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The Journal of the TEXTILE INSTITUTE

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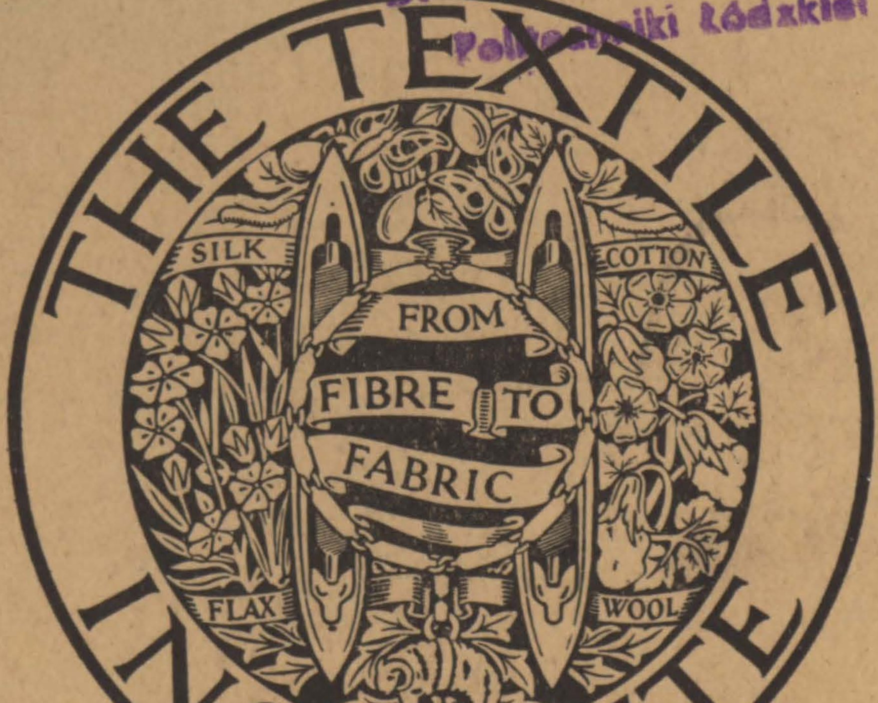

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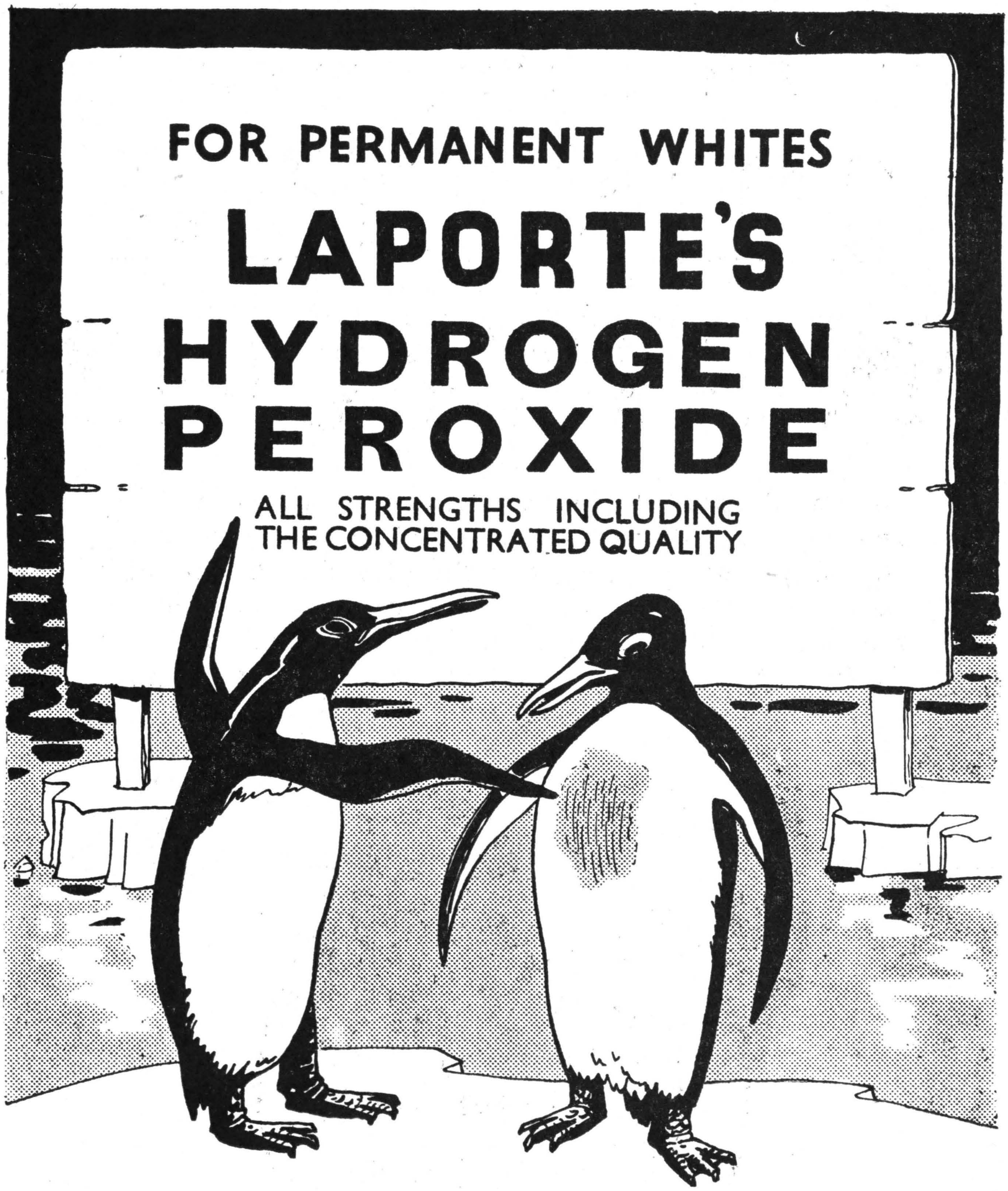
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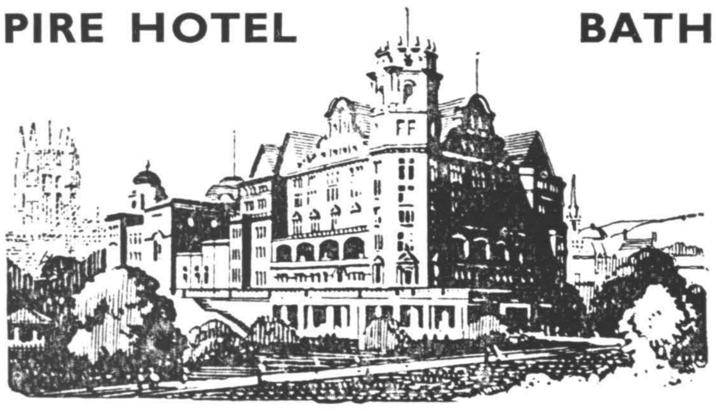

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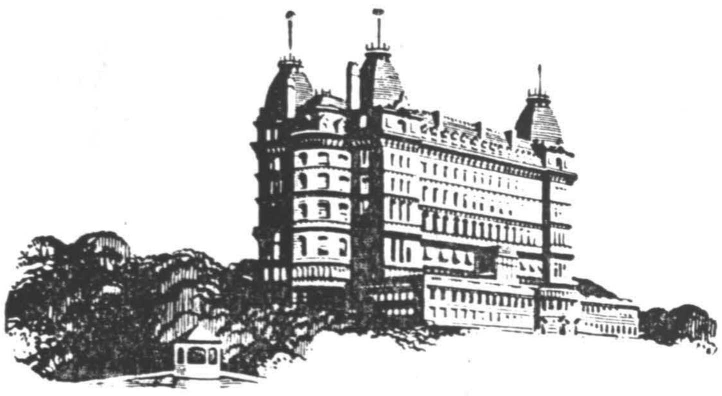

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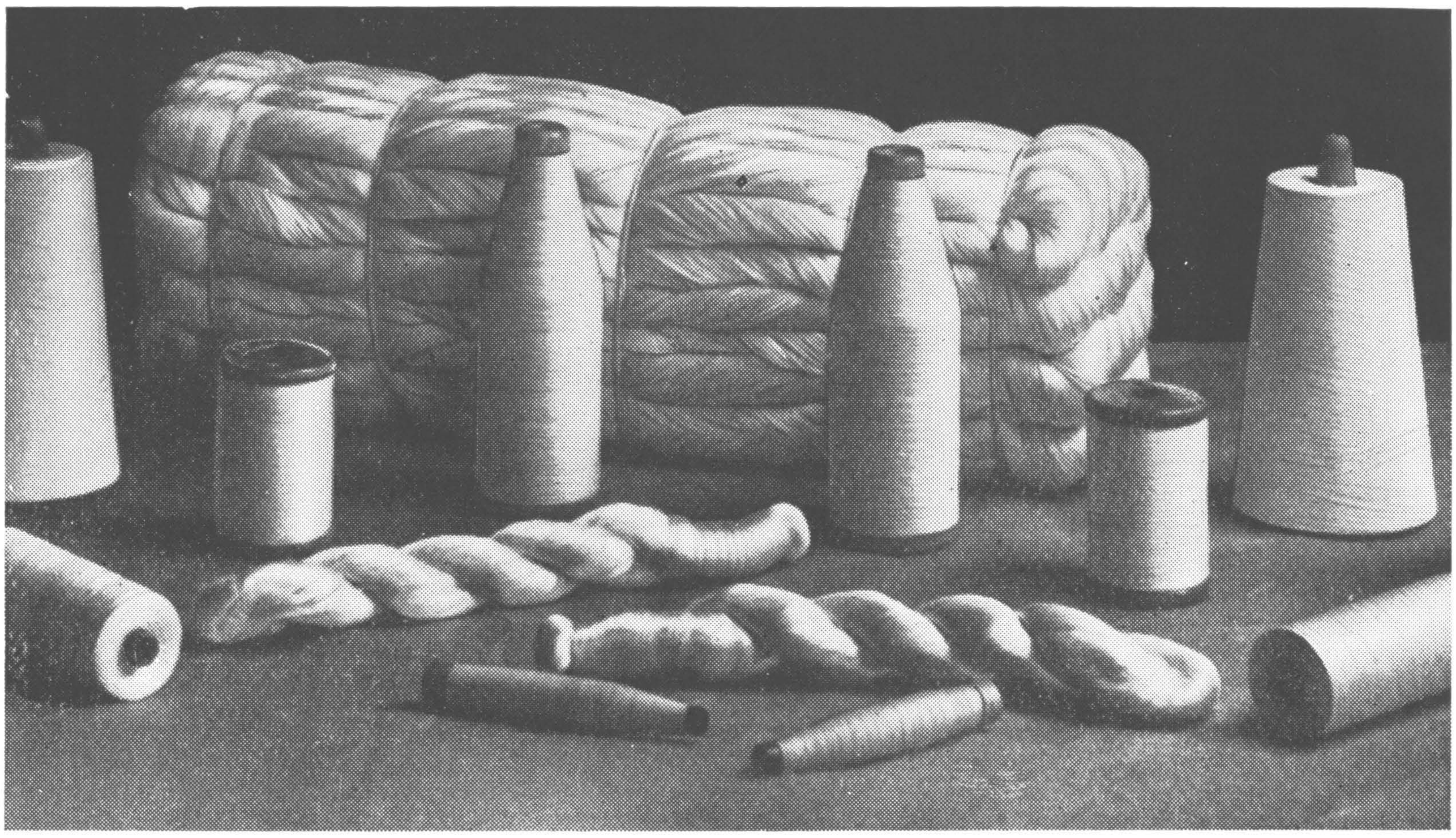

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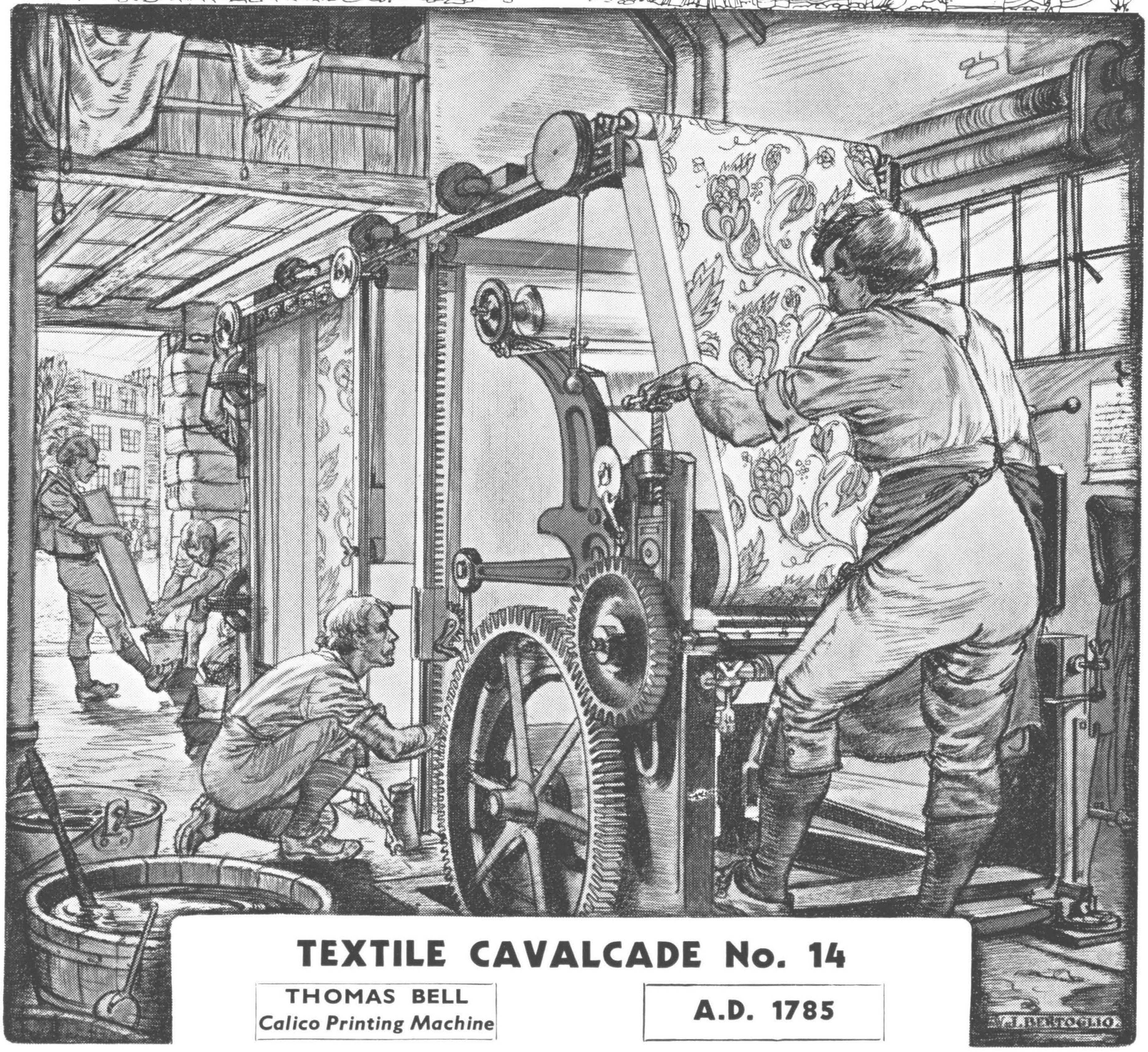
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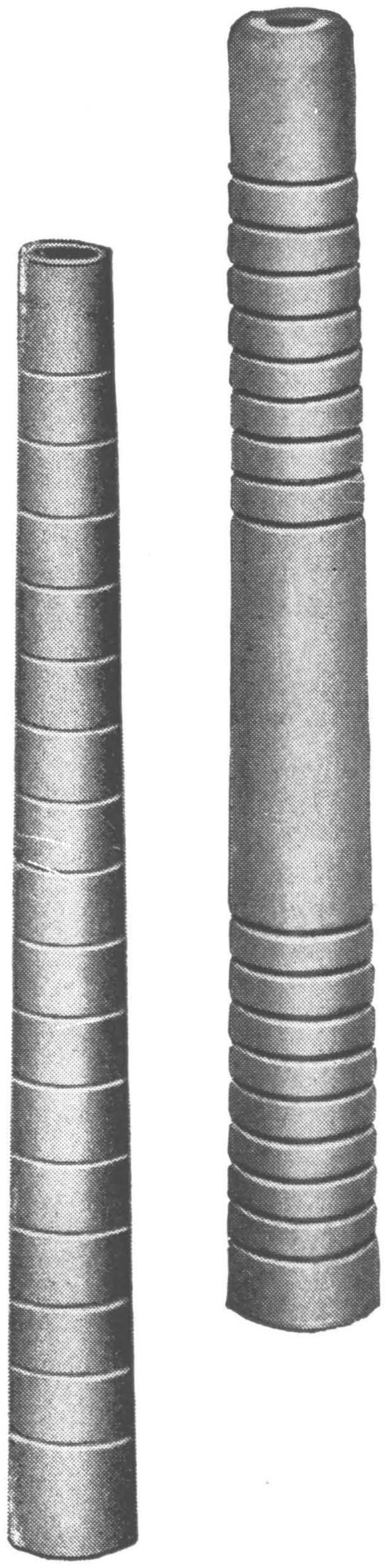

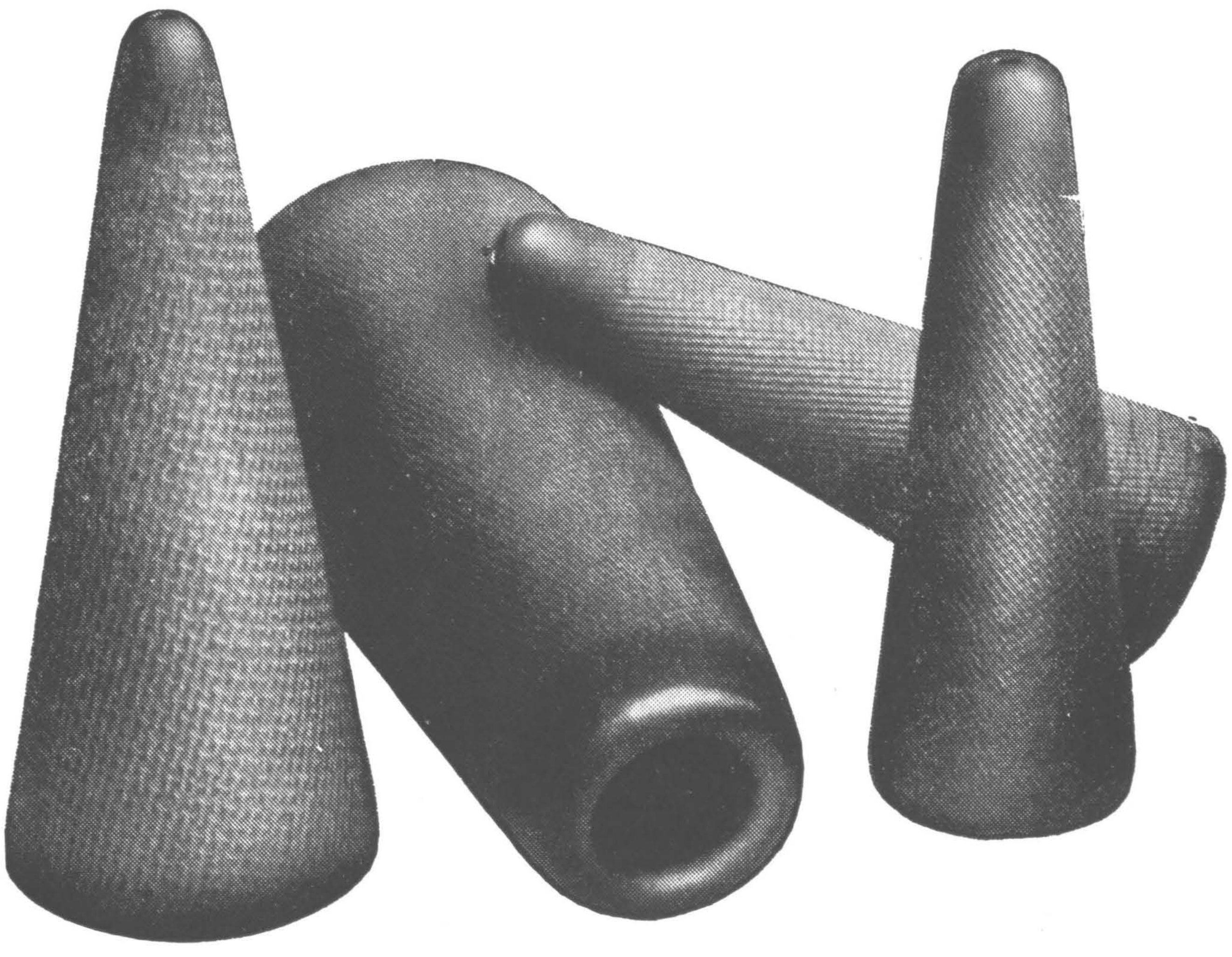

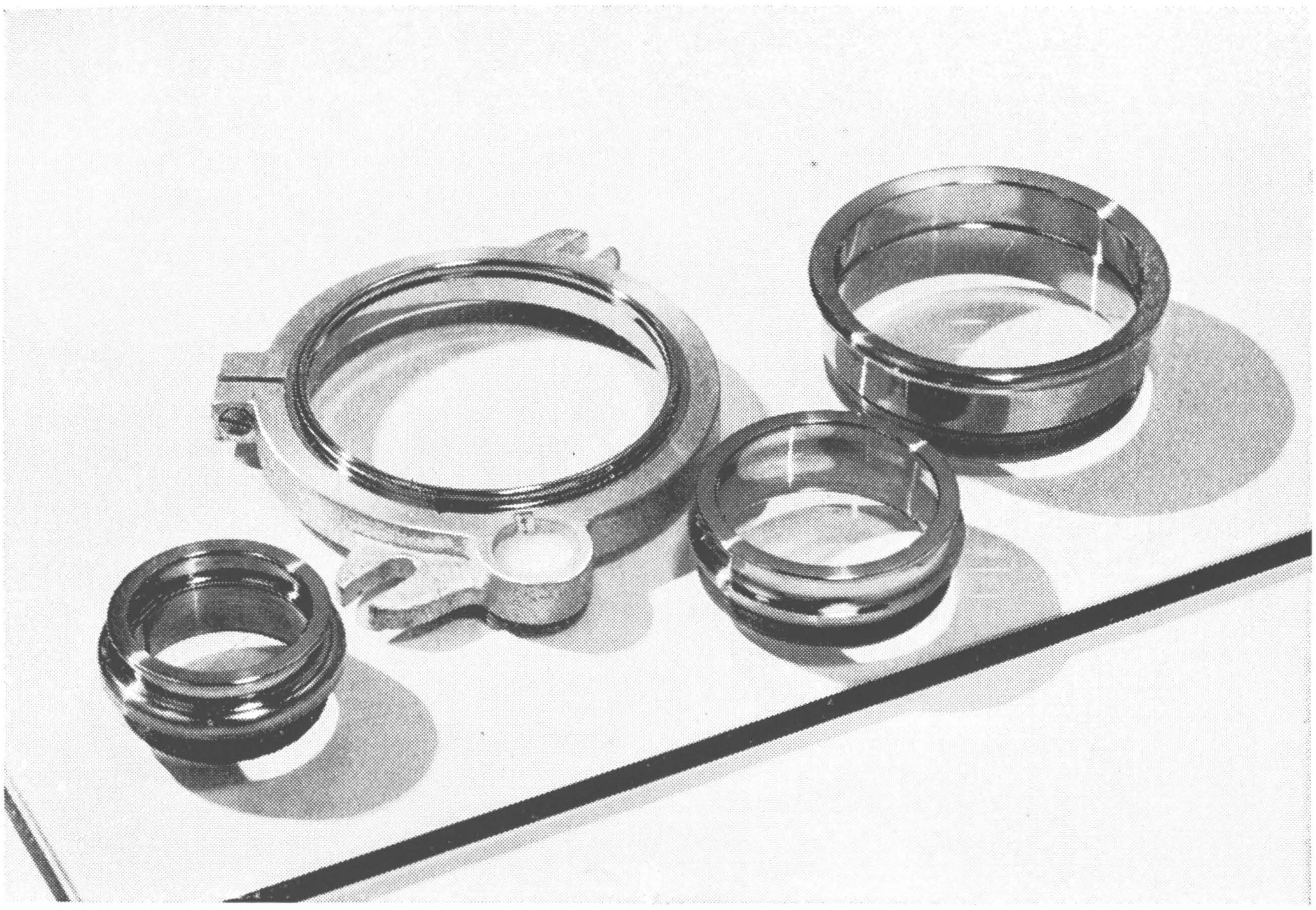

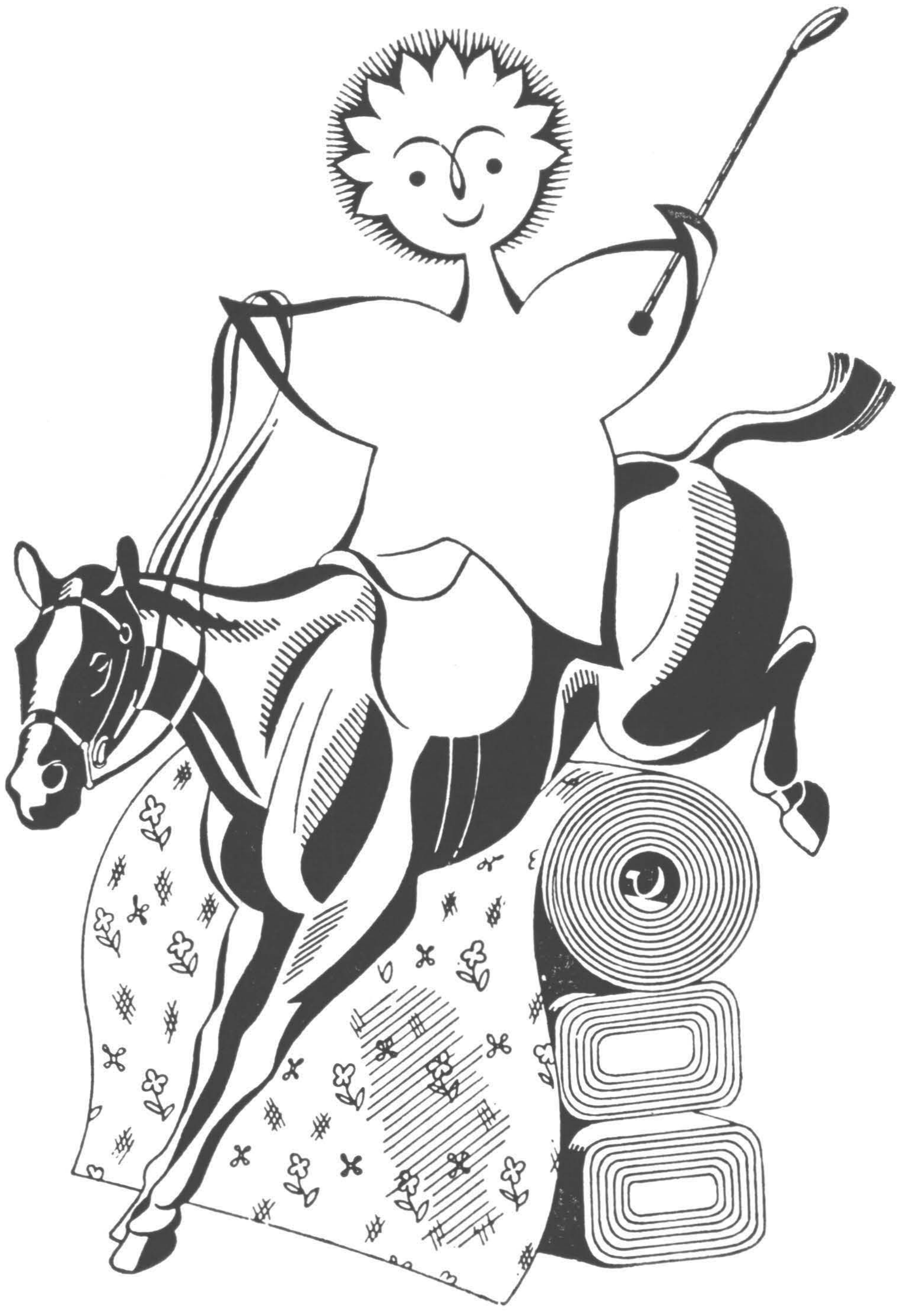

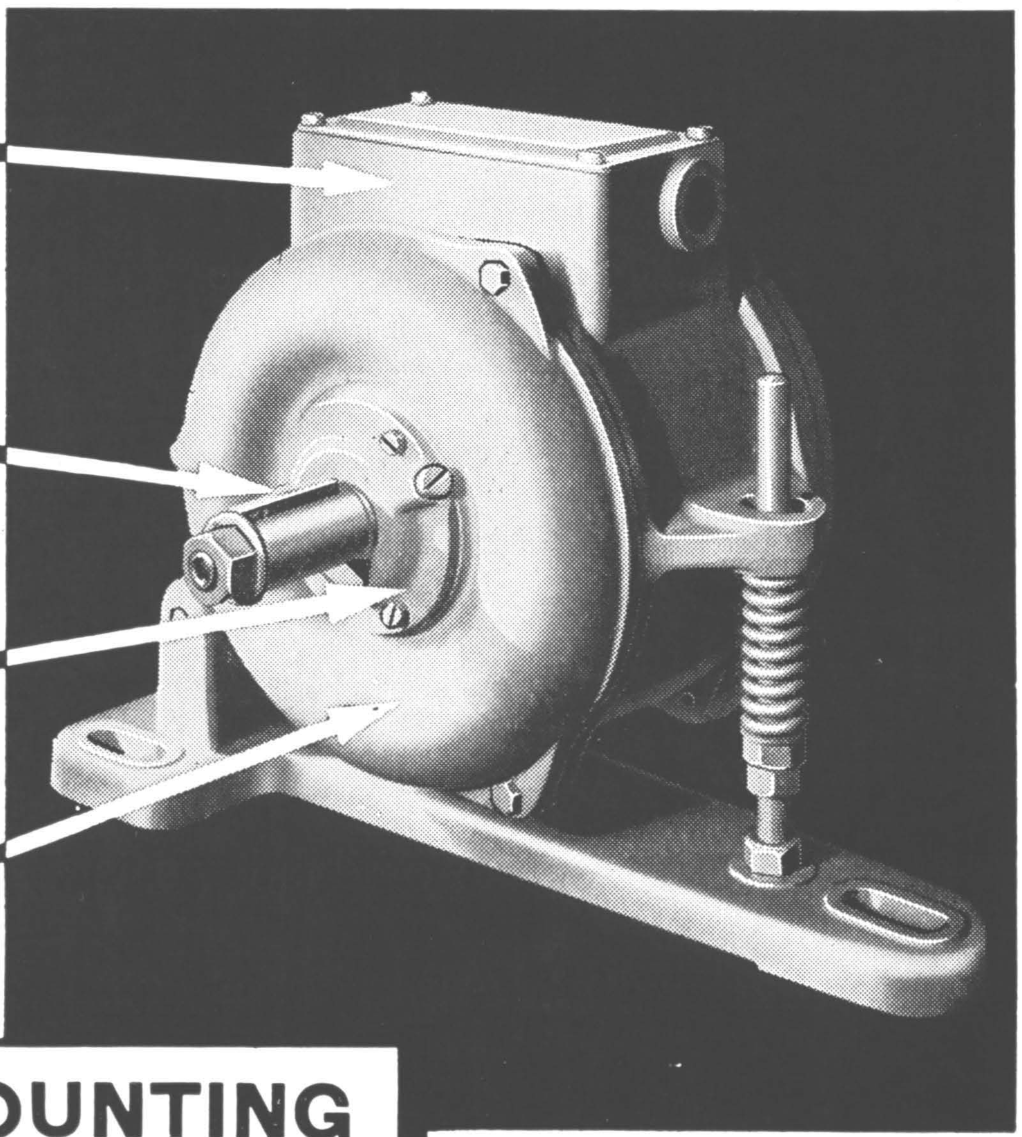

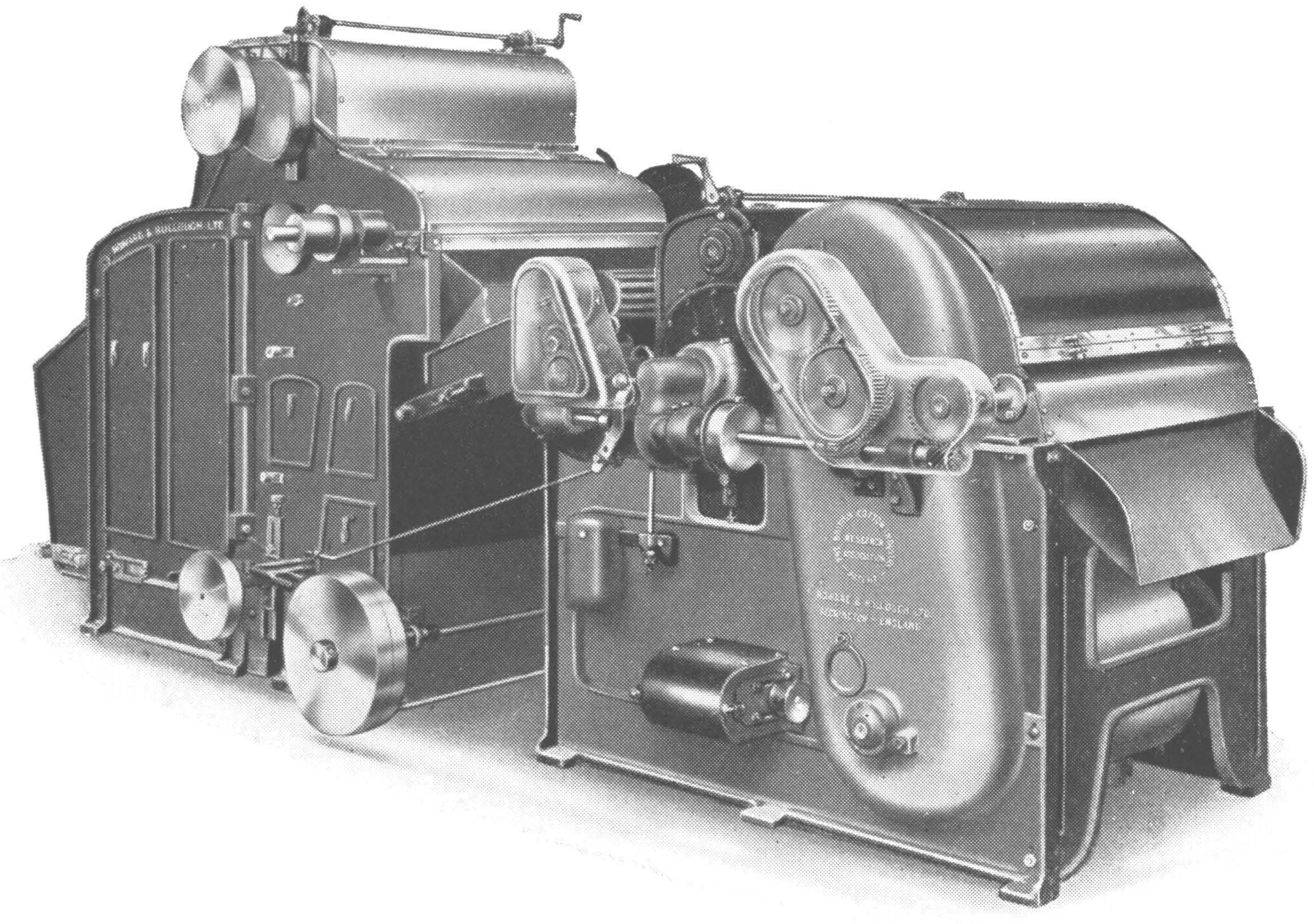

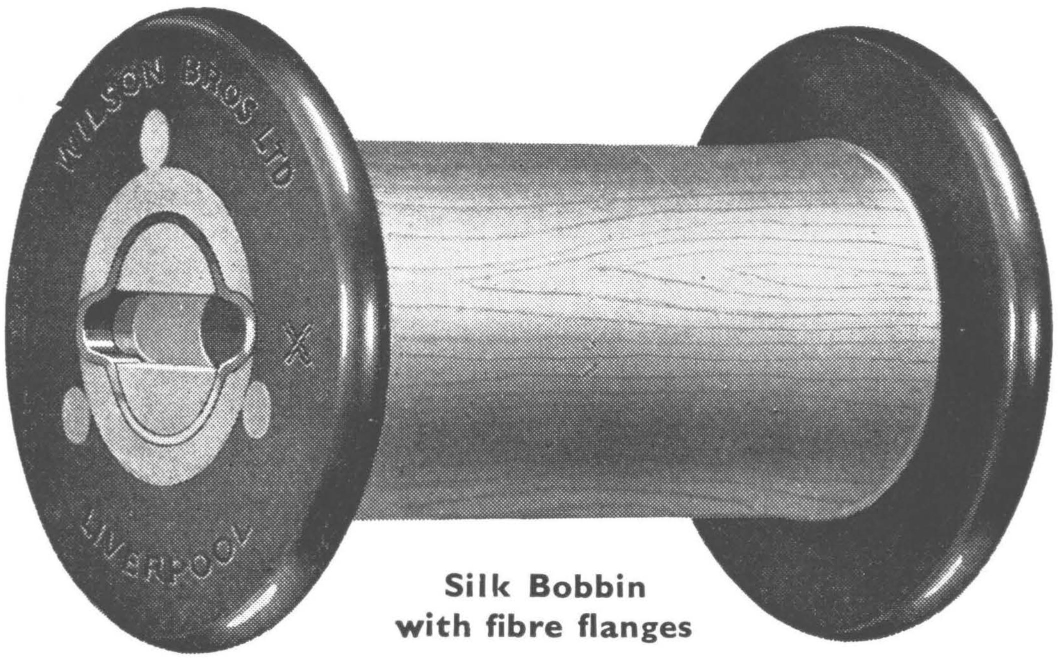
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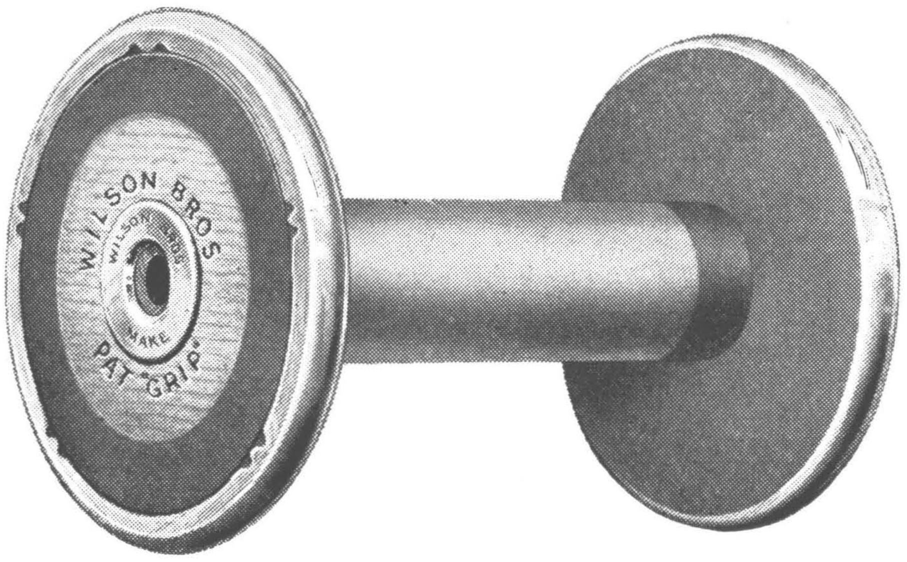
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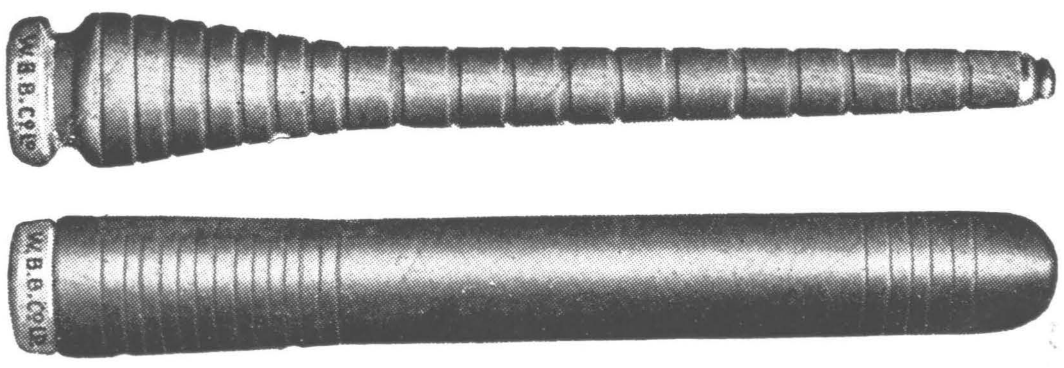
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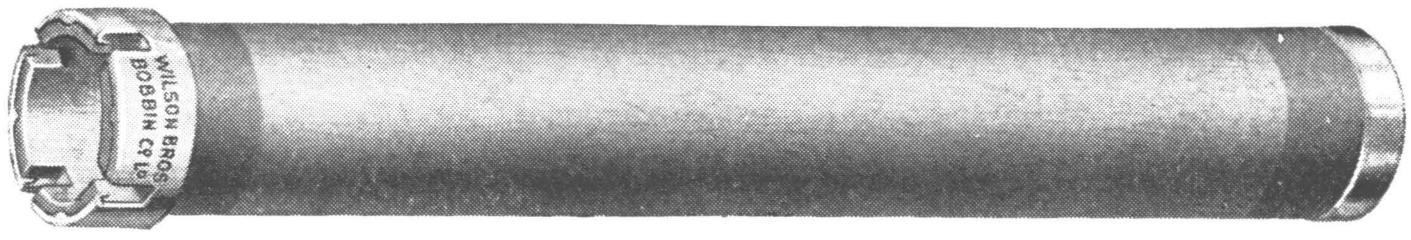
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THE JOURNAL OF THE
TEXTILE INSTITUTE

Vol. XXX MAY 1939 No. 5

PROCEEDINGS

NOTES AND ANNOUNCEMENTS

University Scholarships

The Manchester Education Committee offers a limited number of Scholarships and Exhibitions tenable in any one of the three years' Full-time Day Courses leading to the degree of Bachelor of Technical Science (B.Sc.Tech.) at the Municipal College of Technology (Faculty of Technology in the University of Manchester).

Scholarships will be awarded conditionally upon candidates qualifying to enter a Higher Course in the Faculty of Technology, in accordance with the Ordinances prescribed in the current prospectus of the College of Technology, Manchester. The Scholarships will be open to part-time day or evening students in the College and others whose parents are ratepayers of the City. In the event of there not being sufficient Manchester students qualified to enter upon a Higher Course, and only in that case, the Committee may offer the Scholarships to suitably qualified students who have no ratepayer qualification.

Exhibitions will be awarded conditionally upon candidates becoming qualified for admission to a degree course in the Faculty of Technology. Candidates must be ratepayers, or children or wards of ratepayers, of the City.

Candidates should consult the booklet entitled "Qualifications for entry upon a Degree Course" which may be obtained on application to the Secretary, Joint Matriculation Board, 315 Oxford Road, Manchester 13. Forms of application and all information may be obtained by written application to the Registrar, College of Technology, Manchester, 1. Completed forms of application must be received on or before 20th June, 1939.

Textile Institute Diplomas

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

FELLOWSHIP	
CLAYTON, Frederick Hubert	(Prestbury)
MUIR, John	(Dunblane)
SMITH, Richard James	(Manchester)
TOWNEND, Sidney	(New Zealand)

ASSOCIATESHIP	
BERGEN, Werner von	(New Jersey)
CHADWICK, James	(India)
CUTHILL, Ronald	(Shipley
GUPTA, Sachindra Nath Das	(India)
HAY, Norman Charles Bailie	(London)
HOWDEN, Cyril	(Bradford)
THOMPSON, Thomas Edward	(Bramhall)
WARBURTON, Arthur	(India)

London Section

PRINTING AND PRINTERS' PROBLEMS*

By Russell Felgate Esq.

The lecturer stated that he had no intention of attempting to deliver a learned discourse on the chemistry of printing processes. As all present were presumably concerned with one aspect or other of the draper's craft, he claimed only to talk as one draper to others.

Printing is after all only local dyeing and therefore the fundamental principles of dyeing are also those of printing. The earliest history of both is lost in antiquity, but there is no doubt that very efficient dyeing (in many instances more efficient than the dyeing of to-day) was done several thousands of years ago.

A textile fabric woven in Northern Africa about a thousand years ago was exhibited and attention was called to the brilliance, permanence and delicacy of the colours.

The dyestuffs then available were all natural ones obtained either from animal or vegetable sources together with a few inorganic pigments. Among these dyestuffs were the following.

(1) *Indigo*—A blue used in India and Egypt long before the Christian era and introduced into Europe in the 16th century. It was extracted from plants of the genus indigofera.

(2) *Logwood or Campeachy-wood*—Introduced into England by the Spaniards in the time of Queen Elizabeth. A mordant dyestuff chiefly valuable for the excellent black it yields on silk. It is still used—particularly in France.

Weld—A variety of mignonette producing yellow and greenish yellow shades.

Persian berries—Brown, yellow and green colours, with different metallic mordants.

Redwoods—The various redwoods such as Brazil wood, Peach wood, Sapin wood and Lima wood, all of which give various red, brown and violet colours with different metallic mordants.

Perhaps a word should be said here about mordants. They are merely chemical substances—usually inorganic salts—which form with the dyestuff proper insoluble coloured compounds inside the fibre. The word "mordant" is interesting; it is derived from the French "mordre"—to bite or corrode—because in the early days the French quite wrongly thought that these substances corroded the fibres and thus rendered them more absorbent to the dyestuff.

Cochineal—The female of an insect called the *coccus cacti*; lives on certain kinds of cactus. Only the female insect yields a dye. The insects are collected, dried in the sun and salted. The weight of the dried insect is about one-tenth of a grain, so that 70,000 are required to produce one pound of cochineal. The scarlet cloth for the English army was, and possibly still is, dyed with cochineal.

Cutch or Catechu—Obtained from trees growing in India—gives olives and browns.

Tyrian purple—This is the dye most frequently referred to by historians. It is frequently referred to in the Bible as the colour of the garments of kings. And in the *Acts* there is a reference to a woman called Lydia—a seller of purple. It was extracted from small vessels in the throat of a minute shellfish called *Murex Brandaris*, a mollusc which is still found on the shores of the Mediterranean. It can be readily understood why purple was regarded as the perquisite of kings when it has been calculated that a pound of wool dyed with Tyrian purple in the first century would have cost about £60 in our present money. The actual dyestuff in Tyrian Purple was in composition almost identical with some of the vat

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*A lecture delivered to the London Section of the Textile Institute on Thursday, 2nd March 1939, at the Northumberland Rooms, Northumberland Avenue, WC2, G. H. Colton, Esq., in the Chair.

dyestuffs of to-day, and was exceedingly fast to washing and light, though rather ugly in colour. Actually it was not purple but red, and required a mordant to dye purple.

A thousand years B.C. the Egyptian mummy cloths were painted by hand, the fabric probably having been previously prepared with some substance which prevented the colour from spreading.

Most of the early efforts to obtain patterns in colour on fabric were directed towards methods of applying some process, either chemical or mechanical, which would prevent the colour from reaching certain portions of the fabric. There is in the Victoria and Albert Museum a piece of linen showing a design of the Annunciation, which was printed with some substance which resisted the dye, and the whole fabric was then dyed blue. This particular fabric is fifth century Coptic, and I believe came from the burial grounds of upper Egypt. Of the chemical substance used for the resist in this printing we have no knowledge. Probably many such substances were used. It is a curious fact, however, that fifteen hundred years later we have come back to this method of printing, and the most modern and up to date methods are now based on the resist principle, which is discussed below.

Another method of preventing the colour from reaching portions of the fabric was the method of tying the fabric into knots of selected shape, binding the knots with grass and then plunging the whole fabric into dye; thus the fabric was prevented from taking the colour in the parts protected by the grass binding, and a geometrical pattern was formed varying according to the method of knotting. This practice, known as tie and dye work, is still in use to a limited extent to-day, particularly for men's handkerchiefs. (An example was shown.)

The success of the tie and dye work led the Eastern people, notably the Javanese, to try to find more successful, and less circumscribed methods of preventing the dyestuff from colouring the fabric than by merely knotting with grass, and they hit upon the method of covering the places which they did not want to be coloured with wax, then dyeing the fabric and afterwards removing the wax. The process is still used to some slight extent and is called Batik printing. Of course the wax usually cracked during the handling of the fabric, and a small vein of dye penetrated through the crack. That is why Batik prints have veins of colour running across them.

(Two shawls, good examples of modern Batik printing, were exhibited.)

If the cloth is carefully handled, very small motifs can be printed without cracking the wax, and up to a year or so ago wax was used as a resist method of printing men's ties which required very white whites. There are however, great limitations in the ground colours obtainable, because obviously the dyeing operation has to be done in the cold, as any rise in temperature would melt the wax. On silk only blacks and blues can be successfully dyed in this manner, and even then the ground colour is very far from fast.

Stencil Printing

The use of stencils was probably the next development, the stencil being cut in paper or hide and the colour rubbed through with some sort of brush or sponge. This process had serious limitations, because the shape of the motif which could be cut on the stencil was strictly limited. For example, supposing one wanted to print a ring, it would be impossible to prevent the disc in the middle of the ring from falling out. The Japanese got over this difficulty by connecting the centre to the periphery by means of human hair so fine that it did not show in the print. It is interesting to note that the most modern system of printing—screen printing—to which I shall refer later, is merely a refinement of this early stencil method.

Printing by engraved wooden blocks was another very early printing method. The Chinese certainly used it 2,000 years ago. The monks on the banks of the Rhine printed by this method in the 11th century until the 15th century, when the craft became extinct in that district. There are examples of their work in the Victoria and Albert Museum. They used wooden blocks on which the design to be printed was carved in relief, the block being dabbed on to a pad of colour and then transferred to the fabric. The blocks were of a size comfortable for handling with one hand, and were usually about 12 inches square. The register was obtained by pins fixed to the four corners of the block. This made four pinhead impressions which were scarcely visible, and the next repeat was obtained by putting the left hand pins of the new impression exactly in the marks left by the right hand pins of the old impression, and similarly for vertical repeats.

Obviously, the chief art in successful block printing was the making of the blocks themselves. The Chinese were expert in this two thousand years ago, but when the process came to Europe the peasants on the Swiss Austrian frontier took up the craft amd became very expert in making the blocks, supplying many of the blocks used by the Rhenish printers. This is still quite a big industry in the Tyrol, and to this day some of the blocks used by English printers are made by the same peasant families who started the craft hundreds of years ago.

For several hundred years, very little change indeed has taken place in the methods of block printing. Such changes as have been made have been refinements in the making of the blocks. For instance, the surface of a wooden block is now frequently covered with felt so that it will hold the colour better and more evenly, and where fine lines are required which are difficult to cut in wood these are let into the block by strips of metal. The metal strips were originally hammered in, but are now more usually inserted by burning the wooden block with an electrically heated member, and when the whole pattern has thus been burnt molten type metal is poured over the surface so that it makes a mould of the burnt out portions. When dry the mould is removed and screwed on to the surface of a plain wooden block.

In art schools and also in the homes of certain ardent and artistic ladies, printing blocks are made by cutting the pattern out of linoleum and sticking that on the block. This is an easy method of block making, but the final print has a very amateur appearance and, fortunately for posterity, a lino-cut block has a very short life.

Block printing was the first method to give accurate and consistently repeatable results. The process is, however, very slow, because each impression only prints about 100 square inches, and each colour in the design has to be printed separately, using a separately engraved block. The process is therefore costly, and the production slow.

Some early efforts were made to produce a printing machine by means of an elaborate system of levers operating a block in much the same manner as it would be operated by the human arm. These however, were exceedingly clumsy and were quickly discarded. They gave rise, however, to the surface printing machine invented by a Frenchman in 1806, the principle of which is a circular block with the design engraved in relief. The colour is conveyed to the roller by a felt blanket, and the fabric passes round the roller in a continuous length, receiving the impression as it passes.

The obvious advantage of the surface printing machine over the hand block machine is the tremendously increased production, but it has the disadvantage that the machine is elaborate and very complicated to erect, and is therefore not economical for printing short runs.

Lithograph Printing

By this time lithograph printing had been developed for printing on paper, and some early work was done on textiles by the same method. The design to be printed was engraved intaglio either into a copper sheet or a lithograph stone which was then rubbed with dye so that the engraved portion became full of colour, the surplus colour was wiped off the surface and the fabric was then pressed on to the stone to receive the colour in the engraving. The disadvantage of this method was that fabric could not be printed in continuous lengths, and it was therefore only suitable for articles such as scarves, which were units in themselves.

A scarf shown was printed by this method in the reign of Napoleon III, probably about 1860. The centre of it was printed by block. It was shown in contrast with a beautiful satin printed 80 years later for Mr. Charles Colcombet in Lyons for the silk exhibition in Paris in 1937, containing 230 colours.

Roller Printing

Up till this time, as can be readily imagined, printing was a craft practised either in people's own homes or in the simplest and most primitive workshops. The first important advance towards making textile printing into a commercial industry was made in 1783 by the invention in England by a man named Bell of a cylinder printing machine. This machine made use of the principle of the engraved copper plate, but the engraving was now cut into a round copper roller instead of a flat copper plate. The copper roller revolves in a trough full of the printing paste. As the roller emerges from the trough it is scraped with a knife edge called the doctor which is accurately adjusted to remove the colour from the smooth surface of the roller, leaving only such colour as is sunk into the engraved portions of the roller. The roller then comes into contact with the cloth to be printed—to which it transfers the colour in its engraving, thus putting the design on the fabric. One enormous advantage of this machine is that as many colours as desired up to 12 can be printed at the same time by engraving one roller for each colour appearing in the design and allowing them to come into contact with the fabric one after the other. It is not physically possible to print much more than 16 colours, as the machine becomes too cumbersome.

The output of a roller printing machine is enormous. 18,000 yards of a single colour design or 10,000 of a multi-colour design would be a reasonable day's work. The engraving of the roller is, of course, of vital importance. The oldest method of doing this was by hand, using various shaped tools held in the hand, and carefully polishing the roller afterwards. Hand engraving, however, was a very expensive process, and is hardly ever used to-day, except for very large patterns.

The two principal modern methods of engraving are mill and pantagraph engraving. The mill is a small steel roller, the width of one lateral repeat of the design. It is used in the following manner—The pattern is engraved or etched by hand on to a softened steel roller called the die. When engraved, the die is hardened and pressed by very high pressure against another similar roller of softened steel, called the mill. The mill now takes a male impression of the female engraving on the die. As soon as a complete impression of every line of the die has been made in relief on the mill, the latter is hardened, and then pressed against the soft copper roller, so as to produce a female impression on the copper. When the engraving has been pressed in to the required depth, the mill is moved along the copper-roller to the width of one repeat, and the process is repeated until the whole length of the roller has been engraved.

In the pantagraph process, the copper roller is varnished with a bituminous covering and the pattern is scratched through the varnish to the copper underneath. When this work has been done along the whole length of the roller, it is immersed and revolved in a bath of nitric acid until the pattern has been etched away to the required depth. The accuracy required in scratching the bitumen, particularly for a very small and intricate design, is greater than can be achieved by hand in the ordinary way, and a very ingenious way of doing this has been devised. The design required is first enlarged, say 10 times, and is engraved by hand on a zinc plate. Over the zinc plate is an arm furnished with a steel point. This point traces accurately every line of the pattern engraved on the zinc plate, and through a sytem of levers each movement of the tracing point is transferred to an etching arm in contact with the coated roller. The levers are so arranged as to reduce a large movement of the hand to a small movement of the etching point and thus the enlarged design engraved on the zinc plate is reduced to the intended size.

Screen Printing

The most recent development among processes of textile printing is an evolution from stencil printing which I mentioned a moment ago. The underlying principle of this method is the forcing of colour, by means of a rubber squeegee, through a screen covered with strong silk gauze varnished with an impermeable varnish in all places where the colour is not required.

Just as block making was the secret of block printing, so is screen making of prime importance in screen printing. This is done to-day by taking advantage of an interesting chemical phenomenon. When gelatine is mixed with potassium bichromate and the solution spread on any surface the film becomes insoluble in water where it is exposed to light, but remains soluble where it is protected from light. The first step in screen printing is to cover a frame like a picture frame with tightly stretched silk bolting cloth. This is a very regular strong silk gauze which has been used for very many years by millers for sifting flour. This gauze is then varnished in a dark room with varnish prepared by mixing a solution of gelatine with potassium (or sodium) bichromate. Whilst this has been going on, the design to be printed has been painted on a celluloid sheet with black opaque colour. Each colour in the design is painted separately on a separate sheet and ultimately a screen is made for each individual colour. The celluloid sheet is then pressed against the varnished and dried screen and exposed to bright sunlight or electric arc lamps for a few minutes. After exposure the celluloid sheet is removed and the screen is plunged into warm water. Where the black paint has prevented the light from falling on the screen the gelatine is still soluble, but elsewhere it is insoluble, so that the interstices of the gauze are filled up with the gelatine film. As soon as the soluble portions have dissolved away, the screen is removed and is allowed to dry, and because the gelatine film is not itself durable, the whole screen is covered with a good copal varnish or other suitable protective. Care has to be taken to clean the varnish off the open portions on the under side. When this varnish is dry the screen is ready for use. It is placed on a flat table on to which the fabric to be printed has been fixed. The printing paste is poured into the screen and rubbed across it by two or three sweeps of a rubber squeegee, the length of which is the width of the screen. The screen is then removed to a previously determined point and another impression made, and so on all down the piece. The point of repeat is usually determined by fixing iron stops at regular intervals along an iron rail running the whole length of the table and arranging for a metal projection from the screen to come up against the stop. So long as the distance between the stops is identical with the repeat of the design engraved on the screen, a continuous print will be obtained. In actual practice it is usual to print alternate impressions in order to give one impression a chance to dry before going back and printing its neighbour.

