound substituted in the nucleus with at least one aliphatic hydrocarbon radical of at least four carbon atoms, is treated in the form of its alkali compound with an α, β-halogen hydrin, the resulting hydroxyalkyl ether is converted into a halogenalkyl ether, e.g. by treatment with thionyl chloride, and the halogenalkyl ether is treated with a poly-α, β-glycol in the presence of caustic alkali. The ethers or their conversion products are useful as wetting, washing, dispersing, foaming, softening and levelling agents. C.

Coated Fabrics. N. A. de Bruyne and De Havilland Aircraft Co. Ltd. E.P. 470,331 of 31/1/1936.

A composite material comprising a substance capable of being hardened or set, reinforced with a non-metallic fibrous or filamentary material in felted, corded or woven condition, is produced by imparting to the reinforcement a substantially permanent predetermined tension either during or after the manufacture of the composite material, the tension being equal to or greater than the maximum tensile strength to which the material is intended to be subjected during use. In an example a cotton or rayon fabric is impregnated with a phenol-formaldehyde resin and is subjected to a stress of 2,000 lb. per sq. inch or more while being pressed between hot plates to harden the resin. C.

Quaternary Ammonium Compounds: Use in Dyeing. H. A. Piggott, C. S. Woolvin and Imperial Chemical Industries Ltd. E.P.470,346 of 12/2/1936.

Quaternary ammonium salts are obtained by reacting an alkyl ester of an inorganic acid or of an organic sulphonic acid with an ester of the formula ROOCArNXX′, where R is an aliphatic hydrocarbon radical of 10-20 carbon atoms, Ar is a residue of the benzene series and X and X′ are lower alkyl (methyl to butyl) radicals. The products form foaming aqueous solutions and are useful as additions to alkaline vats for dyeing cellulosic materials such as cotton or viscose rayon. C.

Dye Complex Metal Compounds: Production. A. G. Bloxam (Society of Chemical Industry in Basle). E.P.470,356 of 5/3/1936.

Complex metal compounds of dyes are made by treating in the presence of an aliphatic aminocarboxylic acid or a salt thereof a dye containing a group capable of binding metal in complex union with an agent yielding a metal of atomic weight between 58 and 64, i.e. Cu, Ni and Co. The dye may also be treated with a Cu, Ni or Co salt of an aliphatic aminocarboxylic acid or a dye containing Cu, Ni or Cr in complex combination may be treated with an aliphatic aminocarboxylic acid or a salt thereof. Water soluble products are obtained useful for dyeing wool, silk and leather. C.

Monoazo Dyes: Production. G. W. Johnson (I. G. Farbenindustrie A.-G.). E.P.470,398 of 13/1/1936.

Monoazo dyes are made by coupling diazo compounds of aromatic amines free from SO_3H, COOH and CN groups with aralkylarylamines free from SO_3H and COOH groups of the general formula $X.CH_2.N(R)Y$, in which R is an alkyl group containing at least one hydroxyl group and X and Y are radicals of the benzene series which may be substituted by halogen, alkyl, hydroxyalkyl, amino or nitro groups. They dye cellulose esters and ethers. C.

Tetrakisazo Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). E.P.470,407 of 13/2/1936.

Tetrakisazo dyes are made according to the scheme: 4:4′-diaminodiphenylamines→(alkaline) 2-aminonaphthol sulphonic acids→N-hydroxyalkyl-*m*-phenylenediamines. They dye cotton and viscose in black shades of good dischargeability. C.

Azo Dyes: Production. J. R. Geigy A.-G. E.P.470,436 of 27/7/1936 (Conv. 1/8/1935).

Cellulose ester or ether textile materials are dyed in readily dischargeable fast red-yellow to greenish-yellow shades with azo dyes, sparingly soluble or insoluble in water, obtainable by coupling any diazo component free from groups imparting solubility in water with a hydro-aromatic β-diketone containing an enolizable keto group or with such dyes in which the enol group has been alkylated. C.

Anthraquinone Dyes: Production. A. G. Bloxam (Society of Chemical Industry in Basle). E.P.470,475 of 14/2/1936.

Intermediate products and dyes are manufactured by reacting an α-halogenanthraquinone, which may contain further substituents, e.g. a further halogen atom, with monomethylhydrazine, and, if desired, treating the product, if it contains a reactive hydrogen atom attached to an amino residue, with an acylating agent. Those of the products that are dyes may be used for dyeing and printing vegetable fibres, e.g. cotton, or for dyeing rayon. C.

Cellulose Acetate Coating Composition. E. I. Du Pont de Nemours & Co. E.P. 470,486 of 11/11/1935 (Conv. 16/11/1934).

A cellulose acetate composition for use for coating textiles and impregnating media, leather dressings, printing inks, adhesives or plastics, comprises formamide as solvent and blending agent. It may be employed alone or in conjunction with other materials, e.g. methanol. Other materials soluble in formamide may be included in the composition, e.g. starch, casein, dyes, glue, gelatin, dextrin, albumin, oils and waxes. C.

Vat Dyes: Production. I. G. Farbenindustrie A.-G. E.P.470,529 of 17/7/1936 (Conv. 17/7/1935).

Vat dyes are made by treating with acylating agents the alkaline condensation products of such 1-(Bz 1-benzanthronyl-amino)-4- or -5- or -8-aminoanthraquinones as contain in the 5- or 6- or 7- or 8-position of the benzanthrone nucleus the residue of a further amine of the anthraquinone series. C.

Anthraquinone Dyes: Production. I. G. Farbenindustrie A.-G. E.P.470,531 of 27/7/1936 (Conv. 27/7/1935).

Dyes are made by acylating an alkaline condensation product of 1-(Bz.1-benzanthronyl-amino)-4- or 5- or 8-aminoanthraquinone which contains in the 5- or 6- or 7- or 8-position of the benzanthrone nucleus the residue of a diamine of the anthraquinone series. C.

Amino-alcohol Derivative Wetting Agents and Synthetic Resins: Preparation. Rohm & Haas Co. E.P.470,636 of 8/1/1936 (Conv. 15/1/1935).

Phenolic aralkylamino-alcohols, of probable formula $HO.R.CH_2.N(X).Alkylol$, where R is an aromatic or heterocyclic nucleus which may be substituted and X is hydrogen, methylol or an alkylolaminomethylene group, are manufactured by condensing a phenol having a hydrogen atom *o*- or *p*- to the hydroxyl group, and free from acidic groups, with at least one molecular proportion each of formaldehyde and an aliphatic or alicyclic amino-alcohol having a primary amino group. The products possess the properties of phenols, alcohols and amines. With sulphuric acids they yield sulphuric esters which are wetting, cleansing and emulsifying agents. With inorganic or organic acids they yield amine salts, many of which yield antiseptic or germicidal aqueous solutions, whilst those in which the phenols used contain long alkyl chains or large hydrocarbon radicals in the aromatic nucleus yield aqueous solutions of very low surface tension and strong foaming properties and are useful as wetting, emulsifying, dispersing and cleansing agents. All the products and their esters, amides and salts are convertible into resins when heated, especially in the presence of excess of formaldehyde, and may therefore be employed in coating and moulding compositions. The lactic, phosphoric and acetic acid salts of the " A " stage resins are soluble in water, yielding solutions which can be used for impregnating porous substances such as paper and textile materials. Solutions of the salts of volatile acids, e.g. acetic or formic acid, which acids are expelled on heating the salt above 100° C., are useful for crease-proofing fabrics. The products may also be used in dyeing and mordanting operations. C.

Bleaching and Detergent Preparations. E. V. Hayes-Gratze. E.P.470,699 of 4/12/1936.

A silica gel suspension for treating vegetable, animal and artificial fibres, skins and leather, is prepared by adding a weak solution of sodium silicate to a sulphonated oil and then adding a neutralised protein and an oil, paraffin wax, etc. Bleaching solutions may be made by the addition of peroxide of hydrogen or the solution may be impregnated with ozone or oxygen. Detergents are produced by admixture with soaps or soap solutions. The gel preparation may be used in retting and degumming, if desired with the addition of oleins, amino acids or cellulose esters. C.

Phthalocyanine Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). E.P.470,703 of 14/2/1936.

Phthalocyanines are prepared by heating phthalonitriles substituted by alkoxy or aryloxy groups or in which the benzene nucleus is connected in two positions to a further aryl residue in each case by an oxygen atom, with metals or metal compounds with or without diluents. The products can be pasted from cold sulphuric or ethyl sulphuric acids, and can be sulphonated and then converted into lakes by treatment with polyvalent metal salts or lake-forming amines. They may be used for colouring cuprammonium or viscose rayon. C.

Sulphonated Sterol Wetting Agents: Preparation. H. W. Smith and S. G. Campbell E.P.470,715 of 14/3/1936.

Unsaponifiable matter is extracted from saponified wool grease by extraction with cold or warm solvents such as carbon tetrachloride or acetone. The extract is freed from soap by dilution with solvent after which the purified product consisting of cholesterol, isocholesterol and other alcohols is recovered. This is treated with excess of concentrated sulphuric acid at 140° C., and after (a) repeated washing with water, (b) neutralizing with caustic soda, (c) precipitation with hydrochloric acid, (d) conversion into the calcium salt, filtering, and (e) treating with acid, the resulting sulphonated product may be used as a wetting agent. The filtrate from (d) after boiling with soda forms a product also useful as a wetting agent. C.

Carrotting Fur. Non-mercuric Carrot Co. E.P.471,057 of 20/2/1936.

Fur is carrotted for felting by means of an aqueous solution of an acid hydrolyzing agent, e.g. hydrochloric and sulphuric acid, an oxydizing agent and a soluble neutral salt of a strong acid and an alkali, alkaline earth metal, or ammonium, the salt being present in amount equal to or greater than the amount of the acid so that on drying the treated fur the salt prevents damage to the fur which might be caused by increasing concentration of the acid. Sodium

sulphate is a suitable neutral salt for use in the process and suitable oxidizing agents are hydrogen peroxide, potassium persulphate, chlorate, or perchlorate, and ammonium persulphate. W.

Aminocarboxylic Amides; Textile Assistants; Proofing Permeable Materials. J. R. Geigy A.-G. E.P.471,404 of 23/12/1935.

Amides of aminocarboxylic acids are obtained by the action of primary, secondary or tertiary amines on halogencarboxylic acid amides of the formula $XC_nH_{2n}CONRR^1$, where X is halogen, n is 1, 2 or 3, R is a saturated or unsaturated aliphatic or hydroaromatic radicle containing more than six carbon atoms, and R^1 is a cycloalkyl, aralkyl or aryl group. The amines may be of aliphatic, araliphatic, hydroaromatic or aromatic character, and in the case of secondary or tertiary amines the substituent radicles may be identical or different or may be linked to form, with the nitrogen atom, a heterocyclic ring, as in piperidine, pyridine or nicotine ; if the amine contains alkyl groups, these may be substituted by halogen and/or hydroxyl. The halogenated amides of the formula above are obtainable from halogenated carboxylic acids containing up to 4 carbon atoms, or their chlorides, and amines of the type $NHRR^1$, where R and R^1 are as above ; in particular, R may be a radicle of a higher alcohol obtainable by reducing a fat, oil, resin or naphthenic acid. When the aminocarboxylic amides obtained as described above contain secondary or tertiary amino groups, they may be after-treated with alkylating or aralkylating agents, which may contain hydroxyl and/or halogen in the alkyl or aralkyl group ; specified types of alkylating or aralkylating agents are mineral-acid esters of saturated or unsaturated alcohols, such as alkyl, aralkyl or alkylene halides, halogenhydrins, and dialkyl sulphates, and also alkyl or aralkyl sulphonates ; the products containing secondary or tertiary amino groups may also be converted into salts with inorganic or organic acids, e.g. into hydrochlorides, sulphates, phosphates, silicofluorides, formates, monochloracetates, oxalates, citrates or tartrates. The products are useful (a) as wetting agents, (b) for improving the fastness of direct dyeings to water, (c) for stripping Naphthol AS dyeings, (d) for imparting a matt appearance to regenerated cellulose, e.g. by impregnating the material with an aqueous emulsion containing lithopone, an emulsifying agent, and a product of the invention, (e) as softening agents for textiles, (f) as agents for combating animal pests, e.g. for protecting plants or for moth-proofing, and (g) as bactericides or fungicides. Examples are given. W.

Crease-resistant Textile Materials: Production. Böhme Fettchemie G. m. b. H. (Chemnitz). E.P.471,988 of 21/4/1936: 15/9/1937.

Textile materials of rayon, silk, cotton, linen or mixtures are treated at *p*H 2·5—3·3 in the presence of free acids (except phosphoric acid) or acid-reacting mineral salts and in the absence of organic substances containing basic groups, with aldehydes, preferably formaldehyde, or substances which readily give off such aldehydes, and are then heated to temperatures between 130° C. and 170° C. C.

Synthetic Resins: Preparation. Deutsche Bekleidungs-industrie G. m. b. H. (Potsdam, Germany). E.P.472,066 of 11/5/1936: 16/9/1937.

In a process for the production of water-clear, colourless pressing or injection moulding masses, molten or dissolved phenol-formaldehyde condensates which have been prepared with the use of ammonia as a catalyst are subjected to further condensation in a neutral, acid or alkaline medium, e.g. in the presence of ammonia (which forms hexamethylenetetramine with the formaldehyde present) with aldehydes and urea, thiourea or guanidine, the ratio of the total weight of formaldehyde (calculated as a 40 per cent. by weight solution) to the weight of phenol being at least 4 : 1 and the ratio of the weight of phenol to the weight of urea, thiourea or guanidine being below 1·4 : 1, a corresponding molecular quantity of aldehyde being used when another aldehyde is used instead of formaldehyde. C.

Photographic Mordant Dye Images: Preparation. R. von Arx (Berlin). E.P.472,346 of 29/6/1936: 22/9/1937.

A process for preparing photographic mordant dye images (on transparent or opaque supports) is characterised by the feature that photographic silver images are coverted into mordant images containing zinc ferrocyanide and silver ferrocyanide by means of a conversion bath consisting of an aqueous solution of

a soluble ferricyanide, a soluble zinc salt and a salt which prevents the precipitation of insoluble zinc ferricyanide, and the mordant images are converted by treatment with aqueous dye solutions of organic nature into mordant dye images. Silver ferrocyanide may be removed, before or after dyeing the mordant image, by treatment with a thiosulphate solution and unconverted silver may be removed by means of dilute chromic acid. C.

Permanent Starch Finishes: Production. J. G. Evans, C. E. Salkeld and Imperial Chemical Industries Ltd. (London). E.P.472,389 of 15/1/1936: 15/9/1937.

Starch finishes of a permanent character are produced on materials such as yarns, fabrics and paper, by treating the materials, either before or after or simultaneously with a starching operation, with an aqueous solution of a quaternary ammonium compound of the general formula $R.X.CH_2.N(tert.)Y$, wherein N(tert.) represents the nitrogen atom of a tertiary organic base, Y represents the anion of a salt forming acid, X stands for a non-carbonic link and R stands for an organic radical free from water-solubilising groups, and heating the impregnated, starched material at a temperature sufficient to decompose the quaternary compound. C.

Finishing Apparatus Stop Motion. E. Gessner A.-G. (Aue, Germany). E.P. 472,581 of 16/2/1937: 27/9/1937.

In an electrically driven roller and trough apparatus for pressing webs of fabric, the web travels between electric contact rollers so as to close an electric circuit for stopping the drive when the web carries a foreign metal body between the rollers. The electric circuit to which the rollers are connected contains a relay which, when energized, closes the circuit of another relay whereby the circuit of the driving motor is broken. C.

Mixed Polymerisate Waterproofing Agents. W. W. Groves, London (I. G. Farbenindustrie A.-G.). E.P.472,613 of 27/3/1936: 27/9/1937.

Textile materials are rendered water-repellent by treatment with solutions or dispersions of mixed polymerisates which are prepared from a mono- or di-ester of an $\alpha:\beta$-ethylene-dicarboxylic acid with an aliphatic alcohol containing at least 6 carbon atoms in the molecule and from any olefinic compound (other than acrolein) with which the $\alpha:\beta$-ethylene-dicarboxylic acid component forms mixed polymerisates, with the exception of the mixed polymerisates obtained by common polymerisation of the mono- or di-esters of maleic acid and the vinyl esters of fatty acids containing at least 12 carbon atoms or the vinyl ethers of aliphatic alcohols containing at least 12 carbon atoms. C.