Screen printing has many advantages over all other forms of printing, and only very few disadvantages. Its advantage over block printing is that by its means one can print up to a square yard for each impression against a square foot for each impression printed by block. Its advantage over roller printing is that it is a convenient process for printing small runs; the stock risk involved in a roller printer's run is to-day a very heavy responsibility. It is, of course, more costly than roller printing, and it also uses more colour, but the customer has a considerable offset against this increased cost in the absence of stock risk.

The limitations of screen printing are chiefly concerned with certain special types of designs; for instance, it is not possible accurately to print by screen stripes down the length of a piece, because it would not be possible to join the successive impressions without the join being visible. Also, it has hitherto not been possible to print very fine lines by screen, but recent perfections in screen making are making finer and finer work possible.

So far the methods of applying colour locally to fabric have been discussed. It is necessary now to consider the colour that is applied and the method of fixing it on the fabric.

All printing processes, whatever methods employed, require a printing paste. These printing pastes always contain three ingredients, viz.—(1) the colour, whose function is, of course, to provide the local dyeing; (2) the gum, whose function is two-fold (*a*) to make the mass sufficiently viscous to be conveniently handled, and (*b*) to restrict the capillarity of the fibre and prevent the colour from running where it is not wanted; (3) the fixing medium, whose function is to fix the colours permanently on to the fabric. There is usually a fourth component, which is some substance for assisting the solution of the dyestuffs, as they have to be very concentrated for printing. Such things as glycerine or triacetin are used for this purpose.

There are roughly four categories of dyes; acid colours, basic colours, direct colours, and vat colours. The acid colours are all organic acids, and in principle they dye all animal fibres; the basic colours are all organic salts of bases, and they also dye all animal fibres; the direct colours are lugubriously complicated organic compounds with very long chain molecules. They are used to dye vegetable fibres, in which category I include viscose artificial silk.

The vat colours are also used for vegetable fibres and are all complicated organic compounds, always insoluble in water. Therefore, before they will dye at all they have to be converted into soluble form. Once they are inside the fibre they can be converted back again to their insoluble form. This is done by mixing them with a reducing agent, the most common of which is sodium hyposulphite.

There is a fifth category of dyestuffs, the birth of which has been necessitated by the introduction of cellulose acetate artificial silk. If we assume that the colour enters into the animal or vegetable fibres either by a process of adsorption or —which is probably more likely—by some electrical charge effect, then cellulose acetate cannot be dyed by these methods, and another way has to be devised. The method adopted is that of a solid solution, and the dyeing of acetate fibres is achieved by selecting dyestuffs which form solid solutions inside the acetate fibre. The dyestuffs, if brought into close enough contact with the fibre, prefer to leave the medium in which they are and take up their habitat in the acetate. The difficulty, of course, is to bring them near enough to the acetate fibre to make this move possible, because, as already stated, they are insoluble in water. They are, therefore, emulsified with an emulsifying agent such as Turkey Red oil and are brought into contact with the fibre in the form of an emulsion.

With regard to the selection of dyestuffs to be used for any particular purpose, some rough generalities may be helpful. In general, the bigger the chemical molecule the greater the fastness of the dye, but the less its brightness. For example, basic and acid colours have very small molecules and are, therefore, very bright but not at all fast. Vat colours, on the other hand, have large molecules and are very fast but not very bright. They have another disadvantage, namely, that the large bulk of the molecule makes them difficult to accommodate inside the fibre, and therefore they are very prone to rub.

Many designs, especially on silk and artificial silk, require a white or coloured motif on a dark ground. On those textiles whose fastness to washing is not of prime importance, such effects are usually obtained by first dyeing the ground, using a dischargeable—i.e. easily bleachable—dyestuff. If a white design is required, the printing paste is then made with a bleaching agent in place of a colour. This bleaches the ground where the print falls upon it, and after the piece has been steamed, the design appears white on a dyed ground. If a colour is wanted on the dark ground, all that is necessary is to mix with the discharging paste a non-dischargeable dyestuff so that, whilst the ground is being bleached by the chemical, it is at the same time being dyed another colour by another dyestuff.

Prints produced by this discharge method are, of course, not very fast to washing or light and the public are becoming daily more exigent about the serviceability of textile materials. Modern practice, therefore, is tending more and more to the use of the resist method of the earliest printers, but of course different processes are employed. The aim of these methods is to secure that those portions which are to be finally white are never at any time during the process coloured.

The limitations of the old wax method have already been described and are too great for its use to be continued under modern conditions. Resort has therefore to be made to very complicated chemical reactions. That most generally employed, particularly for cotton on which the white has to be very white and the coloured ground very fast, depends upon the fact that a range of very fast bright colours is obtained by the combination of phenols and amines. The printing technique consists of padding the cloth first of all with either the phenol or the amine, then printing the design with some substance which will prevent the coupling compounds. The fabric is after printing run through a bath containing the second component; the two couple together and form the dyestuff inside the fibre, except at those points where the resist substance printed on the fabric has prevented the coupling from being possible. All that then remains to be done is to scour the fabric thoroughly to remove from the printed portion the unchanged phenol or amine as the case may be.

Our piece of cloth has now left the printing machine or table stiff with a mass of dried gum in which is incorporated the colour (or bleach) and the fixing agent. It is now put into the steamer. In hand printing factories the steamer is usually just a large but very carefully designed and controlled chamber in which several pieces of cloth are hung for a prescribed time. Machine printers who handle very much longer runs usually use continuous steamers into which the cloth is fed as a continuous length. The function of the steam is two-fold—(1) to force the dyestuffs which are at present lying on the surface of the fabric, held there by the gum, into the interior of the fibre, and (2) to complete the chemical reaction which fixes it there permanently.

As soon as these reactions inside the steamer are complete, the piece is removed and washed, preferably in running water, until the gum and surplus colour have been removed from it. As soon as this washing is over the surplus water is removed, either by the humble centrifugal hydro-extractor, or by the modern open width sucker and spooner dryer—the Rolls Royce of printing machinery.

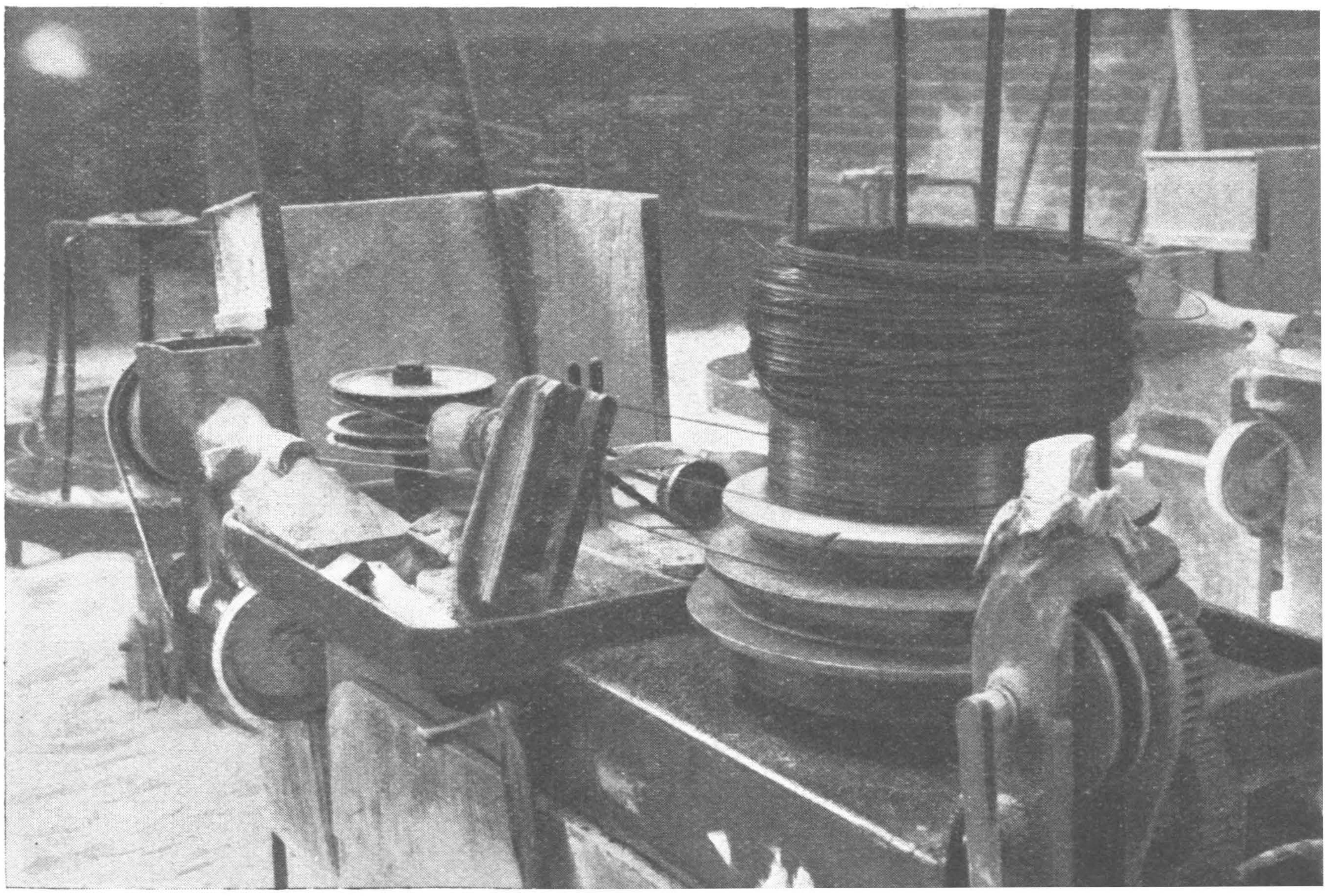
The goods are now ready to go to the finishing department, whence they find their way to the printer's customers. It is well to look kindly on them and to reflect that what to you may seem to be blemishes can certainly be explained by their maker as virtues, and remember the appalling risks to which they have been exposed at every stage of the process of their birth. A printer's lot is not a happy one. He is ever trying to reconcile two diametrically opposed factors—the solid steam roller of his factory with the scintillating meteor of fashion. Fashion's changes descend upon him overnight. When and whence they come he knows not—he imagines from some omnipotent band of dictators on the Continent who decree the colour of dresses, if not of shirts.

Yorkshire Section

THE MANUFACTURE OF CARD CLOTHING*

From one point of view the production of card clothing may be regarded as a side-line of the great textile industry. When, however, the many processes involved are considered, it is seen to include parts of a number of major industries such as steel, leather, textiles, rubber and machinery.

Wire—In a description of the manufacture of card clothing a start may well be made with the preparation of the wire. Steel billets are heated in special furnaces in order to bring them to the necessary temperature for rolling. This takes about 2½ hours and care is needed to avoid excessive oxidation of the surface. In the series of rolls beginning with the cogging mill, the billet four feet long and four inches square is transformed in about two minutes into a 300 yards coil of wire $\frac{3}{16}$ in. diameter. The speeds of the rollers increase as the diameter of the steel decreases. On cooling, a short length is cut from each coil so that the material may be examined and tested for soundness.



Continuous Wire-drawing Block.

To reduce further the diameter of the wire the process of wire drawing is employed. The wire is first pickled in dilute acid to remove the scale which forms during rolling. Excess acid is removed by washing with water from a hose pipe and the wire is left to acquire a protective film of ferric oxide. After immersion in a bath containing lime to neutralise any residual acid the thick wire is heated for several hours and it is then drawn through "ripping blocks" or plates containing a series of holes of graduated sizes, until its diameter is reduced to ⅛ in.

In this process of cold drawing the wire becomes hard and brittle and it is necessary to relieve the strains by annealing in special furnaces. The wire passes continuously through the furnace maintained at the required temperature. It is again pickled to remove scale and is then subjected to further reduction in

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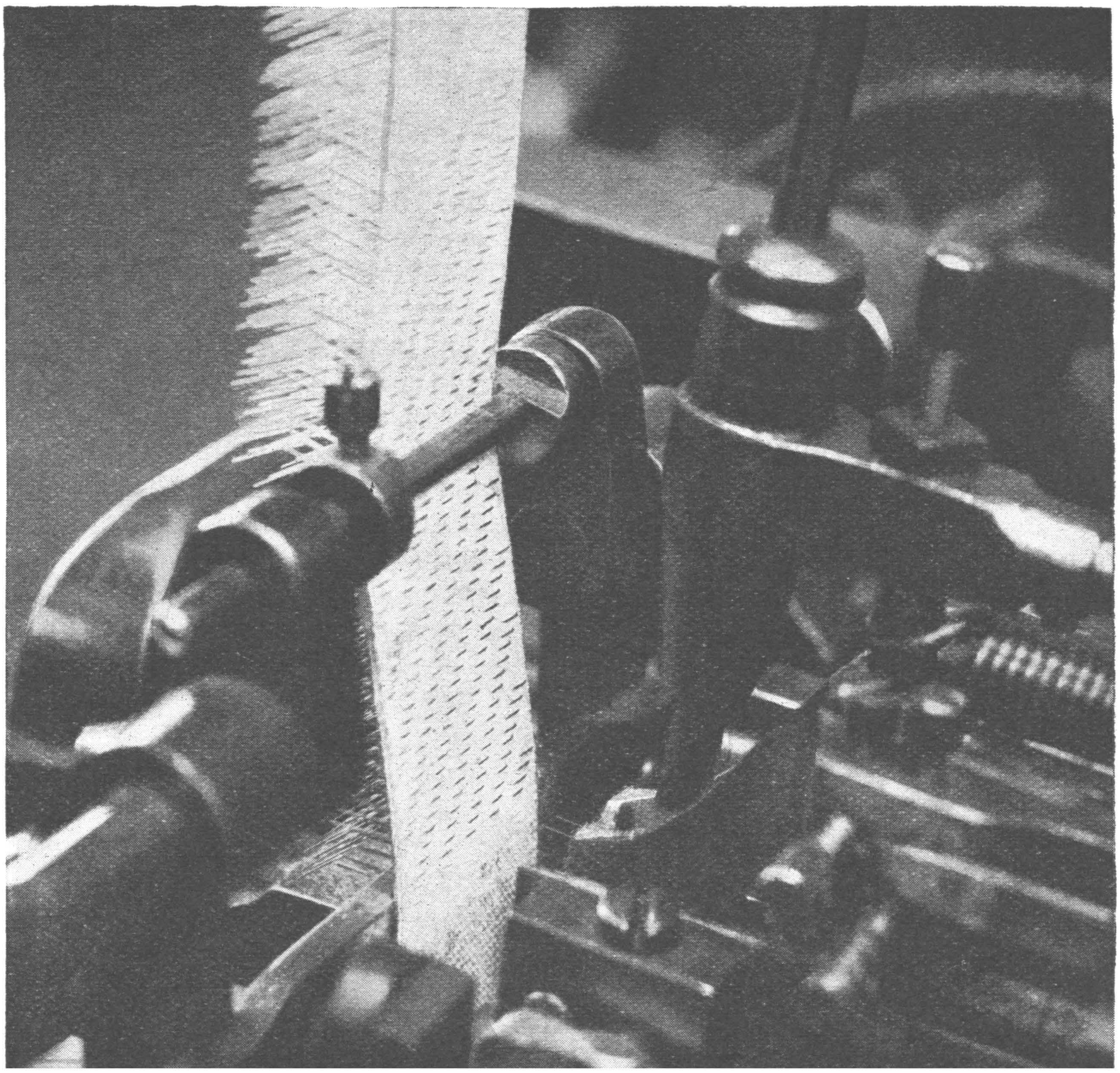
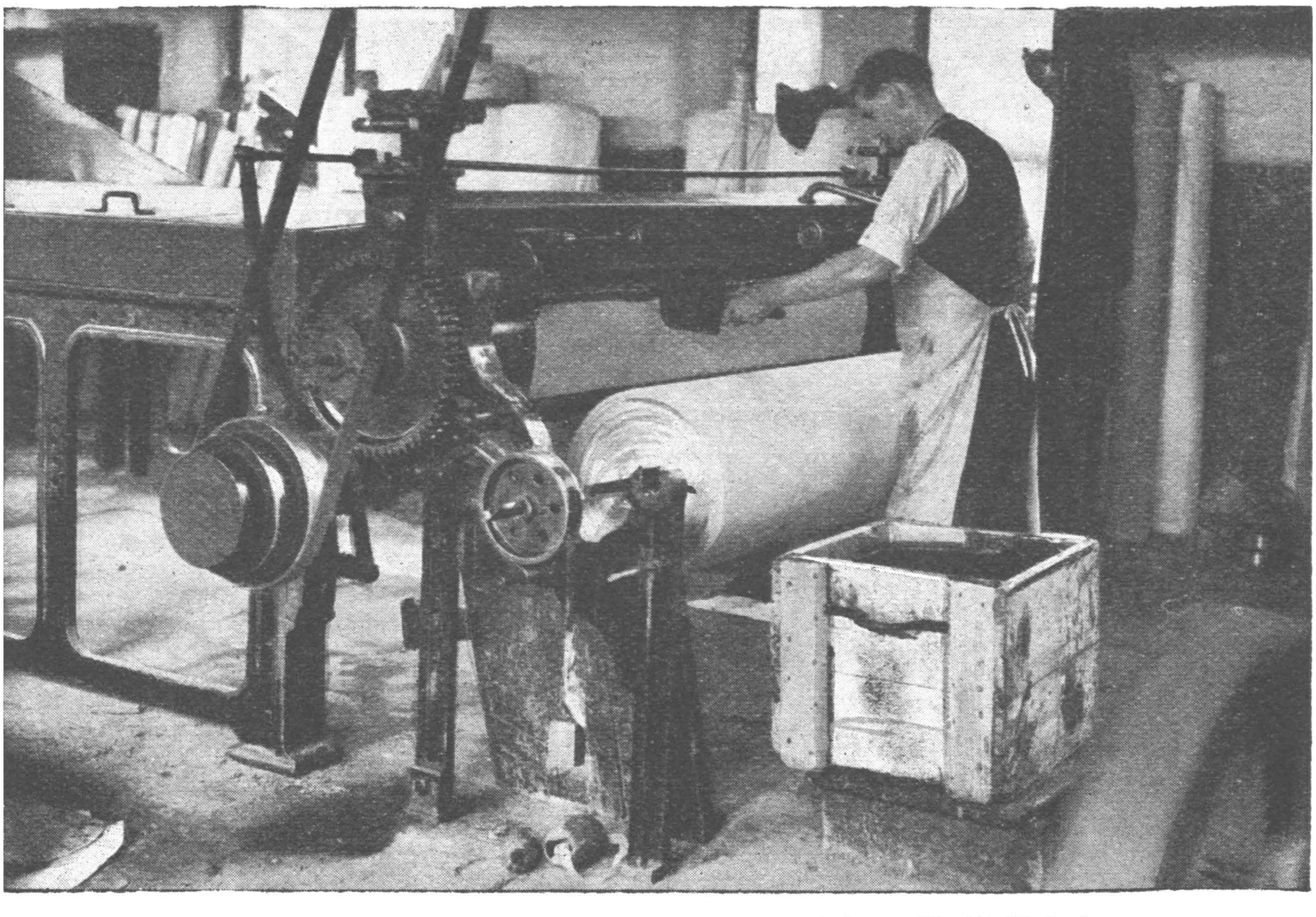
*Abstract of a lecture, accompanied by a film, to the Yorkshire Section of the Textile Institute at Bradford on Thursday, 2nd February, 1939.



Inserting Wire into Cloth Foundation.



Spreading Rubber Cement on Cotton or Linen Twill Fabric.

diameter in the wire drawing machines. In the newest type of continuous wire drawing machines the dies are made of tungsten carbide; a material approaching the diamond in hardness. Depending on the fineness of wire required the series of operations of drawing, annealing and pickling may have to be repeated a number of times. A coating of copper may be given to the wire by immersion in a solution of copper sulphate. The copper acts as a lubricant and prevents the scratching of the wire by the die. The final operation on the wire is the process of hardening and tempering in which the temperatures must be carefully controlled if the wire is to have uniform quality throughout the various batches. For some purposes the hardened and tempered wire is coated with tin by treatment with flux and passing through molten tin. Wires of specially shaped cross sections such as oval, flat and double convex are produced by passing the round wire through rollers with grooves of the required shapes.

Leather Foundation Clothing

The first process in the production of the leather is the removal of the hair from the hides by means of lime. This also removes some of the natural grease. When the hair has thus been loosened it is removed by means of a two handled blunt knife, the hide being laid over a curved beam or table.

Superfluous flesh and fat are then removed by means of a very sharp knife, the manipulation of which calls for great skill. The liquor in which the hides are tanned is prepared from finely ground oak bark in bark pit leeches. The tannin is extracted by means of cold water which is pumped each day from one pit to the next and thus constantly increases in strength. In the handling houses the hides are placed in this liquor in pits for nearly six months. The hides then go to layer pits containing strong liquor, layers of oak bark being placed between them. This operation is repeated until the hides are completely tanned, after which they are dried in the sheds.

Before currying commences, the inferior parts of the tanned hide are cut away, usually leaving about two thirds of the weight received from the tanyard. The selected parts are scoured to remove residues from the tanning processes and to smooth out irregularities. The hide then passes through the rollers of the splitting machine in which the circular band knife makes the leather uniform in thickness by cutting shavings from the irregular places on the flesh side. The split hide is treated with a paste of cod fish oil and tallow called "dubbin" and conditioned for a period which may amount to six months. The hides are cut into straps 5 in. to 7½ in. wide, levelled as regards thickness and treated on the flesh side with a mixture of cod fish oil and soap. Any remaining irregularities are then removed by local stretching and the straps are then put through the glassing machine. The pieces of leather are spliced by hand to give lengths of 60 to 72 inches, using a suitable type of cement. These are now ready for the insertion of the wire.

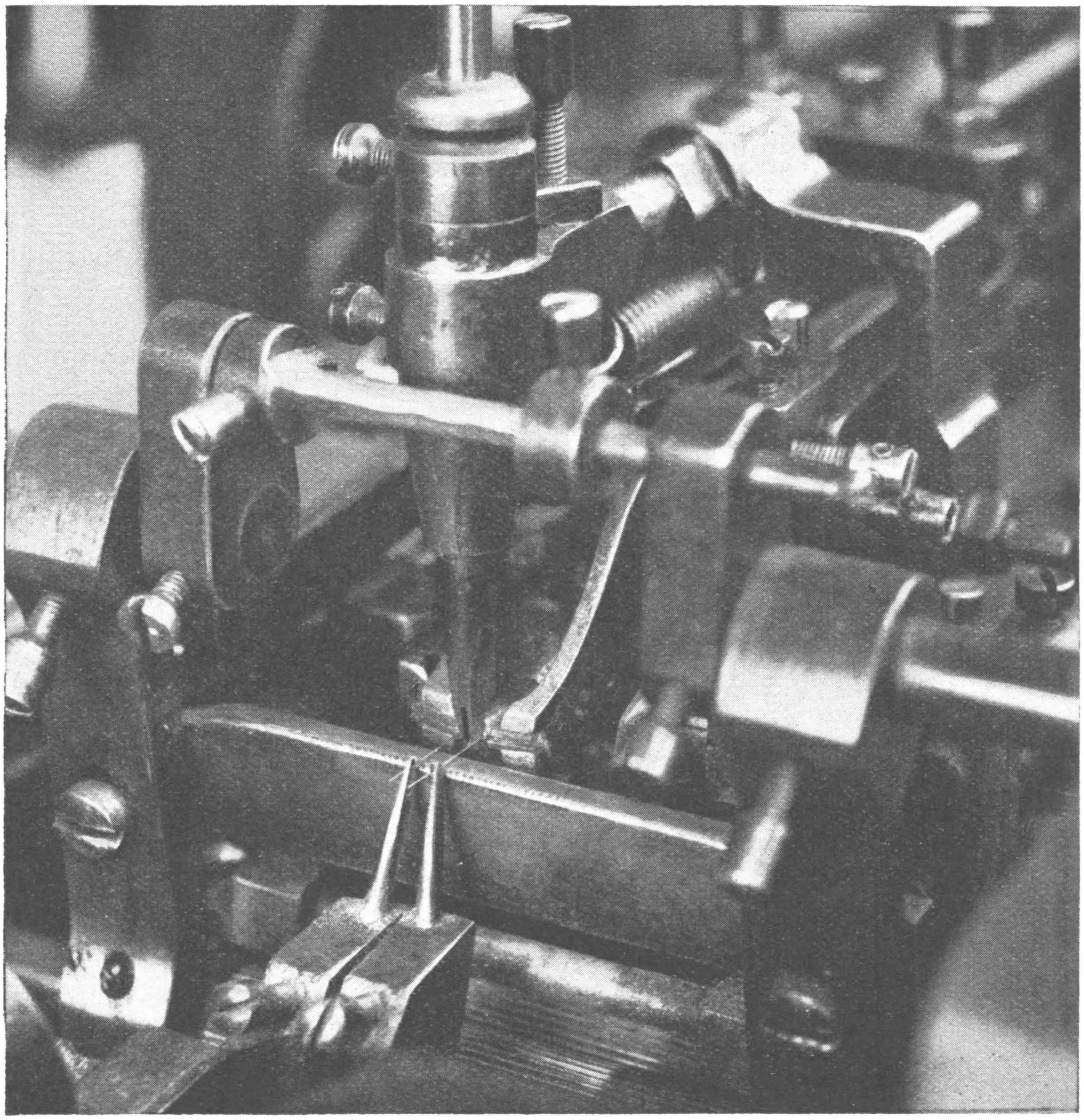
In the wire inserting machine the hardened and tempered wire is fed through a hole in a die and the necessary length to make a staple is cut off. This is gripped by the crown and tongue and the formers bend the wire into the form of a staple tooth. When this has been put through the holes already prepared in the leather, other mechanism bends the legs of the staple to the required angle. The operations are controlled by cams or tappets which must be accurately adjusted as the machines insert from 100 to 450 teeth per minute. It is hardly possible to describe adequately the action of this complicated machine, owing to the many separate operations in the formation of the wire staple, its insertion and the final bending.

Fabric Foundation Clothing

The actual manufacture of the cloth from linen and cotton yarns calls for little comment. As the fabric is usually a twill, simple looms serve for the weaving. The widths of the fabrics range from 62 in. to 72 in. Prior to the treatment with rubber, the fabrics are scoured and shrunk.

Para rubber after being washed and sheeted is stoved. It is then cut into small pieces and ground in pugmills with solvent naphtha for about three days. In this way the rubber is converted into a strong cement. The cement is applied to the linen and cotton fabrics by means of spreading machines, and the fabrics pass over steam heated chests in order to remove the naphtha. The rubber coated cloth can then be made up to any desired thickness in the doubling mills.

For some qualities of cloth foundation a mixture of oil and glue is used as a cement between the sheets of cloth. This applies particularly to those types of foundation which contain a wool cloth between sheets of cotton. Fabrics to which this oil and glue cement is applied require to be carefully dried and conditioned and this operation takes about 14 days.



Tooth Forming on Setting Machine.

The manufacture of vulcanised rubber coated cloth differs considerably from the above types of cloth foundation. The rubber is washed, sheeted, stoved and then thoroughly masticated by means of grinding rollers which are heated by means of steam. After a repetition of the grinding the rubber in the form of a nearly transparent sheet goes into the sulphur bath. It is important that the sulphur be evenly distributed, so that a uniform cure is possible. The rubber is then stored for a time in a larger tank where it assumes the form of a mass of rubber dough. It is then given a further thorough kneading before proceeding to the spreading machines for application to the cloth. The cloth may have to go through the spreading machine from a dozen to 48 times according to the thickness of vulcanised rubber required on the face. When the spreading is complete the rubberised face of the cloth is dusted with talc. Two pieces of cloth, with the rubbered faces in contact, are then run on to a drum which proceeds to the vulcanising well. It is soaked in water overnight and the temperature is then gradually raised to 280° F. by means of steam pipes, and maintained long enough to effect a thorough cure. On removal from the well the pieces of vulcanised faces are separated, washed and dried and are then ready for attachment to cloth backs.

Rubber faces consisting of cut sheets of natural india rubber are also prepared for certain purposes in a somewhat similar manner. The rubber is minced, sieved to secure uniformity in size of particle, moulded into the form of a cylindrical block on a steel mandrel, frozen and cut on the sheet cutting machines by means of a horizontal oscillating knife into a continuous sheet which is taken up between layers of cotton cloth to prevent sticking.

Cloth foundations of all types are cut to the required lengths and widths before the wire is inserted on the card setting machines. The cutting of the cloth is done mechanically and a high accuracy is necessary.

The very large number of varieties of card clothing required in the many branches of the textile industry calls for a corresponding number of types of card setting machine. The plant available can produce up to 11½ million feet of fillet per year as well as 1½ million card flat tops per year. This would require the drawing of nearly 5,000 tons of steel wire and the weaving of 400,000 square yards of cloth. The cloth is prepared in various thicknesses from 2 to 16 plies with various types of face. For leather foundation clothing 7,000 hides are cut up per year.

For certain purposes the points of the card teeth are required to be specially hard so that the ordinary hardening and tempering treatment of the wire is insufficient. The glass-hardening point is produced by passing the finished card clothing teeth uppermost, through Bunsen flames arranged to heat the tips of the wire. The teeth are hardened by passing through a trough containing running water.

For the needle pointed card clothing required in some branches of the textile industry, the wire is cut to the necessary lengths and pointed by means of milling cutters before being bent to form the tooth.

The card clothing industry includes the manufacture of the grinding wheels and machines for maintaining in condition the clothing of carding engines. The emery is crushed, sieved and graded and is then mixed with the necessary plastic material before being moulded to the required shapes. Grinding wheels are also made for other industries.

Fillet clothing is mounted temporarily on a drum in order to be ground. After grinding it is trimmed in the paring machine. During packing for despatch or storing the necessary particulars are noted for record purposes. Card clothing should be stored in a dry place at a moderate temperature.

When re-clothing card flats it is usual to true up the bevels which become worn in the course of time.

TYPES OF OIL-COMBED MERINOS TOPS*

By H. Haigh Esq. A.T.I.

In the construction of woollen fabrics the basis upon which the ensuing manipulative processes are built is the blend of the raw material. In the worsted section of the industry the combed product of this matching, the top, ranks with the raw material blend in importance.

The trade of Bradford and the West Riding has changed very much in the last decade. In this connection a spinner of long experience remarked "At one time the dominant factors in trade were quality, fixed quality and high quality. Now they are price, fixed price and low price."

Years ago standard qualities were to be counted on one's fingers. Certain wools were sorted and matched year after year, and constant blends were made for the production standard types of yarns. To-day there is a multitude of types of merino top, their production varying enormously month by month.

By standard Bradford 64's warp top, is meant a top made from sound, lengthy stapled greasy Australian wool, of constant fibre fineness. The wool from which it is made may not be all Sydney, but it will be from districts renowned for producing even-fibred and sound wool. In order to ensure the consistency of this type in subsequent combings, the proportions of the several districts' wool must be maintained. In this manner the standard has been established and the variation in successive combings has been reduced to a minimum.

In natural sequence with the 64's warp is the 64's weft top, which has similar characteristics, except that it is shorter. It may be made from shorter or more tender wool than the warp top, but it is equally fine and soft and has the same good colour. The next type of 64's top is neither warp nor weft, its length being about midway between the two. It is a cheaper top, though still composed of greasy Australian wool. In place of all fleece wool, however, locks and pieces, belly wool or faulty wool from the poorer districts are used. Irregularity of fibre is overlooked or is overshadowed by the lower price. Such a top may be called an average or super 64's Australian top.

There is in the 64's range of tops another type which is cheaper than those already mentioned. It may be regarded as the ordinary type. Its components are quite sound wool, but they come from various parts of Australia, and there is perhaps a percentage of skin wool in the blend. Some spinners reject tops containing skin wool. They are labouring under an old prejudice. Good skin wool approaches very near to virgin wool and indeed it may be better than some poorly-bred fleece wools. Much depends on the source of the wool, and how and where it is pulled. Just as there are many kinds of fleece wool, so there are many kinds of skin wool, some good and some indifferent. The ordinary top serves admirably for the purpose for which it is intended, but is of course no use for the high class trade, or for fine count yarns.

The types mentioned so far may all be classed as reasonably good. There are, however, more types which still may be classed as 64's tops, namely the shabby varieties. A top in this category may be made from any kind of merino wool. Its fineness is sufficient to place it above 60's; on the other hand it may or may not be as fine as the 64's average. (An attempt has been made to introduce a 62's quality, but so far it has been unsuccessful.) This top is probably irregular in fibre, of poor average length, poor handle, but it is cheap. Tops in this grade vary slightly, some may be very soft and fine, though short and irregular. Others may be harsh and long, but not very fine, and so on. The hosiery trade uses many of these slightly shabby types, as well as some of the best tops. Very often tops for this class of trade are made from all sorts of wool and it is remarkable that

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*Abstract of a lecture to the Yorkshire Section of the Textile Institute at Bradford on Thursday, 23rd February 1939, Mr. W. E. King in the chair.

such wonderful results can be obtained from such blends of wool. Many makers have standardised tops of this kind and produce very regular combings, although some variation is allowed and is excusable. Poor type skin wool, lambs' wool, irregular-fibred wool and sample wool are used in this class of the trade.

The denomination "60's" does not embrace as many types as does the number "64's". There is, however, a similarity in the types. The short and the long types made from virgin wool correspond to weft and warp top of 64's quality. After the medium types come those made from shabby wools of all descriptions. Generally a 60's top is made from the 60's wool sorted out of the 64's, so that there is a natural similarity to the 64's types. 60's tops may be made from all skin wool. They are harsh, poor colour, about 3 in. long but they supply a peculiar demand. Short shabby 60's tops, very soft, made often with a large percentage of lambs' wool, are made for blending with better quality tops.

In 70's quality the range is naturally more restricted. There are the 70's warp and weft qualities corresponding to their 64's counterparts. The average type lower down the scale is generally used where price is the governing factor. There are very few 70's tops which may be called shabby, as such types of wool are generally put into 64's blends. Occasionally shabby 70's tops made from many kinds of wool; lambs', tender, belly and skin wool are combed but the demand for such tops is limited.

In the 70's range of types a top called 66's in the trade might be included. Some people hold the belief that 66's is an unnecessary quality, that there is no room in the range for such a type. But it is there and firmly established too. Such a top is made from warp wool of good style but its fineness places it just outside the 64's class. Yet it is not fine enough to be included in the 70's range. Very often such wool is put in with 70's wool to help the length but it naturally introduces a broader fibre. Some mediocre tops are called 66's but very often this is done either to differentiate between two top types, or to get a rather better price. The top here called 66's lives up to its name and is very often used for dyeing and recombing for the high class trade where something better than 64's but lower in quality than 70's is required. 70's tops are used in the speciality trade. Very often the demand for these superfine tops is greater than the supply. The soundest Australian wool is used, e.g. Port Philip, Super Tasman, wool from the Mudgee Basin and the Monyarra Yess, etc. Such wool is selected fleece wool, carefully sorted, frequently double combed, and well cellared after combing. Many good class 70's tops of superior style and quality are sold as 80's. True 80's however, are not plentiful and this is also the position as regards 90's and 100's. Climatic conditions effect the growth of this superior wool considerably. Successive seasons do not produce the same quantities and for this type of wool fancy prices are frequently paid. It would thus appear that quality numbers often designate a "class" of types rather than a "single" type of top. Even when a quality number is qualified it is not always possible accurately to picture what kind of top it may be. Thus buying on type rather than buying on description is the rule.

The evolution in the course of years of the several types of top may very often be traced to a demand for something cheaper or perhaps for some special effect. A spinner using, e.g. a warp 64's may suddenly find that he cannot afford the price and if necessary a shorter top will do. A new type of top to meet his demand is produced. The argument can be repeated and it is easy to visualise the coming of other descriptions in the range.

The hosiery trade, as above noted, uses many varieties of tops. For some of the thicker yarns used in this section of the industry greater latitude in the types of tops used is possible without much resultant variation. As an example, for one inquiry a top had to be made from 60's skin wool, not very soft but very springy in order to give a certain desired effect.

In this manner, various types of tops are made and become standardised until, as now, a considerable number of types of tops under one denomination are produced. In a similar manner several types of 60's and 70's have been evolved, swelling the number of merino standard types of top and the range still tends to increase. Considering all the difficulties, the top maker maintains a very high consistency. A big trial of the top-maker is the irregular demand. If the demand were steady, it would be possible to prepare and have tops cellared, and so ripe for use, but this appears to be impossible.

REVIEWS

The Genetics of Cotton. By Sydney Cross Harland. (Jonathan Cape, London. 1939. Pp. 193, price 10s. 6d. net.)

The author is well-known as a leading authority on the genetics of cotton and he has produced a book which will be of great use to all investigators in this subject. It brings together for reference the relevant facts and will therefore be of value to the much wider circle of those who are concerned in obtaining reliable information about cotton.

The body of the work is divided into three chapters, dealing respectively with Taxonomy, Cytology and Genetics of the genus Gossypium. These are followed by short sections giving lists of genes in the genus, linkage relations, mutations, hybridisation, polyploidy and haploidy, and the evolutionary history of the genus. The bibliography extends to twelve pages (from which certain relevant papers are missing) and an index is added which is in uncomfortably small type.

The author makes a clear case for the conclusion that the genus Gossypium is an ancient one, probably extending back to the Cretaceous; and the endemic species in Hawaii, Fiji and the Galapagos indicate that part of its evolution took place in a Pacific land mass, only remnants of which remain. While it appears probable that the cottons with $n=26$ chromosomes are allotetraploids, yet it remains obscure what diploid species intercrossed to produce the commercial New York cottons. Probably further light will be thrown on this subject by a more intensive study of the chromosomes in various forms. This should include not only their size and spindle attachments but also the satellites, nucleoli and secondary constrictions, correlated with the chromosome pairing behaviour in the hybrids. By such means it is probable that further light will be thrown on the evolution of the species, and this will be valuable as an aid in the genetics of cotton improvement.

Every person concerned with cotton will find this book of interest.

R. RUGGLES GATES

Textiles. R. Thiébaut. (Paris: Dunod & Co., 1939; 364 pages + 63 pages of mathematical and physical tables.)

This pocket book is one of a series of useful books of "tabloid" information for which Messrs. Dunod are justly famous. Its scope is sufficiently indicated by the list of contents—Pages 1-29, textile fibres and their production (including one page on rayon); pp. 31-44, systems of yarn counts; pp. 45-56, marketing of raw fibres, yarns and fabrics; pp. 57-138, spinning; pp. 140-245, loom mechanism and weaving; pp. 246-275, fabrics and their structure; pp. 276-291, knitting; pp. 293-320, bleaching, dyeing, printing and finishing; pp. 321-324, heating and humidification; pp. 326-348, questions of mill management; pp. 350-363, tables of textile data and conversion formulæ. The disproportion of space devoted to the mechanical processes and to the chemical processes is obvious. The book fits very well, perhaps, into a scheme of compact reference books for laymen but the section on loom mechanism is the only one that approaches the requirements of textile students.

T.

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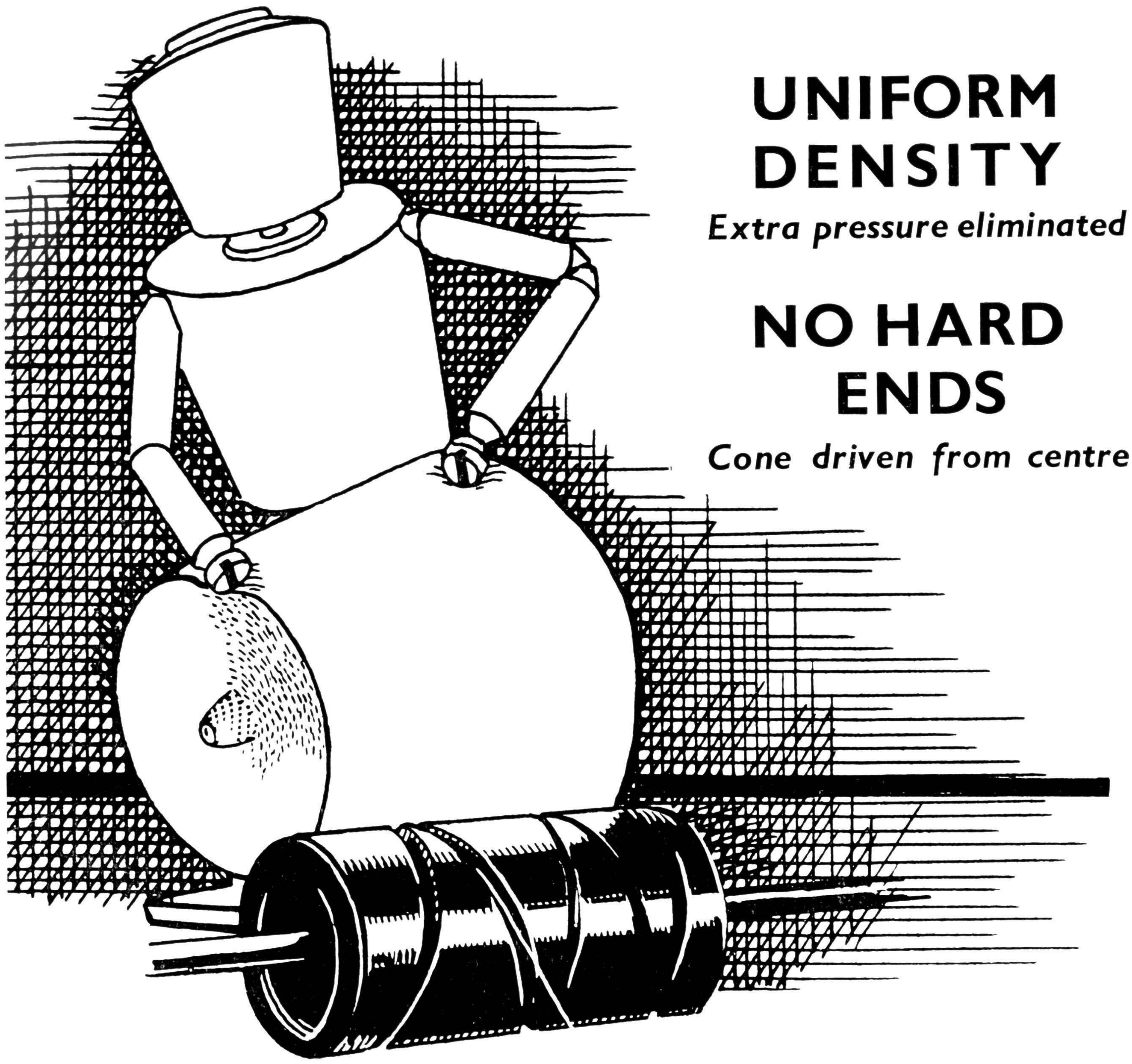

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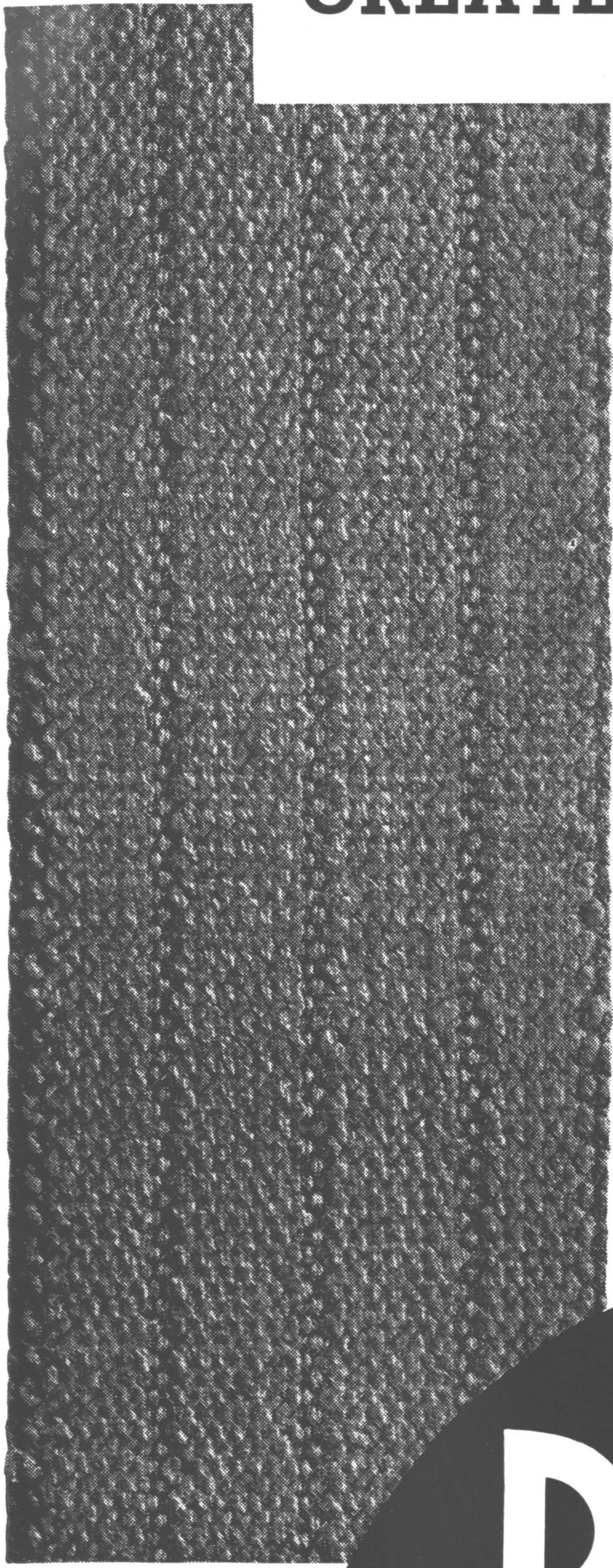

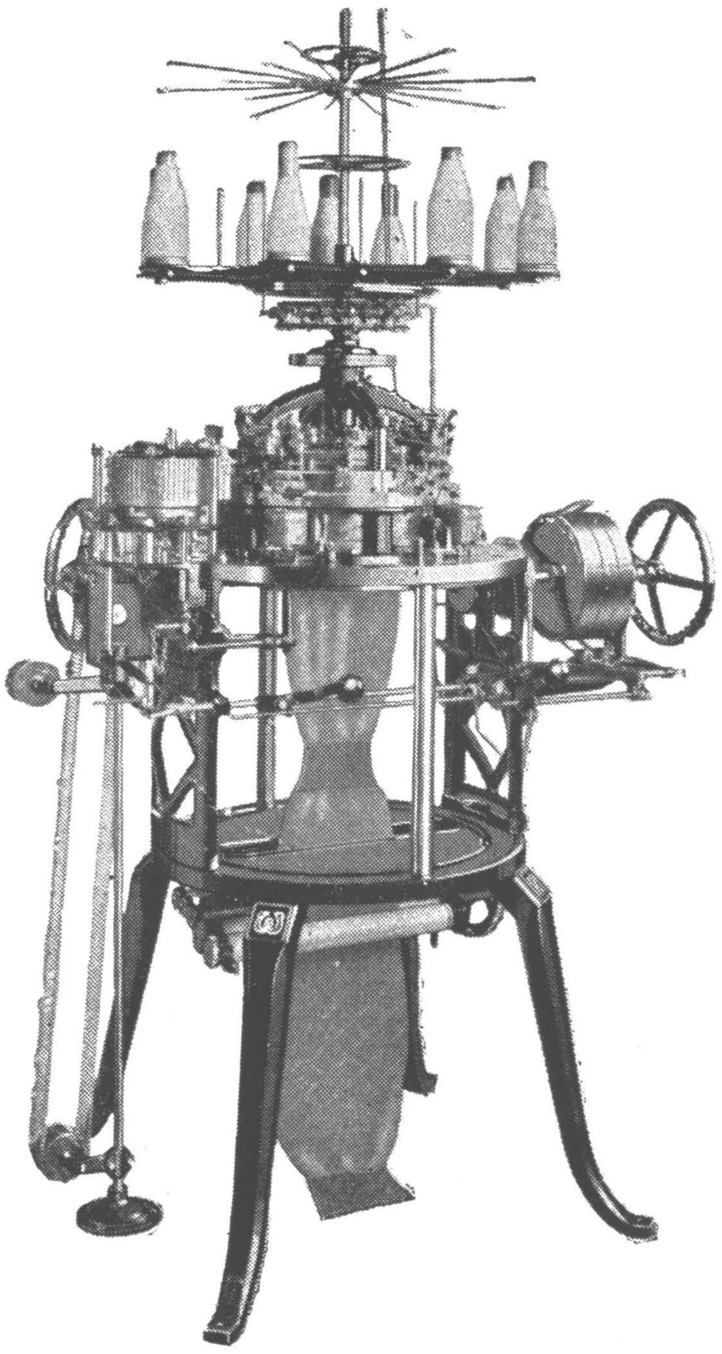

THE JOURNAL OF THE
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TRANSACTIONS

6—MODIFIED STARCHES. PART II*

DEGRADATION OF STARCHES BY HYPOCHLORITE SOLUTIONS

By G. B. JAMBUSERWALA and K. R. KANITKAR

In a study of starches modified by means of varied quantities of potassium dichromate and sulphuric acid, it was found as described in the paper published by one of us (G.B.J.)*, that the majority of starches were degraded to such an extent that they could be of very little use for textile processes. In continuation of the work starches have been treated with various concentrations of neutral hypochlorite solutions. The degrading action in these circumstances is due to the oxidising agent alone, since no acid is present. When the reducing values of starches modified by the two oxidising agents, having the same oxygen content, are compared, it is surprising to find that modification by means of potassium dichromate affects the reducing value about three times as much as modification by means of hypochlorite solution. Thus a reduced degree of modification is effected in the present series of modified starches with a view to their applicability to textile operations. Owing to the limited extent of degradation in this series of experiments, it has been found necessary to make more delicate determinations such as those of carboxyl groups and alkali-labile values to give a more accurate estimate of the degradation of the products. The main object in modifying starch is to increase its penetration as compared with that of raw starch. For this reason a new attempt has been made to study this property by such standard tests as "Herbig" and "Drop Number". Accordingly in the present investigation, a more exhaustive study of modified starches has been made by introducing these four new determinations to the list of those already mentioned in the earlier paper.

Different methods of modifying starch give products of quite different solubilities and viscosities. Acids, alkalis, selected metallic salts, oxidising agents, enzymes etc., are capable of reacting with starch so as to alter its physical and chemical characteristics. The process of hydrolysis begins immediately and its extent varies according to the length of time and temperature of digestion. Oxidising agents of all types such as potassium permanganate, chromates, ozone, persulphates, peroxides, chlorine, hypochlorites, hypobromites and others in their aqueous solutions are digested with starch for a number of hours, to give modified products. While Seck (B.P. 437,890) obtained soluble starches by treatment with hypochlorites, N. V. Muelen and J. H. Muelen (B.P. 420,275) produced soluble starches by treating the suspension of starch (cold) with hypochlorites in presence of ammonia, hydrazine, pyridine etc. So also, Brueder (U.S.A. Pat. 646,724—1899) treated

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* Part I was published in the *J. Text. Inst.*, 1938, 29, T140.

starch with alkaline hypochlorite to obtain soluble starch. Hartwig (U.S.A. Pat. 798,509—1905) treated starch with gaseous chlorine for 8 to 10 days to obtain starch soluble in hot water. Haake (U.S.A. Pat. 813,647—1906) mixed 100 parts of starch containing 20 parts of water with 7 parts of calcium hypochlorite and 1 part of sodium bicarbonate to cause its modification. Siemens and Halske (D.R.P. 103,339) treated starch with chlorine in the presence of nitric acid and obtained a product soluble in hot water. In one example of European practice, chlorination is conducted by suspending starch in an organic solvent containing the chlorine molecule followed by the removal of the solvent. Also "Activin" (Sodium compound of *p*-toluidine sulpho-chloride) was used to modify starches (*Am. Dye. Rep.*, 1925, **14**, 667; 1927, **16**, 789).

The reasons for preferring the method for determining the reducing values of carbohydrates suggested by Richardson and others (*J. Text. Inst.* 1936, **27**, T131) to the methods put forth by other investigators, have already been discussed in the previous paper.*

It is well known that when cellulose is oxidised in an alkaline medium, carboxyl groups are formed, and these are responsible for bringing about an enhanced affinity for basic dyes and certain other properties of oxidation products. Schwalbe (*Ber.* 1921, **34**, 548) and Schmidt and others (*ibid*, 1934, **67**, 2037) attempted to titrate carboxylic acids directly with standard alkali. However Neale and Stringfellow (*Trans. Faraday Soc.*, 1937, **33**, 881) have contended that carboxyl groups attached to solid insoluble residue restrict the ionisation of acid groups, rendering quantitative neutralisation very difficult. They also found unsatisfactory the method of Ludtke (*Papier Fabrikant*, 1934, **32**, 509, 528; *Angew. Chim.* 1935, **53**, 5) for determining carboxyl groups in cellulose by titrating with dilute caustic soda in the presence of a large excess of calcium acetate using phenolphthalein as indicator, presumably because of the buffering effect of the acetate. If, however, the oxidation products are first suspended in a solution of sodium chloride an interchange takes place between the sodium ions of the salt and the hydrogen ions of the COOH groups. Though so far the last method seems to have been employed for degraded cellulose, it can be applied to modified starches as well to find out the extent of the carboxyl groups formed in starch on treatment with oxidising agents.

The commonest form of change which starch undergoes gives rise to reducing sugars and is therefore probably scission of glucoside linkages. During the earlier stages of transformation rather large changes in the physical aspects of starch take place without any great accompanying changes in the reducing values. Now starch is composed of two parts, one of which is readily attacked by hot aqueous alkali and other is relatively slowly attacked, and the latter part can be recovered substantially unchanged after the alkali has acted. The two parts are called respectively alkali-labile and alkali-stable, the one being the antithesis of the other. Various pretreatments of starch cause changes in the amount of alkali susceptible portion. Further slight changes in starch that are not discernible by such well known determinations like viscosity, specific rotation, colour with iodine, and initial reducing values, can be detected readily by allowing hot aqueous alkali to act upon starch, neutralising, and determining the new reducing matter iodimetrically. Thus it is possible to magnify small differences in starches that would otherwise not be significant by the initial reducing values. By titrating iodimetrically the alkali-digested solution of noncarbohydrate break-down material having its origin in the alkali-labile portion, a number, expressed in milligrams of iodine per hundred milligrams of starch may be obtained. This is called as alkali-labile value. (*J. Am. Chem. Soc.*, 1929, **51**, 294; 1933, **55**, 264). More recently Taylor and others (*J. Ind. and Eng. Chem.* (*Anal.*) 1935, **7**, 321) after exhaustive trials have evolved a modified method of determining the alkali-labile values of starch to give more precise and reproducible results. This method has been used with advantage for determining the alkali-labile values of the modified starches.

The extremely delicate reaction between starch and iodine serves as a unique test for both the substances. According to Chretien and Vandenberghe (*Ann. Chim. Anal.*, 1921, **3**, 19) 1 c.c. of 1% starch paste gives a distinct blue colour with as little as 0·1 c.c. of $N/100$ iodine solution. Besides, the iodine test serves a very useful purpose for controlling the course of acid diastatic hydrolysis of starch, since the deep blue colour characteristic of starch changes through violet to reddish brown and finally to pale yellowish red as hydrolysis progresses. Hence Johnson (*J. Am. Chem. Soc.*, 1908, **30**, 798) compared the diastatic activity of enzymes by the depth of the blue tint given by iodine. Blake (*J. Am. Chem. Soc.*, 1918, **40**, 623) and Das Gupta (*J. Ind. Inst. Sc.*, 1936, Vol. 19A, Part IV, p. 37), respectively employed the Dubosq colorimeter and the Lovibond tintometer to express starch-iodide blue tint numerically. Accordingly, the Lovibond tintometer was employed here to determine the degree of hydrolysis of the modified starches.

An outstanding feature of raw starch is its high viscosity. Its viscous property can be modified by suitable treatments, causing a change in its solution properties. The extent to which viscous properties influence the service feature of starch has been dealt with adequately by Farrow and Jones (*J. Text. Inst.*, 1927, **18**, T1). An extensive study of the viscosity of starch pastes and the conditions affecting it has been made by Harrison (*J. Soc. Dyers and Col.*, 1911, **27**, 84). And more recently Richardson and Waite (*J. Text. Inst.*, 1933, **24**, T383), and Wiedmer (*Tiba*, 1936, **14**, 103; 167) have stressed the importance of making the viscosity determinations of starch pastes under precise conditions of temperature, rate of stirring, hydrogen ion concentration, etc. Farrow and others (*J. Text. Inst.*, 1923, **14**, T414; 1928, **19**, T18) have demonstrated that the viscosities of starch pastes, unlike those of normal liquids, cannot be determined satisfactorily by means of capillary instruments; and Jambuserwala* preferred to use a Höppler viscosimeter for the measurement of the viscosities of starch pastes, and the same instrument has been used in this research for the purpose.

Starch pastes are taken up by fibres in two ways (1) by surface coating and (2) by penetration into the interstices of the fibre. The penetration of starch into the fibre varies directly as the fluidity and inversely as the surface tension between the fibre and the starch paste. Besides, penetration depends upon the nature of the fibre and the pressure applied to drive the paste into the fibre by squeezing devices. Herbig (*Z. ges. Textilind.* 1922, **25**, 221; 230) determined quantitatively the amount of solution absorbed by textile materials in a fixed period of time by means of an instrument known as Herbig Tester. Later, the instrument was modified by Herbig and Seyferth (*Z. deut. Oël and Fett. Ind.* 1925, **45**, 751) by introducing a centrifugal device into the older instrument. To test the penetration of the modified starches in the present case an apparatus constructed in this department was used

(*J. Soc. Dyers and Col.*, 1938, **54**, 465). It should be borne in mind that the fluidity of textile auxiliaries is approximately the same as that of water, whereas the starch pastes have such a wide range of viscosities that the property cannot be overlooked in estimating the actual quantity of starch which penetrates because surface coating increases with the viscosity, giving more weight to the treated fibre.

Further, as the fluidity of starch pastes increases, the surface tension between starch pastes and the fabric alters. Surface tension between two phases can be measured by a standard method known as "drop number" originally suggested by Donnan (*Ztg. Physik. Chem.* 1899, **31**, 42). He measured drop numbers of a given liquid against a solution of the substance under test by means of a standard pipette. As the interfacial tension between two liquids alters, the number of drops emitted alters proportionally, thus giving an indication of the penetrating power of the solution under test. In other words when the penetrating properties of starches are compared, the larger the number of drops passed from the standard pipette (containing petroleum ether) into a starch solution the smaller is the surface tension, and the greater is the penetrating power of the starch paste.

A more practical method for studying the penetrating power of the modified starches is to size yarn with them under identical conditions and subsequently weigh the sized yarns and determine their tensile strengths. Hence, all the three methods have been employed in the present investigation to evaluate the penetrating properties of starches.

EXPERIMENTAL

Modification of Starches

In the first instance a concentrated aqueous solution of perchloran (calcium hypochlorite containing about 68% of available chlorine) was made and residue was allowed to settle. Then this was filtered off and the filtrate was rendered acid to bromo-cresol purple (*p*H 5·2–6·8) by means of dilute acetic acid.

Samples of 50 g. each of dried corn, wheat, sago and farina starches were treated separately with 100 c.c. of hypochlorite solutions of 0·25%, 1%, 2%, and 3% concentrations of free available chlorine (on the weight of starch), adding gradually with vigorous shaking without allowing the temperature to rise. The treatment was continued for twenty hours and the solution was filtered off and washed free from chlorine. So produced the modified starches were dried on porous tiles and subsequently in a drying oven at 105° C. In this manner a series of sixteen modified starches was obtained sufficient in quantity for the purpose of present investigations.

Measurement of Reducing Values

Starch (about 2 g.) was weighed out accurately and made up into a 100 c.c. paste. 10 c.c. of the paste was transferred into a Pyrex boiling tube to which 5 c.c. of glucose solution (0·04%) was added. To the mixture was added 20 c.c. of boiling Braidy's solution composed of 3·6 g. of solid mixed carbonates, (anhydrous Na_2CO_3 130 parts and Na HCO_3 50 parts),—18 c.c. of mixed carbonates solution (anhydrous Na_2CO_3 130 g. and $NaHCO_3$ 50 g. per litre) and 2 c.c. of 10% Cu $SO_4{\cdot}5H_2O$. The contents of the tube were heated on a water-bath at 90° C. for three hours. The tube was then centrifuged to separate the reduced copper from the aqueous layer. After decanting the upper layer the residue was well washed to render it free from alkali. The reduced copper left in the tube was then dissolved in 40 c.c. of warm ferric alum, and the ferrous alum so produced was titrated with ceric sulphate (0·04*N* containing 1*N* sulphuric acid), using *o*-phenanthroline as an internal indicator (*J. Am. Chem. Soc.*, 1933, **55**, 2649). Identically a blank test was carried out for the determination of the reducing value of the glucose added to the starch paste, and this was deducted from the reducing value for the starch-glucose mixture. This result was converted into mgm. of copper reduced (RCu), (taking 1 c.c. of *N*/25 Ce $(SO_4)_2$ equivalent to 2·54 mgm. of copper) and by dividing it by the weight of starch taken, the reducing power of starch per gram was obtained.

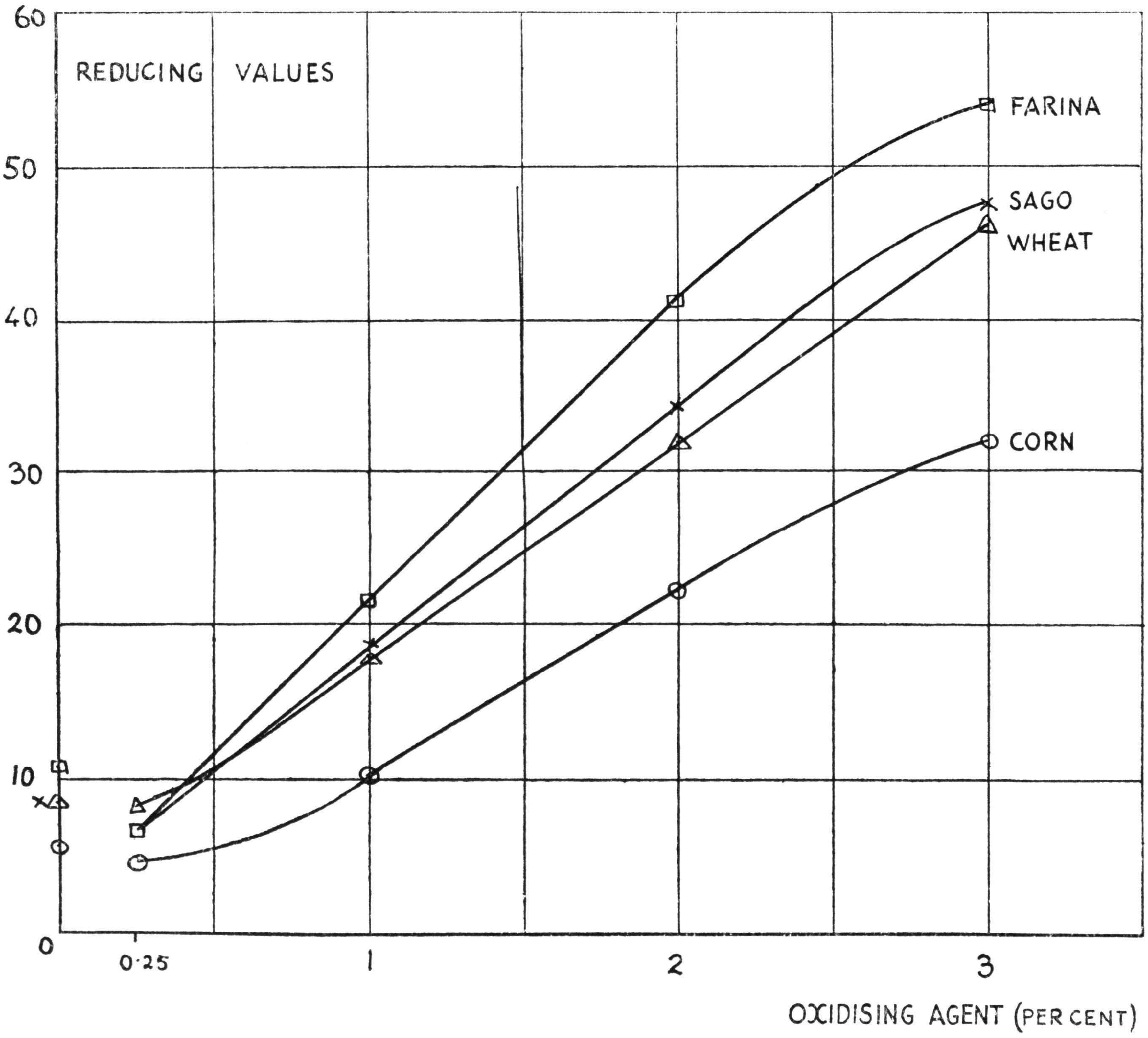

FIG. 1

Carboxyl group determination

1 g. of starch was washed with 0·1 *N* hydrochloric acid and then with distilled water on a filter paper fitted on to a glass funnel, till the filtrate was neutral to bromo-cresol purple (*p*H 5·2 to 6·8). The starch thus washed was added to 20 c.c. of sodium chloride solution (50 g./litre) contained in a conical flask. To this mixture 20 c.c. of 0·02 *N* caustic soda was added. Later air free from carbon dioxide was bubbled into the flask for five minutes. After stoppering it well, the flask was allowed to stand for half an hour. After adding four drops of bromo-cresol purple the mixture was titrated with 0·02*N* hydrochloric acid. On reaching the end point, the mixture was boiled and air free from carbon dioxide was passed to see if the end point drifted further. The result was converted into milli-equivalents of carboxyl groups per 100 g. of starch.

Determination of Alkali-Labile Value

Volumes of 2-3 c.c. of starch paste containing approximately 0·05 g. of starch were taken in large boiling tubes, and to each of these was added 10 c.c. of 0·1 *M* caustic soda solution. They were heated on a boiling water bath for one hour. After cooling under a running tap for thirty seconds 10 c.c. of 0·1 *M* hydrochloric acid was added quickly. The contents of the tubes were transferred to 250 c.c. flasks with 20 c.c. of wash waters from the boiling tubes. These were neutralised to phenolphthalein by means of caustic soda and a further addition of 5 c.c. of 0·1 *M* caustic soda was made to each.

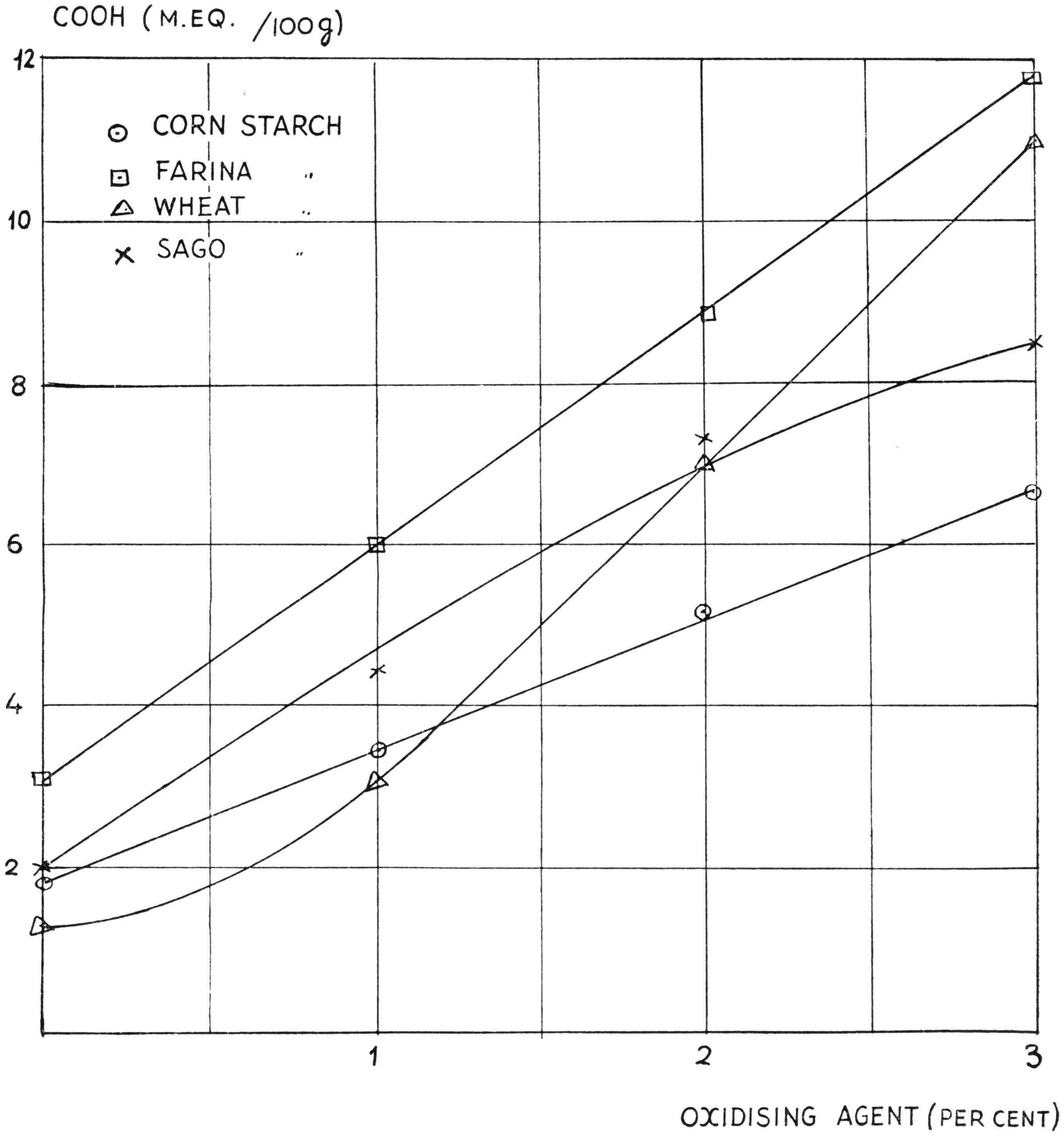

FIG. 2

10 c.c. of 0·025 *M* iodine solution was introduced quickly, taking care that the last three operations were completed within three minutes. The flasks were kept in a cool place for 45 minutes. Subsequently 5 c.c. of 10% hydrochloric acid was added to liberate iodine. Finally this was titrated against 0·025 *M* sodium thiosulphate. The alkali-labile value was deduced in mgm. of iodine by dividing the titration reading with the weight of starch used and multiplying by 100.

Determination of Starch-iodide Colour Units

In order to get more comparable results it was found necessary to employ such concentrations of iodine and starch solutions as could maintain the units of neutral colour (e.g. yellow) more or less constant. By trial it was found that 5 c.c. of 0·2% starch paste and 3 c.c. of 0·005% iodine solution were able to maintain neutral tint satisfactorily. For each of the starch samples the same concentration of iodine solution was used to give a blue starch-iodide colour which was resolved into units of blue, red and yellow by means of a Lovibond tintometer. It was observed that with the increase in the degree of modification of starch, while yellow intensities were constant the intensities of blue decreased and those of red increased. Hence the intensities of the three colours were converted into that of the predominant colour (i.e. difference between the two higher units, e.g. units of blue minus those of yellow) and also into those of component colour (i.e. difference between two lower units e.g. units of red deducted from those of yellow) which express numerically the degree of hydrolysis suffered by the starch. (Table I, Cols. 5 and 6).

Table I

Starch	Chlorine treatment	RCu in mgm. per gram of starch estimated by $Ce(SO_4)_2$	Carboxyl groups in milli-equivalents for 100 g. starch	Alkali-labile values in mg. of I_2 for 100 mg. of starch	Starch-iodide tints	
					Predominant colour units	Component colour units
	1	2	3	4	5	6
	Per cent.					
Corn	—	5·80	1·8	16·3	14·35	1·75
,,	0·25	4·20	—	—	14·35	1·45
,,	1·0	10·20	3·5	21·7	14·25	0·6
,,	2·0	22·50	5·2	28·0	13·7	0·5*
,,	3·0	31·70	6·5	33·6	10·0	2·45*
Wheat	—	8·54	1·2	22·6	14·35	1·95
,,	0·25	8·36	—	—	14·35	1·45
,,	1·0	18·03	3·0	24·6	14·3	0·25
,,	2·0	31·50	6·8	32·1	11·85	2·45*
,,	3·0	45·80	10·4	35·5	9·45	3·35*
Farina	—	10·90	2·65	18·6	14·5	2·4
,,	0·25	6·72	—	—	14·25	2·05
,,	1·0	21·56	6·1	25·9	14·0	1·75
,,	2·0	41·60	8·8	32·8	12·45	1·15
,,	3·0	53·87	11·7	38·9	9·35	0
Sago	—	8·30	1·9	18·7	14·7	2·3
,,	0·25	7·10	—	—	13·9	2·05
,,	1·0	19·05	4·3	25·2	13·6	1·4
,,	2·0	34·30	7·3	29·3	12·25	1·05
,,	3·0	47·05	8·4	31·9	10·45	0·45

* Units of yellow deducted from those of red.

Viscosity Determinations

2·5 g. of starch was stirred into 100 c.c. of cold water. This was slowly brought near the boil (about 92 C.), heating being effected by means of a boiling water bath. The heating of the starch paste was continued for three hours with frequent stirring. Later it was made up to 100 c.c. paste before the viscosity determinations were made. The viscosities of the pastes were determined by means of a Höppler viscosimeter, by noting the time of fall of the ball from the upper mark to the lower one in the tube within the water jacket of the instrument. Two viscosity measurements were made for each of the modified starches, one at 70° C. and another at 30° C. The determinations were converted into centipoises by multiplying the time interval of the fall of the ball by a factor relating to the specific ball and the specific gravity of the starch paste under test (Table II, Cols. 2 and 3).

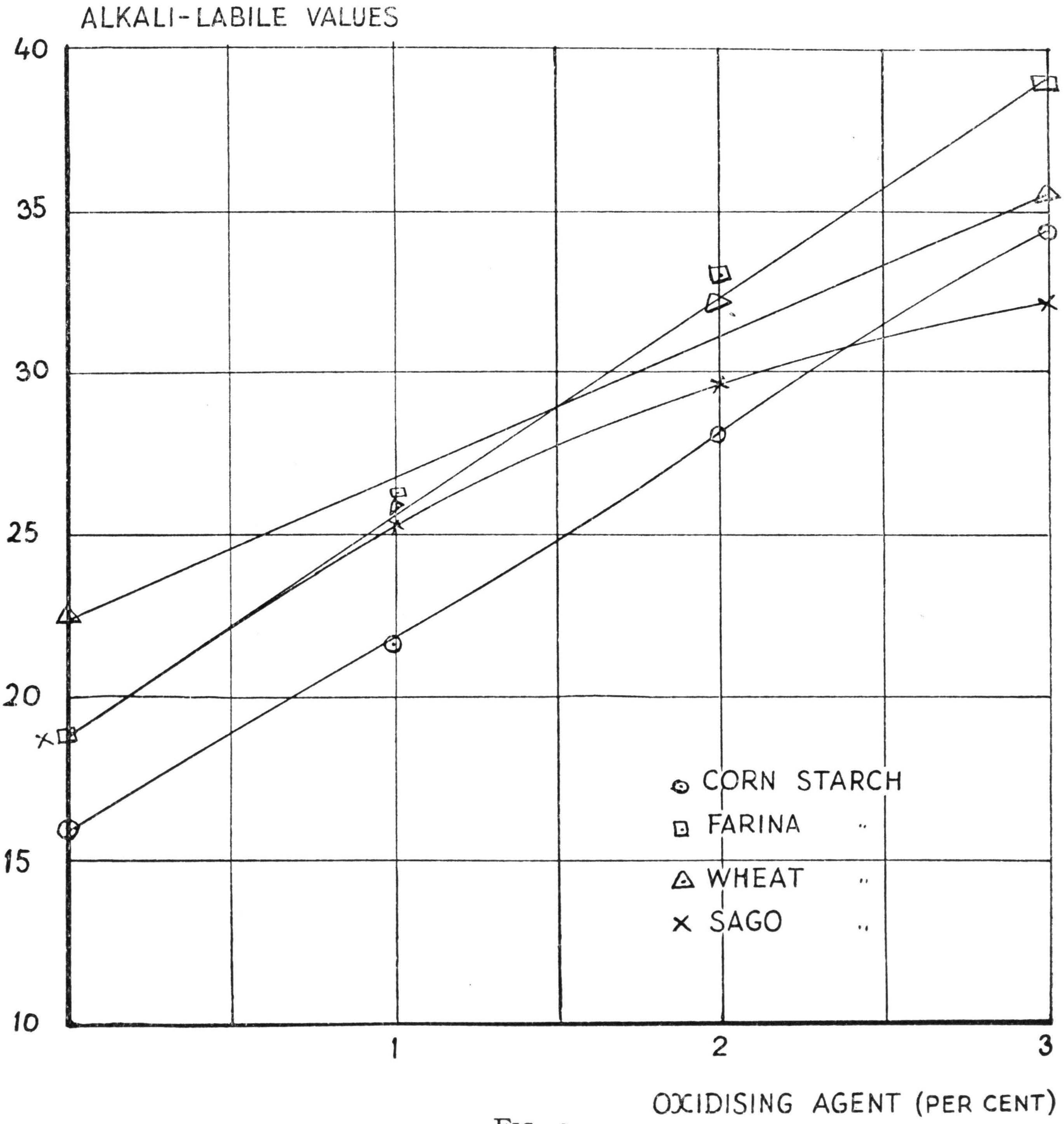

FIG 3

Determination of Herbig Numbers

Three skeins, each weighing about 0·5 g., were weighed accurately in a weighing bottle, and the Herbig number determinations were carried out on a Herbig tester (*loc. cit.*). One of the three skeins was suspended on the hook of the apparatus and to its free end a 10 g. weight was hung to keep it taut during immersion. The skein in this position was then dipped into a cylinder containing 1% starch paste kept at a temperature of 70° C. The duration of immersion was 30 seconds. After raising the hank from the cylinder and detaching the suspended weight, excess of water was removed by centrifuging (a special device fixed on the instrument which stopped automatically after a definite period). The other two skeins were treated in the same way, and all three of them were then weighed together for determining the increase in weight caused by the treatment. These tests were carried out in triplicate. Incidentally the percentage increase would give the Herbig value for starch under test. The Herbig numbers of the starch pastes as set out in Table II Col. 5, can hardly be considered to represent their actual penetrating properties. These pastes are rather viscous hence the figures simply indicate the total take-up, (i) by deposition and (ii) by penetration, of starch by yarn skeins. Therefore it is clear that to obtain a more accurate measure for the penetrating properties of the pastes some sort of relation has to be found between their Herbig numbers and viscosities. Empirically, it has been found that by multiplying the Herbig numbers by the relative viscosities of the respective starches, numbers have been obtained that give a better estimate of their penetrating properties and also these could be more readily compared with the Herbig number (penetrating power) of water which is 40 (Table II Col. 7).

Table II

Starches	Chlorine treatment	Viscosity in centipoises for 2·5% paste 30° C.	Viscosity in centipoises for 2·5% paste 70° C.	Drop Number	Herbig Number	Absolute viscosity of starch paste at 70° C. 1% paste	"Penetrating units"
	1	2	3	4	5	6	7
	Per cent.					β	α
Corn	—	8·88	4·36	192	45·8	0·85	21·3
,,	0·25	8·21	4·06	—	43·0	0·66	25·95
,,	1·0	6·86	3·19	204	40·2	0·61	26·7
,,	2·0	2·59	1·32	210	35·5	0·55	26·4
,,	3·0	1·58	0·79	219	—	—	—
Wheat	—	3·54	1·68	212	39·3	0·76	21·0
,,	0·25	3·27	1·60	—	36·3	0·71	20·8
,,	1·0	2·03	1·10	233	35·5	0·62	23·3
,,	2·0	1·50	0·77	233	32·4	0·53	25·0
,,	3·0	1·26	0·63	237	31·4	0·49	24·8
Farina	—	6·07	2·94	170	42·4	1·24	13·4
,,	0·25	2·57	1·35	—	—	—	—
,,	1·0	1·53	0·76	174	26·9	0·60	18·3
,,	2·0	1·27	0·63	—	25·1	0·51	20·1
,,	3·0	1·06	0·54	180	25·0	0·47	22·6
Sago	—	5·19	2·52	168	33·2	0·90	13·3
,,	0·25	4·31	1·99	—	—	—	—
,,	1·0	1·88	0·94	173	26·1	0·61	17·4
,,	2·0	1·49	0·71	183	—	—	—
,,	3·0	1·32	0·66	183	26·3	0·50	21·3

$$\alpha = \frac{\text{Herbig No.} \times \text{Absolute viscosity of water at } 70^\circ \text{ C.}}{\text{Absolute viscosity of starch paste at } 70^\circ \text{ C.}}$$

$\beta = \eta$ at 70° C. for water $= 0{\cdot}406$

Measurements of Drop Numbers

A Donnan pipette of the type described by Gardner ("Physical and Chemical Examination of Paints, Varnishes and Lacquers", p. 520A), of 5 c.c. capacity, and bent at the lower end, with an orifice of about 0·8 mm. was filled with ligroin (B.P. 130°-140° C.). The pipette was immersed in a beaker containing 1% starch paste under test. The influx of air at the top was so regulated by a clipped rubber tubing that the efflux of ligroin was in a series of distinct drops from the capillary end. The determinations were made at 80° C., and three measurements were made for each of the starch samples, and the means of the three tests are presented in Table II, Col. 4.

Determination of tensile strengths of sized yarns

About 25 g. of 80's yarn was sized with 10% paste of each of the modified starches as described by Jambuserwala (*J. Text. Inst.*, 1938, **29**, T149). On drying the increase in the weight of yarn was noted. Also the tensile strengths for half leas were determined by means of a ballistic tester (*J. Text. Inst.*, 1926, **17**, T317) as outlined in the previous paper* and the results thereof are set out in Table III, Cols. 1 and 2.

Determination of Stiffness

(*a*) Stiffness measurements of sized yarn were made out on a Gurley's stiffness tester (*J. Paper Trade*, 1934, Dec., p. 20) as described in the earlier communication*.

(*b*) Five strips of filter paper of 2 in. by 4 in. dimensions were sized by dipping into 200 c.c. of 5% starch pastes (one by one) at 90° C. for a period of thirty seconds. The excess of liquor was drained off and the paper was dried. The strips were then cut down to 1 in. by 2·5 in. and their stiffnesses determined by means of a Gurley's stiffness tester as before. It was found that sized strips of paper gave results in better agreement and more reproducible than sized yarn.

Table III

Starches	Chlorine treatment	Increase in weight of yarn by sizing	Tensile strength in lbs.	Stiffness values in mg.		Adhesive values in grams
				Yarn	Filter paper	
	1	2	3	4	5	6
	Per cent.	Per cent.				
		γ	π	a	β	
Corn	—	14·7	26·0	1246	516	31·6
,,	0·25	14·5	26·6	—	—	—
,,	1·0	12·5	26·6	1228	488	16·6
,,	2·0	11·4	26·4	1210	461	11·9
,,	3·0	8·0	27·0	1174	418	11·0
Wheat	—	15·0	26·3	1308	471	48·95
,,	0·25	14·9	25·9	1308	471	41·9
,,	1·0	9·6	25·5	1299	—	13·4
,,	2·0	7·0	25·8	1210	445	12·0
,,	3·0	6·9	26·5	—	427	11
Farina	—	9·3	25·5	1281	445	50
,,	0·25	7·9	25·7	—	—	—
,,	1·0	7·6	25·8	—	391	16
,,	2·0	—	—	1175	391	12·5
,,	3·0	6·9	25·7	1032	382	11
Sago	—	16·3	25·6	1175	520	37·5
,,	0·25	—	26·0	—	498	—
,,	1·0	9·6	26·6	1142	445	15·0
,,	2·0	7·2	26·7	1121	418	12·0
,,	3·0	6·0	26·7	997	409	11·5

a—Stiffness values for untreated yarn 961 mg.
β—Stiffness values for untreated filter paper 226 mg.
γ—Weight of yarn sized about 25 g.
π—Tensile strength of unsized yarn (1/2 lea) 24 lb.

Measurements of Adhesiveness

The original method of Saare (*Chem. Ztg.* 1929, **53**, 975) which was modified by Jambuserwala (*J. Text. Inst.* 1938, **29**, T149), was employed for determining the adhesive powers of the modified starches.

100 c.c. of 5% starch paste was transferred to a suitable beaker (100 c.c.) and a round metal disc (weight 12·4 g., 2 in. diameter) suspended by a fine

silk thread passing over a frictionless pulley, was immersed to a depth of ½ in. The disc was counterpoised by a small pan with weights which were adjusted as required. To avoid the formation of skin, the paste was covered by a layer of olive oil. The whole assemblage was allowed to stand undisturbed for twenty-four hours. Extra weights were then placed in the pan in order to pull out the disc from the paste. These weights gave an index to the adhesive powers of starch. They are set out in Table III, Col. 6.

Analysis of Starches

Table A

Starches	Chlorine treatment	Ash contents %	Nitrogen %	P_2O_5 %	Ether extract (Total fatty matter) %
Corn	—	0·18	0·126	Nil.	1·22
,,	2%	—	0·069	—	0·57
Wheat	—	0·40	0·104	0·076	1·39
,,	3%	0·24	0·046	—	0·79
Farina	—	0·36	0·058	0·090	0·32
,,	3%	0·33	—	0·054	—
Sago	—	0·27	0·045	Nil.	0·42

DISCUSSION OF RESULTS

1—Comparing the reducing values of the modified starches, it is clear that farina starch is modified to the greatest extent, followed by sago, wheat and corn starches in the order named (Table I, Col. 2). This is graphically represented in Fig. 1. It is surprising to find that the degraded products produced by 0·25% chlorine have lower reducing values than their respective untreated varieties. This cannot be attributed to some water soluble impurity present in raw starch, for by washing with water alone its reducing property does not alter. However, raw starch when washed out with 0·5% of sodium carbonate solution has practically no reducing property.

2—It is indicated in Fig. 2 that farina and wheat starches show a pronounced rise in the number of carboxyl groups introduced by degradation, though the latter is not affected greatly in the initial stage of modification. The other two varieties increase their carboxyl group contents gradually.

3—Alkali-labile values of corn and farina starches increase linearly as the degree of modification increases and run parallel to each other as observed in Fig. 3. In the initial stages sago and wheat starches experience similar increases in alkali-labile values, but this is not maintained in the last stage of modification. It will be observed from Fig. 4 that the relation between alkali-labile values and carboxyl groups is approximately linear for each of the four varieties of starches.

4—Predominant colour units (Table I, Col. 5) exhibit a remarkable gradation with degradation in the modified forms of starches. When corn and wheat starches suffer heavily in these units by 3% chlorine treatment, the other two varieties do so by 2% chlorine. Fig. 6 presents an interesting relation between the units of predominant colour and the concentrations of the oxidising agent. Similarly the units of component colour fall off regularly, the units of red increasing with the degree of modification (Table I, Col. 6).

5—The viscosities of the members of the present series of modified starches graphically represented in Fig. 5 indicate a smooth relation between viscosity and reducing value for each variety of treated starch. From Table II, Cols.

2 and 3, it is obvious that the most highly modified forms of wheat, sago, corn and farina suffer in their viscosities by as many as 3, 4, 5, 6 times respectively. Also it is interesting to note that corn, sago and farina starch experience greater falls in viscosity on treatment with 2%, 1%, and 0·25% concentration of chlorine respectively, whereas wheat starch has a graded fall at each stage of modification.

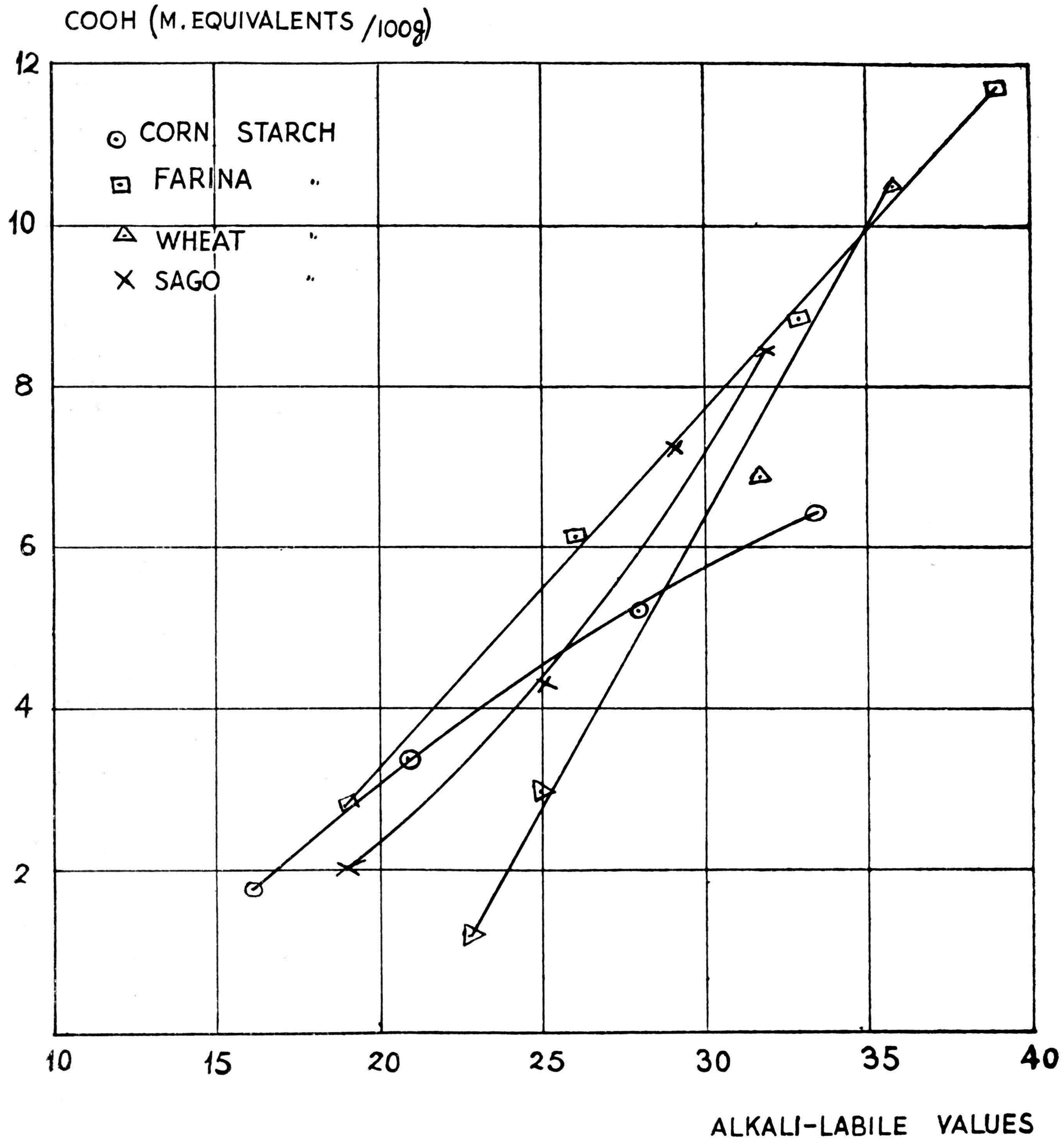

Fig. 4

6—From the Herbig test results converted into penetrating units and drop numbers (Table II, Cols. 7 and 4), it is possible to visualise the increase in the penetrating properties of the modified starches very clearly. Evidently one cannot possibly expect exactly the same results by the two methods because the conditions under which the tests were carried out were entirely different. In the Herbig test the absorbing property of yarn plays no unimportant part and in the case of starch pastes a surface coating would be deposited on the fibre, giving an extra added weight and vitiating the results.

7—The amount of starch taken up by yarn on sizing and shown as increase in its weight in Table III, Col. 2, gets smaller as the starch used in sizing increases in degree of modification. Table III, Col. 3, presents the tensile strengths of yarns sized with the modified forms of starches. It is observed that the more modified the starch, the greater would be the tensile strength of the sized yarn. In any case the rise in tensile strength is not very appreciable because in a fine variety of yarn like 80's there would be little change even under optimum conditions of sizing.

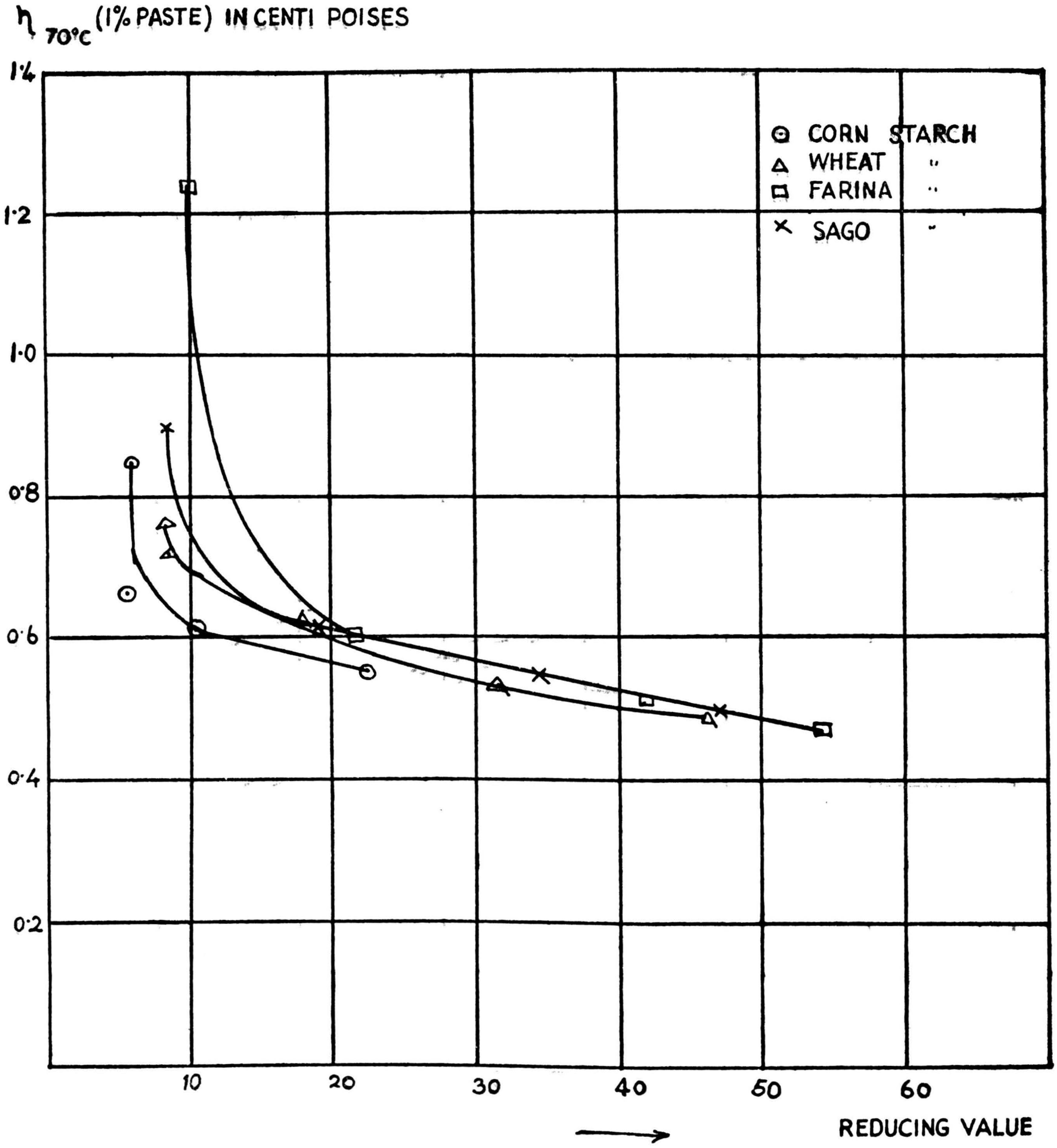

FIG. 5

8—It is proved in Table III, Cols. 4 and 5, that by both the methods, the stiffness of the sized material drops gradually with the increase in the degree of modification, though a more pronounced fall is shown in products produced by 3% chlorine concentration. The results of stiffness tests obtained by yarn and filter paper methods do not coincide, because (*a*) concentrations of starch pastes for sizing were different, being 10% and 5% respectively, i.e. more surface coating would take place in the first instance particularly with high viscosity starches; (*b*) sizing was effected under different conditions. In one case size was forced into yarn by pressure whilst in the other it was simply carried out by dipping paper into starch pastes. The filter paper method is to be preferred to the other for reasons of manipulation and that it gives more reliable, reproducible and consistent results.

9—Adhesiveness of starch pastes is usually correlated with viscosity. However this is not entirely borne out by the results of the present investigation. The adhesive values of the modified forms of all the four varieties go down considerably on treatment with 1% chlorine concentration, and in subsequent modifications the fall is small or nil as found in Table III, Col. 6.

10—As a result of these determinations for the four varieties of starches, it is clear that the degradative action of hypochlorite solutions in each case is different. Broadly speaking, farina starch is affected the most by the oxidising agent, followed by sago, wheat and corn starches in the decreasing order of degradation. Thus it confirms that root starches like farina are more prone than the cereal ones to modification by oxidising agents, as has been already shown by one of us (G.B.J.) in the previous communication (*J. Text. Inst.* 1938, **29**, T149).

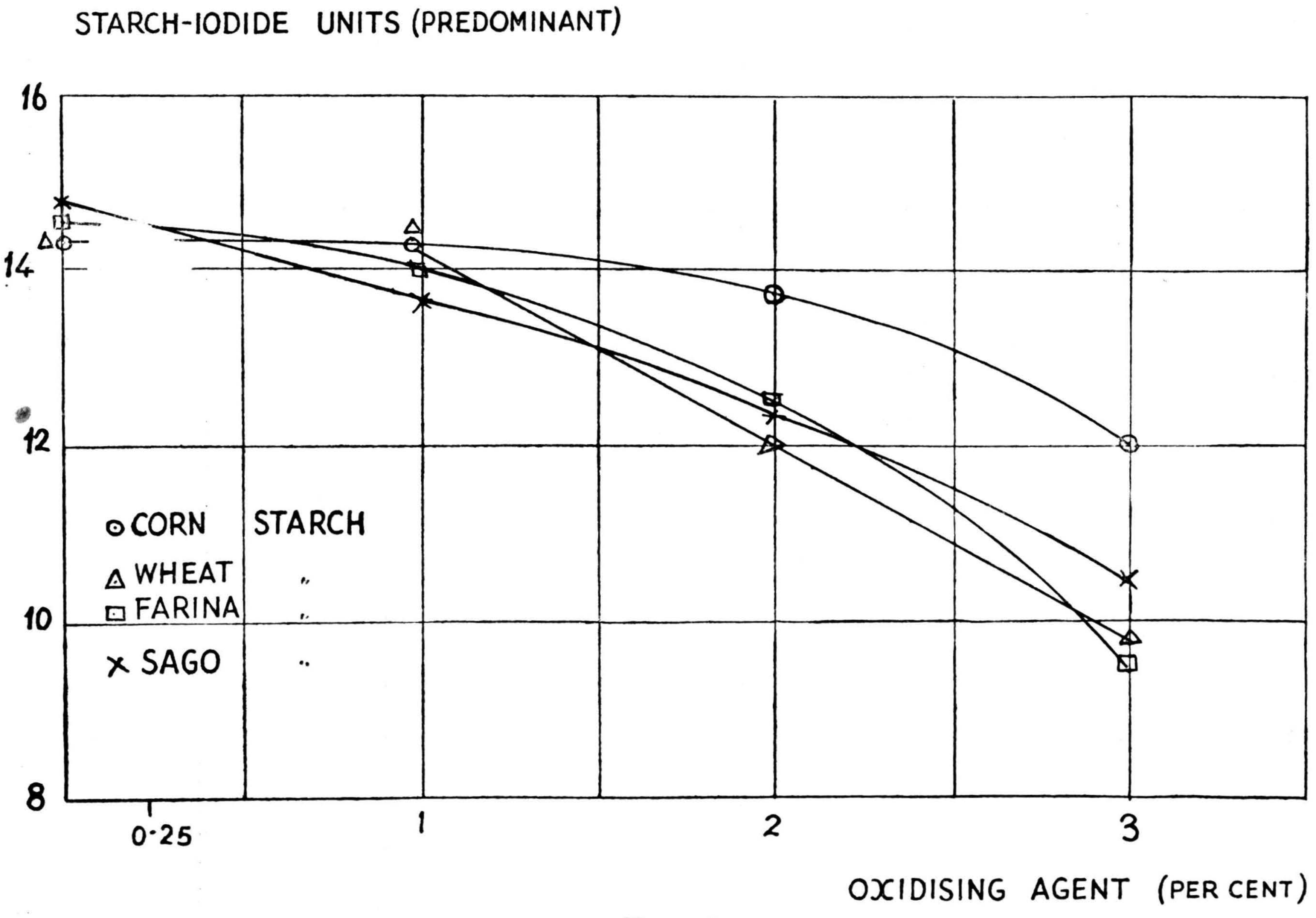

Fig. 6

Finally the modified starches produced in the present investigation have a greater penetration, in other words these have smaller deposition on the surface and as such could result in decreased wear and tear of the sized fibre. The lower viscosities of the modified forms render possible the use of larger quantities of starch in the mix without increasing the viscosity beyond working limits. Also the sized fibre acquires a softer feel and it is more adaptable to textile operations when modified forms of starch are substituted for the raw variety.

Department of Chemical Technology
The University, Bombay 1

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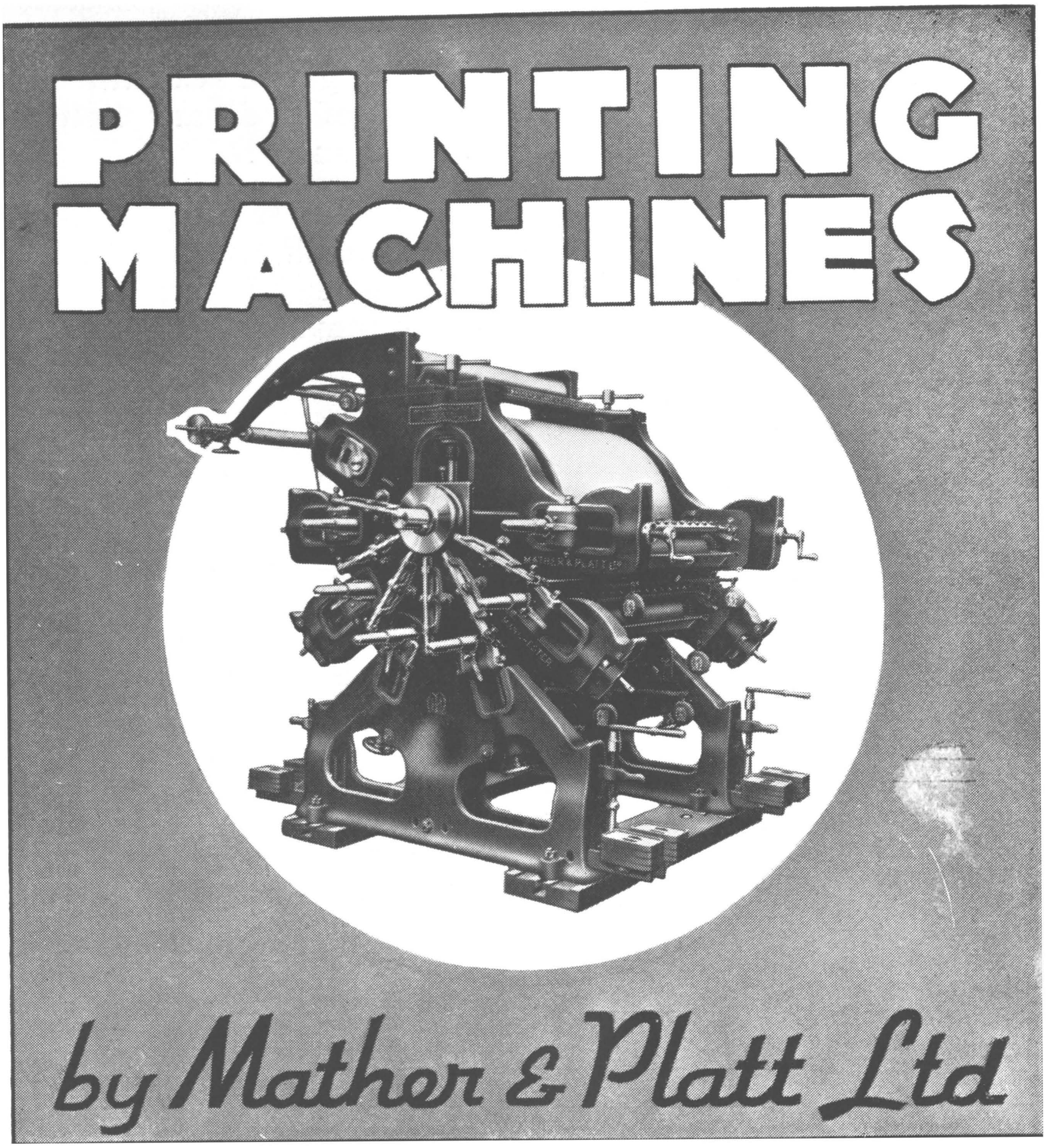
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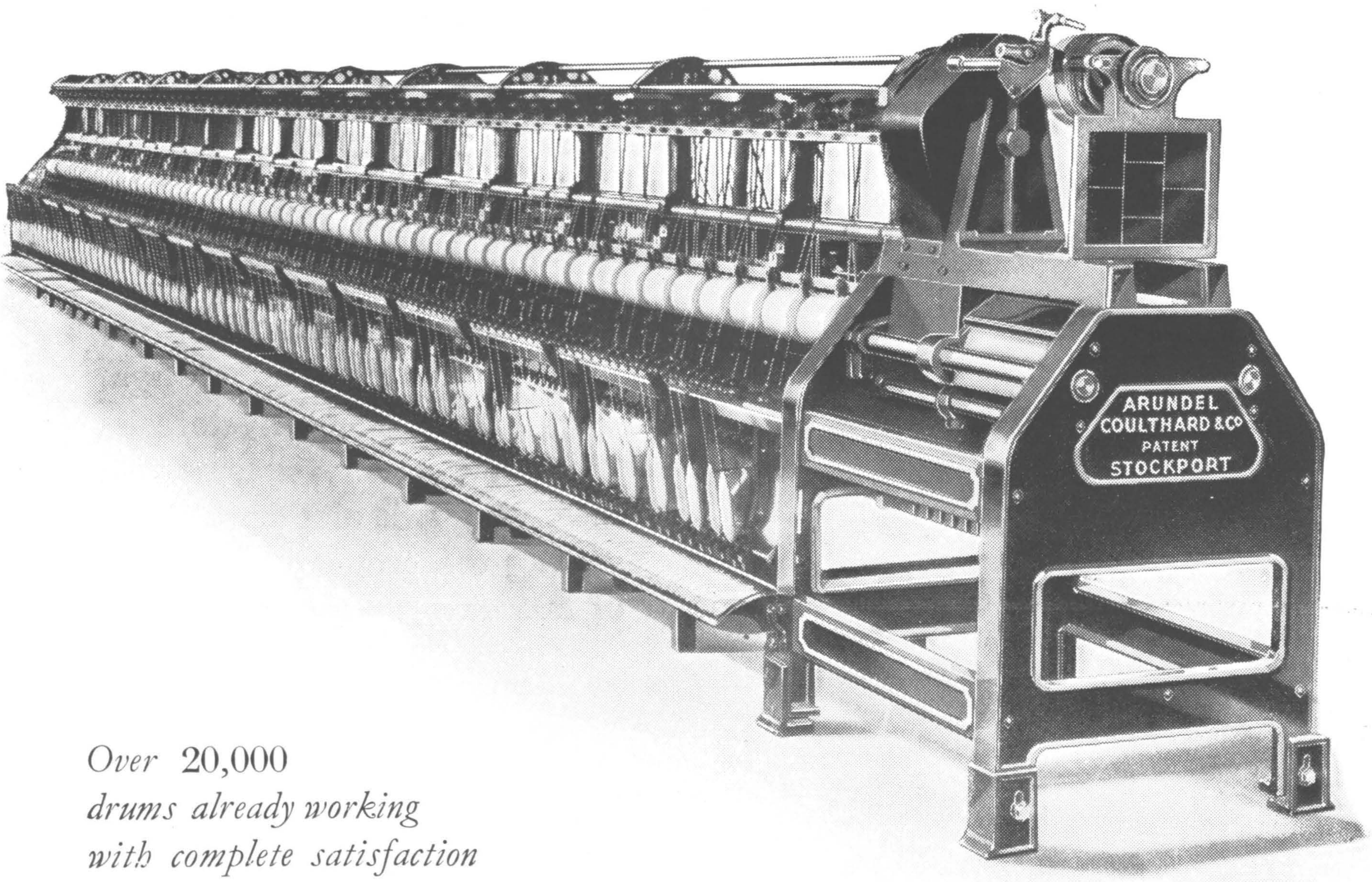
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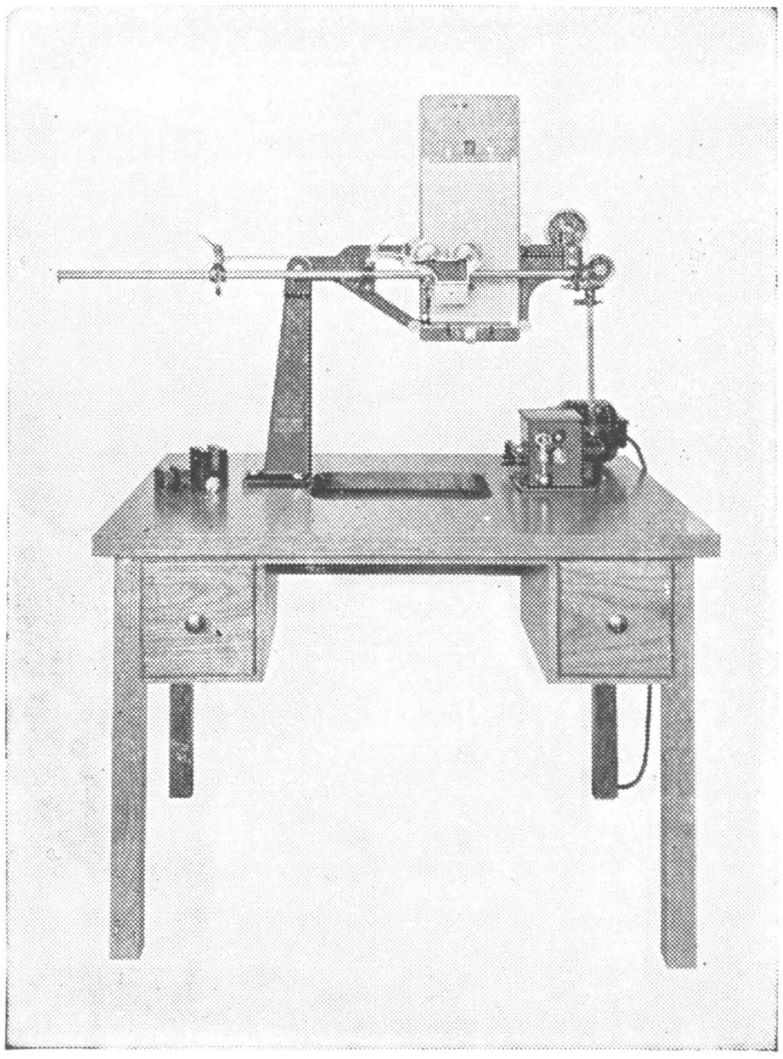
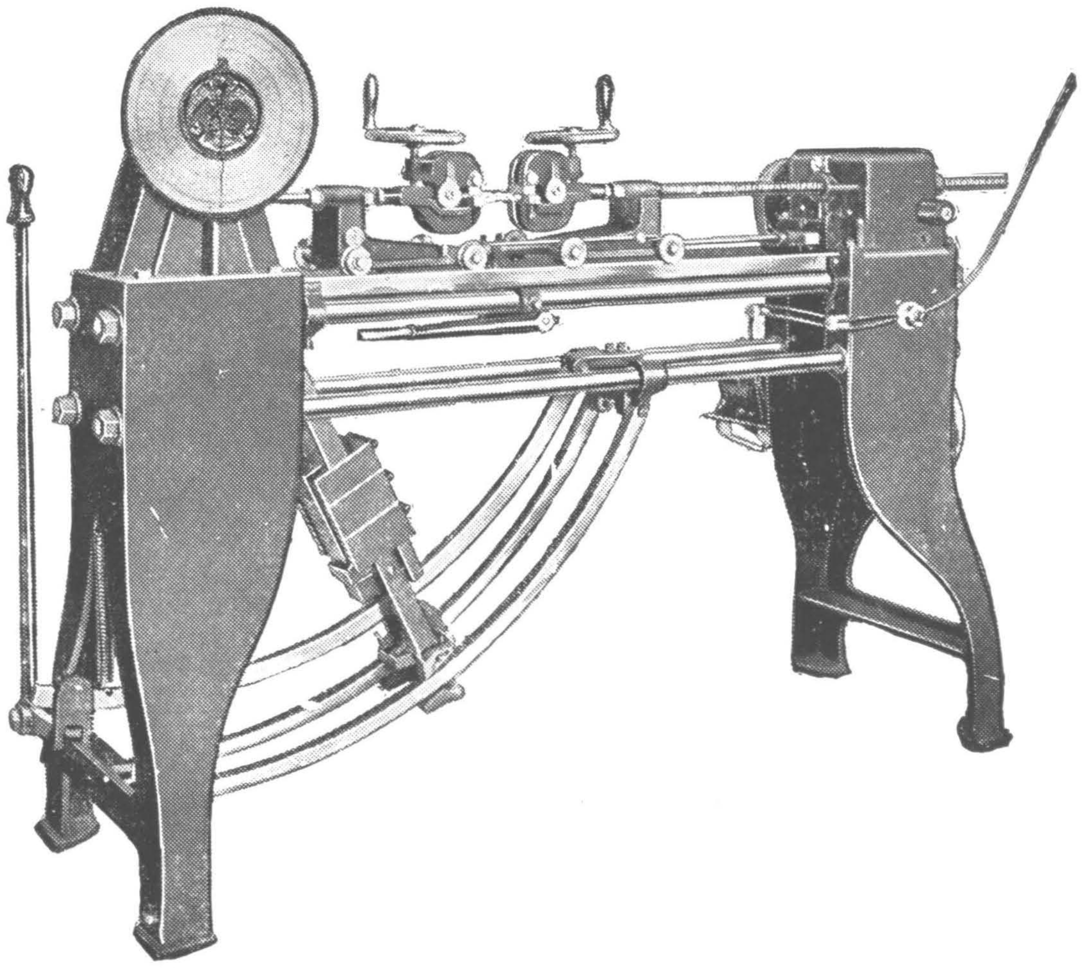




THE JOURNAL OF THE TEXTILE INSTITUTE

ABSTRACTS

LIST OF ABSTRACTORS

The Abstracts in this Section of the "Journal" are supplied by the following Organisations, and the sources 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

(A)—MINERAL

Asbestos: Production and Utilisation. *M/cr Guard. Comml.*, 1939, 38, 238-239.