Printworks Ager. Z. Sochor, S. Morch and A. Kvasnička (Dvůr Králové n. L., Czecho-Slovakia). E.P.472,700 of 9/4/1936: 29/9/1937.

An ager for the development and treatment of printed fabrics, especially suited to the use of organic acids at normal or increased temperature, has a bath or well at its base and means for heating the acid introduced therein. The vapour-containing part of the ager is in communication with an outside condenser and means are provided for returning the condensed acid from the condenser to the bath or well and also for replenishing the acid from an acid container. An out-take or ventilating device may be used between the vapour-containing part of the ager and the condenser to augment collection or circulation of the vapour. The body of the ager is advantageously constructed from two or more compartment-shaped structures made from synthetic resin by casting, pressing or like method. C.

Crepon Fabrics: Production. Heberlein & Co. A.-G. (Wattwil, Switzerland), G. Heberlein and E. Weiss. E.P.473,069 of 1/4/1936: 1/10/1937.

The effects produced by the method described in E.P.469,138 can also be obtained if, instead of crease-proof yarns, yarns are used which have been rendered insensitive to swelling agents and withstand a careful bleaching treatment. For this purpose yarns are suitable which are impregnated with india-rubber or india-rubber derivatives, or have been esterified, for example, benzoylated on the surface. Woven fabrics containing yarn treated in this manner, and raw cellulose-containing yarns covered with their natural incrustations, are subjected to a bleaching process with weak alkaline boiling without pressure and are then treated with one or more swelling agents having shrinking and/or parchmentising actions. C.

5—ANALYSIS, TESTING, GRADING AND DEFECTS

(A)—Fibres.

Cotton Hair Growth Rings: Structure. T. Kerr. *Protoplasma,* 1937, **27,** 229-241 (through *Chem. Abstr.,* 1937, **31,** 3960[3]).

The appearance of layering in swollen cotton hairs is due to a structural differentiation of the cellulose into alternate compact, strongly birefringent zones and more porous, comparatively isotropic lamellae. During the deposition of the secondary wall, two lamellae, one compact and one more porous, are deposited every 24 hours, these two comprising a daily growth ring. The rings show considerable variability in width and density of the more porous lamellae, the latter being correlated with fluctuations of night temperature. When the temperature falls below 20° C., the porous zones do not stain in Congo red and are well differentiated from the contiguous compact lamellae, but if the night temperature remains above 22° the porous zones are poorly differentiated, and stain heavily. The conclusion is drawn that the compact zones are laid down during the day and the porous zones at night. The width of the daily deposit varies within wide limits ; cotton from N. Carolina, with a boll period of 50 days had rings 0·30-0·35 μ thick whereas cotton grown in Massachusetts, with a boll period of 75 days, had rings 0·12 μ thick. " Green lint " cotton has a non-cellulosic constituent in the secondary wall, insoluble in cuprammonium solution or 72 per cent. sulphuric acid, and accumulating in the interstices of the more porous lamellae. C.

Fibres: Structure. F. E. Brauns and H. F. Lewis. *Paper Trade J.,* 1937, **105,** *TAPPI,* 141-143.

The ligneous skin surrounding the secondary lamellae of the fibre that remains undissolved when pulp is swollen in cuprammonium solution, consists of the copper complex of a carbohydrate. On hydrolysis it gives a blue solution and an insoluble grayish precipitate. On dialysing the blue solution, the copper and other ash constituents are removed, leaving a white gel in the dialysing bag. This has been converted into a white powder which proved to be free from methoxyl or uronic acid groups. On hydrolysis with fuming hydrochloric acid the powder gives a 97 per cent. yield of reducing sugar, of which 45 per cent. is fermentable. The original insoluble material could not be hydrolysed after drying. C.

Busch Microscopes and Accessory Apparatus. K. Fischer. *Z. Instrumentenkunde,* 1937, **57,** 349-364.

The author gives a detailed review of microscopes and accessories marketed by Emil Busch, A.G. These include magnifying spectacles with adjustment for two sights, a surface tester for the examination of textiles and papers, and a workshop microscope for the examination of machine parts. A new construction is the " Research " microscope. The coarse and fine adjustment screws are both at a low level, lower than the stage, the objective holder can be changed quickly and easily, and the stage is large enough for the examination of objects such as dishes of cultures. The " Metaphot " is a combination of microscope and camera, with special means for the examination of the specimen in a direct beam of light, or in light falling vertically or obliquely on it, or in polarised light. The " Citophot " camera, for tracing the enlarged microscopic field is also described. C.

Microscope Counting Chamber. A. Herzog. *Textilberichte,* 1937, **18,** 692-693.

A counting chamber for use in the counting of short sections of fibre in the quantitative analysis of mixture yarns consists of a piece of plate glass (6 × 11cm.) provided with numbered lines which at one side are numbered with ordinary figures and at the other with reflected figures. Round the edge of the plate is fused a smoothly ground glass frame or rim which prevents liquid immersion media from flowing on to the microscope stage. The chamber may be used in the inverted position, e.g. in the gelatin counting method. C.

Cellulose and Cellulose Compounds: Water Absorption. J. Tankard. *J. Text. Inst.,* 1937, **28,** T263-T292. C.

Cellulose Fibres: Strength and Degree of Polymerisation. H. Staudinger and M. Sorkin. *Textilberichte,* 1937, **18,** 681-684.

Data showing the breaking load and extension, resistance to breakage by bending, and degree of polymerisation of various cotton and staple fibres show

that the strength properties, especially the resistance to breakage by bending, deteriorate with decreasing degree of polymerisation. The structure and the shape of the fibre cross-section also influence the strength. For fibres of similar structure a decrease in degree of polymerisation means an increase in the number of gaps between the molecules in the direction of the fibre axis and the gaps are weak places in the fibre. A series of hydrocelluloses have been prepared with degrees of polymerisation between 1650 and 150 by treating cotton with water and with normal acids for different periods. The gap numbers and strengths of the products are tabulated and curves are given showing the variation in breaking load and extension and in resistance to breakage by bending with change in degree of polymerisation. These properties are not appreciably affected by a fall in degree of polymerisation down to about 800 but below 600 there is rapid deterioration. Rayons of satisfactory strength can be obtained with degrees of polymerisation of about 500. Curves showing the variations in strength with changes in the number of gaps are also given. C.

Cotton Fibres: X-ray Structure and Tensile Strength. W. A. Sisson. *Textile Research,* 1937, 7, 425-431.

The method of X-ray analysis due to Sisson and Clark, providing a quantitative measure of orientation in cotton fibres, has been simplified and improved and is now shown to offer the possibility of predicting quality in cotton. A calibration between tensile strength and X-ray data (angle of 40 per cent. maximum density on the 002 diffraction ring) was obtained with four types of cotton and used to calculate the strength of six other samples. The samples were prepared as for the Chandler bundle-strength test, a small gap being left unwrapped for the X-ray analysis. A table records the observed and calculated Chandler bundle-strengths for the ten samples and the X-ray angles, and the observed and calculated strengths are plotted. The correlation coefficient is +0·970. Another set of 21 samples gave a curve of somewhat different slope and a correlation coefficient of +0·867. C.

Fibres: Identification. *Text. Merc.,* 1937, **97,** 386-389.

A useful review of simple microscope and staining tests for different fibres, including particulars of Rückert's test for distinguishing between viscose and cuprammonium rayons. C.

Neocarmin Fibre Stains: Application. Brown and Forth Ltd. *Text. Merc.,* 1937, **97,** 332.

The Neocarmin differential stains for mixed fibres are now obtainable from the authors. Neocarmin W stains viscose rayon red, acetate filaments light greenish-yellow, cotton pale blue, and cuprammonium rayon dark blue. Neocarmin B stains cotton red, and cuprammonium rayon or linen dark blue. C.

Raw Cotton: Spinning Value. E. H. Helliwell. *Cotton (U.S.),* 1937, **101,** No. 9, 66-68.

A simple statement of some factors, judged by graders, that affect the spinning value of cotton. On the use of stapling test machines, the writer says that the combing and stretching with forceps often result in an apparent increase of about 6-10 per cent. in staple. C.

Textile Fibres: Thermal Conductivity. I. G. Farbenindustrie, A.-G. *Textil-berichte,* 1937, 18, 684-687.

For the determination of thermal conductivity, yarn was wound on a brass tube of 20 mm. outer diameter to form a package of 30 mm. outer diameter and 200 mm. length. The tube was heated by means of an electrically-heated hot body placed inside it and was suspended in a room maintained at 20° C. and 60% R.H. When equilibrium was reached the difference in temperature between the inner and outer layers of the wound package was determined by means of suitably placed thermo-elements, and the thermal conductivity was calculated. The brass tube was weighed before and after winding on the yarn and the density of the wound package determined. Results are given for cotton, wool, Wollstra, Vistra, Vistra XT, silk and various rayons, Lanital and a high polymer synthetic product, in the form of a table showing the yarn counts, the number of layers in the package and the package density, the temperature difference between inner and outer layers, and the conductivity. When conductivities

are plotted against package densities the mean values for wool, Wollstra, Vistra and rayon lie on one curve whilst the values for cotton and pigment-delustred rayons lie above this curve. When yarn packages of the same density are compared the thermal conductivities of wool, Wollstra, Vistra and undelustred rayon are practically equal whilst the conductivities of cotton and pigment-delustred rayon are about 30 per cent. higher and those of silk and cellulose acetate rayon about 10 per cent. lower. When packages of the same dimensions are compared, regardless of the densities, the conductivity of rayon is double that of wool, that of Vistra is about 25 per cent. more than that of wool, and Wollstra and Vistra XT have conductivities of the same order as the conductivity of wool. Differences in the thermal conductivity of textile fibres are only of secondary importance in connection with the heat holding properties of textile materials. The most important factor is the power of the fibre to form structures of low density. Another secondary factor is the inclination of the fibre to the direction of heat flow. C.

Textile Fibre Mixtures: Analysis. Q. Fimiani. *Maglieria,* 1936, **18**, 475-479.

In the microscopic method for the analysis of mixtures of textile fibres, e.g. yarns containing different types of fibres, samples are placed under the microscope and the fibres of each type are counted. The counting may be facilitated by the use of colour reactions. The author discusses the preparation of the samples, the counting operation, and the method of deducing the percentage by weight of each type of fibre. Another method of analysis depends on the determination of the weight at 65% R.H. of a sample of given dry weight and comparison with a table showing the weights at this humidity of mixtures of known compositions. A table showing the conditioned weights of samples of 1,000 g. dry weight of mixtures of cotton and rayon, and cotton or rayon with varying proportions of hemp, linen, silk, cellulose acetate rayon or wool is given together with graphs showing the variation in weight with composition of conditioned samples of rayon-wool, cotton-wool and cotton-hemp mixtures. C.

Vegetable Fibres and Rayon: Structure. R. Haller. *Textilberichte,* 1937, **18**, 617-618, 733-737.

The differences in structure between natural fibres, such as cotton, flax, hemp, etc., and artificial fibres, such as rayon and staple fibre, are discussed and the influence of structure on properties is pointed out. Attempts to make rayon fibres more like the natural fibres by providing them with a coating or cuticle of cellulose derivates by treatment with solutions of cellulose acetate, benzylcellulose or similar products or by passing a cellulose core thread through the spinning nozzle when spinning solutions of cellulose derivatives have not given satisfactory results. Better results have been obtained by treating rayon filaments with reagents such as *p*-toluenesulphonyl chloride, cyanuryl chloride, stearic acid chloride, and benzoyl chloride. The behaviour on treatment with sulphuric acid and iodine and on swelling in copper ethylenediamine of cuprammonium rayons treated with these reagents is described and it is shown that the behaviour of the treated rayons is similar to that of cotton and other natural fibres. This observed similarity in behaviour provides further evidence in support of the author's view that the natural fibres do not contain transverse elements. Sakostschikoff's theory of the existence of transverse elements is critically discussed and a reply is made to his comments on a previous paper by the author. C.

Durability of Crimp: Measurement. O. Schmidhäuser. *Klepzig's Text. Z.,* 1937, **40**, 516-518 and 527-529.

The fibre is gripped by a clamp and hangs down over a glass sheet provided with a millimetre scale. The fibre is straightened without stretching or loss of crimp and attached to a paperweight provided with a vernier and weighing 10 mg. The pressure is applied and released by means of two springs on a rotatable disk. Crimp stability is estimated by the loss of crimp dependent on the number of strokings. Tables and graphs are given showing the results of measurements on various types of fibres. In 100 strokes the maximum loss for viscose is 81·4 per cent. and for wool only 11·6 per cent. W.

Sulphuric Acid and Sulphates in Wool. L. Armand. *TIBA,* 1937, **15**, 283-289.

A review of methods for the determination of total sulphur, sulphuric acid and sulphates, and free acid in wool. W.

Wool and Mohair: Characteristics and Properties. *Wool Rec.*, 1937, **52**, 557-560.

A description of the microscopical appearance of wool and mohair and of known methods for distinguishing the two fibres. Special reference is made to the dyeing properties. W.

(B)—YARNS.

Rayon Threads: Shrinkage. E. Hensel. *Kunstseide,* 1937, **19**, 336-338.

Measurements of the shrinkage in hot water and on drying of over-stretched rayon threads in the acid-spun state show that the amount of shrinkage increases with the temperature of the water bath and the drying temperature. By repeated wetting and drying it is possible to remove the internal tensions in over-stretched threads and produce materials which do not shrink. In the acid state there is very little difference in the shrinkage characteristics of the beginning and the end sections of thread on the cake or bobbin but when bobbins of the spun thread are washed and dried the outer layers are able to shrink more than the inner layers in contact with the support. On twisting bobbins the positions of the ends are reversed and the shrinkage effects are compensated to a certain extent. A product which shows practically no shrinkage is obtained by wet twisting and then drying without a support. Rayon washed in cake form is also practically free from shrinkage tendencies. The results of extension, residual extension and shrinkage measurements on 120-denier threads are given and the relations between extensibility, shrinkage and dyeing properties are discussed. C.

Yarns: Testing. *Maglieria,* 1936, **18**, 359-365.

In connection with the unification of methods for testing yarns a list is given of recognised tests, including tests of external characteristics and physico-mechanical, microscopic and chemical tests. The s and z system of twist designation and the standard counts systems used for the different types of yarns are explained, and methods of determining twists and counts are briefly described. Tolerances in counts are discussed. C.

Sewing Threads: Testing. F. Kurtz *Textilberichte,* 1937, **18**, 494-8, 690-2.

In order to test their value for use as sewing threads, 2/60's, 3/60's and 3/2/60's cotton yarns were used as the upper thread on a sewing machine and after sewing were carefully removed from the fabric and tested. Changes in strength, extensibility and working power produced by sewing were determined. Two sewing machines of similar construction were used for the tests, normal and soft finishes were applied to the yarns, and light and heavy plain-weave cotton fabrics were sewn. The results are tabulated and discussed. One sewing machine was found to have a greater effect on the yarns than the other. The 3/60's yarn with normal finish was affected least by sewing. The 2/60's yarn was very satisfactory for sewing the thin fabric. The changes in strength of the 2-fold yarn were lower than the changes in working power. Sewing the thick fabric had less effect on the yarns than sewing the thin fabric. This result is attributed to the fact that the hole made by the needle closes up more rapidly in the thin fabric and hence the yarn is subjected to greater friction on being drawn through. Yarns with the harder finish were affected less than those with a normal finish. This result is attributed partly to the fact that the harder finished yarns have already deteriorated more in the finishing process and partly to the smoother surface produced by the hard finish. Additional tests in which the yarns were used as lower threads in the sewing machine showed that the effect on the yarns in this position is much less than in the upper thread position. Tests were also carried out in order to determine the effect of bleaching yarns before finishing on their value as sewing threads. The results are tabulated together with the results of tests on fibres from the unbleached, finished, and bleached and finished yarns. Use in the sewing machine caused a greater loss in strength and working power in the bleached and finished yarns than in those finished without bleaching. The tests on the fibres from the yarns showed that the bleaching process had caused considerable decreases in fibre strength and working power but the bleached and finished yarns were not appreciably weaker than the unbleached, finished yarns. It is suggested that the removal of cotton wax during the bleaching process increases the friction between the fibres in the yarn and compensates for the loss in strength. In the sewing process the creasing and friction to which the yarn is subjected weakens the binding of the

fibres in the yarns and the association of the singles in the folded yarns. It is pointed out that simple determinations of strength are not sufficient for determinations of the value of yarns for sewing. Tests of resistance to bending and rubbing should be included. C.

(C)—FABRICS.

Bleached Cotton: Chemical Tests. A. Hájek. *Textilni Obzor,* 1936, **33**, 10, 30, 52, 112, 122, 134 (through *Chem. Abstr.*, 1937, **31**, 4126[4]).

Estimation of damage in cotton goods by measurements of reducing power is discussed. Copper number is determined by a modification of Dokkum's iodimetric method. The results cannot be correlated with loss of strength. Götz's silver reduction test is not recommended and tests with Nessler's reagent have limited scope. Kaufmann's permanganate method is suitable for cotton and regenerated cellulose provided they have not been treated with non-cellulosic reducing substances. C.

Fabrics: Standard Washing Tests. J. G. Cluett. *Rayon Textile Monthly,* 1937, **18**, 518-9.

Details are given of the American " CCC-T-191 " standard washing test for determining the shrinkage of cotton fabrics and of a modification designed for silk, rayon, wool and mixture fabrics. C.

Lustre Photometer. D. A. Derrett-Smith. *J. Text. Inst.*, 1937, **28**, T293-T298. C.

Cloth: Water and Rain-proof Tests. J. P. Peper and A. ten Bruggencate. *Textilberichte,* 1937, **18**, 630-632, 737-738.

A German translation of a paper previously abstracted from the original Dutch. C.

Mercerised Cotton Fabrics: Iodine Tests. A. J. Hall. *Textile Weekly,* 1937, **20**, 463-467, 605-609.

A review of old and new tests for mercerised cotton that depend on measurements of iodine absorption, with particular reference to the work of Schwertassek. C.

Printed Cotton Fabric: Combined Effect of Light and Perspiration. *Ciba-Rundschau,* 1937, No. 17, 617-618.

A cotton dress printed with a vat dye of good fastness to light showed abnormal fading in parts in direct contact with the skin after wearing once on a hot summer day. Samples dyed the same shade were exposed to bright sunlight (1) in the dry state, (2) sprinkled with 1 per cent. acetic acid, (3) sprinkled with 1 per cent. salt solution, (4) sprinkled with 1 per cent. acetic acid + 1 per cent. salt solution, and (5) sprinkled with ammonia. The fading was much greater in (4) than in the other tests and it is concluded that the fading of the dress was due to the combined action of light and perspiration. It is pointed out that tests of the combined actions of light and washing would also probably give results different from those expected from the results of tests of the separate actions. C.

" Rinso " Wash Testing Laboratories: Proposals. R. H. Hudson Ltd. *Textile Weekly,* 1937, **20**, 380.

It is proposed to issue certificates of reliability for cloths—cottons and linens—which have passed washing tests for quality, colour and shrinkage. In conjunction with the Sanforizing process of controlled shrinkage, the labels " Rinso Wash-Tested " and " Sanforized Shrunk " will be issued. C.

" Tested Quality " Rayon Fabrics: Certification. Courtaulds Ltd. *Textile Weekly,* 1937, **20**, 525-526.

Particulars are given of Courtaulds' quality-control plan, including a reproduction of the testing report sheet issued by the Retail Trading Standards Association Testing House, a declaration of the minimum content of rayon for which the plan is operative (in most fabrics it is 45 per cent.) and a facsimile of the label to be attached to approved goods. C.

" Ultra Lens " Cloth Testing Glass. R. Bock. *Text. Merc.*, 1937, **97**, 387.

The " Ultra Lens " is a triple lens system illuminated from a lamp in a side arm that also serves as a handle. It is placed directly on the cloth and gives a magnification of × 15. A transparent scale is provided to assist in thread counting. C.

Weft in Cloth: Calculation. J. H. Strong. *Textile Weekly*, 1937, **20**, 357, 388.
The difficulty of calculating the amount of weft required for a given cloth is discussed in the light of cloth structure and geometry. C.

Destruction of Wool by Sweat. *Klepzig's Text. Z.*, 1937, **40**, 541.
A brief account is given of the chemical composition of human sweat and of the approximate amounts given off under various conditions. It is recommended that, after washing, wool stockings and sunbathing costumes should be rinsed in dilute acetic acid solution, to neutralize the ammonia occurring in the sweat. W.

Under-arm Damage in Women's Wear. C. R. N. *Text. Mfr.*, 1937, **63**, 329.
Tests are described for detecting under-arm damage in women's garments due to the careless use of deodorants. Perspiration damage can be differentiated from deodorant damage by the fact that in the former case the damaged area does not normally show a higher fluidity or solubility number than the sound parts of the garment. W.

(D)—Other Materials.

Dyed Paper: Fastness Tests. O. T. Chalon and F. A. Soderberg. *Paper Trade J.*, 1937, **105**, *TAPPI*, 152-154.
Fastness tests on paper are discussed and results of exposures (unnamed dyes) are tabulated. Representative dyes were exposed for 15, 60 and 120 minutes in the Fade-ometer and also to bright sunlight in each month of the year until they faded to the same extent as in the Fade-ometer. A rough working ratio between Fade-ometer and sunlight exposures is thus established. C.

Vat Dyeings: Spot Tests. H. C. Borghetty and K. J. Broden. *Amer. Dyes. Rept.*, 1937, **26**, 589-599.
A chart for the identification of vat dyes on vegetable fibre due to G. Buzzi-Ferraris is translated from the Italian, extended, and Colour Index numbers are supplied. The spot tests employ (1) alkaline hydrosulphite, (2) acid hydrosulphite, (3) concentrated sulphuric acid, (4) nitric acid and (5) stannous chloride. The response to these tests is recorded in a table for 176 vat dyes. C.

Dyed Paper: Calculation of Spectral Reflectivity. P. Nolan. *Paper Trade J.*, 1937, **105**, *TAPPI*, 204-207.
Kubelka and Munk's equation for the reflectivity of a medium in terms of its absorption and scattering coefficients is applied to the problem of calculating the spectral reflectivity of paper containing two or more dyes from the spectral reflectivities of papers containing the individual dyes. Experimental and theoretical spectral reflectivities of sheets of unbleached sulphite paper dyed with mixtures of two basic dyes were in good agreement. Spectral reflectivity curves for a mixture of auramine and basic brown on unbleached sulphite pulp are given, and another graph shows the difference between the spectral absorption coefficients of methylene blue absorbed by fibre and in aqueous solution. C.

Starch: Testing in the Paper Industry. I. J. Saxl. *Paper Trade J.*, 1937, **105**, *TAPPI*, 186-192.
A general review of the application of starches as fillers and binders and as surface coating materials in the paper industry. with special reference to testing methods. Several instruments are described, especially the author's chaino-matic load-extension tester and his stiffness tester. C.

Colour Measurement. *Wool Rec.*, 1937, **52**, 581-582.
A description of the Lovibond tintometer and the Guild trichromatic colorimeter, the former a works instrument and the latter for exact measurements in the laboratory. W.

Use of Animalised Fibre ("Tessan") for Testing the Colour of Tanning Materials by a Modified Method. A. Gansser and W. Vogel. *J. Soc. Leather Trades Chem.*, 1937, **21**, 274-277 (through *Brit. Chem. Abs. B.*, 1937, **56**, 952).
"Tessan" is animal or vegetable fibre treated with gelatin. The "Tessan" is suspended in tan liquors of analytical concentration for 36-48 hrs. after which it is drained, dried, and its colour determined by means of the Zeiss photometer or Lovibond tintometer. Results on different tanning materials are compared. W.

Judging Mutton and Lamb Carcases for their Market Suitability. J. Hammond. *Natl. Sheep Breeders' Assoc., 36th Inter. Conference,* 1937, pp. 6-27. W.

7—LAUNDERING AND DRY CLEANING

(A)—Cleaning.

Chlorinated Hydrocarbons: Toxic Action. R. Freitag. *Rayon Textile Monthly,* 1937, **18**, 543-545.

The increasing use of chlorinated hydrocarbons such as carbon tetrachloride and trichlorethylene for cleaning and degreasing purposes and in adhesive and detergent preparations is pointed out and tables are given showing the toxicity and other properties of various chlorinated hydrocarbons. Fatal cases of poisoning by trichlorethylene, methyl chloride, tetrachlorethane and dichlorohydrin are reported. The use of gas masks fitted with inhalation filters is recommended for work in atmospheres containing considerable quantities of chlorinated hydrocarbons. C.

Soaps: Constitution and Detergent Power. L. Szegö and L. Malatesta. *Atti V. Congr. Naz. Chim.,* 1936, **2**, 569-577 (through *Brit. Chem. Abstr.,* 1937, AI, 238).

The surface tension and detergent power of aqueous solutions of the Na soaps of oleic, ricinoleic, stearic, 2-, 10-, and 12- hydroxystearic, cetylmalonic and hexadencane-$\alpha\omega$-dicarboxylic acids are recorded. The introduction of a second hydrophilic group into the carbon chain decreases the capillary properties of the soap, the decrease becoming larger with increased separation of the two active groups. The molecules that contain two hydrophilic groups are oriented parallel to the surface in these soap solutions. C.

Slippage in Rayons. *W.P.Z.,* 1937, **40**, 559.

An illustration of slippage in a rayon shirt is given. The launderer cannot be held responsible for such damage for it is due to unsuitable weaving. The characteristics of a good quality fabric, which would not exhibit this fault, are briefly described. La.

Scientific Observations on Modern Laundry Problems. A. Foulon. *W.P.Z.,* 1937, **40**, 560.

A superficial consideration of such topics as optimum soap concentration, the greater deleterious effect of magnesium as compared with calcium soaps, use of waterglass as a filler, Ott and Beyer's experiments with sodium caseinate and protalbinate, synthetic fats from hydrocarbons, water softening using waterglass, the application of spectrographic analysis to the study of catalytic damage in bleached fabrics, the relation of swelling of synthetic fibres to their wet strength, and the control of swelling, launderability of staple rayon, analysis of mixed yarns, use of high and low pressure steam, and reasons for the inapplicability of superheated steam in the laundry. La.

Origins of Laundry Damage. E. M. Müller. *W.P.Z.,* 1937, **40**, 570.

Mechanical damage may be caused by insecure fastenings on the machines, particularly as they age. Roping of the goods, owing to unequal rotation of the cage is also a cause of damage. If carefully packed, articles do not tear in the hydro. Laying the articles across the cage, or overloading so that the hydro-cover slips, can however cause damage. Chemical damage is difficult to allocate as it frequently fails to develop until several washes have taken place. It may be caused by the absorption of copper from a cage during overnight soaking, or by rust. To avoid the latter indirect heating of the machines is advised. The other advantages of indirect heating are also mentioned. Another cause of chemical damage is the addition of solid washing materials to the load. Home washing powders containing perborate are frequently used in this way and the laundry blamed when minute holes appear in the articles during the subsequent washes. La.

Deposition of Waterglass in Fabrics. *W.P.Z.,* 1937, **40**, 590.

Two simple experiments are described and illustrated which show that waterglass produces a more voluminous precipitate than soda from hard water. To this is attributed the decreased life of fabrics washed in hard water and silicate detergents. It is concluded that whilst it is possible to use waterglass in softened water, no advantage is gained by so doing. La.

Washing Experiments with Pure Fibrous Calico (Zellwolkattun) and a White House Cloth with 56 per cent. Staple Rayon, and Some Interesting Observations on Delustred Rayons. (Communication from the laboratory of the Fachuntergruppe Industrielle Wascherei.) Oscar Uhl. *W.P.Z.*, 1937, **40**, 602.

The decrease in strength of the warp and weft of the all-rayon cloth was measured after wetting and after washing fifty times by three different processes: hand washing with an " automatic " soap powder and with soap flakes, and machine washing in nets with soap flakes. Shrinkage and ash content were also measured. Results were considered satisfactory (loss in wet strength of the order of 20 per cent.) but it was found that mechanical strain on the wet fabric readily gave rise to damage. The house cloths were treated in the same manner as all-cotton articles and showed a somewhat greater decrease in wet strength than the more carefully washed all-rayon fabric. A still more vigorous washing process, however, brought about a 70 per cent. loss in strength after fifty washes. A few remarks about delustred rayons are appended. These fabrics frequently cannot be distinguished as artificial silks and, if made of acetate yarn, readily glaze on ironing. Catalytic damage has sometimes been caused by the delustring agent. A piqué fabric after a short washing process had its surface appearance very greatly altered owing to a variety of slippage. In conclusion, it is pointed out that although rayon and mixed rayon fabrics can be washed satisfactorily much greater supervision of washing proceses is required than hitherto. La.

Cleaning Oil Rags. Carl Blau, Junr. *W.P.Z.*, 1937, **40**, 618.

Unless the oil can be reclaimed and sold, cleaning such goods is uneconomical. They may be dry-cleaned by the usual method; or treated with steam in a centrifuge until the emulsion of oil and water which at first separates has been replaced by a relatively clear effluent, followed by a wash ; or wet cleaned. In the latter process the articles are soaked for three two-hour periods in 0·5 per cent. boiling caustic soda. At the end of each soak cold water is run in gently from below the soaking vessel, the oil and dirt running over the top. If the liquor is run out from below in the usual way, the cloths act as a filter for the oil. The soaked material is finally washed in soap and soda. By adding sulphuric acid to the soak liquors a mixture of fat and oil can be obtained, which is of no great value. La.

Rayon Articles Need Careful Washing. *W.P.Z.*, 1937, **40**, 642.

An illustrated article describing how easily buttons can damage rayon goods. La.

Recollections of the Educational Visit to America Organised by the Deutsches Waschereigewerbes, 1936. Emil Hall. *W.P.Z.*, 1937, **40**, 658.

A German impression of America and American laundry methods. La.

Recognition of Chemical Damage in Laundered Fabrics. O. Oldenroth. *W.P.Z.*, 1937, **40**, 672.

Separate cotton fabrics were treated with bleach and with hydrochloric acid, rinsed and dried. Bursting strength, loss in weight and copper number were determined after one wash, five washes, and after a further half-hour boiled in 0·5 per cent. soda. Qualitative tests for chemical damage were still obtainable. The Willows and Markert test is independent of the presence of the fibre degradation products. La.

Washing Curtains. *W.P.Z.*, 1937, **40**, 725.

Curtains must be carefully measured before washing, then tested for strength, both wet and dry. If very weak the work should not be undertaken. In any case they must be treated with great care. A preliminary soak in plenty of cold water is given, the articles gently pressed free from water (not wrung out), placed in net bags and put into a wash. After a few revolutions they are removed and returned to the machine when it is on the first rinse. In doubtful cases a hand rinse is advised. The rinsed curtains are either hydroed in compact masses or hung up to dry. Finally, they are starched and stretched to the original size. Cream tinting should be avoided if possible as owing to exposed effects even-colouring is almost impossible. If insisted upon the customer should be warned. Fringes must be tied up at 10-15 cm. intervals to avoid excessive mechanical action in the machine. La.

My Visit to English Laundries. H. A. Kind. *W.P.Z.*, 1937, 40, 726.

After a brief survey of England and the English people, visits to the Institution of British Launderers Ltd., the British Launderers' Research Association and a few commercial laundries are described. Comparisons with German practice and several criticisms are made. La.

Processing Furs. *Laundry Rec.*, 1937, 619.

Hand brushing, dry-cleaning methods and precautions necessary in finishing are given. Very careful control of hydro-extraction is necessary and drying should be carried out at a temperature not exceeding 100° F. La.

New Textile Detergent Problems. E. Franz. *Angew Chem.*, 1937, **50**, 26 (through *Dyer*, 1937, 78, 222.

Washing in slightly acid solution is not advised. A return to soap seems therefore to be indicated. La.

PATENTS.