The utilisation of asbestos for textiles was known to the Romans but was neglected from their day until about 1860. Successful mining in Quebec began in 1877 and until about 1930 Canada produced about 70 per cent. of the world output. Production for 1936 was Canada, 271,800, U.S.S.R. 123,100, S. Rhodesia 50,300, and S. Africa 21,700 tons out of a world total of 503,000 tons. The use of asbestos for textiles is briefly noted. C.

(B)—ANIMAL

New Breed of Sheep: The Romdale. *New Zealand Farmer Weekly*, 1939, 59, No. 51, 26.

Mr. S. J. Hunt, a Central Otago farmer, has evolved a new breed of sheep, the Romdale, a product of the Corriedale and the Romney. The sheep is plain-bodied and the wool in the first cross is from 44's/46's to 50's count. A photograph of the Romdale is given. W.

Methods of Liming and Preserving Sheep Skins. W. Grassmann and H. Schelz. *Textil Betrieb*, 1938, Aug., 16-18 (through *Chem. Abs.*, 1939, 33, 1987).

All shearing should be avoided. The different liming methods yield no characteristic differences with regard to leather quality and yield. The biological methods give poorer results than the others. Addition of naphthalene to the preservative salt may effect the colour of the wool. The use of soda without naphthalene has a deleterious action and reddens the skins, particularly in hot weather. Addition of zinc oxide to the preservative salt gives better results. The claim that preservation with salt alone and storage in such preserved state have a bad effect on the wool quality is not proved. W.

Mycotic Dermatitis in Sheep. G. Fethers. *Pastoral Rev.*, 1939, 49, 158.

Treatment for mycotic dermatitis ("lumpy wool") consists of dipping in the late autumn in a solution of 2 lb. of bluestone to 100 gallons of water. A hand-dressing lotion consists of equal parts of raw linseed oil and 2½ per cent. tincture of iodine. W.

Blowfly Control in South Africa. *Pastoral Rev.*, 1939, 49, 131.

Claims made for the efficacy of the oil of the Mexican marigold as a blowfly repellent (see *J. Text. Inst.*, 1937, A674) are not substantiated. Although the oil of the plant is a very strong repellent, later investigations indicate that repellents alone will not prevent re-strike on treated wounds when conditions are otherwise favourable to the fly. W.

Studies on Fly Strike in Merino Sheep—I. D. A. Gill and N. P. H. Graham. *Australia: J. Council Sci. Ind. Res.*, 1939, **12**, 53-70.

A detailed account of the results obtained by Mules' operation (crutch-fold removal). W.

Studies on Fly Strike in Merino Sheep—II. D. A. Gill and N. P. H. Graham. *Australia: J. Council Sci. Ind. Res.*, 1939, **12**, 71-82.

Minor degrees of vulvar deflection had no relationship to strike incidence. Available evidence also refuted the belief that sheep should be docked short. A very close association was noted between the extent of crutch fold development and tail fold development. The opinion is expressed that, if rightly applied, the use of Mules' operation need not conflict with a policy of breeding away from an undesirably wrinkly type of merino. The two practices should be regarded as complementary and not as alternatives. W.

Sheep Rugging. E. A. Elliott. *Agric. Gazette of New South Wales*, 1939, **50**, 65.

In a trial at Condobolin Experiment Farm (in a district where the wool becomes heavily charged with red dust even in an average season), the average greasy weight from the rugged sheep was 7·75 lb. and from the controls 9·93 lb. Prices realised were 10½d. per lb. for rugged fleeces and 7d. per lb. for unrugged. Since the rugs cost 3/9 each, the rugging was not regarded as economical under the conditions of the experiment and with wool prices at the present level. W.

Spray Dipping of Sheep. *Meat & Wool*, 1939, **71**, No. 2, 51.

Sheep in a small enclosed yard are sprayed with dip, the spray nozzles being located overhead and at ground level. It is claimed that spraying is more effective than dipping, and that arduous labour is at the same time eliminated. W.

(C)—VEGETABLE

Cotton: Cultivation in Manchuria. O. L. Dawson. *Intern. Cotton Bull.*, 1939, **17**, 153-157 (from *J. Commerce and Commercial, New York*).

A tentative estimate of the 1938 cotton crop in Manchuria is 100,000 bales (500 lb.) from 276,752 acres. In 1933, a twenty-year cotton plan was initiated to increase the production to approximately 4 million bales. Since 1937, however, the scheme has been supplemented by the cotton cultivation programme set forth in the five-year industrial plan, which aims at a production of about 2 million bales after 1941. It is assumed that Upland cotton will be substituted for the native variety. Distribution has been controlled and cotton improved largely through the Manchuria Cotton Company and Raw Cotton Co. The average raw cotton requirements of Manchuria for the six years 1932-1937 amounted to 390,000 bales of 500 lb. while the average of the cotton crops for 1931-36 was only about 64,000 bales. This large deficit has been made up of imports in various forms, almost entirely from Japanese mills in Japan and China. The general policy which the Manchurian Government has been following in order to avoid any conflict in cotton spinning between Japan and Manchuria, is not to increase cotton textile output nor to establish new cotton spinning mills in Manchuria and there has been no increase in the number of cotton mills since 1932, though the equipment of the mills has been steadily increasing during the past five years. C.

Acala Cotton Strains: Breeding for New Mexico. G. N. Stroman. *New Mexico Sta. Bull.*, 1938, No. 256, pp. 46 (through *Exp. Sta. Rec.*, 1938, **79**, 622).

References are given to new strains of Acala cotton that have been under trial in New Mexico since 1928. C.

Belgian Congo Cotton: Pedigree Selection, 1934-38. *Bull. Trimestr. Comité Cotonnier Congolais*, 1939, **4**, 3-10.

Pedigree selection at Bambassa has increased slowly but progressively during the period 1934-38. Two new selections from indigenous strains, 145.C.55 and 270.D.64, give 10 to 30 per cent. better yields and are barely 1 inch to fully 1 inch in staple. It will, therefore, be advantageous to multiply these strains on a greater scale. Results of trials in various localities are given in tables. C.

Cotton Plant: Breeding Technique. K. Ramiah and V. G. Panse. *Empire Cotton Gr. Rev.*, 1939, **16**, 25-30.

A reply to Mason's note on cotton breeding technique in India with criticism of some of his suggestions. C.

Cotton: Variety Trials in U.S.A. (Arkansas). L. M. Humphrey. *Arkansas Sta. Bull.*, 1938, No. 360, pp. 48 (through *Exp. Sta. Rec.*, 1939, **80**, 39).

The results of variety trials in 1936 and 1937 are reported and strains suited to the various types of land in the Arkansas cotton belt are named. C.

Cotton Varieties: Breeding for Uganda. *E. African Agric. J.*, 1938, **4**, 116-120 (through *Plant Breed. Abstr.*, 1939, **9**, 12).

Work at the Serere Experiment Station is reviewed. The programme includes (*a*) selection from established varieties, (*b*) single plant selection from new introductions such as U.4.4.2., and (*c*) production of hybrids combining the good lint characters of Nyasaland Upland (derived from the American Upland "Floradora") with the good agricultural features of U.4.4.2. The primary aim is good agricultural quality; having secured this, improvement of lint characters is attempted. The strain S.P. 84 is the most successful development so far. C.

Cotton Root-rot Disease: Control in Arizona. R. B. Streets. *Arizona Agric. Coll. Ext. Cir.*, 1938, No. 103, pp. 80 (through *Exp. Sta. Rec.*, 1939, **80**, 59).

A comprehensive account is given of the physiology, life history and pathogenicity of *Phymatotrichum omnivorum*, on its control by rotation, clean fallow and other agricultural measures, and on resistant varieties of cotton. C.

Cotton Wilt Disease: Relation to Soil Moisture. W. H. Tharp and V. H. Young. *J. Agric. Research*, 1939, **58**, 47-61.

The effect of soil moisture content on the Fusarium wilt of cotton has been investigated on the susceptible Harper Mebane and the resistant Rhyne Cook varieties. In all tests the susceptible cotton showed a positive correlation of the disease with rise in moisture level to an optimum at 80 to 90 per cent. of saturation, and a negative correlation with the increase of soil moisture to 100 per cent. of the water-holding capacity of the soil. For the resistant variety there was little correlation of plants actually wilted with soil-moisture level. An inter-related influence of soil moisture and soil temperature on the disease seems possible and the correlative change in acidity with increase in soil moisture indicates that there may be other inter-related effects of different phases of the disease environment. C.

Internal Boll Disease: Relation to Insect Attack. W. Nowell. *Empire Cotton Gr. Rev.*, 1939, **16**, 18-24.

Internal boll disease is a special case of the much wider infestation of fruits and seeds, following on bug punctures, by the same group of fungus parasites. One or more of these have been found to occur on cotton over a wide range of tropical and sub-tropical countries, there being six species in all. From a discussion on this subject, it appears that the first question on which knowledge should be made secure is that of the transmission of the disease. Its dependence on the punctures made by stainers and other bugs is abundantly proved, but until entirely conclusive evidence is obtained that the insect also functions as a vector such other questions as the importance of infection in alternative host-plants and the reasons for the occasional disparity between insect numbers and the damage to the crop will remain in doubt. The actual mechanism of transmission should also be laid bare. In designing experiments for these purposes the possible convenience of using other insects than stainers, which are not always easy to rear, and other plants more easily handled than cotton should be considered, so that investigations may be carried out in a laboratory away from the cotton fields and not even in a cotton-growing country. C.

Cotton Harvesting Machines: Effect on Grade. C. A. Bennett. *Agric. Engin.*, 1938, **19**, 386-8 (through *Exp. Sta. Rec.*, 1939, **80**, 118).

The principal kinds of mechanical cotton harvesters are described and it is pointed out that ginning experiences have so far not been encouraging, the lint being one or more grades lower than that from hand-picked cotton. The problem appears to be three-fold; (1) further improvements in machine design, (2) modifications in ginning practice suited to mechanically-harvested cotton, and (3) breeding of more amenable strains of cotton. C.

Cotton Harvesting Machine: Testing. H. B. Walker. *Agric. Engin.*, 1938, **19**, 392 (through *Exp. Sta. Rec.*, 1939, **80**, 118).

Tests of a revolving-finger type of harvester were fairly successful, the most serious drawback being ground shatter. C.

Cottonseed: Delinting with Sulphuric Acid. N. I. Hancock. *Tennessee Sta. Circ.*, 1938, No. 61, pp. 8 (through *Exp. Sta. Rec.*, 1938, **79**, 622).

The author describes the construction and manipulation of a simple drum for delinting cottonseed with sulphuric acid and discusses the advantages and disadvantages of the process. C.

Saw Gin: Effects of Speed. M. Pilette. *Bull. Trimestr. Comité Cotonnier Congolais*, 1938, **3**, 57-59; 1939, **4**, 19-26.

The author gives a useful summary of work on the effects of the hardness of the seed roller and of the speed of the saws on ginned cotton carried out by the U.S. Bureau of Agricultural Economics. C.

American Cotton: Production in the Punjab and in Sind. W. Roberts. *Empire Cotton Gr. Rev.*, 1939, **16**, 31-33.

In 1930 there were 836,000 acres under 4F and about 12,000 acres under 289F in the Punjab, and in Sind only about 65,000 acres. In 1936-37 the Punjab and bordering states produced nearly 2,000,000 bales of cotton, of which 1,614,000 acres and 894,000 bales were of the American type and the rest "Desi", consisting mainly of *Neglectum* and *Indicum.* The replacement of 4F by 289F types has made a firm advance, and in 1938 in the Punjab there were over 100,000 bales of 289F/K25, 80,000 bales of Government L.S.S. and 20,000 bales of 43F (a 289F selection). In Sind these long-staple types have reached 250,000 bales. Out of a total American crop of 1,400,000 bales now expected in the Punjab and its Dependencies and in Sind, there should be at least 450,000 bales of K25 and other long-staple types such as L.S.S., the remainder being 4F. The cotton is marketed by a system of central markets or "mandis", established by government at distances of 20 to 25 miles along the railways. These markets are provided with from two to five factories consisting of about 40 roller gins, a battery of saw gins and a press. At present there are at least forty sets of saw gins in the Punjab and about one dozen in Sind. The cost of ginning and baling is often under 15 Liverpool points. C.

Indian Cotton Crop, 1936-37: Yield by Staple Length. *Intern. Cotton Bull.*, 1939, **17**, 202-203.

The Indian cotton crop for 1936-37 is classified according to length of staple into six divisions. For each cotton the staple length, colour, feel, blow-room loss percentage, spinning capacity and estimated production are tabulated. C.

World Cotton Crops: Statistics. J. A. Todd. *Empire Cotton Gr. Rev.*, 1939, **16**, 34-40.

The following tables of cotton crops and prices are given and discussed—(1) World's cotton crops, 1933 and estimates for 1938-39; (2) American crop (excluding linters) 1932-38 and 1938-39 progress of the season August to December; (3) Egyptian crop 1933-38 and 1938-39 December (est.); (4) World's carryover of Egyptian cotton, January and July 1932-37 and monthly from July 1937 to November 1938; (5) Federation statistics of World's consumption of cotton by varieties (running bales excluding linters); (6) U.S. consumption of cotton by varieties monthly from May 1936-37, 1937-38 and 1938-39 up to October; (7) Highest and lowest futures prices from May 1936-37 to November 1938-39; and (8) Liverpool spot prices of American with other varieties as percentages from May 1936-37 to November 1938-39. C.

Non-flowering Sisal Plants. J. E. A. den Doop. *Faserforschung*, 1939, **14**, 9-27.

The sisal plant ceases to produce technically useful leaves when flowering commences. Flowering takes place after a certain, fairly constant, number of leaves has been produced, and it is suggested that flowering is caused by a hormone produced in the plant. Evidence is given that the sisal plant is capable of mutation. Non-flowering plants have been observed, and it is probable that they are mutations of the normal flowering plant, arising through loss of the flowering hormone. It cannot yet be said how many normal leaves a non-flowering plant can produce. The non-flowering plants differ slightly in other characteristics from normal flowering plants. The article is illustrated by 12 photographs. L.

Banana Fibre: Extraction. V. A. Reko. *Faserforschung*, 1939, **14**, 34-37.
To avoid a complete loss of the millions of banana plants in Mexico affected by the recent extensive disease, fibre extraction is being undertaken. Small transportable machines have been constructed for use on the plantations. L.

Italian Flax Area. *Irish Text. J.*, 1939, **5**, No. 2, 14.
A detailed cultivation programme has been worked out for each province and efforts are being made to increase the Italian flax area this year. It is hoped to get farmers on the Adriatic coast interested in flax and experimental crops will be grown in the Abruzzi district. A central flax rettery and hackling plant are to be erected in Dalmatia. L.

Versatile Flax Puller. *Irish Text. J.*, 1939, **5**, No. 3, 5.
Some time ago a Soviet inventor devised a machine to carry out all four operations of pulling, tying, de-seeding and bagging the seed. L.

(D)—ARTIFICIAL

Cellulosic Agricultural Waste: Utilisation. D. F. J. Lynch. *Ind. Engng. Chem.*, 1939, **31**, 149-153.
An account is given of the production of strawboard from straw and the estimated amount of straws available to industry in the U.S.A. is shown by a table. References are made to research into new methods for the production of better grades of cellulose from cottonseed hulls, bagasse, straw, jute, hemp and timber wastes. C.

Straw and Pine Pulps: Utilisation. R. E. Dörr. *Papier Fabrikant*, 1939, **37**, *Techn.*, 1-6.
A report of a lecture on the possibilities of straw and pine wood pulp in the rayon industry. Mention is made of the advantages of treating the pulp with alkali in the loose state instead of in pressed sheets, and of the application of Staudinger's viscosity rule for process control. C.

Alkali-cellulose: Preparation with Warm Alkali. Viscosa G.m.b.H. (vorm. O. Kohorn & Co. G.m.b.H.) *Kunstseide*, 1939, **21**, 42-48.
In order to investigate the possibilities of eliminating alkali-cellulose ageing processes by using warm alkali for the preparation of alkali-cellulose, tests were made with 17·85 per cent. caustic soda at various temperatures and the properties of the resulting alkali-cellulose and the viscose obtained from it examined. Tables are given showing the results of determinations of hemi-cellulose contents of mercerising alkali and alkali-cellulose, α-cellulose and alkali contents of alkali-cellulose, viscose viscosities, etc. It was found that the swelling and swelling agent absorption in the alkali, and also the pressure required to press to a given weight, decreased with increasing temperature of the alkali. The hemi-cellulose and alkali contents increased and the α-cellulose content of the alkali-cellulose decreased with increasing temperature. The viscosity of viscose obtained from alkali-cellulose prepared at 50°, and even at 90°, without ageing, is still too high for practical purposes. When alkali-cellulose prepared at such temperatures was subjected to an ageing treatment before conversion to viscose, the rayon obtained on spinning the viscose was inferior to that produced by the usual method. The use of warm alkali to produce a partial ageing of alkali-cellulose is, therefore, not recommended C.

Combined Alkali in Viscose: Decomposition Velocity. R. Inoue. *J. Soc. Chem. Indust., Japan*, 1938, **41**, 359B-360B.
An experimental method is described for determining the decomposition velocity of combined alkali in viscose. The results show that in the earlier stages the combined alkali is scarcely decomposed although there is considerable decomposition of the diffusible alkali. C.

Continuous Viscose Rayon Plant. *Rayon Textile Monthly*, 1939, **20**, 77-78.
The combination into one continuous series of operations of all steps from spinning to drying and twisting the yarn has been made possible by building into one complete machine a spinning unit equipped with continuous Richardson moulded plastic reels and a "stepped" inclined processing panel also equipped

with continuous plastic reels on which the yarn is chemically treated, washed and dried as it travels from one reel to another down a vertical run and finally to the bobbin. Thus there is no handling of the yarn from the time the viscose is forced through the jet until it is wound up on the bobbin ready for transfer to the coning room. All operations are continuous and automatic so that the finished yarn possesses a uniformity of fineness and physical characteristics that could not be guaranteed under the old, orthodox methods. The plastic reel members advance the yarn at a predetermined speed through all the processing stages. Each reel is a simple precision-moulded composite reel embracing two slotted drums or spiders, one inside the other. These interlocking members revolve in the same direction with the inner spider having an eccentric rotation to give forward movement to the thread on the reel during spinning or during processing in which the entire surface of the thread is exposed to the action of chemicals and cleansers. The spinning reels are designed as modified cones which flare outward from the driving axis and they stretch the yarn as it moves forward in successive wraps of increasing diameter. Dropping directly down from the reels at the discharge end the threads pass down through individual tubes to the processing level where each thread passes over a sequence of eight additional cylindrical reels of the same composite plastic structure and is subjected to desulphurising, bleaching, etc., operations. The thread then moves on to an aluminium drying reel of similar construction through which hot water circulates, and finally to plastic bobbins. The spinning reels are moulded of "Durez" moulding powder and "Insurok" is used for many other moulded and laminated parts. C.

Hollow Viscose Filaments: Production. T. Suda. *J. Soc. Chem. Ind. Japan*, 1938, **41**, 421-422B.

Recipes are given for the production of hollow viscose filaments, by the addition of (1) about 2 per cent. of light petroleum, b.p. 40-60° C., and (2) of 1·3 to 1·8 per cent. of sodium carbonate to the spinning mass. It is advantageous to add also small quantities of agents like linseed oil, Turkey red oil or Igepon. C.

Soda-cellulose: Rate of Xanthation. P. C. Scherer and D. W. Miller. *Rayon Textile Monthly*, 1939, **20**, 24-25, 81-82.

An account is given of experiments in which the course of the xanthation of soda-cellulose was followed by measuring the changes in pressure occurring in the xanthation drum. Details of the apparatus and procedure are given. Pressure-time curves are given and it is assumed that the point where the pressure drops to atmospheric indicates the end point of the xanthation, or at least some constant multiple of the end point. The results of studies of the effects of ageing and temperature and of determinations of the time required for the formation of a soluble xanthate are given and compared with the results described in a previous paper. The results show that the time of ageing of soda-cellulose has no effect upon the rate at which soda-cellulose and carbon disulphide combine to give a cellulose xanthate. The return of the pressure in the xanthating drum to atmospheric is an indication of the completion of the reaction and the course of the reaction may be followed by determining this end point for various percentages of carbon disulphide. The reaction follows a smooth curve of the form of $2{\cdot}303 \log (a-p)=kt+c$ and therefore is a pseudo-monomolecular reaction. The equations for the curves obtained differ from those obtained in the previous work only by a constant multiplier, due probably to the different units employed. A comparison of the velocity constants at 25° and 35° C. indicates a ratio of $k_{35}/k_{25}=0{\cdot}0242/0{\cdot}0101=2{\cdot}39$, which indicates that a chemical reaction is occurring and not a simple physical diffusion. A soluble xanthate may be obtained with 37 per cent. CS_2 in about 50 min. This time agrees fairly well with the time required to attain a sulphur to cellulose ratio of 0·16 using excess CS_2. Study of the curves indicates that the end points used in this research are proportional to the true end point of the reaction and so give a curve proportional to that obtained in the first series. C.

Viscose: Decomposition Velocity in the Spinning Process. R. Inoue. *J. Soc. Chem. Ind. Japan*, 1938, **41**, 357-359B.

The author has applied his method for measuring the velocity of decomposition of viscose to a study of the effect of the number of filaments spun and the stretch imposed. His conclusions are that these influences are negligible over a wide range and that the decomposition accords with Fick's diffusion law. The diffusion coefficient calculated from the data is $0{\cdot}68 \times 10^{-5}$ cm^2 per sec. C.

Viscose: Influence of Spinning Conditions on Coagulation. N. Matsumoto. *J. Soc. Chem. Ind. Japan*, 1938, **41**, 380B-381B.

The coagulation of five kinds of viscose, differing in degree of ripening and viscosity, has been examined in baths of various compositions and temperatures, with various lengths of traverse in the bath, and at various spinning rates. The following conclusions are drawn. (1) An instantaneous coagulation occurs with 8 to 30 per cent. of sulphuric acid at 30 to 50° C. in both outer and inner parts of viscose filaments ranging in diameter from 2·5 to 25 μ. (2) Lilienfeld yarn is formed at 45° C. in a bath containing more than 30 per cent. of sulphuric acid. (3) With more than 15 per cent. Glauber's salt, the action of 8 to 13 per cent. acid is suppressed and coagulation of the outer and inner parts is slower. (4) A strong shrinkage is observed in the outer part with more than 0·8 per cent. of zinc sulphate and the acid and Glauber's salt then coagulate the outer layer quickly and the inner part slowly, giving a good micellar arrangement and a finely indented outer layer. (5) Glucose of over 5 per cent. concentration suppresses the action of the acid, Glauber's salt and zinc sulphate. The shrinkage caused by zinc sulphate occurs only in the presence of Glauber's salt, but glucose suppresses the action of sulphuric acid even in the absence of Glauber's salt. The effects of tension on the yarn coagulated from industrial spinning viscose have been studied at 45° C. with the coagulating bath containing 10·5 per cent. of sulphuric acid, 19 per cent. of Glauber's salt, 1 per cent. of zinc sulphate and 0·8 per cent. of glucose, the immersed length being 30 cm. and the spinning velocity 90 metres per minute. It appeared that strength and elongation were increased by tension, and the micellar arrangement markedly improved, for filaments less than 6 μ in diameter; above this limit the reverse is true. C.

Viscose Rayon: Spinning; Physico-chemical Considerations. J. Löbering. *Papier Fabrikant*, 1939, *Techn.*, **37**, 9-15.

A review of structural changes in cellulose during the viscose spinning process is given under the following headings—(1) the structure of the fibre; (2) internal molecular statistics and elastic behaviour; (3) the effect of extension during the coagulation of the fibre; (4) the stretching process; (5) relationships in the sol state, and (6) flow orientation in a sol. C.

Nylon: Preparation. A. Perole. *RUSTA*, 1938, **13**, 527-535; 1939, **14**, 5-17.

An account is given of the methods of preparing polyamide fibres and the after-treatment of such fibres, including cold drawing, heat treatment to impart resistance to creasing, and curling to produce a fibre similar to wool, as described in the Du Pont de Nemours patents. C.

Viscose: Ripening. W. Klauditz. *Zellwolle*, 1939, **5**, 3-4.

The splitting off of the dithiocarbonate residue from cellulose xanthate during the ripening process may be conditioned by the decomposition of the free cellulose dithiocarbonic acid resulting from hydrolysis or by saponification of the mono-cellulose-dithiocarbonic acid ester. In order to determine the relative importance of these two reactions observations were made of the ripening of potassium ethyl xanthate in water and in potassium hydroxide solution. In aqueous solution the decomposition of the xanthate resulted from hydrolysis but with increasing alkali content decomposition by saponification became more important. The primary dithiocarbonate arising as a result of the saponification reaction gave as end product not tricarbonate, but sulphide. A secondary formation of sulphide by saponification of trithiocarbonate was not observed. The ripening of viscose with increasing sodium hydroxide content was followed by iodimetric titration. The results indicate that the splitting off of the dithiocarbonate residue in the ordinary ripening of viscose results mainly through hydrolysis of the xanthate. Only when the sodium hydroxide content rises to 17-18 per cent. is more than one-third of the xanthate decomposed by saponification. The secondary carbon disulphide arising from the decomposition of cellulose-dithiocarbonic acid will form sodium trithiocarbonate and retard the equilibrium. Sodium sulphide present in viscose at the beginning of ripening is an intermediate product of trithiocarbonate formation from carbon disulphide and sodium hydroxide. C.

Curly Staple Fibre: Production. G. Salzmann. *Zellwolle*, 1939 5, 5-7.

It is pointed out that the thermal insulating properties of fibrous materials depend on the surface structure and the curl of the fibres, and various unsuccessful attempts to curl staple fibre by after-treatments are reviewed. Patent processes for the production of curly staple fibre depending on treatment of viscose filaments after coagulation but before complete regeneration, or before drying after spinning processes depending on varying the feed of cuprammonium spinning solutions to the spinning nozzles, and methods making use of the thermoplastic properties of cellulose acetate are discussed. C.

Flox Staple Fibre: Development in 1938. H. O. Koecke. *Zellwolle*, 1939, 5, 18-19.

The recently developed Feinflox has fine individual filaments of 1 denier. Its high strength and regularity of staple and titre make it suitable for the production of fine yarns (over 60's) and it is useful for the production of raised goods. Flox 66/15 is used for the production of strong yarns for technical purposes. Goods made from Flox 50/30 and 66/30 have good wearing qualities and a full handle. These qualities of Flox can also be used for the production of yarns similar to worsted yarns. Duraflox fibre has a higher dry strength and a wet strength almost equal to that of American cotton. Paraflox fibre has a permanent water-repelling property. Floxalan fibre has a grained surface, a stable curl, and high bending strength and elasticity. Parafloxalan is water-repellent, and an animalised variety is to be placed on the market. A new method of processing staple fibre by the worsted spinning system eliminates the expensive combing operation. C.

Tiolan Fibre: Preparation, Properties and Use. *Klepzig's Textil-Z*, 1939, 42, 153-155.

The various uses of casein are described and German supplies of casein are discussed. The method of preparing fibres from casein is outlined and the properties of the German casein fibre, Tiolan, are described and compared with those of wool. Useful yarns are obtained by spinning mixtures of Tiolan with wool or staple fibre. A sample of fabric woven from Tiolan-Schwarza staple fibre and viscose staple fibre yarns is given together with details of its construction. C.

PATENTS

Polyvinyl Chloride Fibres: Heat Treatment. G. W. Johnson (I. G. Farbenindustrie A.-G.). B.P. 497,689 of 26/7/1937.

The properties of shaped articles (such as fibres, films, tubes or rods) manufactured by the use of heat and pressure from polyvinyl chloride, interpolymers of vinyl chloride and other compounds polymerisable under the same conditions (such as styrene, acrylic nitrile, acrylic or methacrylic esters), or conversion products of the polymerisation products (such as chlorinated products) are improved by heating them without pressure to temperatures, above those used in manufacture, at which the articles have practically no elastic extension and only small tensile strength, but which temperatures are below their decomposition points. Suitable temperatures lie between 220° and 320° C. The products may subsequently be stretched at a lower temperature. C.

Alkali-cellulose: Preparation. Maschinenfabrik Imperial Ges. B.P. 497,733 of 22/3/1937 (Conv. 27/4/1936). Void.

Webs or sheets of cellulose are first improved or mercerised and are then alkalised in a second operation. The lye resulting from the alkalising step may be used for the improving. The mercerising lye is preferably at a lower temperature and concentration than the alkalising lye, and the mercerising or alkalising operation may be carried out with the webs or sheets of cellulose running countercurrent to the lye. The webs or sheets of cellulose are caused to enter the improving or mercerising bath at a speed higher than that at which they pass through the bath. The cellulose leaving the baths may be immediately ripened, cooled and converted to viscose. When more than one web or sheet of cellulose is treated, they are kept separate from one another above the surface of the liquid. C.

Cellulose Derivative Rayons: Delustring. Distillers Co. Ltd., H. A. Auden, H. P. Staudinger and H. M. Hutchinson. B.P. 497,846 of 25/6/1937.

Delustred threads, ribbons, sheets, and the like are prepared by embodying in a solution of a cellulose derivative a saponifiable organic compound comprising a fully esterified ester derived from a mono- or di-hydric alcohol or phenol and a carboxylic acid containing less than ten carbon atoms in the molecule, the ester being one that is compatible with the cellulose derivative and has plasticising properties in relation thereto, thereafter forming the desired product from the solution and delustring the product by means of aqueous media without changing the cellulose derivative. Esters specified are cyclohexanol crotonate, glycol di-crotonate, lauryl crotonate, *n*-hexyl crotonate, *n*-butyl furoate, di-isoamyl succinate, triamyl citrate, cyclohexanol lactate, tributyl citrate and resorcinol di-acetate. In examples, (1) triamyl citrate is incorporated in a cellulose triacetate spinning solution and the threads obtained therefrom are delustred by means of hot water; (2) a cellulose triacetate spinning solution containing tributyl citrate is spun into a column into which steam is blown. C.

Cellulose and Starch Derivatives: Precipitation from Solution. J. E. Jones, J. Y. Davies and J. F. Neilson. B.P. 497,963 of 1/7/1937.

Colloidal substances, e.g. cellulose derivatives, rubber, polymerised acrylic esters, bituminous materials, and starch derivatives, are precipitated from solutions thereof by extruding the solution through small orifices directly into a precipitating liquid in contact with the orifices and having relative motion substantially transverse to the direction of flow of the solution through the orifices. Suitable apparatus comprises a cylindrical vessel for precipitating liquid provided with fixed baffles and adjustable baffles, and a perforated rotatable vessel which contains the solution of cellulose acetate or the like. A suitable precipitating liquid for an acetylation solution of cellulose acetate is a 15-30 per cent. solution of acetic acid. C.

Alkali-cellulose Continuous Production Apparatus. W. Grotzinger and Baker Perkins Ltd. B.P. 497,977 of 2/7/1937.

Apparatus for the continuous production of alkali-cellulose from cellulose sheets comprises a train of containers for the sheets carried by an endless conveyor to which intermittent motion is imparted, a lye tank through which the containers pass and a press located in the path of the containers and operated in synchronism with the intermittent rest periods of the containers. The containers for the cellulose sheets may be collapsible, and freely supported between endless chain conveyors. During their travel through the lye tank the spacing between the containers is reduced by supporting the containers on a second slower-moving conveyor, which allows the main chain conveyor to hang in loops between the conveyors. Preferably, the press and the means for advancing the conveyor chains are operated hydraulically. C.

Viscose Crushing Apparatus. T. Saito. B.P. 498,042 of 3/7/1937.

A machine for crushing clots in viscose comprises a cylinder or housing having an inlet and an outlet for the material and carrying a rotatable shaft provided with crushing blades co-operating with fixed perforated discs, a bye-pass being arranged between the cylinder and outlet and controlled by a valve which is opened to reduce the load on the mill when starting the latter. Viscose from a kneader or mixer is driven by a pump into the cylinder. C.

Rayon Spinning Apparatus. W. Wuppermann. B.P. 498,358 of 12/1/1938.

Apparatus for spinning rayon comprises a rotary nozzle and a rotary container for the coagulant, the lower end of the container being open and immersed in a bath of coagulant and the top end of the container being provided with a suction device by means of which the coagulant is drawn upwardly through the container. The suction may be produced, e.g. by a suction apparatus disposed separately of the spinning apparatus, or by constructing the upper part of the container in the form of a centrifugal pump. Any bubbles of air or gas in the container may be removed by providing the container and the nozzles with inclined or bevelled guiding faces directing the bubbles towards the delivery passages and by the provision of ejectors. Various forms are shown. C.

Cellulose Ester-Gelatin Filaments: Spinning. Soc. Rhodiaceta and G. Mouchiroud. B.P. 498,678 of 8/7/1937.

To impart to cellulose acetate, etc., filaments, threads, etc., an affinity for direct, acid, etc., dyes, there is dissolved in the spinning solution a proportion of gelatin, and the solution is spun either by the dry method or by coagulation in a bath containing formalin or other substance having a similar coagulating action towards gelatin; in both cases the aim is to prevent loss of gelatin during the process of filament formation. The gelatin may be used in a proportion of 4-20 per cent. of the cellulose acetate, etc. Solutions of cellulose acetates and gelatin in acetic and formic acids are instanced, and suitable coagulating baths are aqueous solutions of sodium and potassium acetates containing formaldehyde. C.

Matt Viscose Rayon: Production. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P. 499,145 of 15/7/1937.

Uniformly matt artificial filaments of uniform dyeing properties are obtained from viscose which contains, in addition to a liquid insoluble matting agent, e.g. an oil, in finely emulsified form, a substance which retards ripening of the viscose and is soluble therein. Soluble sulphites, cyanides, or zincates may be used for retarding ripening of the viscose. These substances also have the effect of stabilising the emulsion of the matting agent in the viscose. In an example, filaments are obtained by extruding viscose containing finely emulsified paraffin oil and sodium sulphite. C.

High-speed Spinning Spindle. British Thomson-Houston Co. Ltd. (London). B.P. 500,405 of 14/3/1938: 8/2/1939.

A spinning device includes a vertical shaft supported in a bearing having a housing, a second housing arranged about the bearing housing, means including a flexible annular member secured at spaced points to the bearing housing and at other points spaced intermediate the first mentioned spaced points to the second housing for flexibly supporting the bearing housing in spaced relation within the second housing, and a damping fluid contained within the second housing and surrounding the bearing housing. A rayon spinning motor embodying this device is described. C.

Staple Fibre: Production. Courtaulds Ltd. (London), H. Ashton and W. Hardacre. B.P. 501,155 of 8/10/1937: 22/2/1939.

A process for the production of staple fibre comprises combining a continuous thread with another thread consisting of short lengths of fibre and then passing the combined thread through drafting rollers. The distances between the pairs of drafting rollers may be adapted to the length of staple into which the continuous thread is to be broken, and this length should approximate to the length of staple of the thread with which the continuous thread is mixed. If desired, particularly for the longer staples, i.e. of 2 in. or more, supporting rollers or other arrangements may be provided between the nips of the two main drafting rollers. The thread consisting of short lengths of fibre may comprise rayon staple fibre, cotton, wool or other textile material. C.

Polyamides: Quenching to Improve Cold-drawing. E. I. Du Pont de Nemours & Co. B.P. 501,197 of 19/7/1937: 20/2/1939.

Synthetic linear condensation superpolymers, particularly those described in B.P. 461,236/7, may be more readily cold-drawn if they are first subjected to a rapid chilling operation. A hot or molten fibre-forming polyamide may be rapidly cooled by immersion in a relatively cold non-solvent such as water, alcohols, ketones, esters, hydrocarbons, etc. Wetting agents and dyes may be included in the liquid if desired. Instead of being immersed in a bath of the liquid the polyamide may be sprayed with the liquid. C.

Filament Cutting Apparatus. Courtaulds Ltd. (London) and F. J. Collings. B.P. 501,299 of 23/9/1937: 24/2/1939.

Apparatus for cutting a bundle of continuous filaments or threads into short lengths comprises two co-acting wheels each provided with a circumferential flange divided by slotted steps into a number of segments which are alternately at a greater and less distance from the axle of the wheel, the two wheels being of such a shape and so positioned that the surface of one wheel is always practically in contact with that of the other wheel as the wheels are rotated and the slots in the steps are in alignment in a direction substantially perpendicular to the plane containing the axles of the wheels when the steps meet, a cutting edge facing the direction in which the thread is fed to the wheels which bend it in zig-zag or sinous fashion and means for supporting the cutting edge in a fixed position such that the aligned slots pass there-across and the bent thread is severed between the two bends made by each pair of contacting steps, the segments of the flanges at a greater distance from their respective axles passing the cutting edge on the side remote from their respective axles and those at a less distance on the side nearer to their respective axles. The flanges may be provided with holes through which streams of air or water may be directed to assist in the removal of the cut threads. C.

Moss Fibre. E. Schömbs. D.R.P. 666,008 of 10/10/1938 (through *Chem. Abs.*, 1939, **33**, 1964).

Polytrichum commune, preferably after removal of leaves, is boiled in an alkaline solution to yield fibres which can be spun or used for stuffing cushions, etc. W.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—Preparatory Processes

Card Flats: Age and Efficiency. *Cotton* (*U.S.*), 1939, **103**, No. 1, 88-89.

In a test on 100 cards of the same age with the same clothing and working under the same conditions it was found that the flat strip percentages varied from 1·76 to 4·28 per cent. In another group of 124 cards having flats of varying ages the flat strips varied between 1·91 per cent. and 4·15 per cent. Data showing flat strip percentages on various cards taken at random and on the same cards after reducing the flat speeds are given. It is pointed out that old flats in good running condition, evenly worn or ground down and correctly set, should work as well as new flats. C.

MAKA High-pressure Atomising Pump. *Leipz. Monats. Text. Ind.*, 1939, **54**, *Fachheft* I, 34-36.

The reasons for oiling textile fibres are briefly discussed and it is claimed that the usual methods of applying the oil are unsuitable for the treatment of staple fibre. The MAKA high-pressure atomising pump is described and shown in photographs. In this apparatus the atomising of the oil is effected without the use of other agents such as compressed air, steam or water. The amount of oil to be atomised can be regulated as desired by hand with the pump in or out of operation. A feed pump and arrangements for a three-fold filtering of the oil emulsion are provided. Viscous oil emulsions can be applied without difficulty by means of this apparatus. C.

Scutchers: Speeds and Settings. *Cotton* (*U.S.*), 1939, **103**, No. 1, 90-91.

Details are given of scutcher speeds and settings in a mill using 1-inch Middling cotton for a 13½ oz. lap, together with comments and suggestions for improvement from various contributors. C.

Card Grinders: Driving. Dronsfield Bros. Ltd. *Textile Weekly*, 1939, **23**, 356; *Textile Manufacturer*, 1939, **65**, 158.

Two alternative methods for driving card grinders are explained, with diagrams. They comply with the requirements of the Factory Act prohibiting the handling of driving belts while machinery is in motion and the "running idle" of belting on revolving shafting. C.

Analysis of Roller Speeds in Woollen Carding. G. Marshall. *Wool Record*, 1939, **55** 33-38.

Tables are given showing the effect on the working power when the workers are run at higher speeds, and the possibilities of fairly high doffer speeds, with special reference to the question of overloading. W.

Present Retting Installation at the Bergerdamm Hemp Factory. H. Ulbricht. *Faserforschung*, 1939, **14**, 37-42.

A modification of Dr. Schneider's warm-water channel retting system is described. The water and the material undergoing retting are moved simultaneously on a counter-current principle, so that retting is most rapid at the commencement and slowest at the end of the process. In tank-retting the reverse is the case. The labour costs of the process are low. L.

Retting Temperatures and Mill Yields. *Irish Text. J.*, 1939, **5**, No. 3, 12.

Describes the results of scutching, hackling and spinning trials on three varieties of flax, each retted at temperatures approximating to 25/30° C. No differences were apparent in the total yields of fibre after scutching and hackling but the hackled material gave a rather lower proportion of tow when retted at

25° than at 30°. The material retted at the higher temperature was finer, both before and after hackling, than that retted at the lower temperature. Fibre strengths were the same and the differences in the properties of the resulting yarns were small. There are thus no disadvantages incurred by retting at a higher temperature, and the time of retting is greatly reduced. L.

Metal Spinning Troughs. *Irish Text. J.*, 1939, 5, No. 3, 12.

It has been suggested that stainless steel would prove an admirable material for the construction of troughs for wet spinning frames. Monel metal troughs are now used successfully in the silk trade. This type of metal is rustless and has long life. L.

New German Flax Rettery. *Irish Text. J.*, 1939, 5, No. 3, 10.

A new central flax retting and decorticating works has been erected at Kunzelsau. Designed to produce 6,000 tons of scutched flax annually it possesses 24 artificially heated retting tanks. After retting for four days the straw is rinsed automatically, is squeezed between rollers and passed in a conveyor to a drying machine operating at 100° C. The dried straw is carried by conveyor to the scutching machines, the scutching waste being removed by blowing apparatus to the furnace of the power and electric plant. The retting process has been rendered odourless in this plant. L.

(B)—SPINNING AND DOUBLING

Roving: Twist per Inch Calculation. J. Duerst. *Cotton* (*U.S.*), 1939, **103**, No. 1, 56-58.

According to the Duerst formula, twist per inch in roving$=0{\cdot}36(2{\cdot}39-S)\times(\sqrt{1+8h}-1)$, where h=hank number and S =staple length in inches. The development of this formula is explained and a table of roving twists calculated according to the formula is given. C.

Spinning Room: Influence of Humidity. H. L. Kempaner. *Textile World*, 1939, 89, No. 2, 52-53.

The influence of humidity in the spinning of cotton yarns is discussed and it is pointed out that generally a relative humidity of 60-65 per cent. is most suitable in the spinning of fine yarns, and of 65-70 per cent. in the spinning of coarse yarns. The use of the combination split-type humidifying system in spinning rooms is recommended. A table and chart showing the results of tests of the influence of humidity in spinning on the size and strength of yarns are given and discussed. Raising the relative humidity from 60 per cent. to 70 per cent. and 80 per cent., respectively, produced increases of 11 per cent. and 16·7 per cent. in strength. The yarn was appreciably more uniform in size at the higher humidities. Yarn spun with a moving thread board appeared to be slightly stronger than that spun with a stationary board. Yarn spun and tested at 80 per cent. was slightly stronger than yarn spun at 60 per cent. but tested at 80 per cent. C.

Plied Yarns: Balanced Twist. *Cotton* (*U.S.*), 1939, **103**, No. 1, 54-56.

Various replies to an inquiry concerning the determination of balanced twists for ply yarns are quoted. They describe the results of practical experience, indicate twists that have been found to be fairly well balanced, and suggest approximate formulæ for twist calculations. C.

Rubber: Application in the Linen Industry. W. H. Gibson. *Proc. Rubber Tech. Conf.*, 1938, 1054-1056.

The uses of rubberised flax and sisal as alternatives to horsehair in upholstery, and of rubber instead of boxwood and sycamore for spinning and finishing machinery rollers are reviewed and the present deficiencies pointed out. C.

Slub Weft: Production. *Cotton* (*U.S.*), 1939, **103**, No. 1, 88-89.

A diagram is given of a roller system for the production of slub weft in which the slubs are produced by stopping the front roll for a moment at suitable intervals. A friction cone is used in this system. C.

Speed Frames; Causes and Prevention of Faults on—. *Klepzig's Textil-Z.*, 1939, 42, 103-104.

A discussion of the causes and prevention of irregular, cut roving and of faulty bobbin formation on speed frames in the processing of cotton and staple fibre. C.

"Farrow" Mule Spindle "Through" Tube. T. and W. Farrow (Star Paper Tube Co. Ltd.). *Textile Weekly*, 1939, **23**, 453 (Provisional Patent, No. 5246 of 1939).

A new tube has the paper at the base turned inwards into the bore of the tube to form a resilient ring. It is claimed that the tube makes a glove-like fit at the tip of the mule spindle and grips the base of the spindle firmly though flexibly. C.

"Thoma" Suction Roller-cleaning Device. H. Thoma (Freiburg-im-Breisgau). *Textile Weekly*, 1939, **23**, 454.

Illustrations are given of a suction cleaning channel fitted under the bottom delivery rollers of a ring frame. The channel is pierced with funnel-shaped holes, one for each spindle or end, and at the end has a closed-in fan with filter and collecting chamber. Dust and fly are continually removed from the rollers and broken roving is also sucked into the channel. The fan is driven by a ½-h.p. motor. It is claimed that about one-third of the time of the operatives is saved. Underclearers are not required. C.

Yarn Tube Cleaning Machine. Etablissements J. Deiss. *Revue Filature et Tissage*, 1939, **24**, 52-53.

A machine capable of cleaning 2,500 to 3,000 tubes per hour is shown and its advantages are pointed out. The machine cleans both the insides and outsides of tubes. Good waste recovered by this machine does not require to be passed through a hard waste breaker but can be mixed with raw cotton being fed to a bale breaker. C.

Kapok-Staple Fibre Mixtures: Spinning. A. Lambrette. *RUSTA*, 1939, **14**, 81-84.

The characteristics of kapok, especially its behaviour when subjected to compression and on dyeing, are described and difficulties encountered in attempts to spin this fibre are pointed out. The possibilities of spinning mixtures of kapok and other fibres are discussed. Mixtures with staple fibre appear to be the most promising. Some suggestions in regard to procedure are made. C.

Continental Cotton Mills: Organisation. W. H. Watson. *Textile Weekly*, 1939, **23**, 315-319.

A report of a lecture describing typical organisations in spinning mills in Central Europe, with special reference to the comfort and safety of operatives and labour and production costs. C.

Mule Spinners' Wages: Calculation. *Textile Weekly*, 1939, **23**, 353, 355.

A criticism is offered of the system of reckoning wages (*a*) on the basis of the weight of yarn spun and (*b*) on the yardage basis as shown by indicators. C.

Throwing Mill: Organisation. *RUSTA*, 1939, **14**, 27-31, 70-81.

Operatives, power supplies, costs, climate, transport facilities and other factors are briefly discussed and the analysis, organisation and control of the work in a silk throwing mill are studied. Methods of estimating costs of production and efficiency of operation are explained. C.

Coloured Yarn Spinning. *Wool Record*, 1939, **55**, 435-437.

The spinning of coloured yarns, especially marls, half marls and grandrelles, is discussed, the necessity being stressed that roving should be uniform and of a suitable weight. Cork is more suitable than leather for roller covering, as it is less liable to absorb dye from the material being processed. W.

(C)—SUBSEQUENT PROCESSES

Yarn Conditioning Machines. Norman Evans and Rais Ltd. (for American Textile Engineering Inc.). *Textile Recorder*, 1939, **56**, No. 672, 45-46; *Textile Manufacturer*, 1939, **65**, 160.

Illustrations are given of the model 5 A.Y. machine in which cops and the like are conveyed on a travelling lattice through a spraying chamber and the B.D.E. model for lubricating and conditioning yarn on cheeses, cones, etc. by forcing liquid through them from within. "Lubriknit" agents for the purpose are mentioned. C.

Yarn Curling Machine. T. Broadbent and Sons Ltd. *Textile Weekly*, 1939, **23**, 141-3, 215-9, 256-7, 322-3.

A detailed description is given of a machine and equipment for inserting curl of various types and amplitudes in mohair, wool and other yarns. C.

(D)—YARNS AND CORDS

Neophil Sewing Thread. Premier Thread Co. *Textile World*, 1939, 89, No. 2, 49.

Neophil sewing thread made from Nylon is being supplied on 1- and 4-oz. spools, in 2- and 3-cord types, in various sizes ranging from 7,000 to 35,000 yd. per lb., and in a wide variety of colours of high fastness to washing and light. The outstanding characteristics of Neophil are its elasticity, strength, fineness and uniformity; ability to withstand repeated launderings without impairment of properties; resistance to moisture and perspiration; and resistance to abrasion and wear. Standard tensile strength is 5 grams per denier; standard elongation, 25 per cent.; the dry strength is approximately the same as that of first-quality silk thread. Some present applications are mentioned. C.

PATENTS

Endless Belt Drafting Apparatus. Spinnfaser A.-G. (Kassel-Bettenhausen, Germany). B.P. 500,249 of 5/8/1938: 6/2/1939.

Drafting apparatus with two co-operating endless bands which are guided over bars at one end and over rollers at the other end, is characterised in that between the roller and the bar of the lower band, a bar or roller supporting member is provided for the upper run of the lower band which supporting member can be displaced forwardly or backwardly with respect to the direction of travel of the band. C.

Carding Engine Dust Removing Apparatus. F. Crompton and F. W. Sim (trading as Crompton & Sim, Oldham). B.P. 500,341 of 9/9/1938: 7/2/1939.

In apparatus for removing dust when stripping carding engines, of the kind in which the brush is not enclosed by a hood or cover but is carried in two end members connected by a curved side member extending the whole length of the brush and to which a suction chamber is affixed, the suction chamber is formed as a single compartment into which the pipe for connection to the suction or exhaust apparatus is inserted and formed on its under side with a narrow longitudinal slit or aperture extending from end to end of the chamber or with two narrow longitudinal slits or apertures one of which extends from near the end of the suction pipe to one end of the chamber and the other extends from near the end of the suction pipe to the other end of the chamber. C.

Hopper Feeder or Opening Machine Comb Mechanism. W. Tatham Ltd. (Rochdale) and H. Thornton. B.P. 500,452 of 27/11/1937: 9/2/1939.

A rotary combing mechanism for hopper feeders or openers for fibrous materials which is capable of being run at a high speed comprises a plurality of combs mounted in rotatable supports and interconnected with a rotatable eccentric controlling device, whereby the spikes or teeth of the plurality of combs are at all times during operative action disposed and presented at the same angle. The mechanism may comprise rotatable supports with a plurality of combing devices mounted in connection therewith, and a rotatable eccentric controlling device having supporting means which permit of adjustment for varying the setting of the combing devices, and having also cranks or other interconnecting means intermediate the rotatable eccentric device and the combing devices in connection with the rotatable supports, whereby the initial angle at which the combs are set is ensured no matter what the position of each comb is during any complete revolution of the rotatable supports, the rotatable supports being mounted on the same axle. C.

Sliver Twisting Device. A.-G. J. J. Rieter & Cie (Winterthur, Switzerland). B.P. 500,535 of 2/9/1938: 10/2/1939.

A twisting device for use in drawing condensed sliver in preparing and spinning machines comprises a revolving tube and holding and guiding means for the sliver arranged on the tube and formed by a plurality of pins inclined relative to the axis of the tube and converging so that the points thereof meet at a point near the working space between the drawing rollers in the extension of the axis of the tube and positively guide the sliver between them. C.

Staple Fibre Mixtures: Production. W. W. Groves, London (I. G. Farbenindustrie A.-G.). B.P. 500,886 of 19/8/1937: 17/2/1939.

Mixtures of staple fibres of different titre and length are produced by spinning on the same spinning machine continuous threads of different titre which are then collected to form one or several bands or bundles, the band or bands being then cut or torn into staple fibres of different lengths and the staple fibres loosened with the aid of a moving liquid to produce a uniform mixture of fibres. The threads of different titre may be produced by feeding different nozzles with the spinning solution by means of pumps having different outputs, or by feeding different nozzles with the spinning solution under different pressures, or by feeding different spinning pumps with spinning solutions of different concentrations, or by using nozzles having different numbers of perforations, or by conducting different bundles of fibres to the cutting machine under different drafts. C.

Opening and Cleaning Machine Feed Regulating Device. A.-G. J. J. Rieter & Cie (Winterthur, Switzerland). B.P. 500,936 of 23/8/1938: 17/2/1939.

A method of regulating the feed to machines for opening or cleaning cotton and like fibrous material, in which the speed ratio of the drive of the feeding device of the machine is automatically adjusted in accordance with the thickness of the fleece or lap of material fed to the machine, is characterised in that the variation of the speed ratio of the drive of the feeding device is effected as required through the intermediary of a control device by means of a liquid or gaseous medium. In a device for carrying out this method the valves of a pipe system for a liquid or gaseous medium are controlled by a feeler device in dependence upon the feed, so that pistons are accordingly displaced in associated cylinders for the purpose of influencing a variable speed gear. C.

Yarns and Cords: Production. R. Wallach (Briarcliffe Manor, New York, U.S.A.). B.P. 501,436 of 24/5/1937: 24/2/1939.

A process for the manufacture of improved yarns and threads, cords and fabrics comprises mixing together, before spinning, non-adhesive textile fibres or filaments and a minor proportion of at least one type of potentially adhesive fibres or filaments, spinning the mixture of fibres or filaments into a singles yarn, activating the potentially adhesive fibres or filaments sufficiently to render them adhesive but not sufficiently to render the yarn formed therefrom non-porous, and squeezing the fibres or filaments of the yarn together while the fibres or filaments are in an adhesive condition to cause the fibres or filaments to adhere to each other at their points of contact. By this method it is possible to increase the tensile strength and the resistance to wear and laundering and to prevent untwisting of the yarns without substantially altering the original appearance and porosity of the materials. The non-adhesive fibre may be any suitable natural or synthetic fibre and the potentially-adhesive fibres may be natural or artificial fibres which are capable of being rendered adhesive by treatment with suitable physical and/or chemical agents including heat and irradiation, e.g. fibres of synthetic resin, rubber or cellulose ethers. C.

Roving Frame. P. Brambati (Brescia, Italy). B.P. 501,455 of 31/8/1937: 28/2/1939.

A roving frame is provided with two rows of bobbins on each of the two sides of the frame, a flyer associated with each bobbin and drawing rollers for guiding rovings to the flyers from a creel adapted to accommodate a corresponding number of feed bobbins.. The bobbins on each side of the machine are rockable through a mechanical control in order to effect a dismantling and re-assembly, or removal and loading. The drawing rollers are arranged in oblique alignment so as to lessen the angle through which the rovings leave the rollers for the flyers. The first drawing roller is arranged half-way between the two rows of flyers at each side of the machine thus providing an equal length of roving between the rollers and each bobbin. A platen or guide roller is applied against the outermost drawing roller for guiding the roving as it leaves the drawing rollers. Means for adjusting the pressure between the drawing rollers comprise a counterweight combined with a set of levers which enable the pressure to be released. C.

Flyer Frame. P. Brambati (Brescia, Italy). B.P. 501,504 of 31/8/1937: 28/2/1939.

A flyer frame is provided with a single-armed flyer having a balancing member which extends laterally from the upper end of the flyer and is of a substantially uniplanar upper surface. The flyer is provided with an overhead drive, the parts of the drive being enclosed within a closed casing. Pneumatic means are provided for automatic insertion of the roving from the feed bobbin into the flyer and a funnel is provided on the latter for guiding the roving at the place where it enters the flyer. The flyer includes a roving compressor system which comprises a balancing tube with an annular sector section fastened to its lower portion by means of a bearing associated with the roving guide tube. C.

Textile Fibres: Marking for Identification. E. Franz and Kammgarnspinnerei, Stöhr and Co. A.-G. (Leipzig). B.P. 501,643 of 28/7/1937: 28/2/1939.

Textile fibres are marked by depositing manganese dioxide or manganic hydroxide on them. The method is particularly useful for differentiating the components of mixtures of different kinds of fibres. A homogeneous colour of a mixture of marked and unmarked fibres indicates a uniform mixing. The marking may be effected with manganese brown, or solutions of manganates and permanganates may be used. Alternatively, the fibrous material may be treated with grease containing manganese dioxide or manganese dioxide may be formed on or in greasy fibres. The colour is removed by treatment with reducing agents such as sulphurous acid, hypochlorous acid, an acid solution of hydrogen peroxide, and particularly with or in the presence of oxalates, the fibres being simultaneously bleached. C.

Spinning Frame Pressing Roller. T. H. Laird (Calcutta, British India). B.P. 502,135 of 1/2/1938: 13/3/1939.

A pressing roller for spinning frames or the like (especially for jute) comprises the combination of two side members of disc-like form having substantially knife-edged peripheral edges, one of which side members has formed integrally therewith or has secured thereto an outwardly projecting ledge portion of smaller dimensions than the disc-like member, thereby providing a supporting ledge adapted to receive a ring of wearing material, a second outwardly directed ledge portion of smaller dimensions than the first mentioned ledge portion formed integrally therewith or secured thereto, forming a supporting ledge on which the other of the disc-like side members is mounted by means of an aperture therein, and a ring of wearing material which is compressed between and is held in position on the first mentioned ledge portion by the parts of the two side members which project beyond the ledge portion, the thickness and depth of the ring being such that the top of the ring does not extend above the peripheral knife edges of the side members but forms on a level therewith a wearing surface around the whole of the periphery of the roller which is adapted to wear uniformly with the peripheral knife edges of the side members. C.

Apparatus for Threshing, Decorticating and Paralleling Plant Stalk Fibres. G. A. Lowry. U.S.P. 2,130,352/3, 20/9/1938 (through *Chem. Abs.*, 1938, **32**, 9519).

Various structural, mechanical and operative details of apparatus suitable for treating flax straw. L.

Fibre Production from Flax Straw or the Like. R. Forsyth (to R. N. Burton). U.S.P. 2,130,681, 20/9/1938 (through *Chem. Abs.*, 1938, **32**, 9519).