Dry-cleaning Emulsion. S. Lenher and L. B. Arnold, Jr. (to E. I. du Pont de Nemours & Co). U.S.P.2,091,121 of 24/8/1937 (through *Chem. Abs.*, 1937, 31, 7564).

A water-in-oil emulsion is prepared comprising a hydrocarbon dry-cleaning solvent having dissolved in it a long-chain aliphatic alcohol such as oleyl alcohol and an oil-soluble salt of the sulphuric acid ester of oleyl alcohol which has been acetylated prior to sulphonation (the ester being free from inorganic salts and containing no more than a small amount of water). Such an emulsion is suitable for use on textile materials, leather, paper, etc. W.

Washing Machines. S. Newberry & Baker Perkins Ltd. E.P.467,594 of 20/12/1935.

The soiled articles are housed in a hopper having a telescopic shute communicating when in the extended position with the loading aperature in the end of the rotary receptacle of the washing machine. A current of air is created by blowers situated (1) above the hopper and (2) at the opposite end of the washing machine, which conveys the articles from the hopper to the receptacle. After washing another hopper is connected to the aperture in the end of the receptacle by a collapsible coupling and a current of air is created in the reverse direction to disharge the washed articles from the receptacle into the hopper from which they pass to a hydro-extractor. The air current may be warmed. La.

Ironing Machines. Manlove Alliot & Co., Ltd., and W. A. Heastie. E.P. 468,073 of 27/12/1935.

Articles are fed to the ironing machine by the operator securing their leading edges to clips attached to transverse bars mounted on wheels. The loaded carriage is then moved forward by a lever (a) so that the trailing portion of the article is laid over the usual feed tapes. A friction roller that co-operates with the feed tapes is raised during this process. The clips are then released by a mechanism and the article moves to the ironer, in passing it depresses a lever which prevents the movement of the lever (a) until the article has completely passed. Rollers immediately in front of the feed tapes operate so that while not interfering with its forward movement the article is stretched to remove creases. La.

Ironing Machines. British Thomson Houston Co. Ltd. E.P.468,199 of 3/2/37. Conv. 4/2/36.

Improvements relating to the concave shoe of an ironing machine. La.

Ironing Machines. British Thomson-Houston Co., Ltd. E.P.468,203 of 16/2/1937. Conv. 18/2/1936.

The roller of an ironing machine is loosely mounted on a tubular arm so as to be movable transversely. When the concave bed is moved into operative engagement the roller is depressed and driving gear wheel is engaged. A device also enables the bed to be in contact with the roller without the latter rotating. La.

Valve Control in Washing Machines. D. Y. B. Tanqueray & Baker Perkins Ltd. E.P.469,408 of 24/1/1936.

An apparatus for automatically controlling the supply of fluids to washing machines. A timetable carrying a control disc controls the current to electro-

magnetically operated valves operating the washing fluid supply valves. Flow meters control the amount of fluid passing into the machine. Steam valve and discharge valve may also be similarly operated. In place of electric control a pneumatic hydraulic or mechanical system may be used. La.

8—BUILDINGS AND ENGINEERING

(A)—Construction of Buildings

" Ni-Resist " Alloy: Application. Mond Nickel Co. *" Nickel " Publication,* B31, Sept. 1937, 12 pages.

" Ni-Resist " is an alloy cast iron usually containing about 14 per cent. of nickel, 6 per cent. of copper and 2 per cent. of chromium. The cast iron is rendered austenitic, conferring on it resistance to chemicals, heat and abrasion and erosion. The percentages of the different elements can be altered and copper omitted where necessary. The alloy is specially useful for valves, pipes, pumps, pots, structural castings and other parts. In the production of rayon " Ni-Resist " is used in the construction of vats and other machine parts on account of its resistance to attack by acetic acid and caustic alkalis. It is also useful for vats in the bleaching and dyeing of textiles. C.

Iron: Protection from Hot Alkali. W. W. Stender and B. P. Artamonow. *Electrochem. Soc.*, 1937, **72**, Preprint No. 6, 89-107.

It is shown that cathodic polarization of the iron cathode in alkali cells at current densities of 0·5 to 3 amp./sq.m. effectively prevents corrosion of sheet iron or cast iron in hot caustic soda solutions. C.

Nickel: Properties. H. Wiggin & Co. Ltd. *Monel Notes,* 1937, No. 6, 88-89.

Physical and mechanical data are tabulated. C.

(C)—Steam Raising and Power Supply.

Textile Mill Electric Power Supply: Power Factor Correction. A. G. Stanford. *Cotton (U.S.)*, 1937, **101**, No. 9, 63-65.

The advantages of improving the power factor in A.C. supplies are discussed and equipment for the purpose is described. For textile mills, various types of capacitor offer most scope. Illustrations are given of the installation of (a) the individual motor capacitor on 40 H.P. motors driving carding engines, (b) capacitors assembled in groups totalling 30-120 k.v.a. mounted in racks some distance from the sub-station, and (c) large groups of capacitors (e.g. 8 of 120 k.v.a.), mounted in large racks at the sub-station or adjacent to the main switchboard. Mention is made of a mill that installed capacitors of the small rack type totalling 2,200 k.v.a. at a cost of about $10·50 per k.v.a. and thereby saved $25,000 annually in the cost of power. C.

(D)—Power Transmission.

Anti-friction Bearings: Application to Textile Machinery. *Rayon Textile Monthly,* 1937, **18**, 549-551.

A discussion of the application of anti-friction bearings to opening and cleaning machinery, cards, combers, drawing, roving, spinning and twisting frames, warpers, slashers, looms and finishing machinery, and of the benefits derived from such applications. C.

Electro-Automatic Variable Speed Gear. Crofts (Engineers) Ltd. *Textile Recorder,* 1937, **55**, No. 653, 47.

The Crofts variable speed gear embodies the principle of expanding and contracting, driving and driven pulleys, forming " V "-shaped grooves which, by means of the mechanism, can be varied in diameter. The mechanism is so arranged that by increasing the diameter of one pulley, the other pulley diameter is automatically and correspondingly decreased. Two cone-faced discs form each pulley, connected by a flexible belt, to which are secured tapering blocks or lags shaped at the ends to suit the angle of the inner or driving face of the cones. This belt moves upwards or downwards on the cone faces as the pulley formed by the two half discs is increased or decreased in diameter. Consequently, one shaft revolves at a constant speed, and by operating the cones the second shaft is enabled to run at any speed according to the diameter of the belt-tread formed by each pair of cones. In the electro-automatically controlled variable speed

gear this diameter is varied through a mercury switch and an electric motor mounted on the variable speed gear unit. An application of the electro-automatic variable speed gear to a mangle and stentering machine in which it was desired to synchronise the speed of the mangle with that of the stenter, so that the mangle did not over-run or under-feed the stenter, is briefly described. The variable speed gear drives the mangle through a pair of spur wheels, giving an infinite speed variation on the output shaft between 344 and 28·6 r.p.m. C.

Variable Speed Transmission Units: Application in Textile Mills. *Rayon Textile Monthly*, 1937, **18**, 477-480.

The use of variable speed transmission units in textile mills is discussed, various mechanisms are briefly described, and a number of illustrations are given. C.

Lubricating Oils: Static Friction. D. J. W. Kreulen. *J. Inst. Petroleum Tech.*, 1937, **23**, 452-8 (through *Sci. Abstr.*, 1937, B**40**, 528).

The coefficient of static friction has been measured by a modification of Redgrove's method on five mineral oils, a compounded oil containing 5 per cent. of rape oil, and a volt-oil prepared by de Hemptinne's process. The results indicate that it is not the base of the oil that is responsible for the coefficient of static friction since the highest and lowest values are both found in the paraffin-base oils. This is in accord with the theory of polar compounds, which is discussed. C.

Individual Drives for Spinning Machinery. D. Wilson *Wool Rec.*, 1937, **52**, 341-349.

The advantages are stated of the individual drive system for spinning machinery. The disadvantages are chiefly of an economic nature. The following are discussed: overhead motors with belt, ordinary and V rope drives; motors mounted on baseplate with V rope, belt, chain and gear drives; motor coupled direct to cylinder shaft; variable speed motors. W.

(F)—Lighting.

Textile Mills: Lighting. *Text. Merc.*, 1937, **97**, 307-310.

The need for efficient lighting of textile mills is discussed and it is pointed out that tests have shown that improved lighting brings with it not only an increase of output, but also an improvement in the quality of the finished product. The advantages of properly designed and correctly spaced reflectors are described and the need for frequent cleaning of lighting equipment is emphasized. The coating of ceilings, walls and even parts of machines with white-wash is often advantageous. Good quality lamps, in spite of higher initial cost, are more economical in the end than cheap lamps. Electric discharge lamps have a long life and high efficiency and are very suitable for some textile operations. The advantages of " Benjamin " planned lighting systems are pointed out and photographs are given. The Benjamin " Saaflux " R.L.M. reflector is a standard dispersive reflector for use with standard electric lamps. The Bencolite Glass Unit, Type N, provides a high degree of side lighting without glare and is ideal for many locations where high vertical illumination is required, as with circular knitting machines. Porcelain well-glass fittings with dispersive, distributing or parabolic reflectors are available for chemical and dye works. C.

Lighting in Laundries. A. D. S. Atkinson. *Laundry J.*, 1937, 7.

Gives tables of foot-candles required for various laundry processes, and describes suitable fittings. La.

(G)—Heating, Ventilation and Humidification.

Indian Cotton Mill: Air Conditioning. S. G. Karandikar. *Indian Textile J.*, 1937, **47**, 403-404.

A general review of various systems of air conditioning suitable for Indian mills. The following humidities are said to be best at normal temperatures: for carding 55 per cent. RH, combing 60, drawing and speed frame processes 65, mule spinning on coarse counts 56, ring spinning 60, weaving 75 for light goods and 85 for heavily sized goods. C.

Relative Humidity Nomograph. S. M. Troxel. *Rev. Sci. Instr.*, 1937, **8**, 350.

A nomograph connecting wet- and dry-bulb temperatures and relative humidity is reproduced. C.

Room Temperature Control: Automatic Time-lag Compensation. L. J. Newman. *Instruments,* 1937, **10,** 239-241.

The proper control of a heating system is the control of the momentum of heat produced at the source. A new method of control is effected by a time period control thermostat or a thermostat with a positioning control where the arm may be stopped at several predetermined positions. A plain three-wire thermostat contact on the hot side pulls a core to the right and on the cold side to the left, open circuit restoring the core to the centre. The two coils are connected in series with a ballast resistance. The thermostat terminals are connected between the two outside points on the coils and the common point of the coils. Contact of the thermostat blade short-circuits one of the coils, the other coil is actuated and pulls over the core, upon which the mercury switch is attached, closing the motor circuit. The motor operates until one of the cams stops it. One of the cams short-circuits the second solenoid coil through contact at the end of travel, leaving the ballast resistance alone in circuit. On the opening of the thermostat circuit the solenoid coil that had been first short-circuited is energised and pulls the core back to the middle cam, a projection on the cam preventing motion of the core beyond the centre. The mercury switch again closes and the motor operates to give an intermediate result to run either as a timer or to a stop at one of the predetermined positions. The operation of the relay is entirely electrical. C.

Unit Heating Radiators: Application. F. Merish. *Textile World,* 1937, **87,** 2018-9.

Illustrations are given of unit heaters that comprise a fan and a heating element formed of a network of tubes filled with hot water or steam ; they can throw a cone of heated air for about 60 feet. The units are shown fixed (a) in the roof spans of a cotton store, (b) along the walls of a finishing room, and (c) suspended from the ceiling of a spinning room, and their advantages in such situations, especially in comfort to the operatives, are discussed. C.

Pollution of Natural Waters. *West Riding of Yorkshire Rivers Board, 42nd Report from 1st April,* 1934, *to 31st March,* 1937 (through *Water Poll. Res. Bd. Abs,* 1937, **10,** 286-287).

Pollution by and treatment of trade wastes and their discharge into sewers are considered. Special reference is made to the recovery of fibre from textile wastes ; the chemical treatment and settling of scouring and dying waste waters ; the recovery of grease from wool-washing wastes and the treatment of the resulting effluent with lime. W.

Algae Conditions in Meander Reservoir. W. I. van Arnum. *15th Ann Rep., Ohio Conf. Wat. Purif.* (1935), 1936, p. 52 (through *Water Poll. Res. Board Abs.,* 1937, **10,** 217).

Meander reservoir, supplying Youngstown and Niles, holds 10 billion gallons water. *Coelosphaerium* and *Anabaena* are the only organisms which cause trouble. Copper sulphate is applied to the reservoir from a boat when the organisms begin to increase in amount. Deep water requires a heavier treatment than shallow water even though it contains fewer organisms. W.

(I) Waste Disposal.

Reclamation of Used Wash Liquors. *W.P.Z.,* 1937, **40,** 608.

A patented process which has proved successful in practice for half a year is stated to reclaim 80-90 per cent. of the soap in the treated liquor. Colloidal dirt is adsorbed on a diatomaceous earth and coarser particles arrested by a Seitz filter. In the example cited the cost of soap and alkali per wash is reduced from 6 marks to 2·26 marks. An editorial footnote states that the Seitz company's process has been subjected to laboratory tests by the Wascherei Forschungs Institute, and several difficulties have still to be overcome. La.

Patent.

Electric Air Conditioning Machine. W. Dawson and A. Jackson (London). E.P.473,144 of 6/4/1936:6/10/1937.

Air conditioning apparatus comprises a casing in which are mounted a fan and a receptacle containing absorbent material impregnated with sticky material, the receptacle being offset from the axis of the fan and the air being drawn into

the casing by the fan and directed over the absorbent material contained in the receptacle. The air is cleansed of solid matter by passing over or through the absorbent material, the dust adhering to the sticky material with which it is impregnated. The air may be disinfected or perfumed by passing over or through absorbent material suitably impregnated. Preferably the absorbent cleansing material is in the form of layers, the top one of which may be stripped off when fully loaded with dust. The apparatus may be constructed as a portable unit adapted to be plugged into the electrical power or lighting system. C.

9—PURE SCIENCE

Cellulose: Structure. K. Freudenberg. *Papier Fabrikant,* 1937, **35**, *Techn.*, 247-250.

The story of research into the structure of cellulose is divided roughly into three periods, (1) the demonstration of a long-chain structure, (2) from about 1921, investigations into the uniformity of the links in the chain, and (3) the application of X-ray spectroscopy. A long quotation is given from a paper by Böeseken in 1916, as early evidence of the conception of a chain with units linked by primary valencies. C.

Cellulose Acetate and Rubber: Solvent Properties. H. Brintzinger and H. Beier. *Kolloid Z.*, 1937, **79**, 318-323.

A method is described for the measurement of the solubility of solids in solids and is illustrated by reference to the solubility of the nitrophenols in rubber products. The rubber (2 gm.) is cut in pieces and mixed with water (100 gm.) and a weighed amount of the nitrophenol, nine bottles being prepared with increasing quantities to cover a range in which some will not contain a residue of undissolved nitrophenol at equilibrium and some will do so. A tenth bottle contains water and excess of nitrophenol but no rubber, in order to measure the solubility of the nitrophenol in water. Equilibrium is established after about 96 hours in a thermostat and the system is then sought in which the aqueous solution and the rubber are both saturated with nitrophenol but there is no undissolved residue. The desired point is found by plotting the concentration of the clear solution (filtrate) against the difference between the amount of nitrophenol weighed out and the amount in the aqueous solution. The point of inflection where the system with undissolved nitrophenol begins is clearly marked. C.

Cellulose Hydroxyethyl Ethers: Preparation. P. P. Schorygin and J. A. Rymaschewskaja. *Shurn. obscht. Chimii,* 1936, **6**, 1632-8 (through *Chem. Zentr.*, 1937, i, 2299).

By the further action of ethylene oxide and alkali, cellulose hydroxyethyl ether has been converted into a di-ether and this into a tri-ether. The properties of these compounds and of their acetates are described. C.

Large Molecules: Synthesis. H. Mark. *Nature,* 1937, **140**, 8-11.

The present state of knowledge of the formation of large molecules by polymerisation and polycondensation reactions is briefly reviewed. It is pointed out that polymerisation comprises (a) germ or nucleus formation, (b) growth and (c) breaking-off processes and sudden finishing of growth. C.

Linseed Oil: Oxidation; Influence of the Glycerol Radical. B. Glassmann and S. Barsutzkaja. *Z. Anal. Chem.*, 1937, **109**, 251-262.

Determinations of glycerol have been carried out on various samples of linseed oil, on linoxyn, and on the intermediate products. The results are tabulated, and shew that the glycerol radical is not attacked in the oxidation of linseed oil to linoxyn. From this it follows, in confirmation of the results of others, that the formation of volatile products, organic acids, aldehydes and oxides of carbon occurs by decomposition of the fatty acid radicals. Linoxyn has been analysed by extracting first with ether and then with water ; glycerol and fatty acids were detected in the aqueous extract, and the saponification product of the residue also yielded these products. The fatty acids have been examined by the usual analytical methods. The results shew that commercial linoxyn, unpurified with ether and water, consists of a mixture of di- and triglycerides of linoleic acid in different stages of oxidation. The ether-soluble portion

of commercial linoxyn contains more glycerol than the purified product. The glycerol content of the purified product corresponds to a tri-glyceride. Linoxyn prepared by drying linseed oil on glass plates with the aid of a cobalt drier for 2,280 hours consists of a mixture of 7 parts di- and 3 parts tri-glyceride. Molecular weight data indicate that the fatty acids easily split from linoxyn are monomers, thus the observed increase in the molecular weight of linseed oil on oxidation, is, in the opinion of the authors, due to condensation of the primarily formed hydroxy acids, and not to polymerisation at carbon linkages. On oxidation of linseed oil to linoxyn the acid residue is decomposed only as far as the diglyceride. The active oxygen in linoxyn has been determined by treating the substance in solution in acetic acid with sulphuric acid and potassium iodide, and titrating the liberated iodine. With increasing age of linoxyn the active oxygen content decreases. C.

Long-chain Ester Films; Orientation in——. A. E. Alexander and J. H. Schulman. *Proc. Roy. Soc.*, 1937, A161, 115-127.

Long-chain esters when spread in films on normal caustic soda solutions show remarkable differences in the rate of hydrolysis according to the orientation of the component parts of the molecule. Differences in velocity of some thirty times can be obtained by simple orientation, such that films of esters can be placed on strongly alkaline solutions with only extremely slow hydrolysis taking place. It is shown that this strong inhibition of the hydrolysis is due to the protective sheath of short hydrocarbon chains when in a position beneath the polar group. The work of compression of the short chain to a position beneath the surface increases by approximately a constant amount for each -CH_2 group added, in agreement with the work of Langmuir on the soluble straight-chain compounds. The observed vertical components of the apparent dipole moment in the various configurations can be calculated in an approximately quantitative manner, using the ordinary law of vectorial summation by assigning a definite electric moment to each component of the polar group. The polar aqueous substrate so reduces the interaction between the constituent dipoles of the ester group that free rotation about single bonds becomes possible, whereas in non-polar solvents the rotation is restricted. C.

Ultra Centrifuge: Application in the Study of High-molecular Compounds. T. Svedberg. *Nature*, 1937, **139**, 1051-1062.

The ultra-centrifuge can be used to investigate molecular size of high-molecular compounds like proteins and polysaccharides by measuring sedimentation velocity, or sedimentation equilibrium. Expressions are quoted that lead to the deduction of the molecular weight in each case. If the substance is electrolytically dissociated the disturbing influences of the charge may be eliminated by the addition of a non-sedimenting electrolyte. The apparatus and experimental procedure used in making these estimations are described. In the first case centrifugal fields of high intensity have to be used to avoid blurring of the boundary due to diffusion by shortening the time of observation. In the second case an equilibrium between sedimentation and diffusion is attained by prolonged centrifuging at a comparatively low speed. A brief general survey is given of the physico-chemical properties of proteins as elucidated by ultra-centrifugal methods, and a short summary is presented of the results obtained for various proteins, the molecular constants being tabulated. It is pointed out that the data obtained indicate a common plan for the building up of the protein molecule. C.

Mesophyll Cellulose Walls: Wettability. D. H. Bangham and F. J. Lewis. *Nature*, 1937, **139**, 1107-1108.

Strips of leaf, cut so as to permit free exit of air at the top and entry of liquid at the bottom, were placed vertically with their lower edges in contact with water. Capillary rise was in no case observed, and it was found impossible to produce the entry of water into the mesophyll air-space system without either a pressure gradient or prolonged immersion. On the other hand, organic liquids such as benzene, chloroform, ether and essential oils infiltrate rapidly into the mesophyll air-space by capillarity. A drop of water placed on the mesophyll of a leaf which has been exposed by tearing the blade does not flow down and fill the air-spaces but a drop of oil enters the capillary system instantly. When a drop of water is allowed to remain on the surface of the mesophyll, any part of

the drop in contact with the surface of the fine vascular bundles flows out along the bundles, but does not spread laterally over the mesophyll cell-walls. C.

Glucose and Cellulose Acetates: Diffusion in Solution. I. Sakurada and M. Taniguchi. *Z. physikal. Chem.*, 1937, A179, 227-234.

An expression for the diffusion coefficient of hetero-disperse substances is derived and checked by measurements on glucose penta-acetate, cellobiose octa-acetate, quinol, cellodextrin acetate, a special fraction of secondary cellulose acetate, a mixture of these, unfractionated cellulose acetate, and unfractionated nitrocellulose, the solvent being methyl acetate. Precautions to be observed in such measurements are stressed. C.

Ostwald Viscometer: Use for High Molecular Weight Determinations. G. V. Schulz. *Z. Elektrochem.*, 1937, 43, 479-485.

The use of the Ostwald viscometer for determinations of high molecular weights is discussed and it is pointed out that errors may arise owing to the neglect of the Hagenbach correction. A further cause of uncertainty lies in the fact that in solutions of eucolloid substances (the molecular weights of which are greater than 100,000) the viscosity coefficient is dependent on the velocity gradient. It is shown that errors due to these two causes can be reduced to negligible values by the selection of suitable dimensions for the viscometer. Suitable dimensions for viscometers for use with various solvents are indicated. An Ostwald viscometer of suitable dimensions is compared with an Ubbelohde suspended-level viscometer and results of measurements of the viscosities of solutions of nitrocellulose in acetone and polystyrene in toluene by means of the two instruments are tabulated and discussed. C.

Discriminable Colours: Number. G. B. Welch. *Nature*, 1937, 140, 28.

The number of discriminable colours is found to be $9 \cdot 4 \times 10^5$, to two significant figures. The method used involves the choice of an arbitrary colour solid, the Titchener-Ebbinghaus double pyramid, to which available experimental data are applied with simplifying assumptions, in order that ordinary geometry may be used in the calculations. C.

Three-colour Reproduction Process: Theory. A. C. Hardy and F. L. Wurzburg, Jr. *J. Opt. Soc. Amer.*, 1937, 27, 227-240.

The basic principles of three-colour reproduction are outlined. The reasoning underlying the objective theory is shewn to be valid only when the number of primaries is large. Practically, however, it is required that the number of primaries be kept to a minimum, and the theory is thus inadequate for a three-colour process. The theoretical requirements for exact colour reproduction are examined and equations are deduced which suffice to determine sensitivity requirements that must be fulfilled by the three-colour separation negatives. This theory is immediately applicable to any addition process because the primaries of such a process are easily identified, and their tri-chromatic coefficients remain constant throughout the reproduction. The primaries should be chosen so that their mixtures shall give a colour gamut as wide as possible ; this is facilitated by the use of a chromaticity diagram ; an example is explained, and the resulting spectral sensitivity curves are given. These curves indicate that, at certain spectral regions, the sensitivity is required to be less than zero. The case of a set of non-homogeneous primaries is considered. Filters are incapable of imparting a spectral sensitivity of less than zero ; a photo-electric and a photographic means of realising a receptor with the required spectral sensitivity are described. In order to utilise the results of the theory with subtractive processes it is merely necessary to find a method by which the primaries in such processes can be identified. The principle underlying such a method is explained with the aid of an example. C.

Linseed Oil: Drying; Electron Diffraction Study. D. H. Clewell. *Ind. Eng. Chem.*, 1937, 29, 650-653.

Electron diffraction photographs have been taken at intervals during the drying of linseed oil films of varying thickness on small brass blocks. The liquid pattern first obtained consisted of two diffuse rings typical of an organic liquid. The next patterns took on the shape of an inverted V with apex angle of about 120°, approaching 180° as drying proceeded. The final pattern was a system of parallel straight lines, parallel in turn to the specimen surface. These data shew the wet film to be amorphous and with few polar products, the chain

molecules having a perfectly random arrangement. As oxygen is absorbed in drying, these chain molecules orient themselves parallel to one another and perpendicular to the film surface ; their angle with the surface normal progresses from 90° to 0° as drying proceeds, the angle being about 30° when the inverted V pattern is shown. A tendency towards crude crystallisation of the surface molecules has also been noted ; this in some cases may be induced by pigmentation. An explanation of the observed atomic arrangements is put forward, based on the accumulation within the drying oil film of polar molecules which are ranged in position by an electric field existing of the air-oil surface. The existence of this field has been demonstrated by measurement of electron refraction index. A consideration of the chemical processes involved in the drying of linseed oil leads to the idea that a solid lattice structure is formed. C.

Photo-electric Smoke Penetrometer. A. S. G. Hill. *J. Sci. Instr.*, 1937, **14**, 296-303.

A photo-electric smoke penetrometer is described for testing the efficiency of filtering devices. A cloud of carbon particles at a given rate of flow is used as standard. A detailed description of the apparatus and its use is given with diagrams. C.

Chromosomes: Doubling by Chemical Means. A. F. Blakeslee. *C. R. Acad. Sci.*, 1937, **205**, 476-479.

The doubling of the number of chromosomes in a plant not only increases the size of the organs, thereby producing larger fruits and flowers but also transforms sterile plants into fertile ones, diœcious varieties into hermaphrodites, and annuals into perennials ; it also imparts resistance to cold. Colchicine is reported as a particularly powerful agent for securing this effect on chromosomes. Plants may be watered with a 0·2 per cent. solution or shoots treated with a mixture of colchicine and lanoline. C.

Cotton Plant: Genetics. S. C. Harland. *Nature*, 1937, **140**, 467-468.

It is now established on genetical as well as cytological grounds that the New World cultivated cottons are amphidiploid in origin and that thirteen-chromosome species from both Asia and North America have played a part in their formation. C.

Cotton Plant: Growth under Field Conditions. O. V. S. Heath. *Annals of Botany*, 1937, New Ser., **1**, 515-519.

The growths in height and weight of cotton plants on control plots at Barberton, South Africa, were measured from random sample plants and it was found that from a height of 10 cms. up to time of flowering the growth of the main axis is approximately exponential. Below 10 cms. the rate of growth is higher on account of extension of the hypocotyl. Growth in dry weight approximates to an exponential curve from germination until flowering, but shows a slight downward trend due to loss in weight for which the leaves are responsible. The relative growth rate in terms of weight is three times as great as that in terms of height. Graphs are given. C.

Cotton Plant: Effect of Age on Net Assimilation and Relative Growth Rates. O. V. S. Heath. *Annals of Botany*, 1937, New Ser., **1**, 565-566.

In investigations of the vegetative period before the first flowering on random plant samples from experiments on net assimilation rates, calculated on a basis of leaf weight instead of leaf area, no general rise or fall was shown up to the time of flowering, but the relative rate of the total dry weight increase, the relative leaf growth rate and the percentage of the total dry weight consisting of leaves had a slight downward trend in time. The fall in the relative leaf growth rate shows that an increasing proportion of the products of photosynthesis is used for the stem and flower buds as time proceeds and this causes the falling off of the ratio of leaf weight to total dry weight. C.

Cellulose: Fermentation. L. M. Horovitz-Vlassova. *Zentr. Bakt. Par.*, 1936, II, **93**, 347-358 (through *Brit. Chem. Abstr.*, 1937, A111, 272).

Of various organisms isolated from soil, *Aspergillus* species were the most active decomposers of cellulose. They produced soluble substances (not sugars, aldehydes, acids, pentosans or oxycellulose) that were utilisable by bacteria. C.

Saponin Solutions: *p*H Determination. E. O. K. Verstraete. *Natuurw. Tijdschr.*, 1937, **19**, 30-33 (through *Chem. Abstr.*, 1937, **31**, 1678[5]).

The *p*H of alkaline solutions of saponins can be determined with the quinhydrone electrode and a smooth platinum electrode. Saponins are adsorbed by the platinum-black of the H-electrode but this disadvantage is overcome if sodium chloride or sulphate or a buffer solution is present. An electrode vessel is described for use where the bubbling of hydrogen would create foam and thus entail loss. C.

Cellulose and Cellulose Acetate: Action of Liquid Ammonia. G. L. Clark and E. A. Parker. *J. Phys. Chem.*, 1937, **41**, 777-786.

Native and mercerised cellulose give the same X-ray pattern on treatment with liquid ammonia, the product from native cellulose being easier to revert to native cellulose than that obtained from mercerised cellulose. Slow evaporation of the ammonia gives a new modification known as cellulose III. Sodium hydroxide of mercerising strength converts cellulose III from both sources to mercerised cellulose. Acetylation of cellulose III leads to the same product as that given by native and mercerised celluloses. Cellulose acetates are saponified by liquid ammonia. C.

Cellulose Formate: Preparation and Properties. Y. Uyeda and S. Nakamura. *J. Cellulose Inst., Tokyo*, 1937, **13**, (57)-(59).

Tissue paper was formylated by formic acid and sulphuric acid at 25 and 30° C. and the effects of varying the time and the strength of the formic acid were studied by measuring the specific viscosity, tensile strength, elongation, melting point, degree of swelling and durability of the products. Results are tabulated. C.

Starch: Constitution. W. S. Reich and A. F. Damansky. *Bull. Soc. Chim. biol.*, 1937, **19**, 158-189, 357-391 (through *Brit. Chem. Abstr.*, 1937, A11, 326).

(1) Methods of esterifying starch are criticised on the grounds that modification in molecular structure occur. On acetylation, potato starch gives 82 per cent. of a di-acetate and 16 per cent. of a tri-acetate. The former yields on hydrolysis a substance similar to natural starch (" amylogen ") and the latter a different substance (" amylon ", or amylose, according to most authors). The diacetate yields the other acetate on acetylosis. Studies on benzoylation and cinnamylation are also reported, and similar work on maize starch. (2) " Amylopectin " is shown to consist of the above amylogen and amylon in proportions that vary with the method of preparation. " Amylose " is amylon formed by hydrolysis of amylogen. C.

Cotton Flower Pigments: Constitution. K. Neelakantam and T. R. Seshadri. *Proc. Indian Acad. Sci.*, 1937, **5**A, 357-364 (through *Brit. Chem. Abstr.*, 1937, A11, 326).

Herbacitrin, a pigment from *G. herbaceum* flowers, is the 7-glucoside of 3:5:7:8:4′-pentahydroxyflavone. On hydrolysis it yields herbacetin. Derivatives and reactions are described. C.

Gossypol: Structure. K. N. Campbell, R. C. Morris, R. Adams, R. F. Miller, D. J. Butterbaugh. *J. Amer. Chem. Soc.*, 1937, **59**, 1723-1735.

An improved method of purifying gossypol is described ; the product obtained is readily crystallised in the form of brilliant yellow needles, m.p. 184°. Three crystalline forms of gossypol exist, each with a characteristic m.p. Interconversion of the forms may be accomplished by the use of appropriate solvents. Colour reactions as applied to naphthoquinones and anthraquinones have been tried and a table of reagents and corresponding colours is given. Additive products with various organic acids and stannic chloride and a pyridine salt of gossypol are described. Gossypol contains six hydroxyls, two much more acidic than the other four. It is probable also that gossypol contains a naphthalene nucleus and another grouping which gives on degradation isobutyric acid. Work on the acetates and ethers of gossypol is also described. C.

Phenol-Formaldehyde Resins: Mechanism of Formation. B. A. Lomakin and V. I. Guseva. *Plasticheskie Massy, Sbornik*, 1937, **2**, 281-296 (through *Chem. Abstr.*, 1937, **31**, 3762[1]).