Apparatus is described and a process which includes forming the fibrous material into a sliver after the shive has been removed therefrom, subjecting the fibre to a heated liquid bath to dissolve out the colouring matter and soften the gum and resin, then separately dislodging and collecting the softened gum and resin outside the liquid bath while applying heat to prevent cooling and hardening of the gum and resin. L.

3—CONVERSION OF YARNS INTO FABRICS

(A)—PREPARATORY PROCESSES

Bottle Bobbins: Standardisation. *Textilberichte*, 1939, **20**, 169.

Tentative standard dimensions for bottle bobbins for knitting yarns are given. C.

Rayon Warps: High-speed Preparation. H. Marsden. *J. Text. Inst.*, 1939, **30**, P14-18.

Coning in the Mill. *Irish Text. J.*, 1939, **5**, No. 3, 10.

Refers to the increasing use of cones as a supply for some further process. It has been proved that greater efficiency and economy may be secured by winding direct from spinners' bobbins on to the cone and using such cones for supplies in other processes. They may be magazined to give a continuous supply as in high speed twisting. It is becoming general practice to "cheese" warp yarn in the wet spinning mill direct from the wet spinning bobbin. L.

(B)—SIZING

Rayon Warp Sizing Machine. G. Rammer. *Leipz. Monats. Text. Ind.*, 1939, **54**, *Fachheft* I, 23-26.

The disadvantages of hank sizing processes and of the use of warp sizing machines with drying cylinders for rayon are pointed out and an account is given of a warp sizing machine in which the drying is effected by means of hot air. The warp passes through guide rollers and round an immersion roller dipping into a copper size box which is indirectly heated and provided with an automatic temperature control system and with arrangements for varying the depth of immersion as required. From the size box the warp passes between squeeze rollers to the drying chamber in which 3, 5, 7, 9 or 11 skeleton cylinders are arranged. Hot air passes from a heater below the drying chamber into the chamber and the arrangements are such that the supply of hot air is automatically cut off when the machine stops. Hot air and fresh air supplies to the chamber can be varied at will. Fans in the cylinders direct the hot air on to the wet yarn. A differential drive which acts as an automatic tension regulator is placed between the beaming machine and the drying chamber and varies the speed of the sizing rollers according to the tension of the yarn. The tension can be set to the required value by means of a scale and setting slide and is then automatically kept constant. The dried warp is finally wound on to beams on a machine on which the tension can be adjusted independently of the tension of the drying warps. Arrangements may be provided for measuring and marking off piece lengths. C.

Starch Products: Industrial Uses. W. B. Newkirk. *Ind. Engng. Chem.*, 1939, **31**, 153-157.

A short account is given of the manufacture, properties and uses of (1) thick-boiling starch, (2) thin-boiling starches, (3) oxidised starches, (4) gelatinised starches, (5) British gums and dextrins, (6) glucose, and (7) starches used in coal washing and the like. C.

Warp Sizing Research Programme, U.S.A. U.S. Institute for Textile Research. *Textile Research*, 1938, **11**, 49-60.

A report of a Conference on further developments of research on the sizing of cotton and spun rayon warps. Papers containing suggestions for study are contributed by (1) H. M. Chase, (2) F. G. La Piana, (3) W. Bolton, (4) J. B. Quig and (5) W. E. Yelland. The second speaker claims that some of the conclusions of the B.C.I.R.A. on warp sizing are not applicable to the methods and processes used in American mills. C.

Warps: Sizing for Weaving. S. Taylor. *Textile Weekly*, 1939, **23**, 395-397.

A report of a lecture reviewing researches of the B.C.I.R.A. in the field of sizing for weaving. Instruments for controlling the operations are mentioned. C.

(C)—WEAVING

Automatic Looms for Coloured Goods. W. Riesnert and F. Geuting. *Spinner u. Weber*, 1938, **56**, No. 44, 1-7, No. 48, 1-8, No. 49, 5-9, No. 52, 3-8; 1939, **57**, No. 4, 12-14, No. 6, 9-10, No. 7, 5-8.

A detailed account is given of automatic looms for coloured goods, the testing and operation of such looms, and the various let-off and stop motions used on them. Numerous photographs and diagrams are given. C.

Loom Shedding Mechanism. *Revue Textile*, 1939, **37**, 17-27.

A method of shed formation is described which may be used for the production of pattern effects and is particularly useful for the production of centre selvedges on wide and circular looms. The method depends on causing the two outer warp threads of a group of three to change places after a given number of picks has been inserted. For this purpose the two warps are passed through eyes in the ends of two bars projecting from a tube and the latter is caused to turn through 180° and back again to change the positions of the warps as required. This crossing of two warp threads about an intermediate warp thread binds the threads firmly in the fabric and when the material is cut between two groups of three threads of this type the edges do not slip or fray. More complicated crossing effects can be produced by causing groups of warp threads to pass to and fro over two or more intermediate threads. Various methods are shown and arrangements for carrying out the method on a circular loom is described. In a modification, the rotating tube carries three bars for controlling three warp threads and is turned through successive angles of 60°. C.

Roller Temple. R. Lévy (Etablissements J. Deiss). *L'Industrie Textile,* 1939, 56, 73-74.

The faults of the ordinary roller temples with and without covers are pointed out and an improved model is described in which the roller is placed above the fabric and guiding is effected by means of two racks with rounded teeth. The roller is mounted on a lever which can be operated by hand to raise the roller for inspection or introduction or removal of the fabric. The lever is maintained in working position by a locking lever. Details of the construction are shown in diagrams and the advantages of this temple are pointed out. C.

Shuttle Thread Tension Device: Standardisation. *Textilberichte,* 1939, **20**, 169.

Tentative standards are given for thread tension devices for shuttles. C.

Sley Drives. K. Otto. *Textilberichte,* 1939, **20**, 123-125.

The movement of the loom sley is studied and the difficulty of obtaining a dwell of the sley during the passage of the shuttle through the shed with simple driving mechanisms is pointed out. Drives with long and short crank arms are compared and it is shown that a short crank arm makes possible a greater retardation of the sley than a long crank arm but that the production of an actual dwell of the sley by further shortening of the crank arm to a length less than that now usual is not practicable. A double crank drive which gives an appreciable dwell is shown and its advantages are pointed out. C.

Elastics: Weaving. J. K. Ebblewhite. *Proc. Rubber Tech. Conf.,* 1938, 1057-1063.

A general account is given of the use of rubber and rubber-cored threads in weaving and references are made to methods for temporarily checking the elasticity of the thread during weaving, by special sizes or by covering with a destructible braid. A list is given of patents granted to T. L. Shepherd. C.

Novelty Twists and Combination Yarns: Weaving. H. E. Wenrich. *Rayon Textile Monthly,* 1939, **20**, 34-35, 87-88.

The use of novelty twists and combination yarns in the fine fabric trade, preparations for the production of new fabrics, and the timing of new samples are discussed. The importance of suitable shuttles and correct shuttle tensioning is emphasised and suitable arrangements for different types of novelty yarns are indicated. The causes and prevention of ballooning troubles and "split" weft are discussed. C.

Weaving Shed Efficiencies: Determination. *Textilberichte,* 1939, **20**, 126-127.

Methods of determining the efficiencies of individual looms, the efficiency of all the looms in a mill taken as a whole, and the degree of utilisation of the looms of a mill are explained, and examples are worked out. C.

Weft Pirns: Life, Practice and Preference. *Cotton* (*U.S.*), 1939, **103**, No. 1, 44-47.

A table is given showing the answers supplied by 39 mills to a questionnaire concerning the numbers and types of pirns used, types of looms and hours of operation, methods of collecting and stripping pirns, their life, etc. A formula for the calculation of life is given and various comments on conditions that affect the life of pirns are quoted. The results of the survey are discussed. Pirns were preferred that had brass bushings in the base, but with the inside of the barrels plain and without the brass tip on the outside of the pirn. Maple pirns were preferred to birch, and the grooved pirn held precedence over the ribbed and stepped. The average pirn life in loom hours and the percentage of pirn replacements per year varied considerably among the mills. C.

Fine-pitch Jacquard Mechanism. J. T. Hardaker Ltd. *Textile Recorder,* 1939, 56, No. 672, 50-51.

An illustrated account is given of the Hardaker endless paper roll Jacquard mechanism, which is made in the range 896, 1344, 1792 and 2698 needle capacity. C.

Pick Catching Apparatus. Grossenhainer Webstuhl und Maschinenfabrik. *Textilberichte English Edn.,* 1939, **20**, 6.

The pick catching apparatus described prevents drawing of the change threads of a circular box loom into the shed and prevents the selvedges from being drawn in and curling when the weft is inserted under considerable tension. The apparatus comprises a shaft of the same length as the breast beam bar rotatably mounted on the latter. Spindles pass through guide flanges of the shaft and light pressure springs are slipped over the spindles. The outer ends of the spindles are provided with needle heads upon which weft catching pins are arranged. Arrangements are provided for raising and lowering the pins. The pins assume their low position before the shuttle is pushed out of the chamber of the box. When the shuttle drags the weft through the shed, its looped end is applied behind the pick catching pins which hold it fast until shortly before the sley beats up. Details of the construction and the method of working are explained with the aid of diagrams. C.

"Servis" Recorder Charts: Application. Servis Recorders Ltd. *Textile Mercury and Argus,* 1939, **100,** 363-4.

"Servis" recorder charts automatically record the running time of machines and the duration of stops. "Eight hour" charts revolve once in 8 hours but can be set to last for 24 hours, the trace making a spiral; these detect stops of 20 seconds. Other recorders range from 4 hours to 8 days. A typical chart from a loom is shown. C.

(D)—KNITTING

Rubber-cored Threads: Knitting. W. Davis. *Proc. Rubber Tech. Conf.,* 1938, 1064-1072.

A general account is given of the application of rubber-cored threads in light-weight knitwear, including bathing costumes. C.

"Albion" High Speed Warp Loom. J. Hobley & Co. *Hosiery Tr. J.,* 1939, **46,** No. 541, 60.

Increased output is made possible by improved design and a rigid construction which reduces vibration to a minimum. The loom is equipped with a positive take-up action, and with either two or three guide bars, and with or without tuck presser. A special appliance is fitted whereby, if there are two guide bars, the front one can be raised to a high inoperative position to facilitate the threading of the back one; if there are three bars, the front and middle can be raised. W.

(G)—FABRICS

Colour and Weave Patterns: Designing. J. W. Hutchinson. *Textile Weekly,* 1939, **23,** 252-255.

Point-paper diagrams are given of a number of multiple design, warp and weft rib, and fancy twill effects that can be produced by employing weave effects with yarns of different colours. C.

Delamare Weave Rayon Fabrics: Designing. Liga. *Kunstseide,* 1939, **21,** 53-54.

Photographs and structural details are given of new French patterns of rayon fabrics for the export trade which have been produced by the Delamare process. Types of fabrics favoured for the summer 1939 and winter 1939-40 seasons are very briefly discussed and the increasing use of fancy twist yarns, especially combinations of viscose and cellulose acetate yarns is pointed out. A striped fabric of 100 per cent. rayon which is guaranteed fast to washing and does not shrink or spot, and Turitex, a rayon which is resistant to boiling, are mentioned. C.

Fabrics: Design. T. O. Ott. *Cotton (U.S.),* 1939, **103,** No. 1, 62-65.

The production of fancy weaves by combining simple basic weaves is discussed and examples obtained by combining plain and twill weaves, plain and satin weaves, and twill and satin weaves are shown. C.

Finished Tickings: Structure. J. Hoye. *Textile World,* 1939, **89,** No. 2, 76.

Finished tickings obtained by bleaching and printing with suitable mattress patterns standard warp sateens, drills and sheetings are briefly described and details are given of the structures of the gray cloths for finishing. C.

Habutai: Production. M. Fukuda. *Silk J. Rayon World,* 1939, **15,** No. 177, 35-37.

Habutai is woven mainly in the Kawamata, Kaga and Echizen districts of Japan. It is produced in various weights and used for a variety of purposes, the lighter weights generally being used for oilsilk. The weight is expressed in momme (about 7·56 momme = 1 oz.) and a fabric is termed 10 momme (10 m/m) if a strip 1½ in. wide and 25 yd. long weighs 10 momme. Habutai is woven from raw silk filature yarn with very little twist. It is the custom of the Japanese weavers to buy raw silk yarn, reel again, size and do all other necessary preparations at their own factories. Generally speaking, a low grade yarn unsuitable for export is used for ordinary Habutai. Plain, shioze, twill, brocade, striped, etc. weaves are used. The weaving is generally done at small factories having 10-100 looms, usually of the "Tsuda" electrically-driven power loom type. Girls look after 4-6 looms and are paid between 80 sen and 1 yen 20 sen per day of 8 or 9 hours. During weaving, weft yarn is kept moist by the simple method of placing a few pirns in a small receptacle containing water. After weaving the fabric is sent to the refining and finishing factory to be boiled off and finished. Habutai is not allowed to be exported unless passed by the Government Inspection Bureau as first or second quality. Habutai Industrial Guilds in Tukui, Kâga and Kawamata regulate the quantity to be woven per month and in some cases buy raw silk yarns and distribute them to their members and finally sell the goods on the members' behalf. C.

Pick-and-pick Effect Fabrics: Imitation on Single-box Looms. A. Bower. *Textile World*, 1939, **89**, No. 2, 44-45.

Various methods of imitating pick-and-pick effects on box looms having a single box at one end of the lay are explained by a study of examples. C.

Rayon and Staple Fibre Fabrics: Designing. A. Hamann. *Kunstseide*, 1939, **21**, 50-52.

Various new German rayon and staple fibre products and their suitability for use in the production of clothing materials are discussed. Details are given of rayon and staple fibre crepe, georgette, cloqué and moiré fabrics. C.

Staple Fibre Dress Materials: Designing. O. Friedmann. *Kunstseide*, 1939, **21**, 56-58.

Photographs, point paper drafts and structural details are given of new staple fibre dress materials having fancy effect yarns in the warp. C.

Rayon Dress Fabrics: Design. L. Hofmann. *Zellwolle*, 1939, **5**, 12-13.

Designs, photographs and details of rayon fabrics for autumn and winter 1939/1940 are given. C.

Staple Fibre Pleated Cloth: Production. H. Pflanzer. *Zellwolle*, 1939, **5**, 14-15.

Various methods for the production of staple fibre fabrics showing crimped, pleated, blister and similar effects are briefly described. The methods include methods depending on pressing, steaming and similar treatments and on the use of chemical agents, and methods in which the desired effects are produced by the structure of the yarns used in weaving the fabrics or by the weave used. Suitable weaves are shown. C

PATENTS

Straight-bar Knitting Machine. I. L. Berridge & Co. Ltd. and L. H. Colton. B.P. 497,157 of 18/6/1937.

In a straight-bar machine having welting mechanism located above the frame needles for producing a turn-over welt, the thread of the first welt course is prevented, by means independent of the welt hooks, from being engaged in the beards of spaced needles with which the welt hooks co-operate. Various arrangements are described. C.

Circular Knitting Machine Fabric Take-up Means. S. Davis & Sons Ltd. and A. Wigley. B.P. 497,376 of 25/6/1937.

The fabric take-up means of a circular machine includes a circular driving member, the eccentricity of which with respect to the axis of the needle cylinder determines the speed of rotation of the take-up roller or rollers. The member may be adjusted manually, or automatically when changes are made in the knitting operations. The intermediate mechanism through which the member imparts intermittent rotation to the take-up rollers may comprise a friction ratchet mechanism including a disc keyed to one of the rollers, and a driver having a part oscillating about the periphery of the disc, balls or rollers being placed between the disc and the driver. Inclined or cam surfaces are arranged upon either the disc or the driver, so that movement of the driver in one direction wedges the balls or rollers and transmits the drive to the take-up roller, and movement in the opposite direction releases the balls or rollers. A block with strips or shoes of leather may be provided for preventing fluff, etc. entering the ratchet mechanism, and a brake device may prevent reverse rotation of the take-up rollers. C.

Self-adhering Bandage. A. and S. Baitz. B.P. 497,851 and 498,002 of 28/6/1937.

(1) A bandage comprises a strip of pliable absorbent material such as gauze, cheese-cloth, or butter-muslin, on the surface fibres of which rubber from a mixture of raw rubber and a solvent is distributed in such manner that superposed layers of the bandage will cohere but the bandage will not adhere to the skin, the rubber mixture being of such viscosity that it will not penetrate the material nor impair the absorptive property and pliability thereof. The base material or rubber mixture may be coloured, and antiseptic or aromatic substances may be incorporated in the rubber mixture, or applied to the base material. (2) A bandage comprises a strip of pliable absorbent material such as gauze, cheese-cloth, or butter-muslin, on both surfaces of which tacky filaments are deposited from a mixture of raw rubber and a solvent in such condition that layers of the material will cohere when superposed, the filaments being so thin and so distributed that the absorptive property and pliability of the material are not impaired. C.

Pattern-scanning Device and Selector Mechanism. G. Fisher and W. S. Tandler. B.P. 497,874 of 12/11/1937 (Conv. 13/11/1936).

Details are given of an arrangement in which a photo-electric pattern-scanning device and a hammer controlled thereby are mounted on a carriage which is moved to draw the device across the pattern and the hammer past a row of selector elements. The selector elements may lift members connected directly to the heddles or to a series of hooks connected to the heddles and adapted to be lifted by griffe bars. C.

Circular Knitting Machine. Bentley Engineering Co. Ltd., C. H. Wainwright and G. A. Buswell. B.P. 497,959 of 30/6/1937.

A circular machine is provided with two feeders movable from normal plating to reverse plating positions and to a third pair of positions to produced normal plating during reciprocatory knitting. Means are provided for moving the feeders selectively into any of the three pairs of feeding positions and for adjusting the position of each of the feeders when they are in a reverse plating position without affecting its position during normal plating. The invention is described in connection with a superposed cylinder machine in which one feeder is carried by an elbow lever mounted upon an arm which is swung to change the position of the feeder from normal to reverse plating by a bar and lever. C.

Flat Warp Knitting Machine. G. Saupe and P. Wunschmann (trading as E. Saupe). B.P. 497,981 of 15/11/1937.

A flat warp machine has two sets of splicing warp guides slidably supported on an oscillating guide bar and operated by a spindle that is moved axially and rotated, to produce the desired lap and pattern respectively, by two pattern devices. The invention is described in connection with the production of shaped splicings for the toes, soles and heels in a broad web of fabric from which stocking forms are to be cut. C.

Carob Bean Sizes: Preparation. G. W. Johnson (I.G. Farbenindustrie A.-G.). B.P. 498,149 of 29/7/1937.

Water-soluble products useful as dressing and sizing agents are obtained by treating carob bean kernels or their perisperms with alkylating agents, e.g. with alkylene oxides, dialkyl sulphates or diazomethane. The carob bean material may be treated as a flour or a suspension in the presence or absence of an alkali and at atmospheric or raised pressure. The products may be freed from salts by precipitation, extraction with solvents, or dialysis. C.

Hosiery: Knitting. R. & K. Lieberknecht (trading as K. Lieberknecht), and K. W. Rossler. B.P. 498,380 of 5/4/1937.

In knitting hose and half-hose in string formation on a cylinder-and-dial machine, after completing a toe and making some extra courses, non-stop courses are knitted, the stitches are then cast off every alternate cylinder needle and these needles remain inactive while knitting proceeds on the intervening cylinder needles until, at the commencement of the new stocking, rib needles are brought into operation in place of the inactive cylinder needles to knit a rib top. At the completion of the rib top, the loops are transferred from the rib needles to the alternate cylinder needles and plain fabric is knitted using all the cylinder needles. At the commencement of the new stocking, the rib needles knit a course, then hold their loops while the intervening cylinder needles knit a number of courses, and are restored to activity, so that a welt is produced. Transfer needles are provided in the dial. Fingers, one to each dial needle, are pivoted in the dial cap for controlling the needles, and are provided with operating butts engaged by actuating levers. The fingers may be used not only for projecting the dial needles for transferring the loops, but also for patterning purposes. The tension in the yarn may be varied by providing additional tensioning means which can be released under control of a pattern drum. A binder and cutter for the yarns is mounted on the dial cap. The needle cylinder can be raised to increase the tension in the fabric when knitting the stocking top and the heel and toe. C.

Purl Stitch Machine. H. and R. Stoll (trading as Reutlinger Strickmaschinenfabrik H. Stoll and Co.). B.P. 498,438 of 16/2/1938 (Conv. 18/2/1937).

A purl stitch machine has two sets of movable cams which are brought into action alternately for moving the sliders towards and away from the point at which they engage or release the needles. The cams are so disposed relatively to the slider cover that the sliders are fully covered during their forward and rearward movement and the needles are fully advanced before the empty sliders move to linking position. C.

Cylinder-and-Dial Machine. R. and K. Lieberknecht (trading as K. Lieberknecht) and K. W. Rossler. B.P. 498,465 of 5/4/1937.

The needle dial and dial cam cap of a cylinder- and dial machine are supported upon an inverted U-shaped yoke, and to permit the dial and cam cap to be displaced from operative position, a part of the yoke is pivoted about an axis at right-angles to the needle cylinder axis and substantially at the level of the top of the cylinder. An adjusting screw carried at the free end of the pivoted part of the yoke rests on the part of the yoke that carries an inclined driving shaft for the needle dial, and movement of the dial from inoperative position separates a gear rotatable with the dial from its driving gear on the shaft. The dial needles are actuated in the manner described in B.P. 498,380. C.

Knitting Machine Patterning Members. Jacquard Knitting Machine Co. B.P. 498,480 of 7/7/1937 (Conv. 29/7/1936).

Patterning members for selecting the needles, sinkers or pressers, are formed in two parts, each member having a shoe part engaging a needle, etc., and engaged by a raising cam and a body part which may carry the feeler member which engages a slot in the pattern drum. To offset the connections between the shoe and body of adjacent members, the shoe of one member projects in an upward direction and the shoe of the adjacent member projects in a substantially horizontal direction. The body parts may be bent laterally, and the offsetting of the connections serves also to prevent interference between the bent portions of adjacent members. The shoe portions may extend in three directions so that the body parts are arranged at three levels. C.

Knitting Machine Take-up Mechanism. A. W. Kent, H. H. Holmes, and Wildt and Co. Ltd. B.P. 498,621 of 18/10/1937.

In fabric take-up mechanism for knitting machines, e.g. circular superposed cylinder machines of the kind having two rollers, one of each of which is pressed, e.g. by a spring means, towards the other, the rollers being geared together at one or each end, the driving means being associated with one of the rollers and one or each of the rollers being yieldably mounted, a gear associated with the yieldably-mounted roller is mounted independently of this roller and connected therewith by driving means which enable the roller to move relatively to the other roller without affecting the gears which connect the two rollers. The invention may be applied to rotary-cylinder or stationary-cylinder machines. C.

Circular Knitting Machine Yarn Feeder. H. H. Holmes and Wildt and Co. Ltd. B.P. 498,622 of 18/10/1937.

In a yarn feeder for circular knitting machines, of the kind having two yarn-feed openings, one of which is of elongated form horizontally for feeding yarn first from one end thereof and then from the other during reciprocatory knitting, the length of the elongated opening is adjustable. The slot may be formed by recesses in separate parts slidably mounted on a rib on a bracket secured to the top cam box of a superposed cylinder double-ended latch needle machine. In an alternative construction, a long slot in a plate is covered at each end by small plates adjustable laterally. C.

Warp Knitting Machine. E. H. Wirth, H. D. Donner, J. M. Loschner and E. H. Wirth. B.P. 498,802 of 8/6/1938 (Conv. 19/6/1937).

The pattern wheel shaft of a warp machine is driven from the cam shaft by worm gearing and two interchangeable gears mounted to rotate as a unit on a radially adjustable stud carried by a plate which is circumferentially adjustable on a sleeve. The gears engage respectively with a gear wheel on a shaft journalled in the sleeve and with a gear wheel on the worm shaft. C.

Knitting Machine Transfer Needle. Jacquard Machine Co. Inc. B.P. 498,872 of 8/5/1937 (Conv. 9/5/1936)

A transfer needle for use in a machine such as is described in B.P. 495,379 has an upwardly pointing clip mounted thereon, and at the free end of the clip a projection so shaped as to form a continuation of the clip. The needle loop to be transferred is thus first enlarged by drawing it forwardly to rob yarn from the adjacent loops, and is subsequently opened sideways to admit the hook of the needle receiving the loop. A yarn holding shoulder is provided on the needle and a corresponding shoulder or indentation is formed on the clip. C.

Tubular Fabrics: Knitting. G. Blackburn and Sons, Ltd., and E. J. Towers. B.P. 498,937 of 25/9/1937.

Loops of thread are inserted as weft threads in the knitting of tubular fabrics to form a reinforced panel in an elastic fabric or an elastic panel in an inelastic fabric. The fabric is knitted upon a cylinder-and-dial machine, e.g. a machine having a stationary needle cylinder and dial, and the weft thread is carried up the interior of the needle cylinder and out through an opening. The thread passes from the opening to an eye in the top of an instrument mounted in one of the needle tricks, and the yarn is seized and taken around the cylinder as a loop by a hook mounted upon the cam case. The hook is rotatable with a spindle carrying a pinion which engages a segmental rack carried by an arm. In the rotation of the cam case, the arm engages an abutment to rotate the pinions and to cause the hook to release the loop. At the point of release of the loop, a rib needle is projected to hold the end of the loop and subsequently to draw a loop of the ground thread through it to lock it in the fabric. By providing long rib needles in the whole of the panel area, the two lengths of thread comprising each loop are disposed so that one length is positioned between the rib needle and cylinder needle loops of one course and the other length is positioned between the rib and cylinder loops of the next succeeding course. The weft thread is tensioned by passing between jaws carried by a lever which is depressed at the completion of each loop inserting operation to release the thread. C.

Straight-bar Knitting Machine. Schubert and Salzer Maschinenfabrik A.-G. B.P. 499,007 of 27/6/1938 (Conv. 26/7/1937).

A constant lead of the thread guide in straight-bar machines with a variable slur-cock travel is obtained by transmitting the control movements of the narrowing device to the slur-cock bar by means of a screw having a thread of increasing pitch. The screw co-operates with a block slidably mounted in the pivoted sinker arm and connected to a reciprocating sinker bar by a pitman. C.

Stockings: Knitting. O. W. Marden. B.P. 499,353 of 4/5/1938 (Conv. 4/5/1937).

In a fully-fashioned stocking blank having narrowing marks extending from the calf portion to the top of the heel portion, the marks are parallel with the selvedge edges on the calf and gradually converge towards the edges as they approach the heel. Several of the lowermost marks may be taken up in or merge with the seam when the stocking is made up. C.

Stationary Weft-supply Means. W. Gledhill & Sons Ltd. (Holmfirth) and W. V. Gledhill. B.P. 500,756 of 18/11/1937 : 15/2/1939.

Weft-supply means for looms comprise, in combination, a creel or frame in which weft-containing bobbins are revolvably supported, means for applying to the bobbins a braking action which controls the tension on the weft and varies automatically as the diameter of the weft masses on the bobbins decreases, and means whereby, when a weft breaks or becomes unduly slack or the supply fails, the loom is stopped. Each weft, as it leaves its supply bobbin, is led beneath the horizontal portion of a pivoted angle finger, the vertical portion of which, if the weft breaks or becomes unduly slack, is adapted to engage a contact rod or wire and effect or initiate stoppage of the loom. C.

Automatic Shuttle-changing Loom. W. Gledhill (Lytham St. Annes). B.P. 501,082 of 11/11/1937 : 21/2/1939.

A weft replenishing loom of the kind in which replenishment is effected by raising the empty shuttle upwardly out of the working box by means of a full shuttle pushed upwardly beneath it is characterised by the provision, behind the shuttle box, of a pivoted latch or latches which normally engages or engage a pin or pins on an arm or arms carrying a yielding strip at the rear of the box and forming a movable box top, the latch or latches being actuated or moved, to release the box top and permit it to yield upwardly, by a cam or arm on a vertical shaft which is rotated through a suitable arc when a weft replenishment is to take place. C.

Weft Spool. Maschinenfabrik Rüti vormals C. Honegger (Rüti, Switzerland). B.P. 501,507 of 8/9/1938:28/2/1939.

A weft carrier or spool for shuttles having a winding shaft upon which the thread is directly spooled or wound, is characterised by the fact that the winding shaft is provided with at least one longitudinal slot to provide a transversely elastic shaft adapted to contract during winding of the thread thereon and tending to expand after being so contracted, the expansile action automatically giving the necessary tension or grip upon the thread windings when wound directly upon the shaft, whereby a sliding-off of the spooled material during the unspooling, and the consequent loss of material, are avoided. C.

Jacquard Loom. Maschinenfabrik Rüti vorm. C. Honegger (Rüti, Switzerland). B.P. 502,006 of 22/7/1938: 9/3/1939.

The Jacquard machine is located under the loom, if desired in a separate room, in such a manner that the lower shed of the warp is positively drawn on to the race board of the slay by the lifting blade of the Jacquard machine, and the upper shed is formed, during the lifting of the bottom board, by elastic means (springs) arranged above the warp. C.

Moulded Plastic Shuttle. P. Prestat (Saulzoir, France) and E. Despierre (Croix, France). B.P. 502,120 of 8/10/1937: 13/3/1939.

A shuttle body and a cross-bar therefor are moulded from a single piece of plastic material with or without reinforcing means and with pointed metal ends embedded in the body during the moulding, the shuttle body having formed therein also during the moulding recesses, reference marks for the mounting of bobbin frames and spindle cop holders as well as other fittings used in positioning the friction or braking devices for the weft. The shuttle body is of greater density than wood and of minimum coefficient of friction. The reinforcing cross-bar is adapted to serve as a bobbin stop when the latter is used instead of a cop. The shuttle body may be provided with two lateral left and right hand grooves for placing of the weft and two holes or eyes so that the shuttle thus fitted can be operated either to the right or to the left. C.

4—CHEMICAL AND FINISHING PROCESSES

(A)—Preparatory Processes

"Aerosol" Wetting Agents: Properties. C. R. Caryl and W. P. Ericks. *Ind. Engng. Chem.*, 1939, **31**, 44-47.

The sodium salt of dioctyl sulphosuccinate—
$NaSO_3{\cdot}CH(CO_2C_8H_{17}){\cdot}CH_2{\cdot}CO_2{\cdot}C_8H_{17}$ is claimed to be the most efficient wetting agent on the market, according to the Draves test. The theory of surface-active compounds is reviewed. A classification of wetting agents is attempted and charts indicate the effect of acid and alkali on certain types. (To demonstrate the wetting power of Aerosol OT, the authors also present photographs of a duck sinking in water containing about 1 part in 2,500 of the wetting agent). C.

American Surface-active Agents. *Ind. Engng. Chem.*, 1939, **31**, 66-69.

A list is given in alphabetical order of proprietary surface-active agents, with their chemical type, industrial applications and manufacturers. C.

Textile Assistants: Application in Bleaching, Dyeing and Printing. C. H. Fischer. *Kunstseide*, 1939, **21**, 63-68.

An account is given of the properties and applications of 51 proprietary compounds used as wetting agents and assistants in bleaching, dyeing and printing processes. C.

(B)—BOILING, SCOURING, DEGUMMING AND WASHING

Scouring Wool before Export. W. G. Brown. *Queensland Country Life*, 1939, 4, No. 30, 11.

In 1938, 95·80 per cent. of Queensland's wool was exported as greasy wool and 4·92 per cent. as scoured wool. The principal objections to local scouring are discussed, and details given of types of wools which it should pay to scour before export. W.

(D)—MILLING

Theory of Felting. E. Justin-Mueller. *Teintex*, 1938, 3, 717-720; *Textilber.*, 1939, **20**, 72-75.

Articles recapitulating work already noted (see *J. Text. Inst.*, 1939, A105). W.

(E)—DRYING AND CONDITIONING

Drying of Textiles. R. Schulze. *Z. Ver. deut. Ing. Beih. Verfahrenstech.*, 1938, 53 (through *Brit. Chem. Abs. B.*, 1939, 58, 250).

Apparatus for drying felts used in the paper industry is described. W.

(G)—BLEACHING

Tall Oil Soap: Use in Textile Processes. L. Kollmann. *Textilberichte*, 1939, **20**, 129-131.

The composition of tall oil and the properties of its sodium soap are discussed, and an account is given of experimental studies of the value of this soap for various textile treatments. The results show that use of the sodium soap of tall oil in chlorine and peroxide bleaching baths is not advisable on account of its decomposing action. For the degumming of silk, the washing of wool and the desizing of rayon, tall oil soap appears to be as suitable as Marseilles soap. It also gives results as good as those obtained with the usual dearer agents in open alkali boiling of cotton yarns and fabrics, in substantive and vat dye baths, in the levelling and stripping of dyeings, and when used as a dispersing agent in naphthol solutions. The dark colour of tall oil soap solutions does not appear to have any disadvantageous effect on white goods. C.

(H)—MERCERISING

Staple Fibre: Alkali Treatment. C. H. Fischer. *Zellwolle*, 1939, 5, 8-10, 46-47.

Staple fibres, especially cuprammonium fibres, and yarns and fabrics made from them are treated with caustic soda of less than 10° Bé to increase their affinity for dyes, increase the fibre curl, facilitate level dyeing and the removal of oil sizes, modify crepe characters, close up, e.g. knitted stitch structures, reduce lustre, etc. Suitable conditions of treatment for the production of such effects are described and data showing improvements in yarn strength and extensibility are given. In the mercerisation of staple fibre-cotton mixtures, a wetting agent of high activity should be used and the goods should be fed dry to the mercerising liquor. Tables are given showing suitable wetting agents, the best conditions for mercerisation with caustic soda with and without additions of salt, and with mixtures of caustic soda and potash, and the types of fibre mixtures for which these different methods are most suitable. The shrinkage and its dependence on temperature, the use of squeezing rollers, the need for care in rinsing, souring and drying processes, and the loss in weight of staple fibre in mercerising are discussed. C.

(I)—DYEING

Cellulose Acetate Rayon: Dyeing Black. W. Steger. *Monatsh. Seide u. Kunstseide*, 1939, 44, 47-50.

A general account is given of methods of producing black dyeings on materials made of cellulose acetate rayon and materials containing this type of rayon and cotton, viscose rayon, wool, silk or half-wool. C.

Octadecylpyridinium Salts: Effects on Dyed Cloth. F. Seidel and A. Brösamle. *Ber. Dtsch. chem. Ges.*, 1939, **72**, 45-46.

Continuing their studies of textile dyeing assistants, the authors have converted octadecylpyridinium bromide into the naphthionate. It is known that dyes of amine type when treated with octadecyl bromide in the presence of pyridine are converted into paler products. The authors have tried the effect of octadecylpyridinium bromide on prepared dyeings but only with Benzopurpurin 4B was any effect observed. The reduction of colour was more than could be effected by soaping but much less than that produced by treatment of the dye with octadecyl bromide and pyridine. C.

Sirius and Sirius Light Dye Combinations: Application. H. Hansen. *Textilberichte,* 1939, **20**, 132-134.

Samples are given of fast dyeings in yellow, green, scarlet red, blue, olive, old-gold, beige, brown, violet, lilac and grey shades produced with combinations of Sirius and Sirius light dyes. C.

Surface-active Agents: Effect in Dyeing. J. E. Smith. *Ind. Engng. Chem.,* 1939, **31**, 40-42; also *Amer. Dyes. Rept.,* 1939, **28**, 146-155.

The rate of diffusion of Benzopurpurin 4B into water has been measured on solutions containing 0·5 gm. per l. of dye, 0·025 *N* in sodium chloride, to which 0, 1 and 2·5 gm. per l. of lauryl sodium sulphate (recrystallised Gardinol W.A.) was added. At 1 gm. per l. the surface-active agent had a slight dispersing action and at 2·5 gm. per l. a slight agglomerating effect, but the effects appeared to be too small to have importance in dyeing. Measurements of the absorption of the dye by 10 gm -pieces of cotton fabric were also made on solutions containing 75 mg. of dye in 200 c.c., sodium chloride ranging from 0·01 to 0·08 *N*, and 2·5 gm. per l. of lauryl sodium sulphate, Alkanol B (the Na salt of an alkylnaphthalene sulphonic acid, recrystallised from benzene), or sodium oleate. Dyeings were continued for 1 hour at 25° C. The results show that maximum absorption of dye occurred at 0·03 *N* sodium chloride in the absence of surface-active agent, and at 0·02 *N* in its presence. The maximum absorption was greater in the presence of surface-active agent, but dyeings were level except when so much salt was present that the rate of absorption was lowered. A similar experiment was made with Ponsol blue R.S. in solutions 0-0·9 *N* in salt and containing 6·25 gm. per l. of the active agents. The absorption began to decrease at 0·5 *N* salt in the absence of the active agents and at 0·6 *N* in their presence. The conclusion is drawn that negatively-charged surface-active agents of the present type have at most an agglomerating effect on negatively-charged dyes and are effective in dyeing because they promote wetting and swelling of the fibre. C.

Surface-active Agents: Effect in Washing-off of Dyeings. J. E. Smith. *Ind. Engng. Chem.,* 1939, **31**, 42-43.

The fastness to washing has been measured on a series of dyeings made with azo colours containing sulphonic acid groups, the detergents being water, 0·02 *N* NaH sulphate, or 0·01 *N* Na chloride, carbonate, Na_2H phosphate or Na_3 phosphate, to which lauryl sodium sulphate, cetylpyridinium bromide or olive oil soap were added as surface-active agents. In many instances water alone caused as much loss of dye as any of the detergents. The positively charged cetylpyridinium bromide greatly reduced the loss, in some cases almost to nil. Acid solutions retarded and alkaline solutions promoted the removal of colour. By adding 0·01 *N* magnesium sulphate or calcium chloride to a "synthetic" detergent solution, the bleeding of Benzopurpurin 4B or Pontamine Fast red 8BNL was almost completely suppressed. C.

Calcogene Dyes: Application to Staple Fibre. W. H. Watkins. *Rayon Textile Monthly,* 1939, **20**, 89-90.

A list of Calcogene dyes recommended for the production of fast dyeings on rayon staple fibre is given and the general method of application is briefly described. Details are given of various necessary precautions. C.

Naphtol AS Dyes: Constitution. K. L. Dorman. *American Dyestuff Reporter,* 1938, **28**, 79-84, 101-106.

The development of dyes of the Naphtol AS type is described and tables are given showing the chemical constitution of the AS-type first components, the Naphtols listed as derivatives of the parent Naphtol AS, the chemical constitution of Naphtol bases and salts, dyes of French manufacture and the German prototypes, bases listed according to the amine from which they are derived, and the chemical constitution of Rapid Fast dyes and the Rapidogen type dyes. Methods of stabilising the AS dyes, and the preparation and use of active and passive stabilised diazo compounds are discussed. C.

"Autolift" Mechanically Unloaded Hydro-extractor. Watson, Laidlow & Co. Ltd. *Textile Recorder*, 1939, 56, No. 671, 44.

The "Autolift" extractor is a suspended electrically-driven, high-speed hydro-extractor having a basket 48 in. in diameter and capable of taking a load of 260 lb. dry weight. Unloading is by an electrically-operated lifting unit with a cradle for raising and lowering the unloader, and by this means unloading can be effected in about 30 sec. as against about 15 min. for a standard machine of similar capacity. The "Autolift" extractor is fitted with a time clock which can be set for a definite time run when the machine is started and, when the allotted time expires, the clock automatically cuts off the current. C.

French Dyeing Industry: History. H. Wescher. *Ciba Review*, 1939, No. 18, 618-625, 626-641, 643-646.

The history of dyeing in France is reviewed under the headings (1) Dyeing before Colbert, the founder in 1666 of the Académie des Sciences; (2) Great masters of dyeing in the 18th century; (3) the French dyeing industry and its reorganisation by Colbert. C.

Animalised Cellulose Fibres: Affinity for Acid Wool Dyes. P. Eckert, E. Herr and G. Fischer. *Klepzig's Textil-Z*, 1938, **41**, 624-627, 634-637, 646-647, 1939, **42**, 164-168.

An account is given of investigations of the influence of the *p*H, volume, and concentration of the dye bath, time of dyeing, etc. on the adsorption of acid wool dyes by animalised viscose fibres. Triphenylmethane and azo dyes were used in the experiments. The results are given in tables and graphs and are discussed. They show that the affinity of animalised fibres for acid wool dyes, like that of wool, increases with decreasing *p*H. For wool the maximum affinity occurs at a *p*H of 1·3 but for animalised fibres the maximum occurs at *p*H 2·0-2·3 with bath ratios of 1:25 to 1:70 and about 3 per cent. to 5 per cent. sulphuric acid and 10 per cent. Glauber salt. The adsorption velocities on both wool and animalised fibres decrease with increasing *p*H. The bath ratio has no influence on the dyeing power of animalised fibres between the values 1:25 and 1:70 but the speed of dye adsorption decreases with increasing bath volume. The amount of dye taken up by animalised fibres decreases with increasing number of sulpho groups in the dye molecule and the speed of adsorption also decreases. The amount of dye adsorbed increases with increasing dye concentration from 0·5 per cent. up to 4 per cent. calculated on the weight of material to be dyed, but when the amount adsorbed is expressed as a percentage of the weight of fibre material the adsorption decreases with increasing dye concentration. C.

Cotton-Rayon Mixture Fabrics: Dyeing. K. Ottenschläger. *Klepzig's Textil-Z*, 1939, **42**, 151-152.

A general account is given of methods of dyeing woven and knitted fabrics composed of mixtures of cotton and rayon, and the choice of dyes for this purpose is discussed. Samples dyed with Indanthrene dyes and Indigosols are given. C.

Indigo Blue Vat: Indigo Content Determination. J. Lotichius. *J. Soc. Dyers and Col.*, 1939, 55, 87-88.

A colorimetric method for the determination of the indigo in blue vats is described which depends on the formation of a blue sol when sodium protoalbinate is added to an alkaline solution of leuco-indigo and the latter oxidised with hydrogen peroxide. The colour is then compared with that of a standard solution of known indigo content. A colloidal indigo solution may be used as the standard solution but it has been found preferable to use a standard solution of Sirius Blue B (IG) which is very similar in shade and colour intensity to the freshly prepared colloidal indigo solution, the dye content of which can be determined by gravimetric analysis. Details of the procedure and calculations are given together with results showing the accuracy of the method. C.

Mercerised Cotton Fabrics: Dyeing. P. Colomb. *Teintex*, 1938, 3, 721-727.

A general account is given of methods of dyeing mercerised cotton fabrics with direct and vat dyes and with Indigosols, and suitable modern dyeing machines are mentioned. Examples are discussed and methods of finishing are outlined. C.

Silk: Mordanting. *RUSTA*, 1939, 14, 67-69.

The application of aluminium, chromium and iron mordants to silk is described and dyes suitable for use on these mordants on silk are indicated. C.

Mordanting Wool in the Cold. J. M. Gaudit. *Rev. gén. mat. color.*, 1939, **43**, 18 (through *Chem. Abs.*, 1939, **33**, 2343).

Amend's process, which is economical because of eliminating the cost of steam treatment, consisting of a bath of 5 per cent. sulphuric acid, 1 per cent. potassium bichromate and after exhaustion, an addition of 5% sodium bisulphite, is modified to 2·5 per cent. formic acid for 10 min., to which is added 1 per cent. sodium bichromate; this is followed by the bisulphite. It is claimed the fibre treatment is less harsh. W.

(J)—PRINTING

Printing Paste: Properties. *Textile Weekly*, 1938, **22**, 903-9; 1939, **23**, 20, 263-5, 404-5.

A general account is given of the main types of thickeners for printing pastes and the influence of their properties in roller, block and screen printing. C.

Screen Printing Plant Cloth Fixing Machine. A. Franken. *Textilberichte*, 1939, **20**, 134-135.

The difficulty of obtaining good results in screen printing on fabrics with cloqué and other figured effects when the fabrics are pinned to the table, and the unsatisfactory nature of this method of securing the fabric are discussed. A better method consists in pasting the fabric to a fabric support. Machines for this purpose are shown in diagrams. In the most recent model the supporting fabric passes over a roller dipping into a bath of glue, the fabric to be printed is guided into contact with the coated face of the support and the two together pass round a steam-heated drying cylinder and are then wound on a roller. The roller is taken to the printing table and the fabric unwound with the side to be printed on top. C.

Yarns for Chiné Fabrics: Printing. P. Mercy. *Teintex*, 1938, **3**, 727-735.

Fabrics showing chiné or shadow pattern effects are obtained by using printed yarns for the warp. The yarns are printed in hank form, usually by means of printing rollers having grooves in the direction of the axis. The preliminary treatments and printing process are described, and printing paste and thickener recipes are given together with details of the procedures used in printing cotton, rayon, wool and silk yarns with various classes of dyes. C.

(K)—FINISHING

Fabric Feeding Devices. H. Reuter. *Spinner u. Weber*, 1939, **57**, No. 8, 47-49.

Various German patented devices for feeding fabric to tentering, drying and similar machines are briefly described. C.

Silk Velvet: Finishing. A. Effenberger. *Textilberichte English Edn.*, 1939, **20**, 31-32.

A general account is given of the finishing of silk velvet. Fine folded cotton yarn dyed in the hank is used for picks and ends in this type of velvet, and the pile consists of hank-dyed organzine or thrown silk. The warp is sized in the hank, made absorbent and dyed with direct dyes. The cloth is woven as a double warp velvet in three widths of 45 cm. side by side, so that six pieces leave the loom simultaneously, and there are a minimum of six pieces of one colour. Finishing treatments comprise cropping, raising, shearing, back-finishing, drying, ironing, and breaking operations. Suitable machines for such treatments are briefly described. C.

(L)—PROOFING

Moth-proofing Agents: Efficiency. H. I. Jones. *Exterminator's Log*, 1938, **6**, No. 2, 12-13 (through *Chem. Abstr.*, 1938, **32**, 5636^5).

A brief review is given of the efficiency of various classes of moth-proofing agents, with references to their solubility in dry cleaning solvents. The residues from the extraction of thorium and meso-thorium from monazite sand in the gas mantle industry, containing Ce, La, Pr and Dy, are applied by the two-bath process (acetates in one bath and soap in the other). They impart resistance to mildew as well. Efficiency tests are discussed; they should include silver-fish insects and carpet beetles as well as clothes moth larvæ. C.

Single-bath Waterproofing Agents. G. Durst. *Textilberichte*, 1939, **20**, 136-138.

Patent single-bath processes for imparting water-repelling properties to textile materials are discussed, and methods of analysing commercial products used for this purpose and of testing their stability and efficiency are outlined. C.

Balloon Fabrics: Causes of Premature Deterioration. —. Kehren. *Textilberichte English Edn.*, 1939, **20**, 33-35.

The various causes of premature deterioration of balloon fabrics, including incorrect treatment in use and in storage, faulty rubberising, and defective condition of the fabric (presence of grease, acid, copper and manganese) are discussed, and recommendations from "General Directions for the Manufacture of Balloon Casings and for Handling and Storing Balloons" published by the German Air Sport Association are quoted. The colour, construction and testing of balloon fabrics are briefly discussed. C.

Water Drops: Behaviour on Fabrics. H. Bundesmann. *Klepzig's Textil-Z.*, 1939, **42**, 33-140.

Selections from films showing the behaviour of drops of water falling on to wool gabardine and on to a sample of the same fabric which had been made water-repellent are reproduced and discussed. The films were taken at the rate of 1500-3000 photographs per second. The camera used for this purpose is briefly described. A drop of water falling on to the untreated fabric penetrates into the fabric, gives rise to the formation of small beads of water, and wets the fabric. A drop falling on to the water-repellent sample penetrates the fabric in a similar manner, then breaks up into smaller drops which roll on the surface and eventually combine. C.

Prevention of Damage to Wool by Bacteria. R. Hünlich. *Textil Betrieb*, 1938, July, 41, (through *Chem. Abs.*, 1939, 33, 1949).

Wool can be rendered more resistant to bacterial attack by treatment with chromium oxy salts, e.g., basic chromium magnesium sulphate, if necessary, in the presence of bisulphite, chromic acid, potassium bichromate, zinc salts, etc., at 50°. W.

Protection of Textile Fibres by the Prevention of Mould Formation. A. Foulon. *Deut. Wirker-Ztg.*, 1938, 58, No. 41, pp. 10-11 (through *Chem. Abs.*, 1939, 33, 1948).

A discussion of the use of *p*-chloro-*m*-cresol, which is soluble in water and economical to employ and which does not alter the *p*H of the textile material. W.

PATENTS

Shock-proof Compound Fabric Armour: Production. E. Messina. B.P. 496,838 of 16/11/1937.

Shock-proof armourings are produced by uniting worm-free silk cocoons to form elastic plates, e.g. by sewing, sticking or gluing them together, uniting a number of the plates to form a thicker plate, as by gluing or pasting together, and subjecting the resulting thicker plate to a high pressure, e.g. 100-150 atm. The assembled plates may be provided with outer layers and/or intermediate layers of other materials such as silk strewn with colophony and coated with lacquer. Alternatively, mercerised cotton layers may be used, and in that case the final pressure is 150-200 atm. The layers may be treated with an astringent medium such as alum, before being united, and where intermediate layers are employed these may be disposed so that the requisite threads are at angles to each other. C.

Stiffened Fabrics: Production. N. Koves. B.P. 497,568 of 19/7/1938.

Stiffened compound fabrics for collars, cuffs, etc. are made by subjecting an assembly of two outer layers of non-thermoplastic fabric and an intervening layer of fabric composed of or containing cellulose derivative threads, after treatment with a volatile or low-boiling solvent for the cellulose derivative, to pressure between an upper heated surface and a lower, cold, absorbent, water-containing surface. The upper fabric layer is thereby more intimately united to the interlayer than the lower, and the porosity of the interlayer is maintained or increased by the rising water vapour. The compound fabric, while still warm and damp, after pressing, may be soaked in water to increase its flexibility. The outer fabrics may be cotton or linen and the inner fabric cellulose acetate. The solvent may be acetone, ethyl or butyl acetate, ethyl lactate, or a mixture with or without methylated spirit. C.

Cellulose Ethers: Preparation. A. Carpmael (I.G. Farbenindustrie A.-G.). B.P. 497,671 of 23/6/1937.

Aralkyl halides are reacted with alkali-cellulose or the like in the presence of boron compounds, which may be added to the reaction mass in solid form or dissolved in an aqueous neutral or alkaline medium. Alternatively, the alkali-cellulose or other alkali carbohydrate during its manufacture, may be impregnated with the boron compound. Diluents such as benzene, toluene or dibenzyl ether may be present during the etherification. In examples, alkali-cellulose is etherified with benzyl chloride in the presence of boric acid or borax. C.

Coated Fabrics: Production. F. F. Schwarzt and M. A. Chavannes. B.P. 497,696 of 24/1/1938 (Conv. 26/1/1937).

Fabric is provided with an adherent, temporary backing which renders the composite sheet capable of receiving and retaining impressions, the sheet is deformed to bring selected portions of the fabric into relief, and latex, such as rubber latex is then applied to the relief portions of the fabric in the manner described in B.P. 482,767. The temporary support may consist of paper, a layer of fibrous material or a plastic substance or a mixture thereof, or a layer of paste or size, e.g. soluble starch paste; an intermediate layer of soluble material may be interposed between backing and fabric. After embossing and application of the latex, the temporary backing is removed. C.

Gas Protective Suit. Sir R. H. Davis, G. P. Crowden and N. G. Elliot. B.P. 497,710 of 19/6/1937.

A gas protective suit comprises as regards the wall of the suit a layer of oiled cotton, oiled silk, or a like gas- and moisture-impermeable flexible sheet material coated with short cotton or like fibres adhesively applied to the material, e.g. sprayed on to a coating of adhesive thereon, the fibres being disposed on the outer side of the suit. C.

Azo Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). B.P. 497,745 of 24/6/1937.

Azo dyes are manufactured by diazotising the diazo dyes obtained by tetrazotising monoaminobenzoylated diamines of the benzene series and coupling first with an *o*-hydroxycarboxylic acid of the benzene series and secondly with an aminonaphthol mono- or disulphonic acid, and coupling the resulting diazo compounds with *m*-diamino-, *m*-aminohydroxy- or *m*-dihydroxy compounds of the benzene series or the monoazo derivatives thereof. The products dye cotton reddish to deep blackish-brown shades of good neutral and alkaline dischargeability. The dyes may be after-treated on the fibre, e.g. with formaldehyde if one coupling component is a free diamine, or with diazo compounds such as those from *m*- or *p*-nitraniline or 1-amino-2-methoxy-4-nitrobenzene. C.

Quaternary Ammonium Compound Softening and Waterproofing Agents: Preparation. N. W. Cusa, C. E. Salkeld, E. E. Walker and Imperial Chemical Industries Ltd. B.P. 497,856 of 30/6/1937.

Products believed to be quaternary ammonium salts are obtained by reacting (1) a urea derivative of the formula $RCONHCONH_2$ or $RR'NCONH_2$, or an allophanate of the formula $ROCONHCONH_2$, where RCO in the first formula is the radical (saturated or unsaturated) of an acid obtainable from oils or fats by saponification, R in the other formulæ is a corresponding alkyl radical, and R′ is hydrogen or an alkyl group, with (2) formaldehyde or a reagent which yields it, and (3) a salt of a tertiary anime and/or an addition product of a tertiary amine and an inorganic acid anhydride. The reagents may be brought to reaction simultaneously, or a methylol compound obtained from reagents (1) and (2) may be treated with reagent (3); as a further alternative, reagents (1) and (2), or the methylol compound obtained therefrom, may be dissolved in pyridine and the solution treated with sulphur dioxide. The products yield foaming aqueous solutions which decompose when heated and then cease to foam. They may be used as softening and/or waterproofing agents for fabrics, threads and other fibrous materials of animal or vegetable origin, and for this purpose the fibrous material is impregnated with a solution of the quaternary compound in water or an organic solvent, and then heated to decompose the quaternary compound. Preferably, the impregnated material is first dried at a temperature not above 80° C., preferably at 30-50° C., and then heated to 90-200° C. to decompose the quaternary compound. The quaternary ammonium compounds may be applied in conjunction with known textile finishing agents, including crease-proofing agents, and may be incorporated in resist printing pastes. C.

Azo Dyes: Production. Compagnie Nationale de Matieres Colorantes et Manufacturers de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. B.P. 497,862 of 12/8/1937 (Conv. 12/8/1936).

Insoluble azo dyes are prepared in substance or on the fibre by coupling arylamides of *o*-hydroxy carboxylic acids or of acylacetic acids with diazotised amines of the general formula $(o)\text{-}NH_2 \cdot C_6H_4 \cdot SO_2 \cdot O \cdot \text{Aryl}$. The dyes can be produced on cotton, viscose or other natural or artificial fibres, with or without the intermediate formation of nitrosamines, diazoamino derivatives, diazosulphonates or Schiff bases. In an example, the phenyl ester of 1-chloro-3-amino-4-benzenesulphonic acid is converted into the diazonium fluoroborate, which is ground with a mixture of sodium naphthalene-2:7-sulphonate and aluminium sulphate, and the product is dissolved in water to form a bath in which cotton, previously treated with a solution of the β-naphthylamide of 2:3-hydroxynaphthoic acid, is developed. C.

Imidazolonaphtholsulphonic Acid Azo Dyes: Production. W. W. Groves (I. G. Farbenindustrie A.-G.). B.P. 497,935 of 22/6/1937.

Fast dyeings are obtained by applying to the fibre a 5-hydroxy-7-sulphonaphtho-oxazole, -thiazole or -imidazole, substituted at the carbon atom of the heterocyclic ring by an aromatic or araliphatic radical which contains an amino group capable of being diazotised and which may contain further substituents, diazotising and coupling with itself or with another diazo compound from an amine of the constitution above defined, which has been applied to the fibre in the same bath. The coupling may be performed or completed by neutralising the diazo solution or by passing the fibres through an alkaline bath. Some of the dyeings may be after-treated with copper sulphate. In general, the process may be applied to animal fibres, wool and silk being specified, but compounds of a certain given general formula are especially useful on cellulosic fibres or mixtures thereof with animal fibres. In an example, a fabric of viscose staple fibre or cotton is printed with a paste containing 3′-amino-C-phenyl-1:2-(N)-imidazolo-5-naphthol-7-sulphonic acid, ammonia, wheat starch tragacanth thickening and sodium nitrite, dried, steamed in acid vapour, passed through a bath of sodium carbonate and finished as usual. The steaming may be replaced by an acid bath treatment. Other modifications of the printing process are described, including simultaneous use of vat dyes. C.

Vat Dyes: Preparation. I. G. Farbenindustrie A.-G. B.P. 497,971 of 2/7/1937 (Conv. 4/7/1936).

Vat dyes are made by causing aluminium halides in the presence of such organic nitriles as are capable of forming molecular compounds therewith to react upon secondary aromatic amines in which at least one of the aromatic radicals is an anthraquinone radical and at least one ortho-position with respect to the imino group is unsubstituted in both of the radicals Organic nitriles specified are benzonitrile, benzyl cyanide, the substitution products thereof and alkyl cyanides. C.

Sulphonated Hydrocarbon Wetting Agents: Preparation. G. W. Johnson (I.G. Farbenindustrie A-G.). B.P. 498,008 of 25/6/1937.

Capillary-active agents are made by sulphonating aliphatic hydrocarbons containing in the molecule at least 15 carbon atoms and a halogen atom and at least one double linkage which is situated at the middle of the carbon chain or between the middle carbon atom or atoms and adjacent carbon atoms, or by halogenating sulphonation products of aliphatic hydrocarbons of the said nature free from halogen. In working up the sulphonation products they may be converted to salts with alkalis, ammonia or amines and organic bases. The products are wetting agents, and may be used for the treatment of textiles alone or with substances such as common salt, Glauber's salt, solvents, bleaching agents, etc. C.

Polymethine Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). B.P. 498,012 of 30/6/1937.

Polymethine dyes containing substituents in the methine chain are made by condensing ketones of given general formula, in the presence of phosphorus oxychloride, with a tertiary aromatic base with free *p*-position or with a heterocyclic nitrogen compound dihydrogenated in 1:2-position and the carbon atom directly connected with the 1-hetero nitrogen atom carrying a $:CH_2$ group.

In an example, 1:3:3-trimethyl-2-methyleneindoline is condensed with crotonyl chloride in benzene solution and the 1:3:3-trimethyl-2-methylene-ω-crotonylindoline obtained condensed with 1:3:3-trimethyl-2-methyleneindoline in benzene solution in presence of phosphorus oxychloride; the dye is precipitated as zinc chloride double salt and dyes tannined cotton and silk red-violet. C.

Agglutinated Fibrous Materials. J. Klasi. B.P. 498,047 of 9/7/1937.

A continuous wet-felted fibrous web is formed by moving a dry fleece, e.g. of cotton fibres, on a conveyer beneath a system of nozzles ejecting flat film-like jets of water. The conveyer may be made of cotton yarn spun round with wool and of 12 to 30 meshes per sq. cm.; it passes over a suction box and between rollers. The nozzles may be oblique to the axis of the feed pipe which may be axially reciprocated. The product may be impregnated with binding agents to produce material resembling chamois leather, wadding, parchment, or, using a latex composition, leather. Two or more nozzle pipes may be used in succession, and there may also be nozzle pipes beneath the conveyer. Nozzles may fling short fibres on to the surface of the fleece and promote felting. C.

Azo Dyes: Production. Society of Chemical Industry in Basle. B.P. 498,051 of 4/7/1937 (Conv. 14/7/1936).

Azo dyes are manufactured by coupling, in substance or on the fibre, a diazo compound containing no hydroxy, sulphonic acid or carboxylic acid group with an arylide of acetoacetic acid of given general formula. The dyes may be produced on vegetable and regenerated cellulose fibres, silk or wool, e.g. by padding the fibre in alkaline solution with the arylides and developing with a diazo compound, or by using preparations or printing colours containing an alkali salt of one of the arylides and a stabilised diazo compound in the form of a nitrosamine or a diazoamino compound, and developing, e.g. by passage through an acid, or by printing with mixtures of the free diazo components or the corresponding N-nitramines and alkali salts of the arylides and treating with nitrous acid followed, if desired, by alkali. In examples, cotton is impregnated with the product obtained by heating 5-amino-2-phenyl-pseudo-azimidobenzene with ethyl acetoacetate in chlorobenzene in the presence of dimethylaniline, and a greenish-yellow dyeing is developed with diazotised 1-amino-2-methyl-4-nitrobenzene, 1-amino-2-methyl-4-chlorobenzene, 1-amino-2-nitro-4-chlorobenzene or 1-amino-2-nitro-4-methylbenzene, or redder shades with diazotised 1-amino-2-nitro-4-methoxybenzene or *o*-aminoazotoluene. C.

Amidine Textile Assistants: Preparation. J. R. Geigy A.-G. B.P. 498,090 of 8/11/1937.

Amidines having the formula $RC(NR_2R_3):NR_1$ wherein R is an alkyl, aralkyl, aryl or hydroaryl radical, R_1 the same radicals as R and also a heterocyclic radical, the alkyl and aralkyl radicals possibly containing a hetero atom, e.g. S, O or NH, and R_2 and R_3 are hydrogen or an alkyl, aralkyl, aryl or hydroaryl radical, R_1 and R_3 possibly belonging to the same hydroaromatic ring, are treated with alkylating or aralkylating agents to convert them into water-soluble form. The products are stated to be textile assistants and may be used for wetting, improving the fastness of direct dyeings, stripping Naphtol AS dyeings, imparting a matt appearance to regenerated cellulose, softening textiles and combating animal pests, e.g. mothproofing. They also have bactericidal and fungicidal properties. C.

Dipyrazolanthronyl Dyes: Production. Society of Chemical Industry in Basle. B.P. 498,126 of 30/7/1937 (Conv. 30/7/1936).

N:N′-dialkyl-2:2′-dipyrazolanthronyls are manufactured by treating a 2:2′-dipyrazolanthronyl simultaneously or successively with two alkylating agents, one providing an alkyl residue containing an alkoxy group and the other a branched alkyl residue containing no alkoxy group, or by treating an N-monoisoalkyl-2:2′-dipyrazolanthronyl, containing no alkoxy group in the isoalkyl residue, with an alkoxyalkylating agent, or by treating an N-mono-alkoxyalkyl-2:2′-dipyrazolanthronyl, e.g. N-mono-methoxymethyl-, methoxyethyl-, ethoxyethyl- or butoxyethyl-2:2′-dipyrazolanthronyl, with an alkylating agent providing a branched alkyl residue containing no alkoxy group. The products may be treated with a halogenating agent. The products are dyes or intermediates and may be used, if desired, in admixture with N:N′-dimethyl-, diethyl-, dimethoxyl or diethoxyethyl-2:2′-dipyrazolanthronyls, for dyeing or printing vegetable fibres, e.g. cotton, for dyeing rayon, e.g. cellulose acetate rayon, or for colouring lacquers and plastic masses. C.

Wetting Agents: Preparation. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P. 498,136 of 30/6/1937.

Amide-like condensation products are manufactured by causing an amino-carboxylic acid or a water-soluble salt thereof to react in the presence of an agent having an alkaline reaction with the halide of a carboxylic acid of the general formula $R·X·R_1·COOH$, where R is an aromatic ring system substituted at least once by an aliphatic hydrocarbon radical of at least 8 carbon atoms, R_1 is an aliphatic hydrocarbon radical, the chain of which may be interrupted by oxygen, and X is oxygen or sulphur. Solutions of the alkali metal or ammonium salts of the products, or their salts with organic bases, may be employed as wetting, dispersing, emulsifying or purifying agents. The free acids or their salts may be used in conjunction with organic solvents, with fatty acids, with carboxylic acids formed by oxidising paraffin, or with water-soluble salts thereof, with soap substitutes or other textile adjuvants, with sodium carbonate, sodium pyrophosphate or other phosphates or with other products having a similar action on the salts causing hardness in water, or with bleaching agents. C.

Rubber-proofed Fabrics: Production. Dunlop Rubber Co. Ltd. and P. M. Benjamin. B.P. 498,166 of 25/8/1937.

Rubber-proofed material, particularly for aprons and bed-sheeting comprises textile material proofed by spreading, calendering or frictioning on which zones, areas or local patches of additional rubber are applied as a coating. The further rubber coating may be applied in a central narrow band or in bands arranged at intervals across the sheet. In making an apron the material is cut so that the area of additional rubber extends over the central part from the bib to the bottom. C.

Quaternary Ammonium Compound Softening and Waterproofing Agents: Preparation. N. W. Cusa, C. E. Salkeld, E. E. Walker and Imperial Chemical Industries Ltd. B.P. 498,287 of 30/6/1937.

Products believed to be quaternary ammonium salts are obtained by reacting together (1) a carbamate of the formula $ROCONH_2$, where R is the radical (saturated or unsaturated) of an alcohol obtainable by reducing the carboxylic group of an acid obtainable from oils and fats by saponification, (2) formaldehyde or a reagent which yields it, and (3) a salt of a tertiary amine and/or an addition product of a tertiary amine and an inorganic acid anhydride. The products yield foaming aqueous solutions which decompose when heated and then cease to foam. They may be used as softening and/or waterproofing agents for fabrics, threads and other fibrous materials of animal or vegetable origin and for this purpose the fibrous material is impregnated with a solution of the quaternary compound in water or an organic solvent, and then heated to decompose the quaternary compound. The compounds may be used in conjunction with known textile finishing agents and may also be used in resist printing pastes. C.

Red Azo Dyeings: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). B.P. 498,534 of 4/8/1937.

Water-insoluble dyes are prepared on vegetable fibres by impregnating them with 2-(2′:3′-hydroxynaphthoylamino)-naphthalene and coupling with a diazo compound of an amine of given general formula. In an example, boiled cotton yarn is treated with a solution of the coupling component in caustic soda lye containing turkey red oil and formaldehyde and developed, while wet, with diazotised 1-methoxy-2-aminobenzene-4-sulphonic acid *n*-butylamide. Other specified diazo components are 1-methyl-, 1-chloro-, 1-phenoxy-, or 1-(4′-chlorophenoxy)-2-aminobenzene-4-sulphonic acid *n*-butylamide and aniline-3-sulphonic acid *n*-butylamide. The dyeings are bright red. C.

Self-adherent Surgical Bandage. L. T. Sawyer. B.P. 498,591 of 8/5/1937.

A surgical bandage having both sides self-adherent but non-adherent to skin or hair comprises an open-mesh textile fabric, e.g. woven cotton or linen gauze bandaging having relatively large interstices, the threads of which are coated with underlying and overlying coats of vulcanised and unvulcanised rubber latex respectively. The coatings may be formed by applying to each side of the fabric a very thin sheet of material under pressure, or by applying an emulsion or solution. Surgical dressings may be formed by enclosing sheets of absorbent gauze, etc. between two layers of bandage material, with or without intermediate layers, the edges being closed by shearing. C.

Anthraquinone Dyes: Production. A. Carpmael (I. G. Farbenindustrie A.-G.). B.P. 498,602 of 7/7/1937.

A poly-(anthraquinonyl-NH) aryl which contains an acylamino group in at least one of the anthraquinonyl radicals, but in which the aryl radical is incapable of being vatted and contains not more than three condensed rings, and in which the anthraquinonyl radicals contain three condensed rings only, is treated with sulphuric acid or chlorosulphonic acid followed, if necessary, by oxidation of the products. The aryls may be of the benzene, naphthalene or diphenyl series, and acylamino groups may be acetylamino or benzoylamino. The products dye or print cotton fast brown, currant or grey shades. C.

Elastic Compound Fabrics: Production. F. F. Schwartz and M. A. Chavannes. B.P. 498,649 of 25/3/1938 (Conv. 25/3/1937).

Elastic compound fabrics are made by sticking together two stretchable or extensible fabrics which have been sprayed with rubber latex, one fabric being given a coating of latex of sufficient density to provide the required elastic strength, whilst the other receives only a coating sufficient to ensure permanent adhesion when the coated surfaces are pressed together. One or both fabrics may be embossed as described in B.P. 482,679, and the salient parts may have a flat or inverted-V shape, and follow straight or curved lines. The latex may be sprayed obliquely on to the embossed fabrics. Reinforcing whalebones, springs, leather or canvas bands may be placed between the coated fabrics. The surface of iron or steel supports may be converted into ferrous sulphide to facilitate adhesion of the latex. Alternatively, the reinforcing members may be inserted after manufacture in pockets, spaces, or sheaths formed or inserted between the fabric layers. C.

Oxidation Dyeings and Prints: Production. Soc. Anon des Matieres Colorantes et Produits Chimiques de St.-Denis, and R. Lantz. B.P. 498,755 of 8/7/1937 (Conv. 15/7/1936).

Dyeings and printings are produced on fibrous materials by oxidising thereon a compound containing one or more aromatic nuclei and one or more sulphamic acid groups or a salt of such a compound. Specified compounds are phenyl-, tolyl-, naphthyl-, methoxyphenyl-, chlorophenyl- and phenylamino-phenyl-, N-ethylphenyl-, N-(4-aminophenyl)-phenyl- and N-(4′-aminophenyl)-4-hydroxyphenyl-monosulphamic acids, 3:3′-dimethoxydiphenyl-4:4′-disulphamic acid and diphenylamine-4:4′-disulphamic acid and specified oxidising agents are chlorates, bromates, bichromates, nitrites and peroxides. The oxidation is preferably effected in presence of an acid or of a substance yielding acid under the treatment conditions, such as an ammonium salt, an ester, an amide, a fluorosulphonate, a nitrilosulphonate, an iminosulphonate or a hydroxylamine-di- or tri-sulphonate. The colouration may be effected by (*a*) applying to the fibres a mixture of a salt of the sulphamic acid, the oxidising agent and, if necessary, an oxidation catalyst and subjecting the goods to the action of an acid, (*b*) introducing the fibres, especially animal fibres, into a dyebath containing the sulphamate, the oxidising agent, the oxidation catalyst (if necessary) and the acid or acid-forming substance, or (*c*) applying the sulphamate to the fibre and then treating it successively or simultaneously with the oxidising agent and the acid. The process may be used in conjunction with the use of Rapidogen or Indigosol dyes. Examples describe the treatment of cotton, rayon, wool and silk goods. C.

Water-, Splash- and Ladder-proof Hosiery: Production. A. F. Burgess (Institute of Paper Chemistry). B.P. 498,771 of 12/1/1938.

Silk, wool, cotton and rayon hosiery has incorporated therein minute particles of an inert waxy material surrounded by a film of a water-insoluble, acid-precipitatable protein, the ratio of protein to waxy material being not less than 1 to 4 nor more than 4 to 1. The treated hosiery is waterproof and splashproof, resistant to laddering and to body acids, and has increased strength and improved feel and flexibility. The fibres, prior or subsequent to knitting, preferably after dyeing while the fibres are still moist, are treated with an emulsion containing soya bean casein, a solubilising substance such as caustic soda, ammonium hydroxide, sodium carbonate, borax or di- or tri-sodium phosphate, an emulsifier, e.g. a soap such as ammonium oleate, sulphonated oil, turkey red oil, triethanolamine or gum arabic, and a mineral, vegetable or animal oily material which is either liquid at room temperature or has a melting point below 170° F., e.g. paraffin wax. A preservative such as formaldehyde may also be added. Excess is removed and the fibres are then preferably treated with a dilute acidic solution, e.g. of alum or aluminium sulphate. The protein may be hardened by additional treatment with formaldehyde. The treatment with the acidic substance may precede the treatment with the emulsion. C.

Nitrogen-containing Dyes: Production. Montecatini Soc. Generale per L'Industria, Mineraria, ed Agricola. B.P. 498,831 of 13/7/1937 (Conv. 17/7/1936).

Nitrogen-containing dyes are made by heating aromatic *o*-halogen- or *o*-sulpho-mono-nitriles with metallic cyanides and copper powder at 200-320° C. in an open vessel. They may be used as pigments. By treating with sulphuric acid or oleum, dyes for animal fibres are obtained. C.

Artificial Leather: Production. W. W. Groves (Deutsche Celluloid-Fabrik). B.P. 498,840 of 15/7/1937.

Artificial leather is made by successively hot-pressing on to a flexible sheet material such as paper or fabric at least two differently coloured layers of a vinyl polymer, and producing a deep grain by a calendering which locally exposes a lower layer. C.

Wetting Agents: Preparation. G. W. Johnson (I.G. Farbenindustrie A.-G.). B.P. 499,022 of 9/4/1937.

Compounds of the general formula $MO_3S.X.R.CONR_1R_2$, where M is hydrogen, alkali metal, an ammonium radical or the radical of an organic base, X is oxygen, sulphur, NH or NY (Y being an organic radical), R is an aliphatic residue containing at the most 8 carbon atoms, and R_1 and R_2 are aliphatic radicals containing more than 3 carbon atoms each and together more than 11 carbon atoms, are manufactured by reacting amines NHR_1R_2 with aliphatic monocarboxylic acids containing at the most 9 connected carbon atoms and containing reactive halogen, hydroxyl groups, nitrogen atoms with at least one attached hydrogen atom, or double linkages, or with a derivative (anhydride, halide or ester) of such acid and treating the resulting amides with the usual sulphonating agents if hydroxyl groups or double linkages are present, with chlorsulphonic acid, fluorosulphonic acid or sulphur trioxide if nitrogen is present, or with thiosulphates if reactive halogen is present in the acyl radical (whereby radicals HO_3SX–, where X is oxygen, NH or NY, or, when employing thiosulphates, ZO_3S_2, where Z is the metal contained in the thiosulphate, are introduced), and, if desired, subsequently replacing the hydrogen of the radicals HO_3SX– by alkali metals, ammonium radicals or radicals of organic bases. The amines NHR_1R_2 may be employed in the form of their salts, in which case it is preferable to work in the presence of acid-binding agents. The products may be used as assistants in the textile industry, alone or together with other wetting or cleansing agents, and in many cases their wetting power is improved by the presence of constituents of limited water-solubility. C.

Wetting Agents: Preparation. G. W. Johnson (I.G. Farbenindustrie A.-G.). B.P. 499,130 of 9/4/1937.

Compounds of the general formula $(MX)_n-R(CONR_1R_2)(CONR_3R_4)_m$, where M is hydrogen, an alkali metal, an ammonium radical or the radical of an organic base, X is a sulpho group linked to carbon, oxygen or sulphur, R is an aliphatic residue containing at the most 8 carbon atoms, R_1, R_2, R_3 and R_4 are hydrogen or aliphatic radicals, at least two of which are aliphatic radicals containing more than 3 carbon atoms each and more than 11 carbon atoms together, and m and n are 1 or 2, are manufactured by treating amides of the formula $R(CONR_1R_2)(CONR_3R_4)_m$ (where R is an aliphatic residue containing at the most 8 carbon atoms and at least one double linkage, hydroxy or esterified hydroxy group, hydrogen atom in α-position to a CO or COOH group, or halogen atom, and the remaining symbols are as above) with sulphonating agents if hydroxy or esterified hydroxy groups, double linkages or hydrogen atoms in α-position to a CO or COOH group are present, or with sulphites if double linkages are present, or with sulphites or thiosulphates if halogen is present in the acyl radical of the amides, the amounts of the sulphonating agents or sulphites or thiosulphates being so selected that one or two sulphonic groups are introduced into the acyl radical. In a modification of the process, products containing the sulpho group attached to carbon are manufactured by starting with sulphonated aliphatic di- or tri-carboxylic acids, e.g. sulphomalonic or sulphosuccinic acid, and converting them into the amides. The products may be used as wetting agents in the textile industry, alone or with other wetting or cleansing agents, the wetting power in many cases being improved by the presence of constituents of limited water-solubility. C.

Sulphonated Poly-ester Wetting Agents: Preparation. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P. 499,144 of 15/7/1937.

Sulphonation products are obtained by reacting a sulphonating agent with a poly-ester produced by the complete esterification of an aliphatic polyhydroxy compound, free from other substituents, with a mixture of saturated carboxylic acids containing at least 5 carbon atoms obtained by the oxidation of a mixture of non-aromatic hydrocarbons. Polyhydroxy compounds specified are glycol, glycerol, trimethylol-propane, erythritol, pentaerythritol, hexitols, e.g. mannitol and sorbitol, and mixtures thereof, and mixtures of poly-alcohols such as are formed by condensing formaldehyde, acetaldehyde, etc. and hydrogenating the products or by hydrogenating carbohydrates such as cane sugar. Hydrocarbon mixtures which yield suitable oxidation products are petroleum fractions, paraffin oil, hard paraffin, those formed by hydrogenating coal under pressure and by-products in the synthetic production of benzine by the hydrogenation of carbon monoxide. The products have capillary-active properties and high wetting and emulsifying powers. They are suitable for the treatment of textile materials, leather, paper, etc. and can be used if desired in the form of emulsions as softening, oiling and greasing agents for textile materials and leather. They may be used alone or mixed with soap or other materials. C.

Crease-resistant Cellulose Ester and Ether Materials: Production. H. Dreyfus and R. W. Moncrieff. B.P. 499,196 of 15/6/1937.

The resilience and particularly the resistance to creasing, of materials comprising filaments, fibres, foils, etc. having a basis of a cellulose organic ester or ether is increased by impregnating the materials with formaldehyde and urea or a urea-like substance, e.g. thiourea, guanidine, biuret, etc., drying the materials at a temperature not substantially above 50° C., and heating the impregnated materials, the whole process being effected without the addition at any stage of a condensing agent. A lower aliphatic alcohol, ketone, or ester may be present as a swelling agent in the impregnating bath. Softening agents such as glycerol may also be present in the impregnating bath. Effects obtained by mechanical distortion of the materials, e.g. by embossing, beetling, or imparting crimp or curl, are rendered more permanent by the process. The resistance of materials to the action of water and aqueous liquids is increased and their dye affinities may also be modified, enabling them, e.g. to be dyed with acid dyes and rendering them resistant to basic dyes. C.

Wetting Agents: Preparation. A. Carpmael (I.G. Farbenindustrie A.-G.). B.P. 499,203 of 14/7/1937.

Wetting agents are manufactured by reacting organic sulphonic acids or acid sulphuric esters having wetting power *per se* and containing either an aliphatic radical containing at least 12 carbon atoms or an aromatic radical substituted by aliphatic side chains containing at least 3 carbon atoms, or their salts, with salts of quaternary ammonium bases having attached to the pentavalent nitrogen atom, either directly or through a bridge consisting of an ether, ester, or carboxylic acid amide group, a straight or branched chain aliphatic or cyclo-aliphatic radical of 5 to 11 carbon atoms or an araliphatic radical containing either a single aliphatic residue of 5 to 11 carbon atoms or two or more aliphatic residues having a total of 5 to 11 carbon atoms, the other radicals attached to the pentavalent nitrogen atom being either short aliphatic or heterocyclic residues. Suitable organic sulphonic acids and acid sulphuric esters are alkylated aromatic sulphonic acids and sulphonation products of unsaturated fatty acids or hydroxy fatty acids or preferably of their derivatives in which the carboxylic acid group is protected by esterification or amidation. C.

Azo Dyes: Production. E. I. Du Pont de Nemours and Co. B.P. 499,336 of 22/7/1937 (Conv. 22/7/1936).

Azo dyes are made on the fibre by coupling a diazo compound with a component of given general formula, the diazo compound being generated from a stabilised diazo compound such as a diazoamino compound, azosulphonate or a nitrosamine. The dye components must be free from SO_3H and COOH groups. The term diazo compound includes tetrazo compounds. Compositions comprising the stabilised diazo compound and the coupling component may be applied to the fibre and developed by acid treatment. Dark brown and black shades are obtained on cotton, regenerated cellulose and cellulose esters and ethers. In an example, cotton piece goods are printed with a paste containing 3-nitrobenzene-azo-4′-acetylamino-6′-naphthol, the diazoamino compound from 4-chloro-2-aminoanisole and methylglucamine, cellosolve, caustic soda and starch tragacanth, dried and treated with steam containing acetic acid vapour. C.

Sulphonated Alcohol Wetting Agents: Preparation. Proctor and Gamble Co. B.P. 499,373 of 17/7/1937 (Conv. 4/9/1936).

Aliphatic substances containing an alcoholic hydroxyl group are sulphonated by bringing together continuously flowing streams of the aliphatic substance and the sulphonating agent in the full proportions required for the reaction, allowing the reaction to proceed without restraining the resulting rise in temperature and arresting the reaction by neutralisation or rapid cooling or both to prevent side reactions. In a modification, when the reaction is normally instantaneous, the sulphonating agent is diluted or the reaction is restrained by slight cooling. Alcohols obtained from vegetable and animal fats, fatty oils and waxes are specified starting materials. The products are stated to be wetting, sudsing and detergent agents. C.

Textiles: Waterproofing. Farberei A.-G. vorm. E. Stolte Nachfolger and W. Missy. B.P. 499,386 of 31/3/1937. Void.

The specification comprises the subject matter of specifications 492,699, 493,067, 494,761, and 494,833 and also the following—the use, for waterproofing of chloromethyl compounds derived from higher mercaptans, oxyamines, alkylamines or methylol compounds thereof and amidines, also of sterol derivatives, also further examples of (*a*) preparation of chloromethyl ethers from octadecanamidoxime, octadecancyanhydrin and heptadecylaminoethanol, by treatment with dry hydrochloric acid gas in the presence of trioxymethylene; (*b*) waterproofing treatment of fabrics and fibres by the use of octadecoxymethylpyridinium chloride, trimethyloctadecoxymethylammonium chloride with addition of sodium acetate and the quaternary pyridinium salt of octadecanamidoxime; (*c*) combined waterproofing and crease-proofing with the use of baths containing dimethylolurea and stearoxymethyltriethylammonium chloride and the quaternary pyridinium salt of the chloroimino ether obtained by the reaction of octadecannitrile, trioxymethylene and hydrochloric acid; (*d*) addition to viscose spinning solutions of the triethylamine and the trimethylamine salts of octadecylchloromethyl ether, the triethylamine salt of the chloroimino ether obtained by the reaction of octadecannitrile, trioxymethylene and hydrochloric acid, the trimethylamine salt of the chloromethyl ether of dodecancyanhydrin and the trimethylamine salt of heptadecylaminoethanol, and (*e*) animalising cellulosic fibres, for dyeing with acid dyes, by treatment with higher alkyl chloromethyl ethers containing in the alkyl radical, basic nitrogen, e.g. spun rayon fibres by the chloromethylimino ether from stearonitrile, trioxymethylene and hydrochloric acid or by the pyridinium salt of octadecancyanhydrin. C.

Coated Fabrics: Production. Vereenigd Industriel Bezit Veritex N.V. B.P. 499,392 of 13/4/1937 (Conv. 17/4/1936). Void.

Flexible materials such as textile fabrics, leather, artificial leather, leather cloth, etc., or flexible materials made from a fibrous fleece or leather waste are coated with a lacquer containing such a high proportion of pigments, e.g. 125-200 per cent. that the layer is microporous and a coating of wax is applied thereover. Plastifying agents may be added to ensure flexibility. The lacquer may be a cellulose, rubber or oil lacquer. Preferably, a mixture of hard and soft waxes is employed. The coating, which may be coloured by pigments or soluble dyes, is preferably applied as a thin coating over a nitrocellulose or acetyl cellulose lacquer layer which may be associated with one or more priming layers. C.

Pile Fabrics: Production. W. U. Dykes (Research Corporation). B.P. 499,399 of 24/5/1937.

Pile-surfaced sheet material is obtained by depositing attenuated fibres of a cellulose derivative in a layer of adhesive composition including a substance having a solvent action on the cellulose derivative, and indurating the adhesive layer. In an example, a woven fabric is coated with adhesive by means of rolls, and attenuated fibres distributed upon a belt are applied to the coated web in a strong electric field whereby the fibres are oriented at right angles to the fabric. The piled fabric then passes through a heating chamber. For cellulose acetate fibres the adhesive comprises acetone, cellulose acetate, ethylene glycol mono-methyl ether and a plasticiser. Other cellulose esters or ethers of cellulose may be employed. The fibrous material may be deposited upon a temporary backing, or upon preformed sheets of indurated material. C.

Crease-resisting Textile Materials: Production. A. E. Roberts and W. Watkins (Manchester). B.P. 500,184 of 1/5/1937.

In a process for the crease-resistant treatment of textile materials of cellulose and regenerated cellulose and/or for increasing their affinity for dyes, the materials are first steeped in a solution of formaldehyde or its equivalents, in an acid condition, for a period of 2 hours or more, but preferably not less than 24 hours, during which a reaction is brought about between the materials and the solution, are then dried, and are finally subjected to a heat treatment to effect a further reaction between the materials and the aldehyde. Substantial quantities of a strong mineral acid with or without an acid salt, e.g. aluminium sulphate, may be added to the steeping solution and the materials rinsed or mangled and rinsed to remove acid before drying. The solution may contain a weak acid and small traces of mineral acid salts. Drying and heat treatment may be effected simultaneously. The fabrics may first be treated with filling or weighting substances, or reinforcement-forming substances capable of reacting with formaldehyde. C.

Textile Materials: Fireproofing. V. Virtala (Helsingfors, Finland). B.P. 500,416 of 6/7/1938: 8/2/1939.

In a process for fireproofing textiles, paper products or wood, the materials are impregnated, coated or sprayed or mixed with a salt mixture, or its solution or suspension, formed when tricalcium phosphate is treated with sulphuric or hydrochloric acid, together with phosphorus-free neutral compounds of ammonia, e.g. ammonium chloride, sulphate and bromide. C.

Bast Fibres: Bleaching. E. Butterworth, Frazer & Haughton Ltd. (Cullybackey, Northern Ireland), and Imperial Chemical Industries Ltd. (London). B.P. 500,473 of 4/8/1937 : 6/2/1939.

In the bleaching of linen, hemp, jute and the like, with hypochlorite solutions containing no added buffer material calculated to maintain a substantially neutral condition, serious damage due to the chemical degradation of the cellulose is avoided by providing by means of determinations from time to time of the *p*H value and the available chlorine content of the solution that the concentration of the solution is not outside the limits of 1·5 and 5·0 grams of available chlorine per litre while the solution is substantially neutral, that the temperature is not higher than 20° C., that there is a substantial exclusion of active rays, and that the time the material remains in contact with the liquor while it is substantially neutral is adjusted in accordance with the available chlorine concentration. The materials are subjected to a preliminary scour before the hypochlorite treatment and subsequent to the latter are treated with an alkaline peroxide solution, preferably one containing sodium carbonate. C.

Regenerated Cellulose Staple Fibre: Treatment with Enzymes. Kalle & Co. A.-G. (Wiesbaden-Biebrich, Germany). B.P. 500,665 of 7/12/1937: 14/2/1939.

The dyeing properties and feel of regenerated cellulose staple fibre are improved by causing to act on the material a solution of an enzyme preparation obtained with the aid of bacteria, e.g. Bacillus subtilis or mesentericus. The fabric is preferably treated with an enzyme solution as hot as possible, e.g. at 70-80° C. The solution may contain suitable additions, e.g. activators, buffer substances or the like. The treatment may be applied to materials made of staple fibre alone and also to goods containing mixtures of staple fibre and wool or cotton. C.

Cellulose Ester or Ether Crepe Fabrics: Production. Société Rhodiaceta (Paris). B.P. 500,839 of 14/3/1938 : 16/2/1939.

Varied shrinkage or crepe effects are produced on fabrics made of or containing cellulose esters or ethers by treating the fabrics with a solution of a metallic perchlorate, e.g. calcium or magnesium perchlorate. When fabrics composed of threads of cellulose acetate and threads of regenerated cellulose both twisted to the extent of 100-200 turns per metre are treated in this way, quilting and crimping effects are produced by shrinkage of the cellulose acetate threads without any shrinkage of the regenerated cellulose threads. The effects obtained can be varied by varying the duration of the treatment and the temperature and concentration of the solutions employed. It is claimed that the shrinkage confers upon the thread a remarkable elasticity together with better resistance to ironing and a pleasant matt appearance. C.

Quaternary Ammonium Compound-resin Salt Compositions. Courtaulds Ltd. (London), C. M. Whittaker, and C. C. Wilcock. B.P. 501,020 of 18/8/1937: 20/2/1939.

Emulsifying, wetting and cleansing agents are obtained by mixing an aqueous solution of a quaternary ammonium salt of the type in which the nitrogen atom forms part of a heterocyclic ring and in which there is an alkyl chain of at least six carbon atoms, with an alkali metal salt of a natural resin. The resin, for example, colophony, is dissolved in caustic alkali solution before admixture. The products are particularly useful for the treatment of cellulose textile materials to promote the absorption of acid wool dyes and to increase the fastness of these dyes on the fibres. C.

Glycol or Glycerol Borates: Application in Finishing. C. M. Keyworth and Sir T. & A. Wardle Ltd. (Leek). B.P. 501,206 of 23/8/1937 : 23/2/1939.

In a process for improving textile materials, especially cotton, rayon or silk fabrics or yarns, by impregnating the material with a solution of a synthetic resin of the formaldehyde-urea or -thiourea type, or a mixture of such resins, which is afterwards made insoluble by condensation, a water-soluble inorganic ester from an oxygen-acid and a polyhydric alcohol is added to the products used in the impregnating solution. Suitable esters include the boric acid esters of glycerol and glycol. The treatment increases the weight, wet tenacity and resistance to creasing of the textile materials and reduces their tendency to swell. C.

Water-repellent, Crease-resistant Materials: Production. J. G. Evans and Imperial Chemical Industries Ltd. (London). B.P. 501,288 of 23/8/1937: 23/2/1939.

Solutions or suspensions of the quaternary ammonium salts described in B.P. 498,287, 497,856 and other earlier patents are applied to the cellulosic material before or after or simultaneously with a treatment with a medium comprising resin-forming components or a preformed resinous condensation product or products, this process or processes being followed by drying, preferably at a low temperature, and finally by a baking process, i.e. a dry heat treatment at a temperature sufficient to cause decomposition of the quaternary salt and to insolubilise the resin. In this way, by a suitable choice of concentration of the quaternary ammonium salt, there is produced a finished cellulosic material having crease-resistant properties and a soft attractive handle, the finish being resistant to washing or dry cleaning. In addition the cellulosic material may be rendered water-repellent, this property also being resistant to washing and dry cleaning treatments. C.

Cloth Shrinking Apparatus. G. Thönnessen (Berlin). B.P. 501,330 of 18/8/1938: 24/2/1939.

In apparatus for shrinking and like operations on cloth, the boiler and steamer form a unit with the table plates, the steamer being arranged above the boiler, and two devices for receiving or supporting the cloth are combined with the boiler and the steamer and arranged in the direction in which the cloth runs, one of these, which is intended for the treated, e.g. shrunk, cloth, being rockably mounted so that its distance from the boiler can be reduced in operation by simple pressure while leaving the hands of the operator free. A steam chest for pleating, folding, ribbing, or the like is removably mounted upon the steamer. This arrangement has the advantage that goods which have not been satisfactorily pleated or the like may, after removal of the steam chest, be smoothed or ironed out again in the shrinking apparatus. C.

Oil-, Grease-, and Hydrocarbon-resistant Fibrous Materials. Atlas Powder Co. (Wilmington, Delaware, U.S.A.). B.P. 501,558/9 of 19/11/1937: 1/3/1939.

(1) A fibrous material or container made therefrom is rendered resistant to oil, grease and hydrocarbons by two superimposed coatings, whereof the first is

highly resistant to moisture and consists essentially of a plasticised cellulose derivative, and the second coating is highly resistant to oils, greases and hydrocarbons and consists essentially of a water-soluble organic binder selected from the group consisting of protein glues and water-soluble gums rendered flexibile with a polyhydric alcohol containing at least 50 per cent. of sorbitol. (2) The organic binder is rendered flexible with sugar or a mixture containing at least 50 per cent. of a water-soluble sugar. C.

Yarns: Full-bath Liquid Treatment. R. Levaux (Uccle, Belgium). B.P. 501,700 of 5/4/1938:3/3/1939.

A process for the treatment in a full bath of all natural or artificial textile fibres, in the form of threads or yarns is characterised in that the yarn or thread, previously wound on a support, is immersed in a bath with its support at atmospheric pressure and is wound off on to a second support without leaving the bath, this double operation of unwinding and winding being repeated as often as desired at any suitable speeds. Except in rare cases the reagent bath (bleaching, dyeing, degumming or the like) should be of a constant concentration. For this purpose the bath is connected to a second bath containing a concentrated solution of the reagent, communication between the two baths being ensured by means of a pump of which the delivery depends on the speed of unwinding or winding of the yarn or thread or on the speed of rotation of the bobbins, spools, etc. C.

Centrifugal Hydro-extractors. A. Casagrande. B.P. 497,536 of 21/12/1938.

The construction of a centrifugal extractor particularly for dehydrating textile fibres, is described. La.

Dialkylcyclohexylamine Salts of Higher Alkyl Sulphates. S. Lenher and L. B. Arnold (to E. I. du Pont de Nemours & Co.). U.S.P. 2,139,277 of 6/12/1938 (through *Chem. Abs.*, 1939, **33**, 2250).

Compounds of the general formula $RR'R''NHSO_4Y$, where R is a cyclohexyl radical, R′ and R″ are alkyl groups containing not more than 3 C atoms and Y is a normal primary aliphatic hydrocarbon radical having 8 to 20 C atoms, may be used as (or in) emulsifying and dispersing agents, bactericides, insecticides, textile-softening agents, assistants in dyeing, treatment of hides, stabilising rubber latex, controlling precipitations and crystallisations, and for various other specified purposes. They are produced by neutralising a sulphuric acid ester of a normal primary aliphatic alcohol containing 8 to 20 C atoms with a dialkylcyclohexylamine in which the alkyl groups contain not more than 3 C atoms. Diethylcyclohexylamine dodecyl sulphate, dimethylcyclohexylamine hexadecyl sulphate and similar compounds are thus obtained (details of their preparation being given). W.

Amino Acid Derivatives. M. Iselin and J. Bindler (to J. R. Geigy A.-G.). U.S.P. 2,139,190 of 6/12/1938 (through *Chem. Abs.*, 1939, **33**, 2249).

Various examples with details are given for the production of wetting agents, compounds suitable for improving the fastness of dyeings, for combating moths, etc., and having other uses, and which have the general formula $AC_nH_{2n}CONRR'$ in which R represents H or an alkyl group with fewer than 6 C atoms, aralkyl or an aryl group, R^1 represents an alkyl group with fewer than 6 C atoms, cycloalkyl, aralkyl or an aryl group, *n* means one of the numbers 1, 2 and 3, and A represents one of the radicals X^1YN and YNX^2X^3 ac where X^1 represents H or an aliphatic, araliphatic, aromatic or hydroaromatic radical, X^2 and X^3 represent the same as X^1 with the exception of H, Y represents the alkyl radicals of high molecular weight resulting from the alcohols of hydrogenated natural fats, oils, waxes, resins and naphthenic acids, and ac represents an acid residue of a quaternary N compound, including salts of the products in which A represents the radical X′YN—. Dodecylaminoacetic acid dimethylanilide, dodecylaminoacetic acid ethylamide (made from "technical" dodecyl alcohol) and the bromide of N-dimethyl-N-dodecylaminoacetic acid dimethylamide are among the products obtained. (See also U.S.P. 2,104,782 and 2,114,696). W.

Treating Bast Fibres such as Flax, Ramie or Jute. J. L. Goodale. U.S.P. 2,131,040 of 27/9/1938 (through *Chem. Abs.*, 1938, **32**, 9519).

The fibres are treated with an acid, such as acetic or malic or tartaric acid which in normal solution ionises less than 10 per cent., and with a copper salt corresponding to the acid used, and the fibre is then treated with a soluble sulphide, to render it more resistant to algæ, bacteria and fungi. L.

Insoluble Reaction Products. I. G. Farbenindustrie A.-G. F.P. 831,554 of 8/9/1938 (through *Chem. Abs.*, 1939, **33**, 1967).

Cyclic ethyleneimine, its polymers or their homologues or bases of like reaction, are caused to react with carbon bisulphide so as to form a product insoluble in dilute acids and lyes. The products may be formed on finished textile fibres or produced in freshly spun fibres still containing carbon bisulphide by reaction with imines. W.

Animalised Fibres. I. G. Farbenindustrie A.-G. F.P. 831,574 of 8/9/1938 (through *Chem. Abs.*, 1939, **33**, 1967).

Animalised fibres are made by adding the compounds prepared according to F.P. 831,554 (preceding abstract) in fine division to spinning solutions. W.

Azo Dyes. "Kastel" Tvornica Hemijsko-Farmaceutskih Proizvoda D.D. and V. Prelog. Austrian P. 154,365 of 26/9/1938 (through *Chem. Abs.*, 1939, **33**, 1958).

Dyes having parasiticidal or bactericidal properties are obtained by coupling diazo compounds with 1-arylpiperazines, which may be substituted in the 4-position by an alkyl or aliphatic acyl group. Alternatively, 1-aminoarylpiperazines, optionally substituted as above, may be diazotised and coupled with the usual azo dye components. Examples are given. W.

Treatment of Textile Fibres. E. Waldmann and A. Chwala. Austrian P. 154,478 of 10/10/1938 (through *Chem. Abs.*, 1939, **33**, 1964).

Compositions for oiling or lubricating rayon and other textile fibres comprise (1) a liquid hydrocarbon of high molecular weight, e.g. paraffin oil, (2) a not strongly hydrophile emulsifying agent which is stable to hard water, e.g. a mixture of a soap with a sulphonated oil and (or) a sulphonated fatty acid, and (3) and ether-alcohol or an acetal-alcohol, e.g. a monoether of a glycol or diglycol, acetoneglycerol or benzylglycerol. The proportion of component (1) is 60-90 per cent., and that of component (3) is 2·5-6 per cent. A part of component (3) may be replaced by an ester of a lower monohydric alcohol with a higher aliphatic or polymerised aliphatic acid, e.g. methyl oleate or diricinoleate. Examples and various details are given. W.

Treatment of Wool. Merkel & Kienlin G.m.b.H. D.R.P. 666,392 of 19/10/1938 (through *Chem. Abs.*, 1939, **33**, 2349).

Wool is impregnated with the products obtained by esterifying the COOH group of an aromatic hydroxycarboxylic acid with the OH group of a hydroxysulphonic acid. The preparation of such products is described in D.R.P. 638,072, 638,824 and 640,064. Alkali salts of the products may also be used. The products have an affinity for wool but are easily decomposed, e.g. by the heat of the body, whereby the hydroxycarboxylic acid, which has a disinfecting action, is liberated. Examples are given. W.

Sulphonating Phenyl Esters. Oranienburger Chemische Fabrik A.-G. D.R.P. 666,626 of 24/10/1938 (through *Chem. Abs.*, 1939, **33**, 2249).

Esters of phenol and fatty acids containing at least 10 C atoms are treated with an amount of a sulphonating agent sufficient to introduce 1 to 2 HSO_3 groups into the phenolic component. The resulting sulphonic acid is treated with CaO or otherwise neutralised. A small amount of chloride or oxychloride of P or of $SOCl_2$ is added before, during or after the sulphonation. Thus, the chloride of cacao fatty acid is heated with cresol till no further HCl is evolved. The resulting tolyl ester of cacao fatty acid is treated with $ClHSO_3$ at 25° and a small amount of PCl_3 is added. The product is poured on ice and neutralised with NaOH. A white paste useful as a washing agent for raw wool, etc., is obtained. Other examples are given. W.

Carrotting Fur. No-Mercury Felt Corporation. B.P. 499,670 of 4/8/1937.

Furs are carrotted by treatment with a solution containing a permanganate and a strong inorganic acid, e.g. nitric or sulphuric, the acid being in excess of the amount which will completely react the permanganate into a colourless compound on the fur and the carrotting agent being in a proportion sufficient to cause substantial shrinkage but not to burn the fur. When sulphuric acid is employed, the wet fur is afterwards treated with a barium salt of a volatile acid, e.g. hydrochloric or nitric in order to remove the non-volatile sulphuric acid; or the sulphuric acid may be neutralised by exposing the fur to the fumes of ammonia or an ammonium salt. Specifications B.P. 345,404 and U.S.P. 1,885,887 (see *J. Text. Inst.*, 1933, A724) are referred to. W.

5—ANALYSIS, TESTING, GRADING AND DEFECTS

(A)—Fibres

Ancient Fabrics and Paper: Degree of Polymerisation of Cellulose. H. Staudinger and F. Reinecke. *Textilberichte*, 1939, **20**, 109-110.

Tables are given showing the results of strength tests on mummy cloths, other ancient cotton and linen fabrics, papyrus and paper, and the average degrees of polymerisation of the cellulose of these materials before and after dissolving in and precipitating from cuprammonium solution. The average degrees of polymerisation were above 200. At degrees of polymerisation below 200 cellulose disintegrates, forming a fine powder, and loses its capacity for fibre formation. When tests were made on the powdery constituent of a disintegrating mummy cloth, the average degree of polymerisation was found to be 140-150. The value for the cellulose regenerated from a solution of the powdery constituent was 200-250, the increase being due to the fact that the most degraded constituents remained in solution. C.

Cotton Hair: Structure. K. Hess. *Papier Fabrikant*, 1939, **37**, *Techn.*, 25-28.

A plea is put forward for consideration of the morphological evidence on the structure of the cotton hair in discussions of the molecular chain length and micellar dimensions of cellulose, based on viscosity and end-group determinations. The work of Balls and Kerr on daily growth rings in cotton is discussed. C.

Mercerised Cotton: Moisture Relations. F. I. Bogoiavlenski. *Utschen. Zap. Univ. Kazan*, 1938, **97**, 83-93 (through *Brit. Chem. Abstr.*, 1938, A1, 511).

The hygroscopicity of mercerised cotton rises to a maximum when the mercerising alkali is 4*N* caustic soda or 6*N* caustic potash. The maximum is 1·6 to 1·7 times that for raw cotton. Hysteresis is also greatest at these concentrations. C.

Cuprama, Lanusa and Schwarza Staple Fibres: Differentiation. C. Faust. *Monatsh. Seide u. Kunstseide*, 1939, **44**, 60-64.

The difficulty of distinguishing between Cuprama staple fibre and Lanusa and Schwarza staple fibres is discussed and curves obtained in swelling tests on these fibres are given. When transferred from water to 20 per cent. (by volume) caustic soda at 25° C. Cuprama fibres show an increase in length whilst Lanusa and Schwarza staple fibres show decreases in length. A scheme for the analysis of staple fibres is shown. Phrix and Flox have indented cross-sections whilst Vistra XT, Floxalan, Lanusa, Schwarza and Cuprama fibres have smooth circular cross-sections. Vistra and Floxalan may be distinguished from Lanusa, Schwarza and Cuprama by colour reactions with Neocarmine W and with certain dye mixtures, and Cuprama fibres are finally distinguished from Lanusa and Schwarza by the difference in swelling in 20 per cent. caustic soda. C.

German Staple Fibres: Photo-micrography. B. Hauptmann. *Kunstseide*, 1939, **21**, 68-70.

Photo-micrographs of fibres and cross-sections of various Aceta products produced by I.G. Farbenindustrie A.-G. "Aceta" (Berlin) are given. C.

Rayon Filaments: Mechanical Properties. Y. Konisi. *J. Soc. Chem. Ind., Japan*, 1938, **41**, 438B-441B.

The following characteristics of rayon filaments are mathematically discussed—(1) the apparent modulus of elasticity and apparent tensile strength in the wet and dry states; (2) the relationship between the apparent mechanical properties and the surface tension of the impregnating liquid; and (3) the tensile strength correction factors for various atmospheric humidities, and the micellar orientation in rayons. C.

Raw and Boiled-off Silk: Swelling in Water in Relation to Fineness. R. V. Ingram. *Textile Research*, 1938, **9**, 79-89.

A split cocoon filament and a single cocoon filament were used for the study of the swelling of raw and boiled-off silk, respectively. The maximum swelling in distilled water was measured and the relationship of the original diameter to maximum swelling was determined. After fixing the silk to a glass slide, under known tension, following a soaking treatment in distilled water, the image of the filament was projected on to a ground glass screen at 500 diameters magnification and measured in microns directly by a transparent scale. Measurements were made in air and in water. The diameters were averaged, and the standard deviations and standard errors calculated. A linear relationship is found between the diameters in air and those of the filaments swollen in water, the correlation coefficients being 0·81 for raw and 0·78 for boiled-off silk. C.

Dial-reading Fibre Strength Tester. S. S. Sukthanker, N. Ahmad and H. Navkal. *J. Text. Inst.*, 1939, **30**, T47-62.

Photo-microscopic Apparatus. F. Schroeder. *Textile Recorder*, 1939, **56**, No. 672, 22-23.

Illustrations are given of (1) the Vickers projection microscope, (2) the Zeiss "Ultraphot", and (3) the Fuess "Orthophot", and their advantages in textile testing are stressed. C.

Standard Indian Cottons: Spinning Quality. Indian Central Cotton Committee. *Textile Weekly*, 1939, **23**, 388-390.

The results of tests on the 1937-38 crop are recorded. Table I gives production in bales, staple length, blowroom loss, and counts to which the cotton can be spun successfully; Table II shows the acreage sown to seed of known origin; and Table III compares the performance with that of previous seasons. C.

Cellulose: Depolymerisation. H. J. Henk. *Zellwolle*, 1939, **5**, 43-45.

A general account is given of the actions of acids, alkalis, salts and enzymes on cellulose, and the decomposition resulting from oxidation of cellulose in bleaching processes, by the action of peroxides formed from dyes, textile assistants, linseed oil, etc., and on exposure to ultra-violet light. The depolymerisation of cellulose occuring under the influence of such agents and on strong heating is discussed and suggestions for the avoidance of depolymerisation in finishing processes are made. The greater resistance of the higher-polymer celluloses to the various reagents and treatments is pointed out. C.

Lanusa, Schwarza and Cuprama Fibres: Identification. A. C. Feubel and P. A. Koch. *Klepzig's Textil-Z.*, 1939, **42**, 141-143.

Lanusa, Schwarza and Cuprama fibres differ from other types of staple fibre in having smooth circular cross-sections. A test by which these three may be distinguished from each other depends on observations of differences in internal structure revealed by a treatment involving dyeing with Victoria blue 4R followed by boiling in soap solution. Details of the procedure and photomicrographs of treated fibres are given. Lanusa shows very fine short streaks of fairly uniform size and density. In Schwarza W fibres the hollow spaces are somewhat larger, often longer, and less uniform in size than in Lanusa and a few large spaces are also observed. In Cuprama the hollow spaces are much larger and in shape vary from a whetstone form to elongated and pointed forms which are irregularly distributed in the fibre, and fine thin streaks are also observed. C.

Variable-titre Rayons: Testing. P. A. Koch. *Klepzig's Textil-Z.*, 1939, **42**, 143-151.

The production of rayon threads showing variations in thickness is discussed and the desirability of an irregular distribution of the thick and thin places is pointed out. The variations in thickness can be followed by means of the Gleifometer, and the Frenzel-Hahn continuous tester is also useful in the study of such yarns. Records obtained with these instruments in tests on samples of Linalbene, Spot yarn Z, Celtaflam, Glanzstoff TS and Agfa Knop yarn are reproduced and discussed. C.

Wool-like Synthetic Fibres: Properties, Uses and Identification. H. A. Thomas. *J. Soc. Dyers and Col.*, 1939, **55**, 57-68.

The characteristics of wool that producers of synthetic fibres have attempted to imitate are outlined and an account is given of the characteristics of fibres developed for use in place of wool, these being classified into (1) all-protein fibres, e.g. Lanital, Lactofil, Casein Fibre and Tiolan, (2) fibres of regenerated cellulose containing protein, e.g. Cisalpha, Fibramine and Lacisana, (3) animalised or basified viscose rayon, e.g. Artilana, Rayolanda and Velna, (4) synthetic resin fibres e.g. Nylon and Vinyon, and (5) physically-modified viscose staple fibre, e.g. Fibro, Vistra XT, Lanusa and Floxalan. The manufacture of 100 per cent. synthetic fibre fabrics and the use of the fibres in union yarns and fabrics are discussed. Methods for the identification of synthetic textile fibres before dyeing are described and photo-micrographs of various fibres and fibre cross-sections are given. The dyeing properties of the new synthetic textiles are described and some dyeing problems presented by their use in union fabrics are discussed. Reports of discussions of the paper are given. C.

(B)—YARNS

Rayon Thread: Single-strand Testing. *Textile World*, 1939, 89, No. 2, 48-49.

The value of single-strand tests on a Scott incline-plane serigraph for the control of raw materials, processes and finished products is pointed out, and graphs showing results of single-strand tests on rayon yarn as received from the producer, after dyeing, after winding, after twisting, and after steaming and rewinding on shipping spools are given and discussed. C.

Rubberised Wool: Ageing. C. M. Blow. *Proc. Rubber Tech. Conf.*, 1938, 697-705.

Reference is made to the process of the Wool Industries Research Association for the deposition of rubber from latex on textile fibres and it is pointed out that the usual methods for assessing the ageing of rubber have little relation to rubberised wool. Thus, a twistless worsted yarn almost devoid of strength broke under 13·07 oz. when treated with rubber and under 12·9 oz. after the rubber had aged so badly that 85-90 per cent. was soluble in acetone. Tests on rubberised textiles should therefore be designed to reflect the binding power of the rubber. A washing test with soap and soda is described in which loss of rubber is the criterion of ageing. Some types of rubber were removed to the extent of 90-95 per cent. after exposure to daylight for 4 or 5 weeks, but only 5-15 per cent. when stored in the dark. A measurement of harshness is also suggested. C.

Yarns: Examination. E. Möller. *Kunstseide*, 1939, **21**, 48-49.

The value of regular examination of yarns in regard to regularity, cleanness, lustre, fullness, etc. is pointed out. The method is briefly discussed, and winding the yarn on to suitably coloured boards or pads is recommended for observations of regularity. C.

Yarns: Testing. F. Oertel. *Textilberichte*, 1939, **20**, 110-114.

The testing of yarns by the ordinary method, using the Schopper tester and continuous testing with the Frenzel-Hahn tester are studied. The practical value of the results obtained by the two methods is discussed and it is shown by means of examples that two yarns which appear to be almost equally good in the ordinary tests may give very different results on the Frenzel-Hahn tester. The results obtained in the continuous testing method appear to give a better indication of the behaviour of yarns in subsequent processes, such as weaving and knitting, than the results of ordinary strength tests. C.

Cotton Yarns: Count, Twist and Diameter Relationships. P. H. Gee. *Textile Weekly*, 1939, **23**, 427-429.

The following relationships between diameters in inches (D), counts (C) and turns per inch (T) are worked out. (1) $D = 19C^{0.367}.T^{0.263}$. (2) For maximum density, $11{\cdot}22\sqrt{C} = T$. (3) A nomogram and table show the relationships for yarns of 25, 50, 75 and 100 per cent. of maximum density. Ashenhurst's basic formulæ are criticised and the suggestion is made that instead of describing yarns as "soft" or "hard", the "relative hardness" should be expressed as a percentage on the basis of maximum density. C.

The Testing of Linen Yarns and Fabrics. *Irish Text. J.*, 1939, **5**, No. 2, 8.

Describes some methods of determining "Quality" in linen yarns and fabrics. A basis for guidance and comparison by ascertaining the average relation which exists between the weight and strength of cloths of the same character is given. L.

(C)—FABRICS

Cotton Cloth: Strength Testing. J. E. Gill. *Textile Research*, 1939, **9**, 141-145.

The speed and accuracy attained in testing an aeroplane cloth by the grab and strip method have been investigated on three observers, one with recent training and experience, one with less experience, and a third with most experience but out of practice. The first prepared and tested the cloth most rapidly but the third observer's results showed least spread. As for the two methods of testing, the conclusion is drawn that the grab test is quicker and suitable for controlling production whilst the strip method gives more consistent results and is essentially a laboratory test of performance. There is a definite ratio between the width and the tensile strength of the specimen in the strip test but not in the grab test. C.

Textile Materials: Inspection in Ultra-violet Light. J. F. Springer. *Rayon Textile Monthly*, 1939, **20**, 37-38, 98-99.

The use of ultra-violet light in the examination of faults in textile materials and the identification of oils, dyes, finishing agents, etc., is discussed and an account is given of observations of the fluorescence of various oils on bleached cotton and filter paper in ultra-violet light and the effects of ageing on the fluorescence. The fluorescence effects shown by various dyes on cotton, wool and silk are also described. C.

Rayon and Staple Fibre: Determination in Mixture Fabrics. (1) L. Hofmann. (2) A. Schejnoha. *Zellwolle*, 1939, **5**, 48-50.

(1) The author shows how, by a combination of burning tests, observations under the microscope, and determinations of the loss in weight on treatment with various solvents, it is possible to determine the nature of rayon and staple fibre constituents in mixture fabrics and the approximate proportions of the various constituents. Examples are discussed. (2) A method of calculating the percentages of the different fibre constituents of mixture fabrics from a knowledge of the nature, counts and densities of the warps and wefts and the contraction of the yarns in weaving is explained and illustrated by numerical examples. C.

Determination of Lanital in Tissues Mixed with Wool. A. Cappelli & R. Tuffi. *Annali Chim. Appl.*, 1938, **28**, 399-405 (through *Brit. Chem. Abs. B.*, 1939, **58**, 250).

The tissue is treated with 6-vol. hydrogen peroxide for 15 min. at 60° and then with 10 per cent. caustic soda at 35° for 1 hr. The wool is dissolved, and the lanital is filtered off, washed, dried, and weighed. W.

The Testing of Linen Yarns and Fabrics. *See* Section 5B.

(D)—Other Materials

Olein: Testing. —. Kehren. *Textilberichte*, 1939, **20**, 138-141.

Tables are given showing the results of determinations of the turbidity point, ash residue, iron content, iodine number, unsaponifiable constituent, acid number, saponification number, ester number, neutral fat content, and foaming power after saponification, and also the results of the Mackey test, on oleins of Germany origin and oleins imported from various countries. Notes are given on the methods used, and the results are discussed. It is claimed that German products are comparable with, and in certain respects superior to those obtained from other countries. The need for testing supplies and the danger of fires being caused by the use of inferior products are emphasised. C.

Plastics: Plastographic Testing. M. Speitman. *British Plastics*, 1939, **10**, 447-453.

The author describes the application of Brabender's "Plastogram", as designed for flour testing, to the testing of synthetic resins. The resins are subjected at constant temperature in a heatable trough to kneading by a system of rotating scoops. The scoops are connected to the shaft of a synchronous motor, the casing of which is suspended in such a way as to swing freely so that any deformation resistance in the kneading system causes an equal but opposite turning moment in the suspended casing. By means of a system of levers, these turning moments are transmitted to a scale with indicating pointer and registered by a recording mechanism. Typical records are reproduced for some phenol-formaldehyde and other resins by way of illustration of the scope of the test. C.

The Slide Rule in the Textile Industry. *Dyer*, 1938, **81**, 15-16, 61-62 and 66.

A brief description is given, with illustrations, of the principle and construction of the slide rule, the suggestion being made that such instruments do not receive the use in industry which they deserve. Many examples are shown of the use of slide rules in dyeing and conditioning, the conversion of yarn counts and the determination of approximate strengths of cotton yarns from their counts. Useful gauge points and rule settings are given for a wide variety of calculations, and a table giving ounces and drams expressed as decimals of a pound will be of interest to dyers in calculating weights of dyestuffs. Details are given of various types of rule with scales for specific purposes. W.

Detection of Mercury in Carrotted Hair. C. Mahr. *Deut. Hutmacher-Ztg.*, 1939, No. 6, p. 104.