Conductance, viscosity and refractive index methods give similar results in the study of the formation of resins, the curves showing breaks at the point

where layers form in the reaction mixture of phenol and formaldehyde. In acid condensations, the activation energy before layering at the reaction temperature is 20,000 calories or more. After layering at the reaction temperature, the activation energy is 15,000-16,000 cal. The first reaction product probably dominates the reaction from this point. In alkaline condensation the curves change in character during reaction. C.

Paints and Adhesives: Surface Phenomena. E. Kindscher. *Mitt. dtsch. Materialprüfungsanstalten,* 1937, *Sonderheft* **32**, 2-17.

Recent work on the surface phenomena between organic binding materials and solids is reviewed (paints, bitumenous coatings, asphalt, rubber mixings, adhesives, etc.) with special reference to the strengthening effect of a solid filler on the binding agent. Many examples are cited and much work leading to an explanation is quoted. The general conclusions drawn are that the strengthening property of a filling material depends on (1) its crystallographic and chemical composition, (2) its surface development—fineness and shape of its particles—, (3) the kind of binding material used—its chemical and physical constitution at the time of mixing and also later, and (4) on the ratio of filling material to binding material. C.

Casein: Base Exchange. E. Graf. *Kolloid-Beihefte,* 1937, **46**, 229-310.

Experiments have been carried out on base exchange at organic surfaces such as those of casein. This exchange is more difficult to deal with than that at inorganic surfaces on account of swelling. The casein was electrometrically titrated and its base-combining power found to be 1·06 milli-equivs. per gram of casein ; the bases are bound by chemosorption. Experiments showed that casein is a hetero-capillary, de-orientated exchange system with well-defined meta-structure and intra-micellar exchange. The structures are elastic and strongly-swollen casein has a coarser structure than less swollen casein. The apparent adhesion of the ions in casein becomes smaller as swelling proceeds. In alcoholic solution adsorption of neutral salts takes place besides the exchange, and is higher the greater the content of the alcohol in the solution ; in 50 per cent. alcohol the adsorption is of the same magnitude as the exchange. Casein is dispersed with increasing concentration of the exchange ion in alcoholic solution, probably depending on a raising of the potential by adsorption of the neutral salt. This explains the increasing stabilisation of casein in the presence of salts in higher alcoholic concentrations (i.e. over 25 per cent.) in which the adsorption of neutral salt is enhanced. The swelling is also dependent on the adsorption of neutral salt, so that an ion that is strongly adsorbed as a neutral salt is strongly exchanged. This explains small deviations from the Hofmeister series with exchange in alcoholic solutions. Formaldehyde-casein shows in the dehydrated condition about the same base interchange as casein. In aqueous solutions the exchange with formaldehyde-casein is weaker on account of its smaller swelling. Formaldehyde-casein also adsorbs neutral salts from alcoholic solutions. C.

China Clays: Structure and Properties. W. W. Meyer. *Paper Trade J.*, 1937, **105**, *TAPPI,* 155-156.

The author deals with the formation of china clays, showing that a clay tends to weather to the composition which will be isoelectric at the *p*H of the weathering solution, this giving the most stable form. He then goes on to describe particle growth, base exchange capacity and conditions necessary for clay/water suspensions. The application of the Donnan equilibrium equation is discussed with the aid of a diagram. It is shown that the water in the micellar solution held by the ion atmosphere of the particle is water of osmotic imbibition and it is the condition of this water layer that determines whether the clay in a suspension will be flocculated or deflocculated. C.

High-molecular Solutions: Osmotic Pressure and Molecular State. G. V. Schulz. *Z. physikal. Chem.*, 1937, **A180**, 1-24.

A review is given of work on the osmotic pressure of solutions of high-molecular substances such as nitrocellulose and starch. Measurement of the relation between temperature and osmotic pressure is necessary for the exact thermodynamical characterisation of these solutions, and to explain the molecular state of the dissolved material. Typical high-molecular materials

such as starch and cellulose are dispersed to macromolecules in the most dilute solutions. Their molecular weights as determined osmotically are independent of the solvent, and the viscosities of their dilute solutions show only a slight dependence on the temperature and the solvent. By acetylation or methylation the materials are changed into products of the same degree of polymerisation as revealed by osmotic or viscosity measurements. Experiments carried out on nitrocellulose and polystyrol show that the deviation from van't Hoff's law is greater in the case of nitrocellulose. This has been explained by some as being due to the elasticity or false elasticity of the solution, but no perceptible association was observed even when the solutions were widely different from the ideal. With increasing concentration the temperature coefficient of osmotic pressure decreases. The relations between heat of solution, heat of dilution, and association are discussed. From experiments on the influence of temperature and molecular weight on the osmotic pressure it seems probable that at a vanishing concentration van't Hoff's equation holds for solutions of starch and other high-molecular weight substances. In the range of concentration studied, however, they do not behave as ideal dilute or ideal concentrated solutions. They approximate to the " ordinary " state of solutions, however, in so far that the deviations of the osmotic pressure from the van't Hoff law are primarily due to the exchange of energy between the solute and the solvent. C.

Starch: Colloid Properties and Structure. J. Dedek, B. Jelinek and I. Kulcickyj. *Ann. des Ferm.*, 1937, **3**, 257-275 (through *J. Inst. Brew.*, 1937, **43**, 400-401).

Experiments on the swelling, gelatinisation, viscosity and electrical conductivity of normal pulverised and " permutoid " starch are discussed. It was found that the rate of swelling fell when gelatinisation started. The critical temperature, i.e. the temperature at which there is a sharp fall in conductivity, and the temperature at which swelling commences are both 56·5° C. The temperature at which the conductivity changes are temporarily arrested and the temperatures of commencement of rapid swelling and increase in viscosity are also nearly identical at 58·2 to 58·5° C. Conductivity measurement on permutoid starches show that Na, Ca and Ba starches have a critical temperature of 55·5° C. and starch 58·5° C. Graphs relating temperature and conductivity for different starches show marked differences ; the unique nature of the graph for hydrogen starch is ascribed to hydrolysis. Graphs of viscosity against temperature are almost identical for Na, Ba, Ca and lime starches, there being a sharp rise at about 60° C. Swelling curves are alike for all but H-starch which begins to swell at 60° C. instead of 58° C. Pulverised starch increases in conductivity with rise of temperature but with only partially pulverised starch the characteristic inflection in the curve begins to appear showing that it is the internal structure of the grain that is responsible for the sudden fall or diminution in the rate of increase of the conductivity at about 60° C. C.

Flour Suspensions: Viscosity Determination. C. G. Harrel. *J. Assoc. Offic. Agric. Chem.*, 1937, **20**, 373-382.

Collaborative work on the measurement of the viscosity of flour suspensions is reported. Details are given of a proposed standard method for preparing the suspension (acidified with lactic acid) and manipulating the MacMichael viscometer in the measurements. C.

Nitrocellulose: Viscosity. H. Staudinger and M. Sorkin. *Ber. Dtsch. Chem. Ges.*, 1937, **70**, 1993-2017.

Work on the viscosity of nitrocellulose is reviewed. Experiments are described on the behaviour of six polymeric homologues of nitrocellulose of degrees of polymerisation ranging from 6 to 2,650 tested in different solvents, at varying concentrations and temperatures, and a table is given showing the viscosity data, molecular weights and degrees of polymerisation calculated from the measurements, and the nitrogen contents. These nitrocelluloses were produced from celluloses of different degrees of polymerisation. A second table shows the stability of nitrocellulose after one and a half years. The authors then deal with the state of solution of high-molecular material in the sol and gel condition (tables and diagrams) and show that the viscosity of nitrocellulose decreases with rising temperature. The viscosity of nitrocellulose changes in different solvents, showing special behaviour in pyridine. The deviation of nitrocellulose solutions

from the Hagen-Poiseuille law is discussed with special reference to the macromolecular and polyionic viscosity phenomena of solutions of nitrocellulose in butyl acetate. C.

Ostwald Viscometer: Drainage Error. G. Jones and R. E. Stauffer. *J. Amer. Chem. Soc.*, 1937, **59**, 1630-1633.

A piece of apparatus is described for measuring the drainage error of liquids in viscometers and pipettes. This error is determined in two parts viz. the " after drainage " which will drain out of the measuring bulb during a protracted period following the passage of the meniscus and the " wetting film " which remains on the inner surface even after this protracted drainage. The apparatus consists of a special Pyrex glass viscometer in which a bulb drains into a graduated tube and is connected through a stop cock and capillary tube to a reservoir and both bulb and reservoir can be connected to the atmosphere or to a large tank of compressed air. The whole apparatus is mounted inside a thermostat. A definite volume of liquid is let out of the bulb and the time recorded. The lowest position of the meniscus is observed and read and then the rise due to the drainage of the liquid from the walls of the bulb is observed as a function of the time. For measuring the " wetting film " the pipette is drained completely, taken apart, the drop of liquid in the tip removed, dried externally and weighed. The difference in this weight and the weight of the completely dried viscometer gives the weight of liquid wetting the inside of the pipette. From the data given it is shown that for a given surface the volume of after-drainage multiplied by the time of outflow is a constant and that this constant is proportional to the kinematic viscosity of the liquid. Incomplete drainage is therefore not a serious source of error in measurements of viscosity on aqueous solutions relative to that of pure water. C.

Cellulose: Photochemical Oxidation. S. Oguri and T. Yamaguchi. *J. Soc. Chem. Ind. Japan.*, 1937, **40**, 300B.

Evidence is given that on exposing cellulose to the radiation of the quartz mercury lamp in the presence of small quantities of oxygen an aldehydic substance was formed and that with an increased supply of oxygen the formation of the aldehydic substance and its oxidation to carboxylic acid occurred simultaneously. C.

Colour: Measurement. P. J. Bouma. *Philips Techn. Rev.*, 1937, **2**, 39-46.

On the basis of experimental results obtained in colour mixing, it is demonstrated how all colour sensations can be represented in a colour space-diagram and how various transformations can be applied to this diagram. In many cases the diagram can be replaced by a suitable colour triangle. Various characteristics of these triangles, particularly that due to the International Committee on Illumination (1931), are discussed and formulæ are given for the computation of colour mixtures. C.

Experimental Data: Theory of Statistical Estimation. J. Neyman. *Philos. Trans. Roy. Soc.*, 1937, A **236**, 333-380.

A mathematical treatment is given of confidence limits and confidence intervals. Methods are indicated by which it is possible to find among all possible solutions of the problem the one giving the confidence intervals which are shorter (in a sense defined in the text) than those corresponding to any other solution. The method followed to determine the confidence limits for a single parameter permits an obvious generalisation for the case where the number of parameters to be estimated simultaneously is greater than one. Subsidiary results obtained include a method of constructing similar regions which is more general than the one known previously, and a proposition that bears on the theory of testing hypothesis and emphasises the rareness of cases where there exists a uniformly most powerful test. C.

Lignified Cellulose: Fermentation. F. R. Olson, W. H. Peterson and E. C. Sherrard. *Ind. Eng. Chem.*, 1937, **29**, 1026-1029.

Cellulosic material is fermentable by bacteria from manure unless it contains lignin ; fermentation to the extent of 85 per cent. is only produced if the lignin content is less than 1 per cent. Experiments show that the resistance to fermentation is not due to a toxic substance nor to the physical state of the carbohydrates and lignin. The evidence points to a chemical combination between lignin and cellulose. C.

Dusty Air Analysis Filters. H. V. A. Briscoe and J. W. Matthews. *Mikrochimica Acta,* 1937, **1**, 266-283.

Various filters for the collection of dust for microchemical analysis have been examined. The most suitable types are (a) volatile solid filters removable by sublimation, such as naphthalene and anthracene and (b) porous solid filters, soluble in a non-aqueous solvent, such as salicylic acid crystals. Naphthalene is only suitable for filtering small volumes of very dusty air, as in the collection of samples for petrographic analysis. Anthracene is very resistant to flow and can only be used for small filters and slow rates of flow. Salicylic acid crystals are useful for very rapid filtering and large filters ; filters 7 cm. in diameter allow a flow of 200 c. ft. per minute. C.

pH Scale: Standardisation. D. I. Hitchcock. *Electrochem. Soc.,* 1937, **72**, Preprint No. 10, 157-159.

A new scale of hydrogen ion concentration is obtained by determining the potential difference between a reference half-cell and the normal hydrogen electrode by the use of buffer solutions, each containing a weak acid of known ionisation constant with one of its completely ionised salts. The pH of $N/10$ hydrochloric acid was found to be 1·085 and that of $N/10$ acetic acid in $N/10$ sodium acetate 4·648. C.

pH Values: Photo-electric Measurement with Indicator Solutions. G. F. Lothian. *Trans. Faraday Soc.,* 1937, **33**, 1239-1243.

A development of Brode's method for the determination of pH is given, based on the measurement of the absorption of an indicator solution over a finite band of wave lengths transmitted by a filter that transmits light at the wave-lengths covered by the absorption band of the indicator. Results for methyl red are given. The advantages of this method are (1) that it is not necessary to maintain standard solutions for matching, (2) that the method is independent of the visual judgment of colour matching, and (3) that a small quantity of indicator only is necessary. In weakly buffered solutions addition of indicator may change the pH value. C.

Valve Galvanometer for Glass Electrode. H. Kothe. *Z. Spiritusindustrie,* 1937, **60**, 257.

Electrical details and a wiring plant are given of a valve galvanometer (due to Barth ; 1934) for use with the glass electrode. This is fed with a current of 140 m.A., 75 v. that is provided from the mains through a separate apparatus incorporating a Stabilovolt Co's " stabiliser " to give constant direct current, the 295-v. mains supply being divided into four circuits of about 75 v. Details of this apparatus are also given. C.

Benzylcellulose: Preparation. S. N. Ushakov, V. I. Gribkova and N. N. Nastaĭ. *Plasticheskie Massy, Sbornik,* 1937, **2**, 45-58 (through *Chem. Abstr.,* 1937, **31**, 4107[4]).

When cellulose is benzylated at 90-95° instead of 115°, more benzyl chloride is required to complete the reaction. If less than 40 per cent. of the water formed in the reaction is distilled off, the solubility and C content of the product decrease and the viscosity rises. Benzylation is complete in about 2-2½ hours. Longer heating increases the dispersion of the product which thus becomes more homogeneous with time. The viscosity falls steadily as the reaction proceeds. When solutions of the ether in a mixture of alcohol and benzene are fractionally precipitated the first fraction contains the least dispersed and benzylated particles and the most ash. C.

Benzylcellulose Solutions: Properties. S. A. Glikman. *Plasticheskie Massy, Sbornik,* 1937, **2**, 3-30 (through *Chem. Abstr.,* 1937, **31**, 4108[5]).

On treatment with alcoholic hydrochloric acid, benzylcellulose becomes more soluble in benzene, and these solutions are less viscous. Fractional precipitation of solutions in a mixture of alcohol and benzene gives fractions of decreasing viscosity but approximately constant composition. When alcohol is added to benzene solutions of the ether, the viscosity falls sharply to a steady value (reached in a 1 per cent. solution when 1-2 per cent. of alcohol is present, or in a 10 per cent. solution when 7-10 per cent. of alcohol is present), which is maintained until coagulation sets in. With rise of temperature more alcohol is required to effect coagulation. C.

Cellulose Formate: Fractional Solution. Y. Uyeda and S. Nakamura. *J. Cellulose Inst., Tokyo,* 1937, **13** (64).

The fractional solution method of purification has been applied to cellulose formate, the solvent being a mixture of pyridine and benzene. Solubility curves are given for three samples. C.

Cotton Dust: Histamine Content. E. Haworth and A. D. MacDonald. *J. Hygiene,* 1937, **37**, 234-242 (through *Chem. Abstr.*, 1937, **31**, 4503[1]).

Histamine has been isolated from cotton dust and identified by crystal form and m.p. and as the picrate and hydrochloride. Blood histamine was on the average higher in cardroom workers than in a group of students or in a group of elderly chronic bronchitics but the difference was not great enough to serve in the diagnosis of cardroom asthma. C.