Mahr's method for the detection of mercury (*Z. anal. Chem.*, 1936, **104**, 241) has now been applied to its detection in carrotted hair. A quick and simple method is necessary in view of recent German regulations on mercury carrotting (*J. Text. Inst.*, 1938, A460). The method is based on the fact that, in the presence of hydrochloric acid, mercury salts give an insoluble precipitate with "Reinecke" salt, $NH_4[Cr(CNS)_4(NH_3)_2]\cdot H_2O$. The sample to be tested (0·05 or at most 0·1 g.) is placed in a test tube and covered with 5 ccm. 10 per cent. hydrochloric acid. It is heated for 5 min. at about 100° in a water bath, care being taken to keep the sample completely covered with the acid. The sample is then removed from the solution and the acid mixed with a few drops of a 2 per cent. (approx.) "Reinecke" solution. This is placed in the water bath for about 1 min. and if the sample contains appreciable amounts of mercury, a rose-red precipitate is formed. Satisfactory results can also be obtained with a sample as small as 3-5 m.g. No limits for the sensitivity of the test are given. W.

PATENT

Paper Moisture Content Indicating Apparatus. B. Bolton (Blackburn). B.P. 501,659 of 28/10/1937:3/3/1939.

Apparatus for indicating the moisture content of paper during manufacture makes use of the charge of static electricity received by the paper as it passes between the calender rolls, which charge varies with the moisture content of the paper. One terminal of a vapour tube is connected to a collector arranged in proximity to the web in the vicinity of the last rollers of the calender, the other terminal of the tube being connected to earth so that the charge of static electricity on the web will flow across the gap between the web and the collector if the charge exceeds a predetermined amount and illuminate the vapour tube to indicate that the moisture content of the web is not above the desired maximum amount. A second vapour tube connected to a second collector arranged at a greater distance from the webs than the first collector is preferably also provided so that if the charge of static electricity on the web rises to more than a predetermined amount in excess of that necessary to illuminate the first tube, the second tube will also become illuminated thus indicating that the web is too dry. C.

7—LAUNDERING AND DRY CLEANING

(A)—CLEANING

Ether Sulphonates: Detergent Properties. F. J. van Antwerpen. *Ind. Engng. Chem.*, 1939, **31**, 64-66.

A stable sulphonated aliphatic ether is now available as a detergent that is about three times as effective on a pound-for-pound basis as soap. It does not decompose in boiling acid or alkali, and in a commercial textile application it retains detergent properties after 18 hours in a boiling 1 per cent. solution of potassium permanganate. It is adaptable for use in hard water. A mixture containing 1 per cent. calcium chloride, 1 per cent. sulphonated ether and 98 per cent. water is quite clear even in the cold. It does not decompose in contact with perspiration to form sulphuric acid and may therefore be a safer product than ordinary sulphonated or sulphated alcohols and esters for laundry use. It is compared with such agents for power of adsorbing carbon, scouring properties and effect on cloth strength in a series of tables and graphs. C.

Laundered Fabrics and Garments: Origin of Defects. F. C. Harwood. *J. Text. Inst.*, 1939, **30**, P29-35.

PATENTS

Centrifugal Extractors. A. R. Hook and Hydro-Dividers Ltd. B.P. 498,003 of 2/1/1939.

In a hydro extractor for laundry use a cover sheet or disc of waterproof and non-porous material, e.g. of rubber or rubber composition, is used to prevent dirt from being carried to the contents of the extractor by the axial passage of air. The cover may be plain and rest on the contents, or it may have a central hole, to fit on to the spindle and rest on partitions in the bowl. It may have a radial slit with over-lapping edges, and the central hole may be fitted with a reinforcing bush. La.

Ironing Machines: Speed-indicating Apparatus: Automatic Control Systems. J. E. Pointon and Baker Perkins Ltd. B.P. 497,392 of 14/12/1938.

Relates to means for synchronising the peripheral speeds of two adjacent rollers in ironing machines. La.

Washing Machines: Valve Control. T. H. O'Brien and Braithwaite & Son. B.P. 498,129 of 4/1/1939. Addition to 452,938.

The controller described in the parent specification is modified so that it may control any selected one of a number of different formulæ. La.

Soaps. H. A. Couchman. B.P. 498,692 of 12/1/1939.

A soap suitable for laundry or toilet use is made by adding to ordinary soap while in a molten or softened state, the viscid matter contained in seaweed, especially seaweed pods. Small amounts of turpentine and mustard may be added. La.

Centrifugal Extractors. Watson, Laidlaw & Co., and J. T. Peacock. B.P. 498,539 of 10/1/1939.

A centrifugal hydro-extractor, of the over-driven type, has a casing with an annular trough, and a basket with a base consisting of a number of flaps attached to a support or bridge by hinges and held in the basket-closing position, by spring catches which engage sockets on the basket wall. When the catches are released, by means of control ropes, the flaps drop, and the contents of the basket drop into the container below. La.

Ironing Machines. Tullis Ltd. and R. Wilson. B.P. 498,711 of 12/1/1939.

The bed of a two-roller decoudun is described. It consists of a central fixed portion arranged between the rollers and having two concave portions, one associated with each roller; and two movable portions arranged one on each side of the central portion and each provided with a concavity such that each roller is embraced for more than half its peripheral surface. La.

8—BUILDINGS AND ENGINEERING

(B)—FIRE PREVENTION

Oiled Textiles: Spontaneous Inflammability. (1) Levecke. (2) —. Kehren. *Textilberichte*, 1939, **20**, 141-142, 142.

(1) A case of spontaneous ignition on storing oiled wool which had been dyed by a single-bath chrome process is reported and the results of Mackey tests and iodine number determinations on oil obtained from the dyed wool are given. These results are in agreement with Kehren's conclusions in regard to the action of chromium soaps. The author does not, however, agree with Kehren's suggestion that iron soaps do not have a similar effect. He points out the results of Mackey tests indicate that iron soaps have a catalytic action and that in an official German publication on the prevention of fires in oiled fibrous materials, it is stated that iron containers should not be used for the oils. The author doubts whether the fires reported by Kehren were due to spontaneous ignition of the oiled materials, since the iodine numbers of the oils were considerably below 50. (2) In reply to the above, Kehren points out that the extracted oil gave unfavourable results in the Mackey test in spite of low iodine numbers, and that the high temperature in the drying apparatus, where the fire occurred, may have had some influence. He considers that chromium soaps have a much higher catalytic action than iron soaps and that the action of the latter is largely dependent on temperature. In textile processes it is easy to keep the temperature below the critical temperature at which fires are likely to arise in the presence of iron soaps. The iodine numbers of oils tend to fall after long storing on textile materials, and impurities extracted with the oils reduce the iodine numbers so that the author does not consider it possible to deduce any general relation between the iodine numbers of extraction residues and the liability to spontaneous ignition. C.

(D)—POWER TRANSMISSION

Multi-motor Drives: Application in the Textile Industry. W. E. Batiz. *Spinner u. Weber*, 1939, 57, No. 8, 49-52.

The use of multi-motor drives in the textile industry is discussed and flyer spinning frames with individual motors for the flyers and sets of cards with separate motors for the cards and automatic regulating arrangements are mentioned. A finishing system comprising a tenter and calender each driven by an alternating current shunt motor is studied and the action of automatic compensating arrangements provided in the system is explained. C.

(E)—TRANSPORT

Mill Conveying Installations. C. F. Easley and R. B. Betts. *Textile World*, 1939, 89, No. 2, 36-37.

Photographs and brief descriptions are given of installations for handling and conveying stock, warp and loom beams, and rolls of cloth, consisting of monorails with trolleys and tractor units, lifts and overhead cranes. C.

Look up at the Ceiling for New Ideas. *Irish Text. J.*, 1939, 5, No. 3, 8-9.

Discusses the internal transport of materials in the mill or factory and some factory applications of the overhead runway are described. L.

(F)—LIGHTING

Daylight Lamps: Development and Application. *Rayon Textile Monthly*, 1939, 20, 90-92.

Macbeth "Daylighting" models AKP82 and BKX63 have been developed for colour identification and BAX84 for grading. The identification lamps produce two types of light, an extreme north-sky daylight and horizon-sunlight, one with an excess of colour in the blue end of the spectrum and the other an excess at the red end of the spectrum. Checks under these two lights are sure matches under any light. The only possible variation will then be brightness, differences in which can best be detected under the white light known as Illuminant C. This system of colour matching has been used successfully in the automobile industry. For use in the classing of cotton, daylight filter/Mazda combination lighting has been found most suitable. In order to produce the desired results, special diffusing glass was introduced to simulate the light of a natural skylight. Later a new colour identification/colour matching skylight, BKX83, was developed on the same principle of diffusion. A portable cotton classing lamp, BX86 skylight, produces an exact colour reproduction of north-sky daylight, with the diffusion of a natural skylight and over twice the intensity of the average north-sky window. C.

Silk Mill: Lighting. E. D. Boult (Messrs. G. H. Heath and Co. Ltd.). *Textile Mercury and Argus*, 1939, 100, 403-4: *Textile Weekly*, 1939, 23, 467-9; *Textile Manufacturer*, 1939, 65, 161.

An illustrated account is given of the installation of Siemens Q.H. discharge lamps in various departments of silk mills at Macclesfield and Middlewich. An intensity of 13-15 foot-candles was secured in the Middlewich factory for the cost of 6·7 kilo-watts, whereas the previous system required 14·5 k.w. to give only 7-8 foot-candles. C.

(G)—HEATING, VENTILATION, AND HUMIDIFICATION

"Calorider" Domestic Air Conditioning Plant. C. R. Downs. *Ind. Engng. Chem.*, 1939, 31, 134-140.

Illustrations are given of an air-conditioning plant to supply about 500-1000 cubic feet of air per minute. For summer use, moisture is extracted by means of "Caloride", a product consisting of about 72 per cent. calcium chloride formed into cubes of 1½ to 2 in. sides. For winter use, water and the solution of calcium chloride are employed to supply moisture. Obnoxious odours are removed by incorporating activated carbon in the "Caloride". Automatic controls are used. C.

Electric Air-purifying and Fibre-recovering Apparatus. O. T. Koritnig. *Monatsh Seide u. Kunstseide*, 1939, 44, 50-52.

In the electric method for the purification of air or gases the air is caused to flow through a dust chamber between one or more charged electrodes and one or more earthed tubes or plates. Dust and other impurities in the air collect on the plates or tubes. Practical arrangements, power requirements, and the advantages of this method are briefly discussed. The method may be applied to the recovery of waste fibre in the air of spinning mills. C.

"Visco" Self-cleaning Rotating Air Filter. "Visco" Engineering Co. Ltd. *Textile Recorder*, 1939, 56, No. 671, 40.

The standard "Visco" self-cleaning filter consists of a number of filter baskets arranged one above the other and containing sinuous filter plates covered by a thin film of "Viscinol". These divide the air stream into thin layers which, in passing between the plates, take a sinuous path. The dust particles are thus separated and flung and retained on the oil-film covered plate surfaces. By means of suitable gearing and two endless chains running over chain wheels the lowest and dirtiest basket in the column is lowered into an oil bath and given a swinging motion so that a vigorous rinsing action takes place. The basket is then lifted out of the oil bath into draining position and is finally raised to the top of the column when the next basket is moved downwards into the oil bath. Generally the rotating mechanism is operated by hand crank. According to the number of baskets and the dust saturation of the air, one basket is passed through the oil bath every one, two or three days. If desired, and for large installations, the rotating mechanism can be operated by motor with push-button or automatic time switch control. The resistance offered by the filter to the air stream is about 0·35 in. C.

(H)—WATER PURIFICATION

"Accelator" Water Softening or Purification Plant. A. S. Behrman and W. H. Green (International Filter Co., Chicago). *Ind. Engng. Chem.*, 1939, **31**, 128-133.

Some particulars and drawings are given of a plant in which a novel method of utilising, circulating and conditioning the previously precipitated sludge and the fresh precipitate makes it possible to accomplish almost complete softening by the lime-soda method in a short standing time. The plant can also be employed for clarification of turbid or coloured waters by means of aluminium sulphate or other coagulant. C.

Calcium Carbonate Deposits: Prevention. (1) G. B. Hatch and O. Rice. (2) O. Rice and E. P. Partridge. *Ind. Engng. Chem.*, 1939, **31**, 51-57, 58-63.

(1) The surface activity and other properties of glassy sodium metaphosphate, Graham's salt, or hexametaphosphate are briefly discussed and its use in the "threshold treatment" of water to prevent deposition of calcium carbonate is described. (2) The "threshold" method of combating calcium carbonate deposition in condensers, heat exchangers or filters and pipe-lines leading from lime-soda softening plant depends upon the fact that sodium hexametaphosphate, present in the water to the extent of only a few parts per million, will prevent precipitation when a high-bicarbonate water is treated with alkali or heated to a temperature not exceeding the boiling point. In once-through systems a continuous feed of from 5 to as little as 1 pound of sodium hexametaphosphate per million pounds of water is employed. An advantage of the treatment is the relatively high *p*H that may be maintained in order to decrease corrosion without causing precipitation of calcium carbonate. C.

PATENTS

Artificial Fibrous Packing Material. R. Etzkorn. B.P. 497,983 of 4/2/1938 (Conv. 9/2/1937).

A stuffing box or other packing device is packed with an artificial fibrous material containing a lubricating substance, which is incorporated in the material from which the fibres are made, and is distributed uniformly over the cross-section of the fibres. The lubricating substances, e.g. graphite, fat and oil, are present in amount not less than 10 per cent., and preferably in such amount that the cellulose or cellulose compound which constitutes the artificial fibre is present in just sufficient amount to form a thread which has sufficient strength to be worked up. The fibres may be made by viscose, cuprammonium, nitrate and acetate processes. C.

Rubberised Fabric Driving Belt. Wingfoot Corporation. B.P. 498,776 of 18/2/1938 (Conv. 16/7/1937).

A rubberised fabric driving belt comprises a pulley-engaging surface composed of fabric or cords impregnated with a rubber distillation residue. When the belt is prepared by laminating layers of rubber-impregnated cord or fabric and coated with rubber, the pulley surface is formed from a ply free from rubber on one side. Crude, cured, scrap or compounded rubber cut into small pieces is heated until it melts, and is agitated mechanically and by blowing in air. The temperature is increased to 250-300° C. and maintained for 15 to 70 hours, after which the mass is cooled and dissolved in carbon tetrachloride or gasoline. The degree of unsaturation of the product (rubber = 100) may lie between 45 and 80. The inner bare fabric surface of the belt is impregnated with the solution and dried. C.

Hygrostat. J. H. Duckworth and J. Jeffreys and Co. Ltd. (London). B.P. 501,852 of 28/10/1937:7/3/1939.

A hygrostat for operating compressed air controls has a sensitive element composed of a number of strands of silk under equal tension which are connected at the top end to a relative humidity setting knob and at the bottom end to a piece which, by means of a spring, exerts a constant load acting on the centre line of the element. The change in length of the silk may be transferred from the piece to an arm by a flexible metal strip. The arm is supported at one end by a flexible metal strip so that the change in length of the silk element due to variation in the relative humidity of the surrounding air causes the arm to swing about a fixed point. The moving member of a leak valve is raised or lowered by the movement of the arm so that the leakage of air from the system is dependent upon the length of the silk element. C.

Treatment of Spent Soap Lyes. Solvay & Cie. F.P. 829,999 of 18/7/1938 (through *Chem. Abs.*, 1939, **33**, 1968).

Spent soap lyes, e.g. waste waters from the washing of wool or from laundries, are treated with a compound of a metal which forms a water-insoluble soap, e.g., with calcium chloride, magnesium chloride or lime, and the precipitated soap containing occluded impurities is separated. The precipitate is then digested with soda solution at above 50° to yield a soap solution suitable for use again. W.

9—PURE SCIENCE

Starch Granule: Structure. N. P. Badenhuizen. *Rec. Trav. Bot. Néerl.*, 1938, **35**, 559-679 (through *Chem. Zentr.*, 1938, ii, 2768).

The author presents a comprehensive review of problems connected with the structure of the starch granule. The existence of an external sheath is rejected. Swelling and pasting phenomena are discussed on the basis of a lamellar structure. C.

Cereal Starch Fatty Acids: Distribution. L. Lehrman. *J. Amer. Chem. Soc.*, 1939, **61**, 212-213.

Because of the extraction of fatty acid by fat solvents having hydrophilic groups, it is conceivable that the fatty acid in starch might be present as an adsorption complex with the carbohydrate. This could account for the selective solution by certain solvents and explains the polarity of the fat-bearing carbohydrate component. C.

Chromatographic Analysis Device. W. G. Brown. *Nature*, 1939, **143**, 377.

A sheet of hard blotting paper between two pieces of plate glass, the top one having a small hole, forms a simple device for preliminary chromatographic analysis. Thus, a drop of a solution of leaf pigments in carbon disulphide is placed on the paper, followed by fresh solvent. The carotenoid and the two chlorophyll pigments show as distinct zones in the spreading field. C.

Colorimetric Analytical Devices: Accuracy. (1) A. Ringbom. (2) A. Ringbom and F. Sundman. *Z. anal. Chemie*, 1939, **115**, 332-343, 402-412.

(1) The fundamental difference between subjective and objective colorimetric methods is discussed and the limitation of the former in consequence of the validity of the Weber-Fechner law is emphasised. When the Lambert-Beer law is valid, a concentration can be exactly determined photo-electrically, if the extinction is equal to 0·434 corresponding to a light absorption of 63·2 per cent. If the intensity of light is determined at this extinction with an average error of ±1 per cent. light absorption, the analytical error is ± 2·72 per cent. With any other extinction the error is greater but can be calculated. If the Lambert-Beer law is not exactly applicable, the optimum absorption region is determined

by drawing a curve with the logarithm of the concentration as abscissæ and the percentage absorption as ordinates. The turning point gives the absorption optimum. The advantages and disadvantages of different methods of working with Lange's photo-electric colorimeter are discussed and the limitations due to the inconstancy in the sensitivity of the photo-elements in such methods are also mentioned. (2) The accuracy reached by Lange's colorimeter has been tested by determinations of (1) Blue coloration of copper with ammonia; (2) the green coloration of nickel salts; (3) red coloration of cobalt salts and (4) the blue coloration of cobalt salts with thiocyanate. The experimental results were found to be in good agreement with theory. General considerations with regard to the choice of light source and filters have been made in connection with the different determinations. A process is also described for the colorimetric determination of two substances of different colour when found together and the analysis of a solution of nickel and cobalt has been further tested. C.

Glass Electrode: Application. H. Saechtling. *Papier Fabrikant,* 1938, 36, *Techn.,* 508-513.

Technical applications of the glass electrode for measuring *p*H in solutions with a disturbing redox potential are reviewed and suitable equipment is described. C.

Manganese: Micro-determination. A. C. Wiese and B. Connor Johnson. *J. Biol. Chem.,* 1939, **127**, 203-209.

A method is described for the determination of from 0·1 to 10 μg. of Mn that depends on the production of a yellow-green colour in the reaction of permanganate with benzidine in nitric acid. The colour is read at the end of 5 minutes in the Evelyn photo-electric colorimeter with a 4200A filter. C.

Iodine Numbers: Determination by the Wijs Method. A. Vossgård and E. Björsvik. *Z. anal. Chemie,* 1939, **115**, 195-204.

The authors summarise the results of a wide experience of the Wijs method for determining iodine numbers. They recommend a volume ratio of glacial acetic acid to carbon tetrachloride of 45:55, and an excess of halogen of 65-400 per cent. The reaction time is reduced to 30 minutes. C.

Organic Acids: Conductometric Micro-titration. M. Furter and H. Gubser. *Helv. Chim. Acta,* 1939, **21**, 1725-1734.

An apparatus and its manipulation are described for conductivity measurements on micro-quantities (3 to 30 mg.) of organic acids and the results obtained with 31 acids, including mono-, di-, tri-, tetra- and penta-carboxylic acids of the aliphatic and aromatic series, are tabulated. The curves obtained with the mono-, di- and poly- acids are discussed. With alcohol concentrations over 95 per cent., the dissolved acids show very little or no dissociation and a conductivity of zero. The addition of only a small quantity of water or alkali causes rapid rise of conductivity and the conductivity curves have a steep initial branch. Their additional course depends on various factors, which are discussed. C.

Polysaccharide Uronic Groups: Determination. A. G. Norman. *Nature,* 1939, **143**, 284.

The rate of evolution of carbon dioxide when sugars, celluloses and starch are kept at 140° C. is suggested as a clue to the presence or absence of uronic acid groups. Pectin gave a peak rate between 20 and 30 minutes from the first ebullition, and slightly less than 50 per cent. of the final yield of carbon dioxide was obtained by the end of one hour. Fructose and sucrose gave sharp peak rates between 10 and 20 minutes. With glucose there was a steady rise to an ill-defined peak at 75 minutes and only 15 per cent. of the final yield was collected at the end of the first hour. The curve for starch resembled that for glucose. Cotton cellulose gave a peak at 30 minutes, followed by a steady fall. Spruce cellulose showed a second but smaller maximum at 75 minutes and on treatment with dilute acid or alkali suffered a loss in carbon dioxide yield out of all proportion to the loss in weight due to the extraction. Yields are tabulated for various celluloses, starches and sugars. C.

Resin: Determination in Pulp. W. S. Smirnov. *Bumashnaja Prom.,* 1938, **16**, No. 5, 53-57 (through *Chem. Zentr.,* 1938, ii, 3766).

The dry pulp, 0·5 gm., is left with a mixture of acetic anhydride, 7 c.c., and carbon tetrachloride, 2 c.c., for 10 minutes, filtered, 5 c.c. of the filtrate are mixed with 0·22 c.c. of conc. sulphuric acid, and the greenish colour is matched against standards. Should the colour be yellowish, a blue or matt glass is interposed in the colorimeter. C.

Cellulose: Fractional Dissolution in Cuprammonium. W. Kumichel. *Papier Fabrikant,* 1938, **36**, *Techn.*, 497-508.

By gradually raising the copper content of cuprammonium solution all degrees of "solubility" can be obtained. Chemical and colloidal chemical investigation of the fractions obtained by means of such controlled dissolution shows that a concentration threshold divides two regions of solubility, one in which there is separation of cellulose from accompanying substances and the other in which there is colloid-chemical separation according to particle size. The solubility of cellulose in cuprammonium varies according to its origin and pre-treatment. The solubility curves are chiefly characterised by the above solvation threshold, and especially by the minimum concentration of copper for complete dispersion. The utilisation of the curves and histograms constructed from them for describing the properties and composition of a pulp is illustrated by several examples. C.

Cellulose Esters: Dissolution. E. Berl and W. Koerber. *J. Amer. Chem. Soc.*, 1939, **61**, 154-157.

The dissolution of different cellulose nitrates and acetates in fibrous form in different solvents at room temperature and at −50° is reported and shown by microphotographs. Certain nitrocelluloses (10-12·7 per cent. N) that are insoluble at room temperature may be soluble at lower temperatures (−50°). Since ether and alcohol do not form molecular compounds, it is probable that a molecular compound is formed with alcohol which is soluble in ether but dissociates at higher temperatures. C.

Cuprammonium Solutions: Solvent Action for Celluloses. L. J. Jolley. *J. Text. Inst.*, 1939, **30**, T4-21.

Cupri-ethylenediamine Solutions: Solvent Action for Celluloses. L. J. Jolley. *J. Text. Inst.*, 1939, **30**, T22-41.

Cotton Flower: Pollination. L. M. Humphrey and A. V. Tuller. *Arkansas Sta. Bull.*, 1938, No. 359, 11, (through *Exp. Sta. Rec.*, 1939, **80**, 39).

A drinking straw is put over the stigma of the emasculated flower and wired to the plant. Stamens of the male parent are placed in the straw so that pollination proceeds without further trouble. C.

Malts: Determination of Proteolytic Activity. J. R. Koch, O. Nelson and L. Ehrnst. *Ind. Eng. Chem. Anal. Edn.*, 1939, **11**, 35-41.

A method for determining proteolytic activity in malts is based on the fact that the viscosity of gelatin decreases as it is attacked by a proteolytic enzyme. The viscometer consists essentially of two Erlenmeyer flasks connected at the necks with a capillary tube having a bore of about 1·5 mm. and length 2·5 to 3·7 cm., and passing at room temperature 50 c.c. of water in about 35 seconds. The proteolytic activity is calculated in terms of the time necessary for a 20 per cent. drop in kinematic viscosity. Graphs allow the ready conversion of flow time to kinematic viscosity. The method has been used for testing various gelatins and many types of proteolytic digestions, a large number of runs being made with pepsin, trypsin and papain chosen to cover a wide *p*H range. C.

Starch Granule: Structure. C. L. Alsberg. *Plant Physiol.*, 1938, **13**, 295-330 (through *Exp. Sta. Rec.*, 1938, **79**, 599).

The author presents his views on the anatomical structure of starch granules, with evidence provided by a critical review of the literature; 112 references are cited. C.

Starch Granule: Structure and Digestion by Amylase. G. L. Teller. *Plant Physiol.*, 1938, **13**, 227-240 (through *Exp. Sta. Rec.*, 1938, **79**, 599).

In growing potatoes and wheat grains, starch granules may be detected in various stages of development, the interiors ranging from amorphous to segmented. If the coating is removed carefully, e.g. by the action of a liquefying diastase, groups of segments are gradually released, appearing in various regular forms. Acted on further by the enzyme they diminish in size and pass into solution. C.

Hydrogen Electrode for *p*H Micro-determinations. H. A. Frediani. *Ind. Eng. Chem. Anal. Edn.*, 1939, **11**, 53.

An apparatus is described for determining *p*H on volumes ranging from 5 to

60 mm³. It has the advantages and disadvantages of the hydrogen electrode but is more satisfactory with small volumes. C.

Photo-electric Photometric Devices: Application. R. H. Müller. *Ind. Eng. Chem., Anal. Edn.*, 1939, **11**, 1-17.

A review is given of the applications of photo-electric photometry in chemical analysis and process control, with a bibliography of 239 references and a list of special monographs in the fields of optics and electronics. The paper is subdivided as follows (1) photometry and colorimetry; (2) photo-electric methods; (3) photo-electric cells; (4) light sources; (5) monochromators and filters; (6) choice of instrument; (7) colorimetric analysis; (8) photometric titrations; (9) automatic inspection and control and (10) applications. C.

Hydrogen Ion: Determination by Colour Analysis. A. G. de Almeida. *Mikrochemie*, 1939, **26**, 9-21.

An experimental principle for the measurement of hydrogen ion is established by means of which the *p*H value of a solution can be found by measuring the hue and saturation of the colour given by a known indicator. A series of veronal-acetate buffer solutions were produced to cover the regions of colour change of the original Clark and Lubs indicators. Each solution was treated with the indicator in question and the colour formed was examined in the step-photometer behind red, green, and blue filters, a barytes white plate serving as standard. Curves (S-shaped) were obtained by plotting *p*H values as abscissæ and the hue values as ordinates. A hue difference of $\varphi=0{\cdot}0006$ was found to correspond to a *p*H difference of 2 to 4×10^{-3}, which gives an accuracy not attainable by electrometric methods. C.

Redox Potentials: Determination with Indicators. *Chem. Ztg.*, 1938, **62**, 912 (through *Analyst*, 1939, **64**, 137-138).

A series of indicators is suggested that cover the entire range of *r*H values. Their potentials in volts at *p*H 7 and their *r*H ranges are, respectively, neutral red, −0·32 and 2 to 4·5; Safranine-T, −0·29 and 4 to 7·5; sodium indigo disulphonate, −0·11 and 8·5 to 10·5; potassium indigo trisulphonate, −0·07 and 9·5 to 12·0; potassium indigo tetrasulphonate, −0·03 and 11·5 to 13·5; methylene blue, +0·01 and 13·5 to 15·5; thionine, +0·06 and 15 to 17; toluylene blue, +0·11 and 16 to 18; thymol indophenol, +0·18 and 17·5 to 20; *m*-cresol indophenol, +0·21 and 19 to 21·5; 2:6-dichlorophenol indophenol, +0·23 and 20 to 22·5; diphenylamine sulphonic acid, +0·83 (in *N* sulphuric acid) and 27 to 29. Industrial applications are described and the passivity of metals with regard to *r*H value is discussed. C.

Malt Extract: Analysis. R. Gardner. *Analyst*, 1939, **64**, 103-108.

A description is given of a modification of McLachlan's method (1928) for the analysis of malt extract and similar mixtures of carbohydrates. Essentially the method consists in comparing (*a*) an unfermented portion, (*b*) another portion after fermentation with a yeast that ferments dextrose but not maltose, and (*c*) a further portion after fermentation with a maltose-fermenting yeast. For (*b*) a new yeast strain isolated from tomato sauce was used. The following methods have been tried for the examination of the solutions after removal of alcohol—(1) total solids, calculated from the density of solution; (2) reducing sugar by Fehling's and similar methods; (3) optical rotation, and (4) total sugar estimated as dextrose after acid hydrolysis. Diastatic malt extracts do not contain malto-dextrins. All samples of malt extract examined contained a considerable proportion of substances other than fermentable sugars or substances hydrolysable by acid to reducing sugars. After deducting mineral matter and protein (N × 6·25), the "other substances" are usually about 10 to 15 per cent. of the total solids. Most of these substances are precipitated by alcohol as a dark-coloured gummy mass. In some of the older methods of analysis this would be returned as "dextrin", which is clearly incorrect. It is suggested that the unfermentable sugars are largely hexosans produced during evaporation. C.

Pentoses: Colorimetric Determination. Wanda Mejbaum. *Z. physiol. Chem.*, 1939, **258**, 117-120.

Bial's reaction with orcinol and hydrochloric acid containing ferric chloride is developed into a colorimetric method for determining 1-20 μg. of pentose. It is particularly valuable for compounds in which pentose is esterified by phosphoric acid, for which the furfuraldehyde distillation fails. C.

Starch: Colorimetric Determination. J. J. Chinoy. *Mikrochemie*, 1939, **26**, 132-142.

A method is described for the determination of 0·5 mg. or more of starch in plant products with an accuracy in duplicate analyses of 2 to 3 per cent. Iodine is generated in a neutral or weakly acid solution by the addition of potassium iodide and hydrogen peroxide, excess of iodine is removed by chloroform, and the colour of the completely dispersed starch iodide is measured in a colorimeter. C.

Sulphated and Sulphonated Surface-active Agents: Analysis. R. Hart. *Ind. Eng. Chem., Anal. Edn.*, 1939, **11**, 33-34.

A method for the determination of active ingredients in true sulphonic compounds and in sulphuric acid esters, used as detergents and wetting agents, consists essentially in extracting the active ingredients with solvents over a concentrated salt solution, evaporating the solvent, heating the residue to constant weight and determining the loss in weight on ashing the residue. The fatty matter in sulphuric acid esters may also be determined by assuming that the latter yield on hydrolysis a hydroxyl group for every combined sulphuric anhydride split off. Formulæ for calculating both the total active ingredients and the total fatty matter are given. C.

Partially Acetylated Cellulose Fibres: Solubility. I. Sakurada and T. Morita. *J. Soc. Chem. Ind., Japan*, 1938, **41**, 381B-382B.

The solubility in chloroform and acetone of partially acetylated cellulose fibres has been determined and its relationship to the degree of acetylation graphically represented. The solubility in chloroform is almost wholly dependent on the degree of acetylation and is only slightly influenced by the raw material, or the diluting medium, the amount of sulphuric acid, the catalyst or the temperature used in the acetylation. The graph is approximately a single curve, either a parabola or hyperbola. From mathematical considerations the solubility in chloroform on the whole increases with the square of the acetylation period. The reaction is explained on the theory of molecular layers and lattice forces or on the basis of the generalised micellar fringe theory. The solubility in acetone is more strongly influenced by the conditions of acetylation than the solubility in chloroform. Solubility in acetone is always less than the solubility in chloroform and increases with the degree of acetylation; no maximum is reached. It appears to be impossible to obtain a cellulose acetate 100 per cent. soluble in acetone by interruption of the acetylating process. C.

Cellulose: Acetylation; X-ray Study. I. Sakurada, K. Hutino and J. Matusita. *J. Soc. Chem. Ind., Japan*, 1938, **41**, 383B-384B.

Ramie, mercerised ramie and loose cotton were treated with glacial acetic acid and acetylated with a mixture of acetic anhydride, benzene and sulphuric acid. Examination was made of the acetic acid content, the solubility and the X-ray diagrams. The following results were obtained—(1) In the X-ray photographs only diagrams of the initial cellulose and cellulose triacetate can be recognised, and (2) the distances of their space lattices remain unchanged during acetylation. (3) Native and mercerised celluloses give triacetates with the same diagram. To explain the occurrence of this mixed diagram a preparation of partially acetylated ramie fibre was extracted with chloroform. Only 6·2 per cent. was soluble, and the insoluble residue still exhibited the interferences of cellulose triacetate. A triacetylated ramie completely soluble in chloroform was saponified, and partly acetylated to a product with 1·58 Ac. per $C_6H_{10}O_5$ unit. This gave a mixed diagram of cellulose and cellulose triacetate and was soluble in chloroform to the extent of 17·6 per cent. The insoluble portion also showed the presence of insoluble cellulose triacetate micelles. An explanation of the course of acetylation is attempted. C.

Fibrous Cellulose Triacetate: Saponification. I. Sakurada and I. Tukahara. *J. Soc. Chem. Ind., Japan*, 1938, **41**, 384B.

Fibrous cellulose triacetate (ramie) was almost completely saponified by *N*/5 alcoholic potash in 2 hours at 30° C. The solubility in acetone of the product of the action of *N*/50-*N*/100 aqueous potash was investigated and plotted against its acetic acid content. At the beginning, the solubility in acetone increased, reached a maximum when about 1 per cent. of acetic acid was split off and then decreased almost to nil when 5 per cent. had been lost. The fibrous cellulose acetate, insoluble in acetone, obtained by partial saponification showed the typical X-ray diagram of cellulose triacetate. C.

Fibrous Acetone-soluble Cellulose Acetate: Production. I. Sakurada and T. Morita. *J. Soc. Chem. Ind., Japan,* 1938, 41, 385B-386B.

Fibrous cellulose triacetate from ramie, cotton and wood pulp was saponified with various mineral acids, 1*N*, at 30° C., and the change of the solubility in acetone and chloroform of the partially hydrolysed products is recorded in diagrams. Nitric acid and perchloric acid gave fibrous products containing about $58{\cdot}5 \pm 1{\cdot}5$ per cent. of acetic acid that were completely soluble but the hydrolysis was much slower with hydrochloric and sulphuric acids and complete solubility was not attained. C.

Fibrous Holocelluloses: Isolation and Strength. C. Jayme, K. Storch, E. Kerler and G. Schwab. *Papier Fabrikant,* 1939, 37, *Tech.,* 57-59.

By "holocellulose" is understood the total cellulose remaining when lignin is removed from a woody tissue by chlorination and solution of the chlorolignin in a mild alkali. For this purpose monoethanolamine has been used by American workers but the present authors find that dilute ammonia or lime water serve the same purpose. The number of chlorination steps can be reduced by carrying out the treatment in an evacuated apparatus. A yield of 73-75 per cent. of "holocellulose" containing 0·3-3 per cent. of residual lignin can be secured. The results of extractions of beech and pine are recorded, the analyses and tensile data for the fibres being tabulated. C.

Wood: Extraction with Ethanolamine. L. E. Wise, F. C. Peterson and W. M. Harlow. *Ind. Eng. Chem., Anal. Edn.,* 1939, 11, 18-19.

Delignification of various woody tissues with anhydrous mono-ethanolamine gives a residue corresponding very closely to Cross and Bevan cellulose, and removes from the wood not only most of the lignin, but also a large amount of the "cellulosan" fraction and extraneous materials. The visual effect of boiling monomethanolamine on wood sections seems the same as that obtained by subjecting them to chlorination or bromination followed by hot dilute sodium sulphite or 10 per cent. ammonium hydroxide. C.

Thin-boiling and Oxidised Starches: Production and Properties. J. R. Katz. *Textile Research,* 1939, 9, 146-154.

A brief review is given of thin-boiling starches obtained by acid attack and Bryer and Duryea's methods of production (1901) are mentioned. Oxidised starches are then dealt with and a prescription for making one is given. The phenomenon of "thin boilingness" is investigated by determinations of viscosity and sediment volume and microscope observations on the behaviour of the starch granules on cooking. Sediment volume and viscosity are higher the lower the American commercial "fluidity number". The special feature of "thin-boiling" starches is the small dimensions of the vesicles formed on swelling of the granules; the smaller the vesicles, the higher the "fluidity number". The chief difference between thin-boiling starches prepared by acid attack and by oxidation is that the vesicles of the former are the more resistant to cooking. C.

Globular Proteins: Cyclol Structure. Dorothy M. Wrinch. *Nature,* 1939, 143, 482-483.

Recent objections to the cyclol structure assigned to globular proteins are briefly reviewed and met. C.

Phenol-formaldehyde Resins: Softening Point Diagram. S. Tsuruta and O. Sugita. *J. Soc. Chem. Ind., Japan,* 1938, 41, 441B-443B.

An investigation of the heating and hardening reaction of binary mixtures of resol and phenols has been undertaken. The softening point curves obtained showed discontinuities after heating the mixture. C.

Calcium Stearate Multi-layers: Effect of *p*H on Film Potentials. W. D. Harkins and R. W. Mattoon. *Physical Review,* 1939, 55, 320-321.

The film potentials of the calcium stearate X-type multi-layers on gold at *p*H 6·3 do not increase linearly with the number of layers, but reach a value of about +0·1 or +0·2 volt in a few layers, as with the Y-type of deposition. After this the increment per X-layer is almost zero. At a *p*H of 6·3, 0·0001 *M* calcium chloride gives the X-type of deposition, but the 0·01 *M* solution gives the Y-type. Intermediate solutions may start with the Y-type and change over to the X-type. The contact angle changes continuously from about 0° to about 90° as the deposition changes from Y to X. The increase in calcium concentration has no definite effect on the film potential at this low *p*H. The *p*H of the solution is one of the primary factors that determine the film potential. C.

Proteins: Surface Activity. H. Neurath and H. B. Bull. *Chemical Reviews*, 1938, **23**, 391-435.

A review of the literature under the main headings—(I) Surface films on protein solutions; (1) surface tension of protein solutions; (2) adsorption of proteins at a solid/solution interface; (3) electrokinetic studies on protein surfaces. (II) Spread protein mono-layers, (1) methods of spreading and factors of influence; (2) properties. The references cited are 146. C.

Liquids: Boundary Tensions; Measurement and Applications. E. A. Hauser, J. M. Andreas and W. B. Tucker. *Ind. Eng. Chem.*, 1939, **31**, 32-35.

The most common methods for the determination of boundary tensions are briefly reviewed and their limitations from the point of view of industrial applicability and reliability discussed. The method of pendant drops for determining surface tension has the advantage that the measurements are made without disturbing the interface. This is done by making an accurate silhouette photograph of the drop, the shape and size of which are determined from measurements made on the photograph. This method is particularly adapted to the determination of the rate of change of boundary energy with time and to the measurement of the boundary energy of liquids at high or low temperatures and over an extended range of pressures. Industrial processes in which surface tension is important are mentioned. C.

Solution Surfaces: Depth. J. W. McBain and L. H. Perry. *Ind. Engng. Chem.*, 1939, **31**, 35-39.

A convenient film balance is described and its use in studying ordinary solutions is discussed with reference to the following problems—(1) Whether or not after (*a*) sweeping or (*b*) compressing, the surface is "reversible"; that is, its original properties are spontaneously restored with (*c*) the rate and (*d*) the time required for complete restoration. (2) The extents to which the areas of a surface must be diminished in order to produce, (*a*) any pressure at all, (*b*) a pressure that does not disappear, (*c*) any desired pressure, determining also (*d*) the rate of solution of a compressed film at constant pressure or at constant area, (*e*) the initial and final pressures and (*f*) the minimum age at which such properties are fully exhibited, that is the age at which a free surface becomes mature. (3) The maximum difference of surface pressure between an aged and a fresh surface. (4) The minimum amount of solute which must be sprinkled upon pure water to give (*a*) any pressure at all, (*b*) an initial pressure falling to a final pressure which may or may not be zero. Three types of solution are revealed by the balance. Studies on hydrocinnamic acid solutions are described and explanations are given for the formation of a surface pellicle on solutions and for the fact that the surface of a solution is deep. C.

Colloidal Prussian Blue: Properties. T. R. Bolam and W. Taylor. *Trans. Faraday Soc.*, 1939, **35**, 268-276.

The ionic interchange in sols formed by the peptisation of prussian blue by oxalic acid, and the extent to which this interchange is connected with the coagulating action of electrolytes, have been investigated. The peptisation is found to be due to the adsorption, on the colloidal particles, of ferrocyanic acid formed by the interaction of the oxalic acid with part of the blue. The liberation of hydrogen ions from the micelles in these sols by the action of neutral salts, attains a maximum value which varies with the nature of the salt kation, the displacing powers of the alkali metals giving the lyotropic sequence Cs $>$ K $>$ Na $>$ Li. It is suggested that the liberation of hydrogen ions is due to interchange between the salt kations and hydrogen counter-ions pertaining to the adsorbed ferrocyanic acid and also probably hydrogen ions introduced into the crystal lattice by interaction of the oxalic acid with certain of the ferric atoms. The coagulating powers of salts probably show the same sequence as their powers of effecting interchange with the counter hydrogen ions. C.

Bentonite: Emulsifying Power. J. M. Fain and F. D. Snell. *Ind. Engng. Chem.*, 1939, **31**, 48-51.

In order to throw light on the mechanism of emulsification by surface-active solids, the authors have examined the effect of adjusting *p*H on the dispersion of asphalt by Bentonite. At the optimum *p*H for emulsification, the viscosity of the Bentonite slip (5 per cent. of dry matter) was greater than that of the unadjusted clay, the increase being apparently due to flocculation. Partial flocculation appears also to be necessary for optimum emulsifying power. Two explanations were offered. C.

High-molecular Materials: Swelling and Solubility. W. Ostwald. *J. Oil Colour Chem. Assoc.*, 1939, **22**, 31-46.

A report of a lecture on the author's and Moll's work on the swelling and solubility of high-molecular compounds. Tables of the dipole moment and dielectric constant are given for a number of solvents and also diagrams showing the relationship between these two factors and the solvent power towards nitrocellulose, ethylcellulose, cellulose triacetate, polystyrene, rubber and other high-molecular substances. C.

Microscopic Glass Spheres: Preparation. K. Sollner. *Ind. Eng. Chem., Anal. Edn.*, 1939, **11**, 48-49.

Well-defined microscopic spheres of glass from below 0·5 up to 50 μ diameter have been prepared as follows. Oxygen is passed through a bottle containing glass powder and the loaded stream is passed through a settling chamber and fed into a gas stream, which produces a flame at the end of the delivery tube. The particles carried with the oxygen pass through the flame and melt to spheres which are thrown into a dish of water, immediately below the flame, probably by centrifugal forces originating in the curvature of the flame when it strikes the water surface. Satisfactory results have not yet been obtained with quartz. The glass spheres are perfect in shape and suitable for model experiments on colloids and adhesion experiments. C.

Chain-molecular Esters: Viscous Flow. F. Eirich and R. Simha. *J. Chem. Phys.*, 1939, **7**, 116-121.

The quantum-mechanical transition-state method applied to the theory of transport phenomena in liquids, has been extended to new data involving homologous series of nonylenic and oleic esters. The variation of the activation heats of the flow process with temperature, molecular weight and constitution is considered and an attempt made to correlate it with the molecular constitution. C.

Concentric Cone Torsion Viscometer. C. F. Goodeve. *J. Sci. Instruments*, 1939, **16**, 19-27.

A new viscometer has a container with a conical internal surface rotated at a constant speed and a frustum of a cone suspended or pivoted coaxially inside. The fluid between the conical surfaces imparts a moment tending to rotate the inner cone and this moment is measured by the angular displacement of a torsion wire or spring. The distance between the conical surfaces is altered by raising or lowering the inner cone along the axis. The rate of revolution of the lower cone is maintained by a motor of the universal, governor-controlled, constant-speed type. The instrument is calibrated by an oil or other Newtonian fluid of known viscosity. The instrument is especially designed for the measurement of anomalous viscosities and very high rates of shear may be obtained without turbulent flow. C.

Starch Pastes: Viscosity. J. R. Katz. *Textile Research*, 1938, **11**, 69-78.

The viscosity of one per cent. starch pastes has been examined after prolonged heating and stirring. After different intervals a sample was taken out, examined under the microscope, and its viscosity measured at 25° C. The influence of stirring was tested by use of a glass stirrer, driven by a synchronous motor at different well-defined velocities. The results are graphed for potato and corn starches and compared with measurements on polyvinyl alcohol, the viscosity of which is not affected by heating or stirring. A very high viscosity is obtained with potato starch, much higher than with polyvinyl alcohol or corn starch, but the maximum holds only for a short time, the viscosity falling to a steady value after about six hours which is about six times as high as the viscosity of thick-boiling corn starch. Microscopical examination shows that a progressive swelling and rupture of starch vesicles occurs. The maximum viscosity is reached earlier and is lower the more intensive the stirring. The vesicles of corn starch do not swell up as much as those of potato starch. They break down rapidly, but their walls do not dissolve even after 12 hours of heating at 99° C. C.

Potato Starch Pastes: Viscosity. J. R. Katz. *Textile Research*, 1939, 9, 114-119.

De-mineralised potato starch paste (1 per cent.), with and without additions of sodium carbonate, was heated under a reflux condenser at 99° C. and samples were taken from time to time for viscosity measurements. The amounts of sodium carbonate added were those necessary for neutralisation and one-quarter, one-half and double this amount respectively. The viscosity curve obtained for the unneutralised starch showed a high maximum after about 10 min. heating. The height of the maximum was reduced by addition of sodium carbonate and with twice the amount required for neutralisation the viscosity curve was practically horizontal. Addition of sodium bicarbonate had a similar effect. When the de-mineralised starch is neutralised with calcium carbonate instead of sodium carbonate the curve lies much lower than with sodium carbonate and shows practically no indication of a maximum. Effects of the same kind can be obtained by addition of small amounts of different salts to paste made from ordinary (non-demineralised) potato starch. Curves showing the effects of additions of sodium sulphate, calcium sulphate and magnesium sulphate are given and it is pointed out that hard or soft water and the degree of acidity of starch may make a difference in the viscosity curves of potato starch paste. The effects of milling potato starch on its viscosity are discussed. The viscosity-time curve at 99° C. of a paste of milled starch shows that the milled starch has lost practically all of the characteristics of potato starch and behaves almost like a grain starch, the viscosity remaining practically constant during heating. Experiments with sweet potato starch have shown that this starch swells much less than ordinary potato starch, and accordingly has a lower but much more constant viscosity in 1 per cent. pastes. This viscosity and its changes are, however, larger than those of grain starches. C.

Ammonium Oleate Dye Solutions: Polarisation of Fluorescence. H. Zocher. *Kolloid Z.*, 1939, 35, 34-39.

The emission of polarised fluorescence radiation by solutions of dyes in anisotropic liquids has been investigated with ammonium oleate as typical solvent. Most fluorescing dyes exhibited negative dichroism and negative "bifluorescence". Dyes derived from dehydrothiotoluidine also showed negative bifluorescence but positive dichroism. Positive bifluorescence was only observed with chlorophyll and hæmatoporphyrin, which showed positive dichroism for long waves and negative for short ones. C.

Anthracene Solutions: Quenching of Fluorescence. E. J. Bowen and A. Norton. *Trans. Faraday Soc.*, 1939, 35, 44-48.

The absolute fluorescence efficiencies of anthracene dissolved in a number of solvents under a variety of conditions of concentration, temperature and in the presence of various "quenchers" are recorded. The efficiency tended to a maximum at a concentration of 0·5 gm. per l. Dissolved oxygen acted as a quencher, air-free solutions having efficiencies 10 to 35 per cent. greater. After saturation with oxygen the solution regained its original efficiency by passing in nitrogen. C.

Fluorescent Dyes: Photo-sensitised Reactions and Fluorescence Quenching. J. Weiss. *Trans. Faraday Soc.*, 1939, 35, 48-64.

The elementary process of fluorescence quenching is identical in many cases with the primary process of a photo-sensitised reaction and has been studied in solutions of eosin and Lauth's violet containing iodide ions (KI) as quenching substance. The solution is placed in a rectangular quartz vessel and illuminated laterally by a strong parallel beam of light (intensity L). A second narrow and relatively weak beam (intensity I) passes through the vessel along the axis and the changes in the concentration of the dye in the vessel, which follow as L is switched on, are measured by observing the change in the extinction coefficient of the light I with a photo-electric compensation device with which changes in the extinction coefficient of the order of 0·1 per cent. can be measured and changes of 0·01 per cent. can be detected. The quenching in these cases is effected by a radiationless electron transfer in a complex between the excited molecule and the quenching acceptor molecule or ion, with the consequent formation of a reduced form of the excited molecule and an oxidised form of the acceptor. If this quenching process takes place in the presence of molecular oxygen the photo-sensitised oxidation can be represented by a cycle, from which expressions can be deduced for the quantum efficiency of the oxidations. C.

Portable Projection Microscope. Bellingham & Stanley Ltd. *Engineering*, 1939, 147, 306.

A brief description, with illustrations, is given of an instrument for use in the inspection of fine gear teeth and the like. The image of the part is reflected on a screen that may be up to 10 feet distant, or projected on a photographic plate to give an image magnified by 12 diameters. C.

Sphere and Cylinder: Uniform Motion through Viscous Liquid. B. R. Seth. *Phil. Mag.*, 1939, [vii], 27, 212-220.

As no exact solution of the equations of motion has yet been obtained either for a sphere or for a circular cylinder through a viscous medium, the conditions under which the symmetric flow is possible when the inertia terms are not neglected have been determined by introducing an external force X per unit mass in the direction in which the body is moving. The following results have been obtained—(1) Oseen's criticism that Stokes's solution is defective at points distant from the sphere holds good only when the liquid flows past the fixed sphere, and not when the sphere is moving uniformly through it. (2) If the kinetic energy can be infinite it should be possible to use Stokes's solution when U^2/a is too small to be taken into account. (3) When a big sphere moves slowly through a slightly viscous liquid the value of the drag should be greater than one and a half times that given by Stokes, and for a circular cylinder it should be greater than $4 \pi \mu U$; in these cases the Reynolds number, R, has a finite value. (4) As R increases from zero to infinity the kinetic energy of the fluid decreases from infinity to the value for the corresponding irrotational motion. (5) For a very big sphere or a cylinder moving slowly through a slightly viscous liquid the motion is everywhere irrotational except in a thin layer near the boundary; R is now very large. C.

Wood Blocks: Internal Temperature Measurement. *Chem.-Ztg.*, 1938, 62, 932 (through *Analyst*, 1939, 64, 142-143).

A method is described for the measurement of temperature in inaccessible portions of an object, such as wood blocks undergoing hot impregnation. Holes bored in the object hold cylindrical metal capsules containing twelve sealed melting-point tubes containing aromatic compounds of various sharp melting points. Suitable substances to cover the range 37-95° C. are named. C.

Experimental Data: Rank Correlation. M. G. Kendall, S. F. H. Kendall and B. B. Smith. *Biometrika*, 1939, 30, 251-273.

The sampling distribution of Spearman's Coefficient of Rank Correlation for a universe of uncorrelated material is worked out for samples up to 8, and approximate distributions are obtained experimentally for samples of 10 and 20. For samples of 6 or more, the usual test of significance for the ordinary product-moment coefficient of correlation may be used as an approximation. C.

Field Plots: Balanced and Random Arrangement. F. Yates. *Biometrika*, 1939, 30, 440-466.

Continuing a controversy started by W. S. Gosset ("Student") on the relative advantages of systematic and random arrangements in agricultural experimentation, this paper re-states the general arguments for and against each system. A number of particular instances are examined and the conclusion is reached that systematic arrangements may sometimes give greater accuracy than randomised blocks, but that in such instances the devices of confounding, quasi-factorial designs and split-plot Latin squares are more satisfactory statistically and are likely to give a similar gain in accuracy. C.

Insect Population: Sampling. G. Beall. *Biometrika*, 1939, 30, 422-439.

The data are given of a uniformity trial of counts of insects in a field, and are used to show the relative efficiency of various methods of sampling. Stratafication gives a substantial increase in accuracy. C.

Micro-manipulator: Construction. E. E. Pyke. *Annals of Botany*, 1939, 3, 253-255.

A simple micro-manipulator for use with a microscope for delicate dissections or manipulations of plant tissues is described with the aid of diagrams. The necessary steadiness and precision are obtained by a massive baseplate in which all controlling screws are mounted and by using bearings of kinematic design.

Radical component movements at right angles in a horizontal plane are provided by a combination of two rocking levers. The vertical movement is linear and is obtained by sliding one of the levers up or down relative to the baseplate. The apparatus has been employed in an investigation of the mechanism of stomatal movement and in studying the effect of puncturing individual latex tubes of *Euphorbia Wulfenii*. C.

***Gossypium* Species: Cytology.** J. M. Webber. *J. Agric. Research*, 1939, **58**, 237-261.

A survey is given of cytogenetic data bearing upon the relationships within and among the four groups of *Gossypium*, namely a wild Australian species, *G. sturtii*, and Asiatic, wild American, and cultivated American species. The meiotic chromosome conjugation and fertility of interspecific hybrids and variants in *Gossypium* is summarised in table form. The degree of meiotic chromosome conjugation in hybrids involving Asiatic species is discussed and three hypotheses are given as to the origin of 13-chromosome species. Evidence is afforded that the 26-chromosome species are polyploids and the possibility of there being, besides true allopolyploids, autopolyploids that behave as allopolyploids. C.

Morocco Pima Cotton: Inheritance of Seed Hairiness. M. de Balsac, E. Miège and O. Roehrich. *Coton et Culture Cotonnière*, 1938, **12**, 101-107.

Experiments carried out on Pima 67 in Morocco suggest that the hairiness of the seed is a fluctuating characteristic depending on the surroundings and only slightly or partially hereditary to the variety. Cottons from non-hairy seeds are more homogeneous in diameter and strength than those from hairy seeds. Results of stapling and other tests are tabulated. C.

Colorimetry Apparatus: Review. M. G. Mellon. *Ind. Eng. Chem. Anal. Edn.*, 1939, **11**, 80-85.

An account of colorimetric methods in chemistry is given with methods of measurement and descriptions of stimulimeters, comparators and absorptometers. C.

Micro-Kjeldahl Apparatus. J. Needham and E. J. Boell. *Biochem. J.*, 1939, **33**, 149-152.

An ultramicro-Kjeldahl technique, suitable for amounts of total N from 1 to 20 μg. is described. The Kjeldahl digestion vessel is turned on its side after neutralisation and the ammonia diffusing from the resulting relatively large liquid-air interface is trapped by a hanging film of acid in a tube fitted into the mouth of the vessel. C.

Spectrophotometric Analysis: Review. S. E. Q. Ashley. *Ind. Eng. Chem., Anal. Edn.*, 1939, **11**, 72-79.

A review is given with bibliography of spectrophotometric methods in modern analytical chemistry under the headings (1) definition and terms; (2) application of Beer's law; (3) visual sensitivity and colorimetry; (4) evaluation of errors and methods; (5) range; (6) analysis of mixtures of coloured substances; (7) hydrogen-ion determination; (8) spectrophotometry in the infra-red and ultra-violet. (9) construction of instruments and (10) reactions and methods. C.

Viscometers and Pipettes: Drainage. G. Jones and E. Ferrell. *J. Chem. Soc.*, 1939, 325-332.

Experiments on the drainage of liquids from viscometers and pipettes show that for a given surface and volume, the total volume of after-drainage multiplied by the time of outflow is a constant for any given liquid and that this constant is proportional to the kinematic viscosity and independent of the surface tension of the liquid. Double cone pipettes are superior to cylindrical and spherical ones, as the penalty for carelessness or haste may be appreciably less than with the usual forms. C.

Copper, Lead and Zinc: Micro-determination with Dithizone. J. Schwaibold and A. Lesmüller. *Biochem. Z.*, 1939, **300**, 331-337.

Details are given of a trustworthy method for ashing biological material in the determination of quantities of Cu, Pb and Zn of the order of 1 μg. The material is incinerated in a quartz dish at a low temperature, evaporated with a little nitric acid, and ashed again at 500 to 600°. The determination of the metals is carried out with dithizone as described in a previous paper. C.

Magnesium: Determination in Water. W. G. Moffitt. *J. Soc. Chem. Ind.*, 1939, 58, 125-126.

Details are given of a method for determining magnesium in water by titrating with potassium palmitate after precipitating the calcium as carbonate. The precipitation of magnesium hydroxide is prevented by having present in the reagent sufficient bicarbonate to suppress the concentration of hydroxyl ion to a value below that at which magnesium hydroxide is precipitated. The difficulty of obtaining a sharp end-point is discussed and it is shown that satisfactory results can be obtained by using a mixture of phenolphthalein and xylene cyanol FF having a sharp colour change at *p*H 8·2 when a slight excess of acid is present during the titration. Typical results are given C.

Metallic Traces: Spectrographic Analysis. J. S. Owens. *Ind. Eng. Chem., Anal. Edn.*, 1939, 11, 59-63.

In the spectrographic analysis of trace elements, (concentration less than 0·01 per cent.), the following sources have been found to be appropriate (1) the high voltage, A.C. arc for inorganic chemicals; (2) the D.C. arc for metallurgical specimens; (3) the cathode layer of the D.C. carbon arc for geochemical samples; (4) the D.C. condensed spark and the high-voltage A.C. arc for organic chemical and biological materials. Wiring diagrams are submitted and representative trace analyses with typical analytical curves are presented. C.

Hydroxyl: Determination. H. N. Wilson and W. C. Hughes. *J. Soc. Chem. Ind.*, 1939, 58, 74-77.