Hemicelluloses: Extraction and Preparation. A. G. Norman. *Biochem J.*, 1937, **31**, 1579-1585.

Experiments on the different methods of extracting hemicelluloses are investigated. (1) When alcoholic sodium hydroxide is used, a certain amount of lignin is dissolved and the degradation effect should be checked by comparing the analyses of material before and after the extraction. (2) A procedure that gives an extensive removal of hemicellulose is to chlorinate the residue obtained from the initial cold alkali treatment and after washing with a little water immediately to extract again with cold alkali of the same strength. Prior to the initial treatment the material should be extracted, if necessary, with organic solvents, with warm water and with dilute ammonium oxalate if pectin is present. Most of the polyuronide hemicelluloses are brought into solution by this treatment. As an alternative to the cold alkali the extraction may be carried out with a very dilute boiling sodium hydroxide solution alternating with chlorination, or a 2 per cent. sodium carbonate solution followed by chlorination and then a 0·5 per cent. solution of sodium hydroxide. The greater part of the hemicelluloses are dissolved by these methods. (3) A 4 to 10 per cent. solution of cold alkali extracts the hemicelluloses of two types as well as the lignin. The residues should be analysed in this case. For purity of extraction the methods under (2) are used and for completeness of extraction that under (3). Whatever means of extraction are adopted an analysis of the residue is desirable in order that the relative proportions of the various constituents removed may be known. It must be remembered that lignin is always removed from plant material by alkali and is later reprecipitated. To minimise the amount of lignin in the final preparation experiments have been carried out to reduce the amount of lignin in the original alkaline extract before precipitation of the hemicelluloses or more effectively to reduce the amount of lignin still retained by the hemicellulose preparation precipitated in the usual manner. C.

Potato Starch: *p*H Measurement. C. von Schéele, I. Afzelius and K. Leander. *Z. Spiritusindustrie,* 1937, **60**, 163, 171.

Experiments are described on the basis of which the authors recommend for the determination of the *p*H of starch measurements with the quinhydrone electrode on a 15 per cent. suspension in 0·5 *M*-potassium chloride, 15-30 minutes after making the suspension. Results are recorded for 70 samples of potato starch ; the *p*H range is from 7·64 to 3·68, only four or five being outside the range 7 to 4. The maximum experimental error is about 0·03 or 1 per cent. of the whole range. Figures obtained by titration (no details) did not, with many samples, follow the same order as the *p*H figures. C.

Proteins: Precipitation. F. Rappaport and J. Reifer. *Mikrochimica Acta,* 1937, **1**, 220-225.

The de-proteinisation of blood or serum has been brought about by Al hydroxide or tungstate, Th hydroxide, Zr hydroxide, Ca fluoride or phosphate, and silicic acid. Determinations of non-protein nitrogen have been performed in the de-proteinised solutions. Varying results were obtained due to the individual precipitability of the different non-proteinic nitrogen compounds. C.

Vegetable Fibres: Composition. A. G. Norman. *Biochem. J.*, 1937, **31**, 1575-8.

Vegetable fibres fall into two groups, those containing a small amount of xylan (the high quality textile fibres) and those containing a larger amount

of xylan e.g. manilla and sisal. Twenty-seven of the less known fibres (mostly tropical) have been examined and all were found to belong to the second group (more than 13 per cent. of xylan) except Sunn hemp and Tucum palm fibre. The analyses are tabulated . C.

" Plastoscope " Thermoplastic Substance Testing Instrument. A. Noll. *Papierfabrikant,* 1937, **35**, *Techn.*, 365-368.

A detailed explanation with diagrams is given of a new apparatus for measuring the plasticity of such substances as sulphite pitch. The instrument consists of a nipple into which the substance to be tested is squeezed in the form of a pastille. The nipple is furnished with a standardised bore through which the material is pushed in the form of a strand into a chemically inert liquid contained in a glass tube surrounded by a glycerin bath. The temperature of deformation of the material is read off on the outer scale of a thermometer the mercury bulb of which is immersed in glycerin in a tube immediately above the nipple. The substance must be carefully powdered to avoid adherence of moisture before admitting to the nipple. C.

Alkyl Sodium Sulphate Solutions: Properties. J. Powney and C. C. Addison. *Trans. Faraday Soc.*, 1937, **33**, 1243-1253 ; 1253-1260.

(1) The surface and interfacial tensions of aqueous solutions of pure sodium alkyl sulphates having chain lengths of 12 to 18 carbon atoms have been measured. The crude compounds are used as wetting agents and detergents. The results show a close agreement between surface and interfacial tension data for these paraffin-chain salts, both sets of curves having abrupt changes at critical concentrations corresponding to breaks in the electrical conductivity curves. The surface tension measurements were made by a du Noüy tensiometer and the interfacial tension measurements by a modified drop pipette. The influence of chain length on the temperature coefficients of both surface and interfacial tensions and critical concentrations are discussed. Gibbs' equation is not applicable. (2) A detailed study of the influence of various added salts on both surface and interfacial tension of the alkyl sodium sulphates is described. Calcium salts have more influence than sodium salts. The surface activity and the critical concentration for micelles are modified to an extent which is dependent upon the valency of the added cation and independent of the nature of the associated anion. The magnitude of these effects is also governed by chain length and temperature. C.

Glycerol Solutions: Relative Humidity above ——. B. Prindle. *Textile Research,* 1937, **7**, 413-424.

A dew-point method has been used to determine the R.H. of the air above solutions of glycerol at 25° C., both air and liquid being in a state of violent agitation. The method is shown by check determinations to give results in complete accord with established data for sulphuric acid solutions. The results for glycerol, however, differ widely from those calculated from vapour pressures as recorded in International Critical Tables, but agree with Carson's data (1931). A smooth curve relates percentage of glycerol (about 19 to 63) and R.H. (95 to about 72 per cent.). C.

Ethylcellulose Solutions: Viscosity. R. S. Aleksandrova. *Plasticheskie Massy, Sbornik,* 1937, **2**, 31-44 (through *Chem. Abstr.*, 1937, **31**, 4107[9]).

Ethylcellulose solutions show the effects of micelle structure on viscosity, especially in mixtures of alcohol and benzene and in tetrachloroethane. C.

Nitrocellulose: Viscosity; Lowering of ——. Kueh-Tah Lin. *Chiao-Tung Univ. Research Inst., Ann. Rept. Bur. Chem.*, 1936, **3**, 72-73 (through *Chem. Abstr.*, 1937, **31**, 4107[7]).

The author has attempted to reduce the viscosity of nitrocellulose by (A) treatment of cellulose before nitration, (B) varying the conditions of nitration and (C) treatment of the product. Under (A), cotton was treated at 90-100° with alkaline permanganate, dilute alkali, dilute sulphuric acid, or ferric nitrate, or heated with water at 180°. Although the viscosity of the cellulose could be reduced (from 87 to 9 secs.) the viscosity of the nitrocellulose was independent. Under (B), temperature was found to have most influence ; a product with falling-sphere time of 105 sec. was obtained at 55° C. Under (C), the falling-sphere time was reduced to 10·5 sec. by heating the nitrocellulose under reflux with alcoholic alkali at 80° for 14 hours, but part of the product was lost. C.

Colour: Reproduction and Theory. H. E. J. Neugebauer. *Z. wiss. Photogr.*, 1937, **36**, 171-182.

Simple formulae similar to those used for additive mixing can be applied for reproduction by autotypical and subtractive colour mixing if use is made of the subtractive vectors proceeding from the white point instead of those from the black point. The simplified expression made in this way is an advantage for all orientating and general considerations, particularly as it can be shown to be approximately true for the colours in practical use. The stipulated conditions are generalised with autotypical mixing for more than three colours and the most general solution is given for the problem of subtractive reproduction true to nature.. C.

Light-scattering Materials: Optical Specification. D. B. Judd. *J. Res. Natl. Bur. Stnds.*, 1937, **19**, 287-317.

In the Kubelka-Munk equation for the relationship between reflectance and thickness of material for thin, homogeneous layers illuminated diffusely, the hypothetical ideal material is defined by two constants, reflectivity and coefficient of scatter. In the present paper the determination of these constants is discussed and graphical aids are given. Data for vitreous enamels, cold-water paints, dental silicate cements and paper are given and it is shown that the simple Kubelka-Munk theory applies to the reflectance measurements and that description of these materials by means of the two constants of the theory, reflectivity and coefficient of scatter, is, therefore, of practical validity and use. C.

Turbulent Flowing Liquid: Experimental Study of Turbulence Diffusion. E. G. Richardson. *Proc. Phys. Soc.*, 1937, **49**, 479-492.

An account is given of a method of studying turbulence diffusion which involves the study of the rate of diffusion, due to the turbulence prevailing in a stream, of a dye let into the stream. The concentration of the dye is measured with a beam of light and a photo-electric cell, and the stream-velocity with a hot-wire anemometer, at various places in the stream. As a test of the method the latter is first applied to molecular diffusion and shown to give results in accordance with those obtained by other methods. Next, turbulence induced in a water channel by gratings of various mesh-widths is traced. By using a pair of sources and light beams with associated photo-electric cells, the degree of correlation between the motions at two points in the turbulent stream, both along and across it, can be studied. Finally, the diffusion due to turbulence of the dye source at the head of a plate edge-on to the stream is studied. Smooth plates and those having a sinusoidal roughness are used. It is found that both the velocity distributions and the rates of diffusion can be expressed in terms of a Blasius parameter and a factor dependent on the wave-length of the roughness. C.

Sound Level Meters: Application. H. H. Scott. *Instruments*, 1937, **10**, 231-6.

The author discusses noise and its measurement in industry. The modern sound level meter can be connected with a wave analyser and piezo-electric vibration pick-up and provides a means for definite comparison between various sounds of different pitches, amplitudes and harmonic structures and in most cases the readings check with the average of a large number of aural observations made by persons of normal hearing. It is in fact a simple device that can be operated by an untrained person. C.

Statistical Data: Incomplete Randomised Block Arrangement. F. Yates. *Annals of Eugenics*, 1936, **7**, 121-140.

The paper describes a method of arranging replicated experiments in randomized blocks when the number of treatments to be compared is greater than the number of experimental units in a block. The restriction that every two treatments shall occur together in a block the same number of times enables estimates of the experimental error to be obtained expeditiously by the ordinary procedure of the analysis of variance. C.

Statistical Data: Quasi-Latin Square Arrangements. F. Yates. *Annals of Eugenics*, 1937, **7**, 319-332.

The principles of quasi-factorial design are extended so as to enable trials involving a number of varieties or treatments which is a perfect square to be so

arranged that differences associated with the two groupings of the experimental material are simultaneously eliminated from the varietal comparison. An example is given in which a gain in efficiency is obtained by the use of this design of 91 per cent. over an ordinary randomized block arrangement, the corresponding gain with a quasi-factorial design in randomized blocks being 41 per cent. C.

Statistical Data: Precision of Systematic Arrangements. R. A. Fisher. *Annals of Eugenics,* 1936, 7, 189-183.

Some uniformity trial data have been used to show that designs randomising the arrangement of half-drill strips give smaller errors than systematic arrangement, and that for the latter "Student's" test of significance is not approximately correct. C.

Statistical Data: Significance of a Difference. L. McMullan. *Annals of Eugenics,* 1936, 7, 105-106.

It is shown that when the normal frequency table is used to test the significance of differences between numbers of "successes" in small numbers of events, where the probability of a "success" follows the binomial law, a correction should be made to compensate for an error introduced by the implied fitting of a normal curve to the binomial histogram. C.

Statistical Data: Treatment by Method of Moments. R. A. Fisher. *Annals of Eugenics,* 1937, 7, 303-318.

A recent paper by the late Prof. Karl Pearson on the method of moments is examined and some errors pointed out. A general discussion of the practical utility of Pearson's methods of curve-fitting by moments is appended. C.

The Determination of Total Selenium in Rubber. J. G. Mackay and C. H. Avons. *Trans. I.R.I.,* 1937, 12, 471-474.

A modified method for the determination of total selenium in vulcanized rubber and ebonite is described. This consists of oxidation of the sample by a mixture of fuming nitric and perchloric acids, and, after expulsion of the excess nitric acid, reduction with sulphur dioxide, to precipitate the metallic selenium, which, transformed to the grey-black state by boiling, is weighed in a Gooch crucible. Results obtained by analysis of known mixes are recorded. C.J.W.

A Study of Deproteinized Rubber. Toda Okita. *India-Rubber J.,* 1937, 94, 187-191.

Experiments are reported in which the water absorption of deproteinized rubber (1) and washed smoked sheet (2) are compared by the vapour and direct immersion methods, suitable allowance being made for the oxidation effect in drying. The water absorption of (1) was found to be below one-third of (2). Deproteinized rubber was found to be more oxidizable than washed smoked sheet. Further work with the vulcanized materials showed that with an anti-oxidant present, deproteinized rubber had slightly better ageing properties. C.J.W.

The Chemistry of Soft Rubber Vulcanization. B. S. Garvey, Jr. *India-Rubber J.,* 1937, 94, 217-222.

A study of the effect of the addition of sulphur monochloride to solutions (1-4 per cent.) of latex crêpe in benzene. The effect of time on the viscosity, the effect of stirring, and the solubility of the films from evaporation of the solutions and the effect of premastication of the material were examined. Unexpected results were obtained with the dilute solutions. Some of the results are explained by a molecular felting theory. C.J.W.

Studies on the Joule Effect of Rubber; Thermal Effect on Stretched Latex Vulcanizates. Y. Tanaka and S. Kambara. *India-Rubber J.,* 1937, 94, 247-249.

The effect of sulphur content and time of vulcanization on the elongation, heating elongation and Joule effect elongation of vulcanized latex films is recorded for tensions of 5, 10 and 15 kgms. per sq. cm. Latex films behave similarly to ordinary vulcanized rubber films. The theoretical basis of these results is discussed. C.J.W.

Electrolytic Recording of Weak Electric Currents. F. E. Lutkin. *J. Sci. Inst.*, 1937, 14, 306-308.

Solutions for use in electrolytic recording are described which give dark-coloured permanent records. The solutions are about five times as sensitive as the starch iodide solution generally employed in this work. Suitable solutions: (1) Ammonium nitrate 10 gm., ammonium chloride 10 gm., sodium diethyldithio-carbonate 1 gm., water 200 gm.; (2) Ammonium nitrate 10 gm., ammonium chloride 10 gm., dithio-oxamide) rubeanic acid (saturated solution in alcohol) 20 c.c., water 200 c.c. L.

Visual Turning and Speed Control of a Phonograph Turntable. V. Karapetoff. *Rev. Sci. Inst.*, 1937, 8, 213-214.

The paper describes a stroboscopic method of measuring small differences in the speed of a phonograph turntable by observing the stroboscopic creep in a given time interval. L.

Determination of Lignin: III. Acid Pretreatment and Effect of the Presence of Nitrogenous Substances. A. G. Norman. *Biochem. J.*, 1937, 31, 1567-1574.

The method in general use for determination of lignin, involving digestion with 72 per cent. sulphuric acid, can lead to inaccurate results in the presence of certain substances. Phenolic and aldehydic substances can form condensation products either among themselves or with the lignin, and these lead to an apparent lignin content which is too high. The observation that after intermittent pretreatment with dilute acid lower lignin yields are obtained than after continuous treatment is confirmed. It is suggested that a part of the lignin is soluble in dilute acid and is removed by such preliminary treatments. Proteins and their degradation products interfere with the lignin determination and their effect is difficult to eliminate. Simple amino-acids and nitrogenous bases have a relatively small disturbing effect. L.

Estimation of Cystine in Finger Nail Clippings with Hydrolysis for One Hour. M. X. Sullivan, H. W. Howard and W. C. Hess. *J. Biol. Chem.*, 1937, 119, 721-724.

A description is given of a satisfactory short method of sulphuric acid hydrolysis, based on Salkowski's method (*Biochem. Z.*, 1922, **133**, 1). Hydrochloric acid hydrolysis is still preferable for general work and when more time is available. W.

Effect of Aldehydes on the Quantitative Determination of Cysteine and Cystine. M. X. Sullivan and W. C. Hess. *J. Biol Chem.*, 1937, **120**, 537-542.

Freshly added aldehydes have little action on the Sullivan and the Okuda cystine procedures. Formaldehyde inhibits the Folin-Marenzi cystine method markedly, heptaldehyde does so to some degree, and acetaldehyde has very little action, except in high molecular ratios. In general the aldehydes have little inhibitory action on cystine determinations by the Okuda method, some effect, though slight in low molar relation, on the Sullivan cysteine procedure, some inhibitory action on the Folin-Marenzi procedure as used for cysteine, and very marked retarding effect on the Mason ferricyanide procedure for -SH compounds. W.

Infra-red Absorption Spectra of the Stereoisomers of Cystine. N. Wright. *J. Biol. Chem.*, 1937, **120**, 641-646.

The infra-red absorption spectra of the *l*, *d*, *dl*, and meso forms of cystine are recorded. Comparison of the spectra shows that *dl*-cystine as obtained by crystallization from solution is a compound and not a mixture. The spectrum of mesocystine shows a marked divergence from that of the optically active cystines, as expected from its difference in molecular structure. Samples of *l*-cystine from protein and from cystinuric urine have identical spectra. W.

Determination of Thiol and Disulphide Compounds, with Special Reference to Cysteine and Cystine. VIII. K. Shinohara. *J. Biol. Chem.*, 1937, **120**, 743-749.

A-phospho-18-tungstic acid or its ammonium salt reacts with cysteine at *p*H 5·0 in equimolar ratio in a first step; in presence of excess cysteine a second reaction takes place whereby a second equivalent of oxygen is slowly removed from the product of the first step. W.

Composition of the Tissue Proteins. II. Estimation of Arginine. S. Graff, E. Maculla and A. M. Graff. *J. Biol. Chem.*, 1937, **121**, 71-77.

A method is described for the determination of small quantities of arginine (0·5-1·5 mg. of arginine nitrogen) in protein hydrolysates. For wool containing 9·88 mg. total nitrogen in sample, arganine nitrogen found (expressed as per cent. of total nitrogen) is 19·93 and 19·96. W.

Composition of the Tissue Proteins. IV. Estimation of Cystine. S. Graff, E. Maculla and A. M. Graff. *J. Biol. Chem.*, 1937, **121**, 81-86.

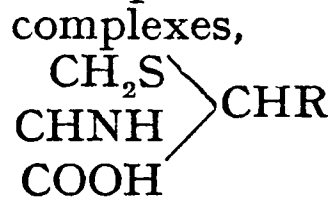
The method involves hydrolysis of the protein, reduction of the cystine, filtration from humin and excess zinc, precipitation of the mercaptide, washing of the precipitate, and optional ultimate digestion by the Kjeldahl procedure or ignition for sulphur determination. Figures are given for raw wool and for surgical, extracted wool. W.

Basic Amino Acid Content of Porcupine Quills and Echidna Spines. R. J. Block and M. K. Horwitt. *J. Biol. Chem.*, 1937, **121**, 99-100.

Porcupine quills and echidna spines yield 0·6 and 0·5 per cent. of histidine, 2·2 and 1·8 per cent. of lysine and 7·3 and 6·6 per cent. of arginine respectively. These amino acids are in the molecular ratios 1:4:11 in the porcupine quills and 1:4:12 in the echidna spines. Thus, these two tissue proteins can also be classified as " true " keratins on the basis of their embryological origin and chemical composition. W.

Further Studies on the Effect of Aldehydes on Cystine and Cysteine. W. C. Hess and M. X. Sullivan. *J. Biol. Chem.*, 1937, **121**, 323-329.

Formaldehye, acetaldehyde, heptaldehyde, glyoxal, and methylglyoxal, have little effect whether in dilute or relatively concentrated solutions, even in a number of hours contact. On cystine determination of the Sullivan method on cysteine, the aldehydes act to make a new complex, very slowly in dilute solution, more rapidly in concentrated mixtures, especially with lessening acidity. As the new complexes, thiazolidine derivatives, are formed, the cysteine reactions, the Sullivan, the Okuda, and the Folin-Marenzi without sulphite, become progressively less. Aldehydes, as such, have no effect on these reactions and become negative because both the sulphur and the nitrogen are no longer free when thiazolidinecarboxylic acid complexes,



are formed. Even in the presence of these aldehydes cysteine can be determined by the Sullivan method as long as it is free or in a reversible complex. W.

Total Sulphur in Normal Human Keratinous Tissues. P. Valdiguié and Dachary. *Compt. rend. Soc. Biol.*, 1937, **125**, 855-857 (through *Brit. Chem. Abs. A. III*, 1937, p. 340).

The average values for total sulphur in the hair and nails are 4·86 and 3·37 per cent., respectively. Variations with colour, age, and sex are discussed. W.

Decomposition of Human Hair by Boiling with Concentrated Magnesium Chloride Solution. K. Schuster. *Z. Physiol. Chem.*, 1937, **247**, 6-8 (through *Brit. Chem. Abs., A. III.*, 1937, p. 252).

Human hair boiled for 100 hr. at approximately 115° C. with 40 per cent. aqueous magnesium chloride saturated with sodium chloride (*p*H 6·6) in an atmosphere of nitrogen lost a very small amount of free sulphur, 0·18 per cent. of sulphur as hydrogen sulphide, 0·024 per cent. of ammonia, and 1·024 per cent. of soluble nitrogen (0·141 per cent. as ammonium chloride), the total loss being 6.4 per cent. The residual hair (but not untreated hair) gave with 0·1 per cent. N-caustic soda a homogenous jelly after one week at 37° C. but was not attacked by trypsin. Hair boiled for 30 and 100 hr. with magnesium chloride and sodium chloride yielded 0·55 per cent. and 0·0 per cent. cystine, respectively, when hydrolysed with concentrated hydrochloric acid. W.

Reaction with Iron Compounds for the Determination of *B. Anthracis* and of its Pathogenicity. E. de Angelis. *J. Bacteriology*, 1937, **33**, No. 2, pp. 197-206 (through *Exper. Sta. Rec.*, 1937, 77, 392).

A new type of chemical test for the identification of the anthrax organism (*Bacillus anthracis*) is described. There are two procedures for obtaining the reaction, the direct and the indirect, and both give positive and negative results.

Virulent cultures of *B. anthracis* give positive direct and indirect reactions, avirulent strains of *B. anthracis* give negative direct and positive indirect reactions, *B. subtilis* and other spore-bearing bacilli tested give negative direct and indirect reactions. There is a definite relationship between the strength of the reaction and the potency of the strains of *B. anthracis*. Little of the chemistry is known, but the fact is definitely established that a union of iron ions, whether ferric, ferrous, or both, with a product produced by the *B. anthracis* takes place. The substance seems to be derived from the gelatin portion of the medium. Out of some 30 different organisms tested, only *B. anthracis* has been found to give the reaction. Some bacteria which prevent anthrax when they are simultaneously injected into rabbits, guinea pigs, and mice with *B. anthracis* have also shown similar antagonistic action on this reaction. W.

Arsenicals in Agriculture. E. Griffiths, W. L. Morgan, S. L. Allman and R. N. McCullough. *J. Austral. Inst. Agric. Sci.*, 1937, **3**, 84-85 (through *Brit. Chem. Abs. B.*, 1937, **56**, 1107).

A résumé of certain aspects of the use of arsenicals in fruit and vegetable culture and in sheep dips. W.

Colour Sensation of Congenital Total Colour Blindness. H. Kanazawa. *Imp. Acad. Tokyo, Proc.*, 1937, **13**, 200-203 (through *Sci. Abs. A.*, 1937, **40**, 1063).

Gives the results of brightness matching experiments for three totally colour blind subjects using Ostwald's standard colour papers. W.

10—ECONOMICS

Cotton Looms: International Statistics. N. S. Pearse. *Int. Cotton Bull.*, 1937, **15**, 571-580.

Tables are given showing the number of looms (a) in place, (b) idle, (c) in course of erection, the number of cotton looms engaged in the production of cotton and rayon and cotton and staple fibre mixtures, all-rayon and all-staple fibre fabrics, the number of looms specially erected for weaving rayon goods, and the average hours worked per week and in a normal working week for the various countries of the world for 1936. Estimates of the number of looms in place in 1930 are also given. Compared with the figures for 1933 the figures for 1936 show an increase of 10,526 in the total number of looms in the world and a decrease of 34,378 in Europe. Looms in Great Britain have declined by 83,191 in the three years, and in U.S.A. by 40,181. These decreases are offset by increases in U.S.S.R., Japan, China, India, etc. The proportion of automatic looms to ordinary looms in Europe appears to be increasing with remarkable steadiness. C.

Cotton Fabrics: Industrial Uses. Economic Service, Joint Committee of Cotton Trades Organisations. *Textile Weekly*, 1937, **20**, 355.

Data relating to the use of cotton fabrics in the rubber, canvas, sack and bag, umbrella, typewriter, and belting industries are extracted from the Board of Trade's Fifth Census of Production and their significance is emphasised. C.

Indian Silk Imports. *Indian Textile J.*, 1937, **47**, 408-409.

A statistical analysis of India's silk imports shows the ineffectiveness of the existing tariff protection. Five tables of imports from 1921 to 1936 inclusive are given. The tables show the quantity and value of (1) raw silk imports from China, Japan and all sources, (2) imports of silk yarn, noils and warps, (3) silk piece goods, (4) goods of silk mixed with other materials, (5) declared value of silk imports. In tables 2, 3 and 4, Japanese supplies are distinguished from the totals. C.

Lancashire Cotton Trade: Organisation and Policy. T. Ashurst. *Textile Weekly*, 1937, **20**, 484, 530, 569.

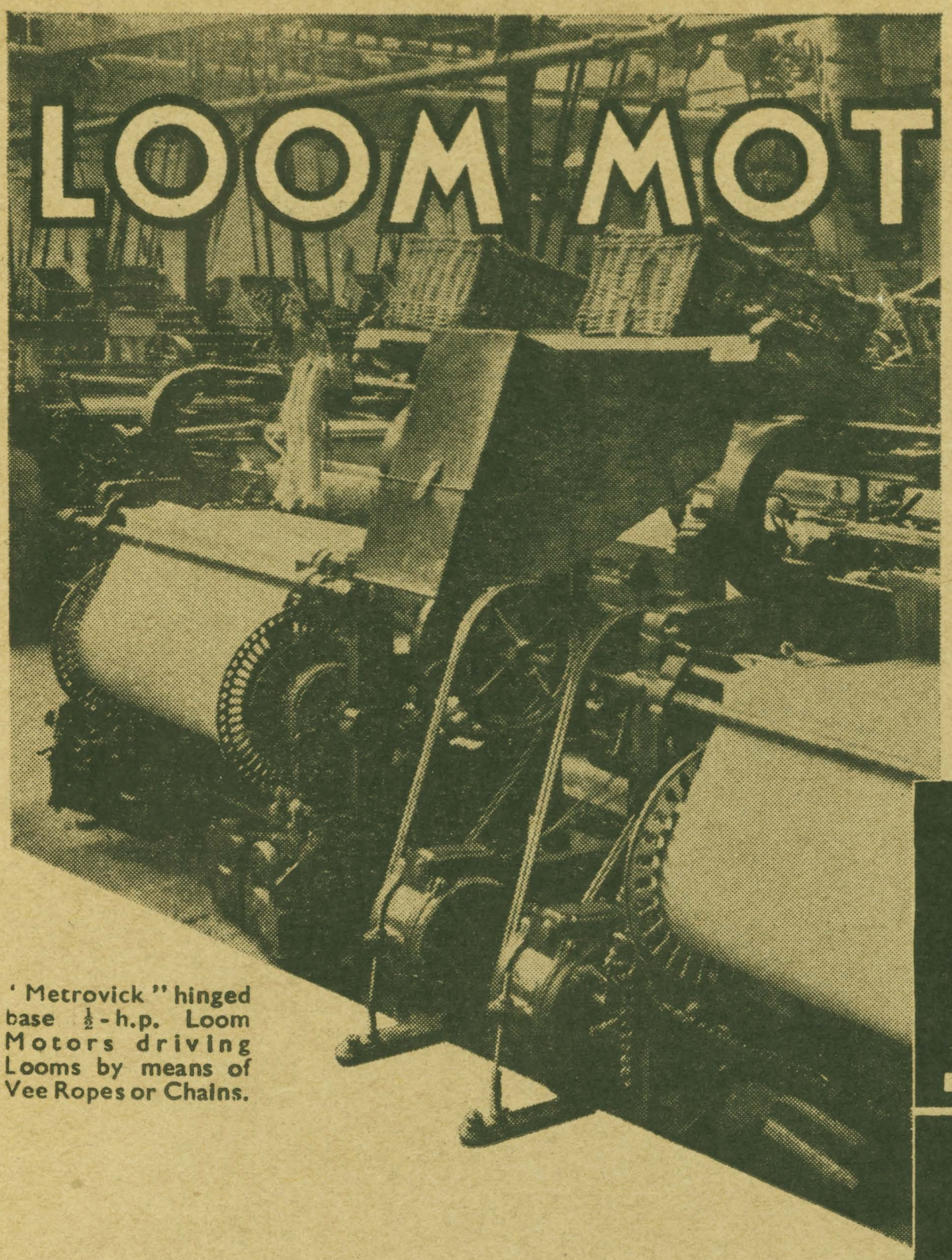
A report of a lecture on factors that are influencing the present organisation of the Lancashire cotton industry, dealing with Empire cotton supplies, the Shirley Institute, conditions in the export market (especially India), financing the industry, the adoption of automatic looms, Trade Union restrictions, wage rates, Factory Acts and social services, the operations of the International Labour Office, and trade barriers. 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*.

Alphabetical Index to Advertisements

LOOM MOTORS



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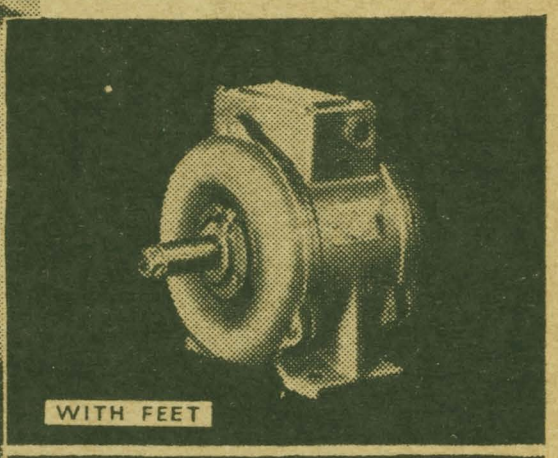

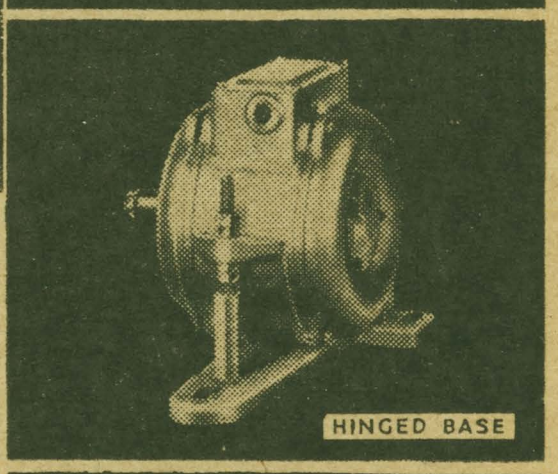

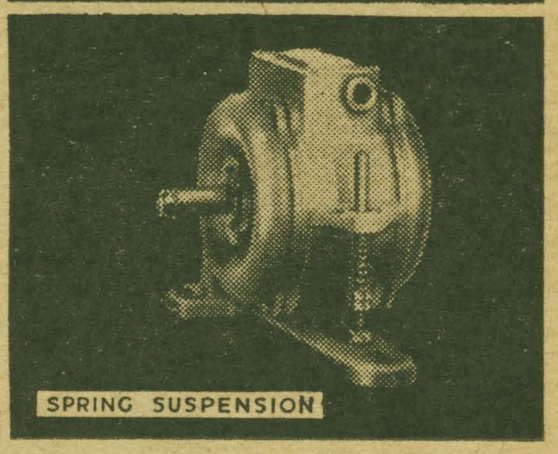

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