A specification for suitable pyridine in the pyridine-acetic anhydride method for determining hydroxyl is as follows—(1) The water in the pyridine should be determined either by Fischer's reagent or in the Dean and Stark apparatus and be adjusted to 0·35 to 0·40 per cent.; (2) The pyridine should contain not less than 97·5 per cent. of bases, calculated as C_5H_5N on the dry basis; (3) Less than 25 ml. of 0·1*N* bromine per 100 ml. of pyridine should be absorbed on treatment of pyridine with bromine; (4) On boiling the acetylation mixture under reflux for six hours, the loss of titre on a 50·0 ml. portion of the reagent should not exceed 0·1 ml. of *N*-sodium hydroxide; (5) With a satisfactory pyridine, pure dry mannitol will have an apparent hydroxyl content of at least 55·5 per cent. C.

Organic Compounds: Qualitative Micro-analysis. F. Schneider and D. G. Foulke. *Ind. Eng. Chem. Anal. Edn.*, 1939, 11, 111-114.

An account is given of micro-technique for the classification of compounds containing C, H, and O, including (1) the fuchsin test for aldehydes, (2) Molisch test for carbohydrates, (3) titration for acids, (4) ferric chloride and alkali solubility for phenols, (5) saponification for esters, (6) phenylhydrazine test for ketones and (7) sodium test and solubility test for alcohols. The tests are carried out in this order until a positive test is obtained which places the substance in its group. C.

Partly Methylated Cellulose: Hydrolysis to 2- and 3-Methyl Glucose Derivatives. W. J. Heddle and E. G. V. Percival. *J. Chem. Soc.*, 1939, 249-250.

2-Methyl glucosephenylhydrazone and 3-methylglucosazone have been isolated from the products of hydrolysis of a partially methylated cellulose obtained by Piwonka's method from a sodium cupri-cellulose complex. The absence of derivatives of 6-methylglucose is noteworthy and the possibility of shielding of the primary alcohol residues seems feasible. C.

Amines: Folin's Reaction. E. G. Schmidt. *Ind Eng. Chem., Anal. Edn.*, 1939, 11, 99-100.

An investigation is reported of the factors which influence the shade and amount of colour given by sodium 1:2-naphthoquinone-4-sulphonate and various amines. The data on the reaction with 27 different compounds are given in a table and include the optimum amount of alkali and acid reagents, the per cent. of nitrogen recovered and the colour match with glycine, with both the Folin method and the Danielson modification. The results are discussed. C.

Ammonium Soaps: Instability. J. E. Kench and T. Malkin. *J. Chem. Soc.*, 1939, 230-232.

The stability of ammonium soaps of the series heptoic to stearic has been investigated by means of chemical and X-ray analysis. Salts obtained from alcohol yielded two distinct long spacings, the lines corresponding with the shorter spacing being the more intense, and salts prepared from ether yielded only the longer spacing, with an occasional faint ndication of the shorter. The shorter and the longer spacings were identified with the neutral and the acid soaps, respectively. The spacings plotted for acid and neutral ammonium salts correspond with double molecules with carboxyl groups in juxtaposition. The difference in melting behaviour of neutral and acid salts affords a good indication of the composition of any particular ammonium salt and the curve gives to within 1° the comparatively sharp m.p.'s of acid salts, the range of sintering above this temperature being roughly proportional to the amount of neutral salts present. C.

Linoleic Acids: Identity. R. W. Riemenschneider, D. H. Wheeler and C. E. Sando. *J. Biol. Chem.*, 1939, **127**, 391-402.

So-called α- and β-linoleic acids have been isolated from cottonseed oil and their bromination and oxidation products studied. Only two tetrabromostearic acids and two sativic acids were obtained and the conclusion is drawn that α, β, and natural linoleic acids are identical and have but one geometrical configuration. C.

Rubber from Dialysed Latex: Properties. H. P. Stevens and J. W. Rowe. *J. Soc. Chem. Ind.*, 1939, 58, 116-122.

In order to ascertain the advantages derived from purification of latex by dialysis, rubber prepared from dialysed, ammonia-preserved latex has been vulcanised and the physical properties have been determined in comparison with rubber from the same latex before dialysis. It is shown that dialysis removes an accelerator and an anti-oxidant. The properties of crêpe from dialysed and undialysed latex are substantially the same. The moisture absorption figures for the same specimens on exposure to air of 75 per cent. humidity have also been determined, and it is shown that a large reduction in the figures for whole-latex rubber is produced by dialysis but that crêpe from dialysed latex gives only slightly lower figures than crêpe from undialysed latex. These latter figures are higher than for crêpe obtained from centrifuged or creamed latex. Alkali-treatment followed by dialysis yielded still lower figures, almost but not quite as low as those shown by a commercial low-nitrogen rubber. The conclusion is reached that 16 per cent. of the nitrogen in latex is diffusible, 57 per cent. colloidally dispersed, and the remaining 27 per cent. is strongly sorbed on the latex particles and removable only by chemical treatment. The film from dialysed latex is stronger than that from a control. C

Quinone-anils and Indoanilines: Oxidation-Reduction Potentials. L. F. Fieser and H. T. Thompson. *J. Amer. Chem. Soc.*, 1939, **61**, 376-383.

An interpretation of the influence of substituent groups on the potentials of quinone-hydroquinone systems has been undertaken by means of electrometric titrations of a solution of the reductant, prepared either from the pure, crystalline amine or its hydrochloride or by hydrogenation of the oxidant. Methods of preparation of the compounds are described. The results show that the influence of a 3-substituent in modifying the character of the quinonoid system is responsible for only a little more than half of the total observed effect, the remainder being attributable to the structural alteration in the reductant. Therefore the structure of both oxidant and reductant must be considered in studying the effect of substituents on the oxidation-reduction potentials of quinonoid systems. C.

Cataphoresis Apparatus for Protein Separations. T. B. Coolidge. *J. Biol. Chem.*, 1939, **127**, 551-553.

A simple cataphoresis apparatus is described for the almost quantitative separation of proteins with isoelectric points quite close together, such as serum albumin and globulin. C.

Wood: Sorption of Sodium Hydroxide. G. R. Lusby and O. Maass. *Canadian J. Research*, 1939, **B17**, 36-39.

The sorption of sodium hydroxide by black spruce varies little between 20° and 75°, but an increase in temperature causes the break in the sorption curve to occur at a higher concentration of alkali. At 20° the change in concentration is complete within one hour. At 50° there is a small change after one hour and at 75° a considerable change. The rate of change in concentration at 75°

gradually decreases, but is such that at the end of two days the calculated "sorption" value is almost double that at the end of one hour. The probable explanation of the change after one hour is that cooking action liberates acids of such strength that after they combine with the alkali the latter cannot be titrated by hydrochloric acid with methyl orange as indicator, and with cooking action taking place at 75° no precise evaluation can be made of the change caused by raising the temperature from 50° to 75°. Along the flat part of the curve, the sorption per gram of cellulose is considerably greater for wood based on a content of 50 per cent. cellulose, than for cotton. The indication is that lignin and other wood substances, in addition to cellulose, take up alkali. C.

Calcium Stearate Deposited Layers: Electrical Properties. P. A. Zahl, C. P. Haskins, D. M. Gallagher and C. E. Buchwald. *Trans. Faraday Soc.*, 1939, **35**, 308-312.

A method is described for measuring the resistance and capacitance of mono- and multi-layers of calcium stearate, deposited at metal surfaces in the presence of a solution of a metal salt. The measured films were made a part of a cell in a slightly modified conventional a.c. Wheatstone bridge circuit, the capacitance and resistance of which were measured. Data are presented for a number of readings taken with films from 1 to 41 in number on electrodes immersed in $M/264$ calcium chloride at *p*H 7·2. A rough calculation of the average value for 41 layers gives a dielectric constant of 3·7. The structure of the films, and consequently their electrical properties, may be considerably altered by the presence of the copper ion, the values differing very greatly from those taken with calcium chloride and varying widely with the concentration of copper sulphate, the resistance rising and the capacitance decreasing and the variation between differing sets of data falling off sharply with decreasing electrolyte concentration. C.

Water Adsorbed by Cellulose: Heat Content. J. H. Shipley, W. B. Campbell and O. Maass. *Canadian J. Research*, 1939, **B17**, 40-50.

A new adiabatic-electrical calorimeter is described, the novel feature of which is that there is no liquid bath around the inner container, the heating coil being wound directly around the copper container. This eliminates the errors due to evaporation of the calorimetric liquid and the heat capacity of the apparatus is reduced to a much lower value. The total heat capacities of dry bleached sulphite pulp, D 1·57, and of pulp containing 2, 4, 8 and 12 per cent. of adsorbed water were determined over the four ranges of temperature $-35°$ to $+25°$ C., $-20°$ to $+25°$ C., $-5°$ to $+25°$ C., and $+5°$ to $+25°$ C. A change in the amount of bound water with the temperature is suggested as a mechanism to explain the high values obtained for the apparent specific heats of adsorbed water. C.

Rennet Casein: Elastic and Plastic Properties. C. A. Cooper and P. G. T. Hand. *British Plastics*, 1939, **10**, 572-577.

A method of comparing the elastic and plastic properties of rennet caseins is described which depends on compression of moulded cylindrical pellets of standard dimensions between the hot platens in a Scott Plastometer. Measurements are made of the initial height of the pellet, the height at the end of three minutes while still under compression in the instrument, and the final height after releasing the pressure and cooling, and temporary and permanent deformations and recovery are calculated. Data are given for 60 samples of casein from various countries and it is shown that there is no definite connection between the deformation of these caseins under heat and pressure and other properties, such as fat content, ash, *p*H, etc. The results of investigations of the effects of varying temperature, pressure, and moisture content of casein on deformation are shown in tables and graphs and briefly discussed. C.

Thixotropy and Viscosity: Theory. C. F. Goodeve. *Trans. Faraday Soc.*, 1939, **35**, 342-358.

Explanations for the phenomenon of thixotropy are discussed and a new theoretical approach to the problem is described. Thixotropy may be attributed to the interference between particles and the formation of links. These links when stretched and broken give rise to a series of "impulses" (a transfer of momentum) from a moving layer to a neighbouring layer. The amount of each impulse is inversely proportional to the rate of shear and the number of impulses per second proportional to the rate of shear. The product, the total force due to these links, is therefore independent of the rate of shear, a behaviour found with thixotropic substances. The theory also suggests an explanation of the difference between Newtonian and thixotropic viscosities. It appears to be of general application to colloidal systems in which there is interference between the particles and can be used to explain the thixotropy of emulsions and foams. C.

Sulphuric Acid Solutions: Viscosity and Density at 35°. M. K. Srinivasan and B. Prasad. *Trans. Faraday Soc.*, 1939, 35, 374-378.

Viscosity and density of sulphuric acid-water systems have been measured throughout the whole range at 35° C. The viscosity-concentration curve shows a maximum at about 86 per cent. and a minimum at about 95 per cent. but the maximum deviations from linearity occur at 60, 83 and 97 per cent. by weight of acid. It is not possible, however, to assign with certainty the occurrence of maxima, minima or maximum deviations to compound formation. C.

Colloids: Ultra-violet Emission on Coagulation. A. Rabinerson and M. Philippov. *C. R. Acad. Sci.*, 1939, **207**, 35-37.

The ultra-violet rays emitted by hydrophobic ferric hydroxide and vanadium pentoxide and hydrophilic sodium oleate on coagulation are tabulated. The apparatus for detecting the phenomenon was a combination of a Geiger-Müller tube and a photoelectric element of the Barth form. Experimental results with a biological detector coincide with those taken by a photo-electron counter. The conclusion is drawn that emission at coagulation is identical with mitogenetic radiation. C.

Proteins: Photolysis. D. C. Carpenter. *Science*, 1939, 89, 251.

When mono-layers of benzyl stearyl amine and β-phenylethyl stearyl amine on $N/1$ hydrochloric acid solution are subjected to ultra-violet light of wave-length 2480 and 2537A, through filters, photolysis can be demonstrated by the properties of the film and by the reaction products. It is therefore to be expected that the peptide chains of proteins may be split at places where light-absorbing side-chains occur in the molecule. C.

Dyed Gelatin: Absorption Spectra. Ilona Mischung. *Math. naturwiss. Anz. ungar. Akad. Wiss.*, 1938, 57, 209-230 (through *Chem. Abstr.*, 1938, **32**, 6550^5).

The absorption of pure gelatin is insignificant within the visible spectrum but increases in the ultra-violet. Rhodulin orange N in gelatin shows two similar bands between 240 and 800 mμ, one in the visible and the other in the ultra-violet region. Absorptions were measured at 100, 20 and −160° C.; the bands shifted towards shorter wave-lengths on cooling. The absorption steadily increased with illumination to a maximum and decreased slowly when the exposure was cut off. C.

Hydrogen Bond: Review. W. H. Rodebush and A. M. Buswell. *J. Phys. Chem.*, 1939, 43, 219-230.

The paper discusses association through hydrogen under the sub-headings (1) Infra-red spectroscopy as a method of determining the existence of hydrogen bonds and (2) resonance in structures involving hydrogen bonds. The most striking result of the study of association through hydrogen by means of the infra-red technique is that it appears to be a universal phenomenon. Thus not only polar liquids such as water, but glucose, starch and proteins also are completely associated through hydrogen bonds (containing no unbonded or "free" hydroxyl). Further, while it has long been known that carboxylic acids are associated to a high degree in inert solvents, it is now found that alcohols, amides, oximes, etc., show a high degree of association in all except the most dilute solutions in a solvent such as carbon tetrachloride, where the infra-red technique is particularly satisfactory. The great difficulty is that the polar molecules are nearly insoluble in non-polar solvents. In order to work in polar solvents it is necessary to use very thin films. C.

Liquid Water: Infra-red Absorption Band. J. R. Collins. *Phys. Rev.*, 1939, 55, 470-472.

The absorption of liquid water in the spectral region from 2·00 to 2·65 μ was measured by means of a thermopile and glass prism spectrometer with a slit width of 100A in a search for a weak absorption band predicted by Ellis as a combination band occurring in liquid water but not in water vapour. A band was found with a peak at 2·52 μ and with a maximum coefficient of about 34.

This is the fifth absorption band to be found in the spectrum of liquid water that has no counterpart in the spectrum of water vapour. C.

Raman Effect: Review. K. W. F. Kohlrausch. *Die Physik*, 1939, 7, 79-88.

A short review is given of work during the past four years on the Raman effect, as follows—(1) the dispersing mechanism and general properties of the dispersed light; (2) vibration spectra and structure of bi- and poly- atomic molecules; and (3) special problems such as (*a*) proof of tautomerism, (*b*) mesomerism, (*c*) cis-trans isomerism of ethylene derivatives, (*d*) rotation—or atropic—isomerism, (*e*) chelated compounds, (*f*) polymerisation, (*g*) mixed molecules, (*h*) ring tension and (*i*) electrolytic dissociation. A bibliography is provided.

Vinyl Ethers: Ethylene Frequencies. A. Kirrmann. *C. R. Acad. Sci.*, 1939, 208, 353-355.

The physical constants and Raman frequencies of ethoxyethylene CH_2:CH·OEt and its homologues CH_3·CH:CH·OEt and CH_2:CH(OEt)·CH_3 are presented. The first compound gives two lines of frequency 1611 and 1635 in the ethylene region, the second a single line of frequency 1666, which by deduction of 28 for the methyl group gives 1638, a number almost identical with the 1635 of the first, and the third compound has a frequency of 1654. No explanation is offered for the 1611 line of ethoxyethylene. C.

Bristol Board: Analysis of Scattered Light. W. W. Barkas. *Proc. Physical Soc.*, 1939, 51, 274-295.

A conception of mirror facets has been attempted in order to deal with surface structures such as wood or paper, which can be resolved microscopically. On the assumption of the diffusion and reflection of the incident light by these facets according to established laws, formulæ have been obtained whereby the emergent flux can be resolved into its diffuse and specular components and from which the proportional area of the mirror facets, set at different angles to the mean surface, can be calculated. Diagrams of the optical and electrical apparatus are shown. The surface used for experiment was a piece of Bristol board of low gloss. With a strip of plane mirror held against the surface, the sample was adjusted so that the illuminating beam fell normally on it and all angles of incidence α were measured from this position. At any setting of α, the flux was measured for all angles of view β of the rotating arm as a percentage of the maximum flux obtainable. This for Bristol board was found in each case to be at the specular angle ($\beta=-\alpha$), but for magnesium oxide it was found when $\beta=0$. The relative values of these maxima were then measured so that the different curves could be correlated. The analysis seems to be successful for surfaces giving symmetrical scattering curves for normal illumination and the question of dealing with asymmetrical surfaces such as those of wood is now being considered. The results also seem to indicate that the analysis is in fact applicable even to surfaces so nearly matt as magnesium oxide because it leads to the plausible structure of a uniform surface of perfect diffusion sprinkled over with few randomly oriented mirror facets projecting from the general surface. How far surfaces can be differentiated by this method of analysis is discussed. An outline of previous work on the analysis of light scattered from matt or semi-matt surfaces by R. F. S. Hearmon is included. C.

Colour-blind Persons: Testing. Mary Collins. *J. Text. Inst.*, 1939, 30, P20-27.

Light: Measurement of Subjective Effects. W. D. Wright. *Trans. Illum. Eng. Soc. (London)*, 1939, 4, 1-16.

Problems likely to be encountered in any attempt to measure the subjective effects of light are surveyed under the headings (1) the response of the eye to light; (2) methods of measuring subjective brightness and (3) specification of contrast including a constant scale and colour contrast. The article is followed by six pages of discussion and 29 references. C.

Tri-stimulus Value Calculator. F. W. Sears. *J. Opt. Soc. Amer.*, 1939, 29, 77-78.

An improved calculator of the type of that designed by Swank and Mellon is described for obtaining tri-stimulus values from spectrophotometric data. Two instruments have been built, one manually operated and the other motor driven. Diagrams of both are given and full details of operation. C.

X-ray Fluorescence Photography. E. Dershem. *J. Opt. Soc. Amer.*, 1939, 29, 41-42.

A camera constructed to use soft X-rays of such wave-length that they are selectively absorbed by one of the elements in the object is described for the X-ray photography of microtome sections of bone. For this purpose an element is radiated with X-rays of a frequency somewhat higher than the critical absorption frequency. The element will then emit, almost exclusively, its own characteristic K-radiation. Photographs of bone and grasshopper wings are reproduced. C.

Flow-measurement Throttles: New Forms. W. Koennecke. *Archiv. Tech. Mess.*, 1939, Lief. 91, T2-4.

Three new forms of throttle are described for flow measurements with small and medium Reynolds numbers, (1) a quarter-circle, (2) a cylinder, and (3) a combination of (1) and (2). Curves for the different throttles are presented and their spheres of application are given. C.

Low Temperature Dew-point Hygrometer. C. A. Winkler. *Canadian J. Res.*, 1939, D17, 35-38.

An instrument is described for the accurate determination of relative humidity at low temperatures. To ensure that the observed temperature yields an accurate estimate of the true temperature of the surface on which dew is deposited, multiple thermocouple junctions are contained in the mirror and connected in series to increase the thermo-electric potential developed. Since the small amount of moisture present in the air at low temperatures increases the time required for a visible deposit of dew to form, and since the dew-point temperature must be approached very gradually or its observed value may be considerably below the true value, accurate temperature regulation of the cooling fluid is provided so that the mirror may be cooled as slowly as desired. Tests with a manually controlled arrangement of the apparatus at temperatures down to $-15°$ C. and over a range of 60 to 95 per cent. relative humidity showed that a precision of $\pm 0{\cdot}5$ per cent. relative humidity was readily attained when the dew-point was approached at the rate of about 2° C. per hour. C.

Photo-electric Gauging Device. C. Tuttle and W. Bornemann. *Instruments*, 1939, 12, 67-70.

Two arrangements are described that employ photo-electric cells in optical systems for gauging. In the first and simpler arrangement, the article to be measured diaphragms the beam to one cell and the other beam falls on a second cell which merely monitors the light source. In the second arrangement, both beams become measuring beams and both cells measuring cells. As an example, the measurement of the pitch of a gear wheel or toothed rack is described. The accuracy of these methods is discussed at some length. C.

Elastic Thread: Deformation under Load. J. Haag. *C. R. Acad. Sci.*, 1939, 208, 483-486.

The author's previous method of calculating the deformation of an elastic thread when submitted to any exterior force has been applied to the particular case of a thread subjected simply to the action of weight, the thread being plane in the natural state and the straight section having a principal axis of inertia in the plane of the neutral fibre, this plane being successively horizontal and vertical. Equations are derived for the natural horizontal and vertical positions and for the case of a cylindrical coil. The results of experimental verification with red bronze spiral springs are recorded. C.

Molecular Forces: Theory. H. Margenau. *Reviews of Modern Physics*, 1939, 11, 1-35.

A detailed review and application of the theory of Van der Waals forces is given under the following headings (1) history; (2) forces between polar molecules; (3) forces between nonpolar molecules; (4) forces between excited molecules; (5) tables of calculated constants and (6) summary of applications. There is also a bibliography of 45 references. C.

Metals: Sliding and Frictional Forces. F. P. Bowden and L. Leben. *Proc. Roy Soc.*, 1939, A169, 371-391.

The physical processes that occur during sliding and the nature of the frictional force that opposes the motion have been investigated with unlubricated metallic surfaces. Experiments with dissimilar metals show that the sliding process is not a continuous one but the motion proceeds by jerks. When the surfaces are of the same metal large fluctuations in the friction still occur but are comparatively slow and very irregular. The average value of the frictional force is also considerably higher than that found for dissimilar metals and a well-marked and characteristic track is formed during the sliding. An analysis of the surface temperature, measured by using the rubbing contact of two different metals as a thermocouple, shows that it, too, is changing rapidly during the sliding and that there is a well-defined correlation between these changes and the frictional fluctuations. It is clear, therefore, that metals do not slide uniformly and even if the surfaces are lubricated the behaviour may be essentially the same. Moreover, the frictional effects are not confined to the surface. The sliding causes a permanent deformation of the solid which extends to a great depth beneath the surface so that the friction must also be dependent on the bulk properties of the solids. This investigation suggests that the kinetic friction between moving metals is due to a local welding together and a formation of metallic junctions between the metals. Since the size of these junctions is great compared with the dimensions of a molecule, their subsequent breaking causes a tearing and deformation of the metal which extends to a considerable depth. The exact behaviour depends upon the nature of the metals, and there is evidence that three distinct types of metallic junctions may be formed. C.

Plane Surfaces: Measurement of Area of Contact. F. P. Bowden and D. Tabor. *Proc. Roy. Soc.*, 1939, **A169**, 391-413.

The area of contact between stationary and moving metal surfaces has been measured by electrical and by visual means. Surfaces of different size, shape and material were used and the measurements made over a wide range of loads, so that the results could be correlated with the measurements on friction. The measured values of the conductance between stationary metal surfaces lie in the same order as the specific conductivities of the metals. Since the mechanical properties are not widely different, this suggests that the measured resistance is essentially metallic and is not that of oxides or contaminating films on the surface. The results also show that the conductance varies in an orderly manner with the applied load and that the variation of conductance with load is in much better agreement with plastic than with elastic deformation. For surfaces which, by their geometric form, make contact in a single region the measured values of the conductance suggest that intimate contact occurs over the whole of the deformed area, and provided the actual contact is localised in a single continuous area, the conductance and hence the real area of contact will be reasonably independent of the shape and radius of curvature of the surfaces. The conductance with flat surfaces is of the same order of magnitude as with curved surfaces and can be taken as almost independent of the apparent area of the surfaces; it depends mainly on the load. For flat surfaces, therefore, the real area of contact even for appreciable loads is a small fraction of the apparent area. The flat surfaces are held apart by small surface irregularities, which form bridges of an essentially metallic nature. These bridges flow under the applied pressure or their number increases until their total cross-section is sufficient to enable them to support the applied load. Measurements of conductance on moving surfaces were made by replacing the potentiometer by an Einthoven galvanometer or a cathode-ray oscillograph and the friction was measured by a high-frequency apparatus. These measurements showed that the area of contact is not constant but fluctuates during sliding and the fluctuations correlate with the frictional and temperature changes. It appears that metallic junctions between the metals are being rapidly formed and broken, the nature of the junctions depending on the relative physical properties of the two metals. If the metals are lubricated with mineral oils, metallic contact may still occur through the film of lubricant, giving the same results as with unlubricated surfaces. C.

Moving Solid: Law of Air Resistance. J. Villey and R. Jamin. *C. R. Acad. Sci.*, 1939, **208**, 628-630.

A mathematical discussion is given of the law of variation of the force opposed by the air when a solid body moves through it. C.

Turbulence: Definition. G. Dedebant and P. Wehrlé. *C. R. Acad. Sci.*, 1939, **208**, 625-628.

Equations defining turbulence are derived from considerations of an aleatory function and geometrical and physical correlations of a turbulent fluid. C.

Supersonic Phenomena: Review. W. T. Richards. *Reviews of Modern Physics*, 1939, **11**, 36-64.

An explanation for supersonic phenomena is presented under the following headings (1) the theory of the propagation of plane sound waves; (2) the experimental determination of the velocity and absorption of sound and (3) the effect of sound waves of large amplitude. A classified bibliography of 348 references is added. C.

Plastics: Double Refraction and Change in Length. H. W. Farwell. *J. Applied Physics*, 1939, **10**, 109-113.

The change in length of a Vinylite plastic under constant load and recovery has been measured by examination in polarised light by Mach's method to determine the birefringence. A Poisson's ratio of 0·50 was obtained, which has been found to hold for rubber also. C.

Fibroin, Keratin and Gelatin Films: Electron Diffraction. C. Matano. *J. Soc. Chem. Ind., Japan*, 1939, **42**, 30-31B.

The structure of fibroin, keratin and gelatin has been studied by the electron diffraction method. Films of fibroin were obtained by evaporating a dialysed solution of degummed silk in magnesium nitrate solution, and films of keratin from a dialysed solution of wool in sodium sulphide. The three proteins display the same patterns of three diffuse rings with lattice distances 4·1, 2·0 and 1·1 A. Reasons are given for believing that the inner ring is due to the (002) spacing. The keratin and gelatin films appear to be in a state of stress, hence the correspondence with fibroin. C.

Orthogonalised Latin Squares: Formation. W. L. Stevens. *Annals of Eugenics*, 1939, **9**, 82-93.

Two Latin squares are orthogonal if, when they are superimposed, a Graeco-Latin square results, each "treatment" of one square occurring once and once only with each "treatment" of the other. Theorems are given relating to the number of orthogonal squares that exist for any given size of square, and rules are developed for their formation. C.

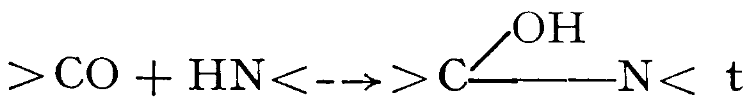
Amino Acid Composition of Keratins—the Composition of Gorgonin, Spongin, Turtle Scutes and other Keratins. R. J. Block and D. Bolling. *J. Biol. Chem.*, 1939, **127**, 685-693.

Gorgonin, spongin, turtle scutes and a horny excrescence on the bill of the pelican were analysed for nitrogen, sulphur, iodine, histidine, lysine, arginine, tyrosine, tryptophane, phenylalanine, and glycine. These proteins, which may be classified as pseudokeratins, are characterised by their insolubility, resistance to enzymatic digestion, and by their content of lysine and arginine. The latter are in the molecular ratio of approximately 4:6. Specific differences in amino acid composition are also apparent. Thus gorgonin and turtle scutes contain more than 13 per cent. of tyrosine, while spongin yields less than 1 per cent. of this amino acid. More than 8 per cent. of cystine was found in the former proteins, while spongin and pelican excrescence contain approximately 3 and 4 per cent. respectively. In contrast to other pseudokeratins, turtle scutes yield more histidine and less lysine. Tryptophane was not found in either spongin or gorgonin. The origin and possible interrelationship of the eukeratins and pseudokeratins are discussed. W.

Discussion on the Protein Molecule. T. Svedberg. *Proc. Roy. Soc. A.*, 1939, **170**, 41-79. W.

Structure of Proteins. M. L. Huggins. *J. Amer. Chem. Soc.*, 1939, **61**, 755.

Wrinch's "cyclol" theory of protein structure necessitates distances between atoms, not directly bonded together, which are considerably less than would be expected from known crystal structure data. At these short distances the interatomic repulsions would be tremendous. This interatomic distance difficulty can be removed by substituting for the Frank-Wrinch condensation



$$>CO + HN< \dashrightarrow >\overset{OH}{C}\text{——}N<$$

the formation of an NHO bridge

$$>CO + HN< \dashrightarrow >CO\ldots\ldots\ldots\ldots\ldots HN<$$

W.

Sub-micro-determination of Nitrogen in Organic Material by Kjeldahl's Method. C. Dumazert. *Bull. Soc. Chim. Biol.*, 1938, **20**, 1405-1418, (through *Brit. Chem. Abs. A*. II, 1939, p. 132).

A modification of the Parnas and Wagner micro-Kjeldahl apparatus by which 10-260 μg. of nitrogen can be determined with an error of 1 per cent. is described. Approximately 1 mg. of substance is heated for 2 hr. with 0·3 c.c. of sulphuric acid and 10 mg. of a mixed catalyst prepared from 1 g. of mercury selenite and 24 g. of potassium hydrogen sulphate. A control is done at the same time. The ammonia is liberated in the usual way and absorbed in 1 or 2 c.c. of 0·01*N* sulphuric acid. After addition of potassium iodide and potassium iodate the liberated iodine is determined by 0·01*N* sodium thiosulphate. W.

Toxicity of Some Dipping Fluids containing Arsenic and Sulphur. D. G. Steyn and P. M Bekker. *Onderstepoort J.*, 1938, **11**, 247-255.

Experiments to determine the toxic doses of some dipping-fluids containing arsenic are described, and the minimum lethal dose has been determined for rabbits. Sheep, cattle and horses are more susceptible than rabbits to arsenic. The toxicities of two proprietory lime sulphur dips have been determined. W.

Influence of Clothing on the Physiological Reactions of the Human Body to Varying Environmental Temperatures. A. P. Gagge, C. E. A. Winslow and L. P. Herrington. *Amer. J. Physiol.*, 1938, **124**, 30-50 (through *Brit. Chem. Abs. A*. III, 1939, p. 316).

The partition of heat loss from a normally clothed subject in a semi-reclining position shows that he is able to tolerate a difference of 8° between skin and environmental temperature before body cooling sets in at 25° T_0 (T_0=operation temp. specially defined). Between 25° and 28° T_0 thermal equilibrium of the clothed body is maintained by vasomotor regulation. Above 29° evaporation regulation sets in. For equal wall and air temp. and a turbulent air movement of 5 metres per min., 55 per cent. of the total loss by radiation and convection is due to radiation. In the zones of vasomotor regulation and evaporation regulation, blood flow is the principal variable in conductance. A range of 4-4·5° difference between internal tissues and skin represents a point of minimum conductance and presumable maximum vaso-constriction. Heat loss by evaporation (in the range of temperature and humidity studied) takes place at the skin surface and not in the folds of clothing. Analysis shows that the gross physiological responses of the clothed body when compared with the nude are broadly identical. W.

Relative Influence of Radiation and Convection on the Temperature Regulation of the Clothed Body. C. E. A. Winslow, L. P. Herrington and A. P. Gagge. *Amer. J. Physiol.*, 1938, **124**, 51-61 (through *Brit. Chem. Abs. A*. III, 1939, p. 316).

Employing the technique described in *Amer. J. Physiol.*, 1937, **120**, 133-143, 277-287 and 288-299, it was found that when a given temperature (T_0) is produced by (*a*) air and walls of the same temperature and (*b*) cooler air and warmer walls, the physiological reactions of the clothed human body differ. The mean skin temperature is lower in (*a*); the conductance of the skin is much lower in (*b*). As a result of higher skin temperature, heating of the body is greater in the hot region and chilling of the body is less in the cold region in (*b*). The wetted area is less for (*b*) in the hot region. Discomfort is less in the hot region and greater in the cold region for (*b*). W.

PATENTS

Starch: Separation from Liquids. W. Kroner. B.P. 497,243 of 28/6/1937 (Conv. 17/12/1936).

Starch or other material of like density and grain size is separated from liquid by passing the suspension upwards within an inclined tubular structure, fresh water entering below the place of entry of the liquid passing up through the material precipitating from the liquid. The velocity of the fresh water is equal to or less than the velocity at which the particles fall. Application of the method in the preparation of starch from potatoes is described. The process may also be applied to the treatment of starch milk or of a suspension of coagulated albumen. C.

Cellulosic Materials: Saccarification. M. C. G. Tournel (Marseille, France). B.P. 501,513 of 30/8/1937:28/2/1939.

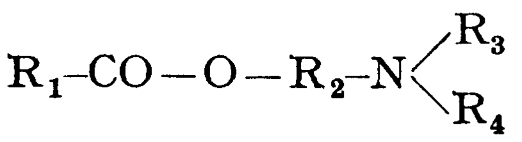
A method of hydrolysing cellulosic substances to extract sugar therefrom comprises treating the substances to eliminate hemi-celluloses, hydrogenating or reducing the resultant materials, treating the products with a reactant, e.g. urea, with which the sugar materials form complexes capable of protecting them during the hydrolysis, hydrolysing the resultant products and finally decomposing the complexes contained in the extracted juice to liberate the sugar materials. Sulphuric acid of about 1·25 per cent. concentration at boiling point, or 0·5 per cent. concentration at 120-130° C. is used at atmospheric pressure to eliminate the hemi-celluloses, and the *p*H value of the solution is maintained substantially constant by a buffering effect. Lignin is eliminated after eliminating the hemi-celluloses and before the hydrogenation phase, e.g. by treatment with 5 to 10 per cent. nitric acid at 60-80° C. Oxycelluloses are hydrogenated by electrolysis in a weak sulphuric acid solution having a current density of approximately 0·3 amp. per sq. cm. of cathode. Hydrolysis is effected by 2·5 per cent. sulphuric acid under pressure at a temperature of 170° C. C.

Metallic Impurities: Detection in Non-metallic Materials. International Cigar Machinery Co. (New York). B.P. 501,581 of 1/6/1937:1/3/1939.

A method of detecting the presence of undesirable metallic matter in non-metallic material, such as foodstuffs, cigars or the like, consists in automatically introducing the non-metallic material into or passing the same through the electromagnetic field of an energised coil or coils included in an inductance or impedance bridge which is adjusted to a condition of substantially exact electrical balance, in such manner that any metallic matter present in the material will disturb the electrical balance of the bridge and cause the production of a voltage, or a change in voltage between given points thereof, and utilising the voltage or change in voltage to produce an effect indicating the presence of the metallic matter. Suitable apparatus is described. C.

Anti-oxidants for Oils. T. Sabalitschka and E. Bohm. B.P. 498,110 of 4/1/1938.

The anti-oxidation of organic substances readily liable to atmospheric oxidation is prevented by incorporating with the material, substances of the general formula—



$$R_1\text{-}CO-O-R_2\text{-}N\begin{matrix}\diagup R_3\\ \diagdown R_4\end{matrix}$$

in which R_1 represents H, alkyl, alkylene or aryl radicals, which may be substituted by OH, oxyalkyl, alkyl or NH_2 groups, R_2 represents alkylene with a chain of not more than four C atoms, preferably less, R_3 represents alkyl with not more than three C atoms and R_4 represents H or alkyl with not more than three C atoms. The examples mention $C_2H_5-CO-O-(CH_2)_3-N(C_2H_5)_2$ as an anti-oxidant for arachis and linseed oil; $C_3H_7-CO-O-(CH_2)_2-N(CH_3)_2$ as an anti-oxidant for linseed oil. The first mentioned compound is prepared by heating a solution of propionyl chloride in $CHCl_3$ with a solution of γ-diethylaminopropanol in $CHCl_3$ and adding sodium carbonate. It may be used to prevent auto-oxidation of olive kernel oil. The compound $C_3H_7-CO-O-(CH_2)_2-N(C_2H_5)_2$ is prepared by heating *n*-butyryl chloride with diethylaminoethanol and the compound $OH-C_6H_4-CO-O-(CH_2)_3-N(C_2H_5)_2$ by heating *p*-hydroxybenzoic acid, trimethylene glycol and diethylamine. W.

10—ECONOMICS

Lancashire Cotton Industry: Reorganisation. *Wirtschaftsdienst*, 1939, 24, 259-261.

Figures are given for the export of cotton yarn and fabric to various countries for the years 1913, 1928 and 1938 in comparison with World figures, and the relative decline of Lancashire is discussed. The provisions of the proposed Cotton Industry Enabling Bill are outlined. C.

Rayon and Staple Fibre: World Production, Consumption and Trade. *Silk J. Rayon World*, 1939, 15, No. 177, 16-17.

Statistics are given for the aggregate world production and consumption of continuous filament rayon, staple fibre and waste, production and consumption of continuous filament rayon and of staple fibre and waste, and export and import trades for the years 1935-38. The total world output of synthetic fibres for 1938 amounted to 1,994,250,000 lb., nearly 8 per cent. higher than the total for 1937 and nearly double that for 1935. Japan, Germany and Italy together produced over 67 per cent. of the 1938 output and their combined total rose by 16 per cent. compared with 1937, whilst the total output of other producers declined by about 8 per cent. World consumption of rayon and staple fibre increased from 1,647,250,000 lb. in 1937 to 1,919,200,000 lb. in 1938. The aggregate consumption of Japan, Germany and Italy rose by more than 33 per cent. whilst the uptake of all the other countries declined by about 7 per cent. There was an almost general contraction in output of continuous filament rayon in 1938 and an enormous expansion (about 57 per cent.) in output of staple fibre for which Japan, Germany and Italy were chiefly responsible. Declines in import and export trade occurred in 1938, the decline being general for all countries with the sole exception of British shipments in staple fibres which almost doubled, due almost entirely to a strong but passing demand from the United States. C.

Sudeten Textile Industry. *Klepzig's Textil-Z.*, 1939, **42**, 83-85.

The condition of the Sudeten textile industry immediately prior to the annexation of the region by Germany is discussed and the locations of the different branches of the industry are indicated. Machinery, production, sale, and export figures are given for the whole Czecho-Slovakian textile industry. It is estimated that about 50 per cent. of the cotton ring spindles, about 75 per cent. of the mule spindles, 40 per cent. of the cotton and rayon looms, and over 50 per cent. of the jute, flax, and wool spindles and looms are in the Sudeten region. C.

Textile Wholesale Prices, February 1939. *Bd. Trade J.*, 1939, **142**, 352, 355.

The Index numbers for February are—cotton 79·4, wool 97·9, other textiles 72·4, all commodities 96·8 (1930=100). Average monthly prices are given for the main categories of raw fibre, yarn and cloth from February 1938 to February 1939. A general decrease in price for most products is shown from last month, but raw wool, cotton drills and rayon have remained stationary, and jute and linen have increased in price. C.

United States Dutiable Cotton Cloth Schedule. *Board of Trade J.*, 1939, **142**, 381-383.

A copy of the schedule of 4th February 1939 is presented, showing the rates of duty applicable to various cotton cloths provided for in the 1930 Tariff Act. C.

Brazilian Cotton: Export Statistics. *Industria Textil*, 1939, **8**, 20.

Figures are given of the number of bales, weight, value and destination of raw cotton exported from Brazil through the port of Santos for 1938. The total number of bales was 1,121,682 weighing 200,116,609 kilos. In 1937 the export was 873,777 bales weighing 155,223,525 kilos. Japan was the chief buyer closely followed by Germany. C.

Textile Production Statistics, Feb. 1939. *Bd. Trade J.*, 1939, **142**, 480.

Monthly averages are given for raw cotton delivered to mills, index of wages paid in the wool industry, percentage of insured workers unemployed in the cotton and wool industries, production of rayon yarn and waste, and deliveries of silk for home consumption for the years 1930, 1937 and 1938, three monthly periods from October, 1937 to December 1938, and the months January, 1939, and February, 1938 and 1939. Raw cotton delivered to mills in February, 1939, amounted to 100 million lb. (109·0 per cent. of the 1930 figure), production of rayon yarn and waste 12·48 million lb. (307·1 per cent. of 1930 figure), and deliveries of silk for home consumption to 396,000 lb. (150·4 per cent. of 1930 figure). C.

Co-operation and Rationalisation for the British Linen Industry. *Irish Text. J.*, 1939, **5**, No. 2, 1.

Refers to the individualism of the British linen industry in the past and the need for a new set of conditions to meet new tasks in the future. It is suggested that the industry could help itself by some measures of "rationalisation". The following measures are suggested (1) Arrange for joint purchase of flax. (2) Co-operative advertising campaigns for linens. (3) Each manufacturer to specialise on a few lines. (4) Joint merchanting. L.

Banana Fibre: Utilisation. F. Tobler. *Faserforschung*, 1939, **14**, 28-43.

The eating banana is closely related to the Manila plant and is capable of yielding fibres of similar quality. Extraction of the fibres presents no special difficulty, and a large supply of fibrous material is thus available for exploitation. L.

11—INDUSTRIAL WELFARE, INDUSTRIAL PSYCHOLOGY, AND EDUCATION

Belgian Cotton Spinners: Incidence of Respiratory Diseases. U. Thiry. *Arch. Méd. Soc. et Hyg.*, 1938, **1**, 749-751 (through *Bull. Hygiene*, 1939, **14**, 106).

An examination of 125 operatives is reported. All who had been at work a short time were healthy but the incidence of lung troubles among the others was higher than among the clientele of a hospital for lung diseases. No signs of silicosis were detected. Cervical and axillary adenitis was frequently present, as is usual in cases of chronic pulmonary inflammation. The dust in the air of the mills contained a large number of moulds and some short, Gram-negative bacilli. C.

Textile Mill Research and Testing Departments: Organisation. G. E. Hopkins. *Textile World*, 1939, **89**, No. 3, 103-105.

A discussion of the work of a research and testing department of a textile mill, the development and organisation of such a department, and its relations with purchasing, manufacturing, cost and sales departments. Suggested organisation charts are given. C.

Dermatitis. H. E. Cox. *Dyer*, 1939, **81**, 265.

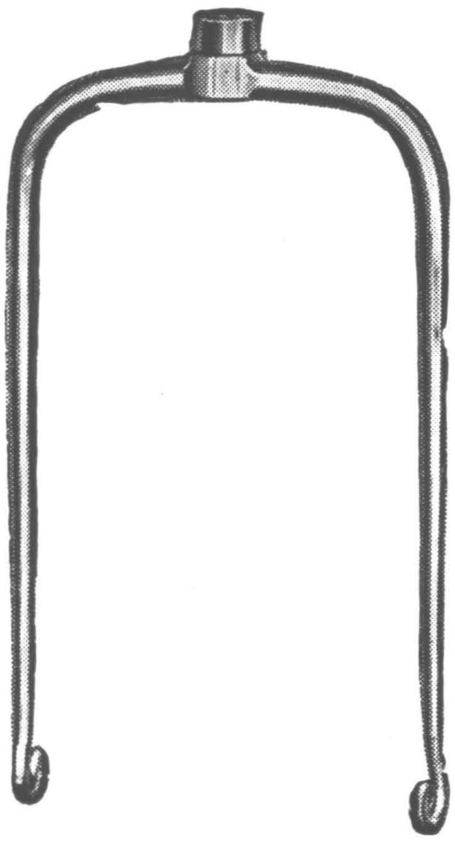
Address to North Western Section of the Institute of Chemistry, Liverpool, March 1939. Considerations applicable to fur and hair dyes do not apply to dyed textiles. The question of idiosyncrasy is discussed. Further research is urged on new chemicals for their internal and external reactions on the human body. W.

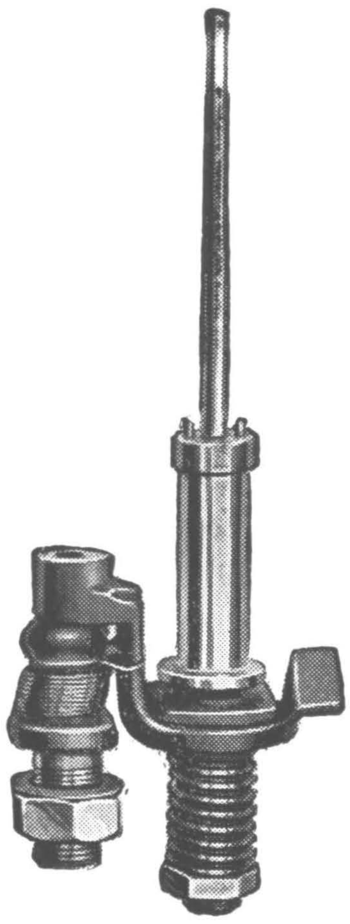
Dermatitis. M. R. Mayers. *Safety Engng.*, 1938, **76**, No. 5, pp. 9-10 (through *Chem. Abs.*, 1939, **33**, 891).

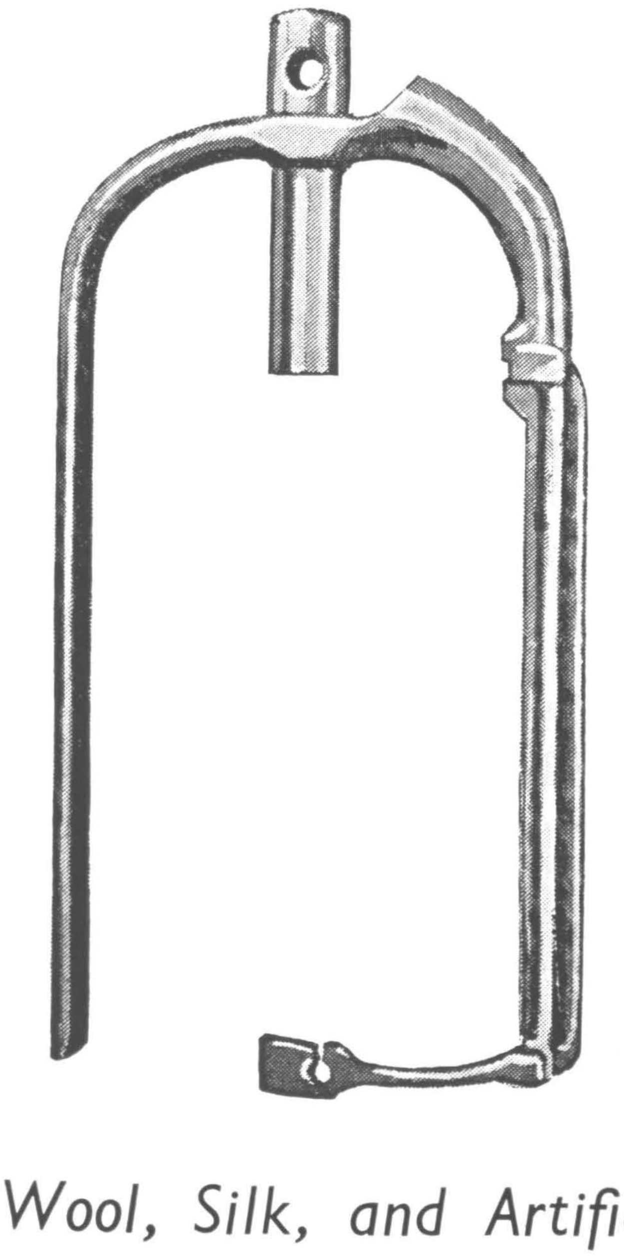
Allergic skin reactions due to occupational exposure to soaps, powders and oils are discussed. A large percentage is due to alkalies. W.

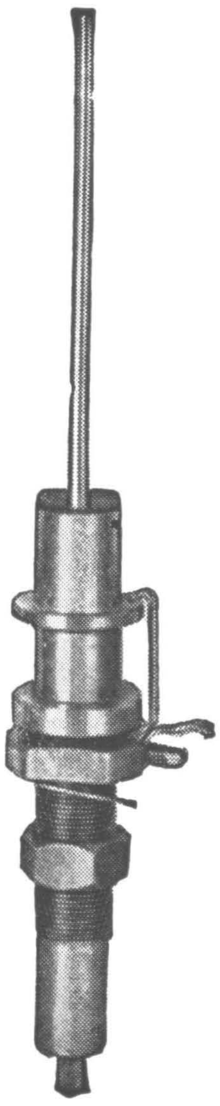
Specific Refractivity and Carcinogenicity of Mineral Lubricating Oils. S. J. M. Auld. *J. Inst. Petroleum Tech.*, 1938, **24**, 577-583, (through *Chem. Abs.*, 1939, **33**, 2202).

The Manchester Committee on Cancer in its 1934 report proposed the following standard by which the textile industry can distinguish between oils liable and those not liable to produce mule spinners' cancer—Mule spindle mineral lubricating oils should have a specific refractivity $(n-1)/d$, below 0·5539 when the specific gravity is above 0·895 and below 0·5569 when the specific gravity is below 0·895. The consistency of this standard appeared very doubtful from determinations of the two physical constants for three series of mixtures of oils from an Oklahoma paraffinic and Gulf Coast naphthenic crude oil. In certain combinations the mixtures would be noncarcinogenic according to the standard, in other combinations carcinogenic—a highly improbable condition. If increasing thoroughness of refining implies decrease in the content of carcinogenic substances in an oil, this may be supposed to hold for both paraffinic and naphthenic oils. However, naphthenic oils decrease in specific refractivity with increase in degree of refinement and paraffinic oils increase. Naphthenic oils, moreover, increase in specific refractivity with increased viscosity and specific gravity while paraffinic oils decrease in specific refractivity with increased viscosity and specific gravity. Specific refractivity cannot be regarded as a generally reliable basis for distinguishing between carcinogenicity and its absence. W.









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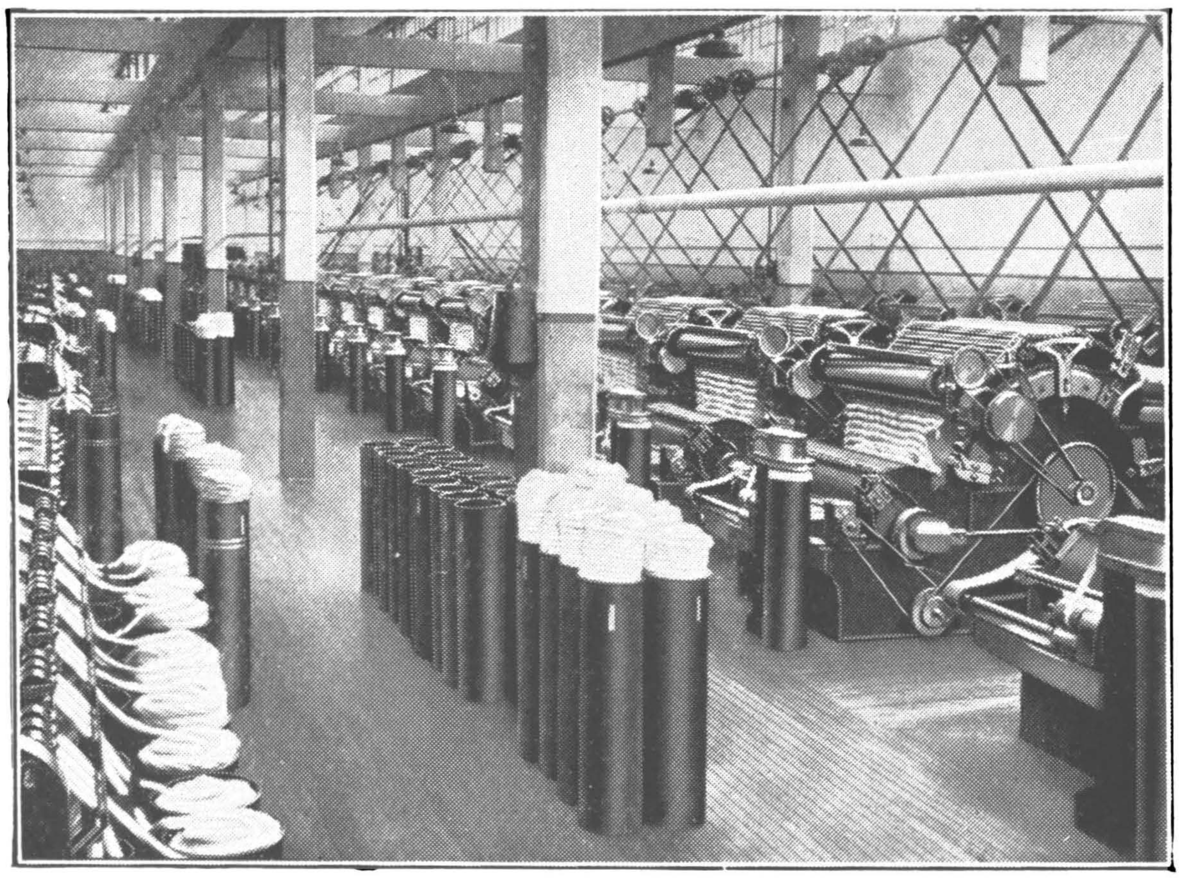

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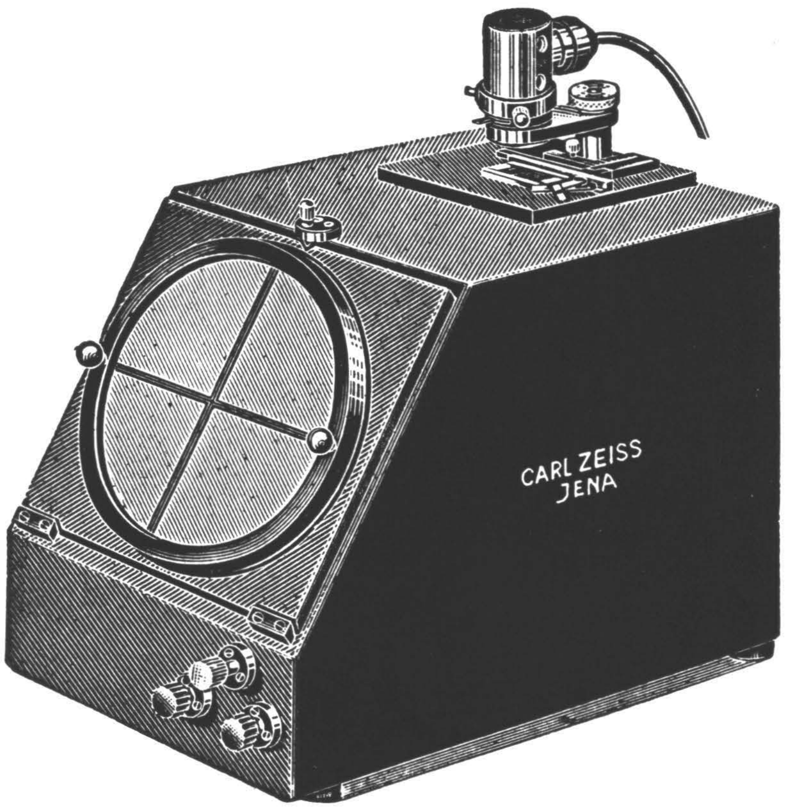
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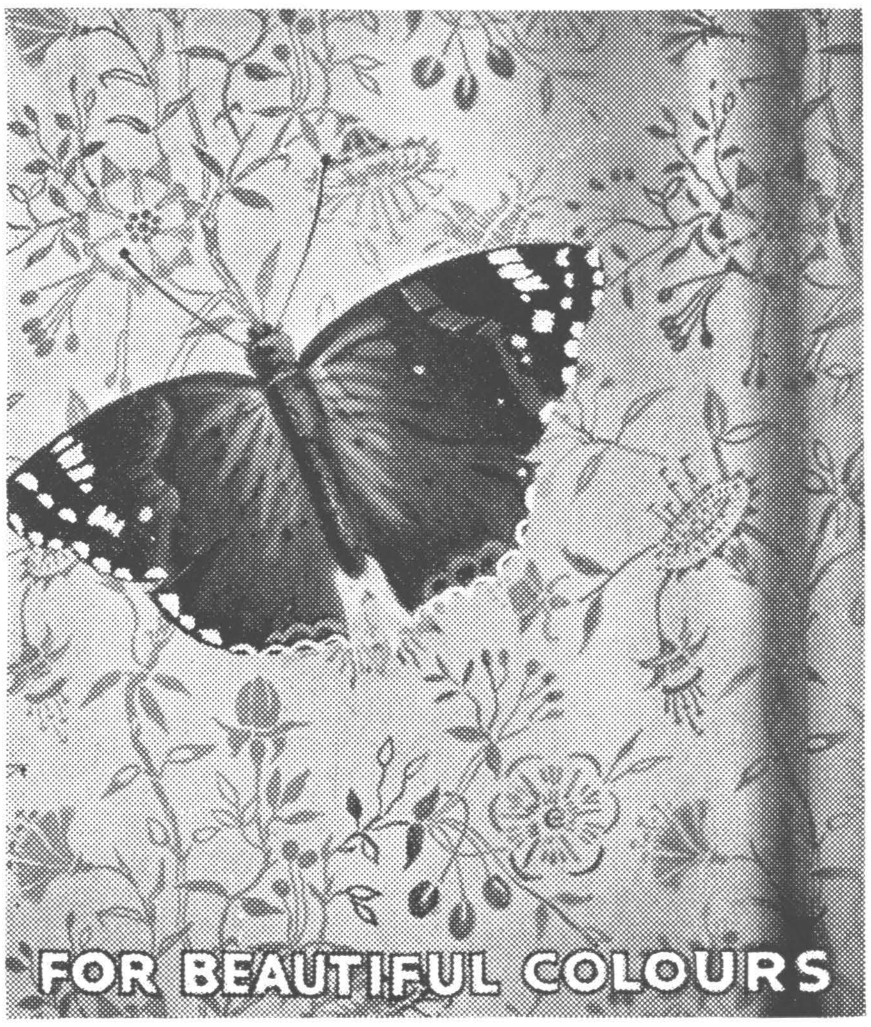

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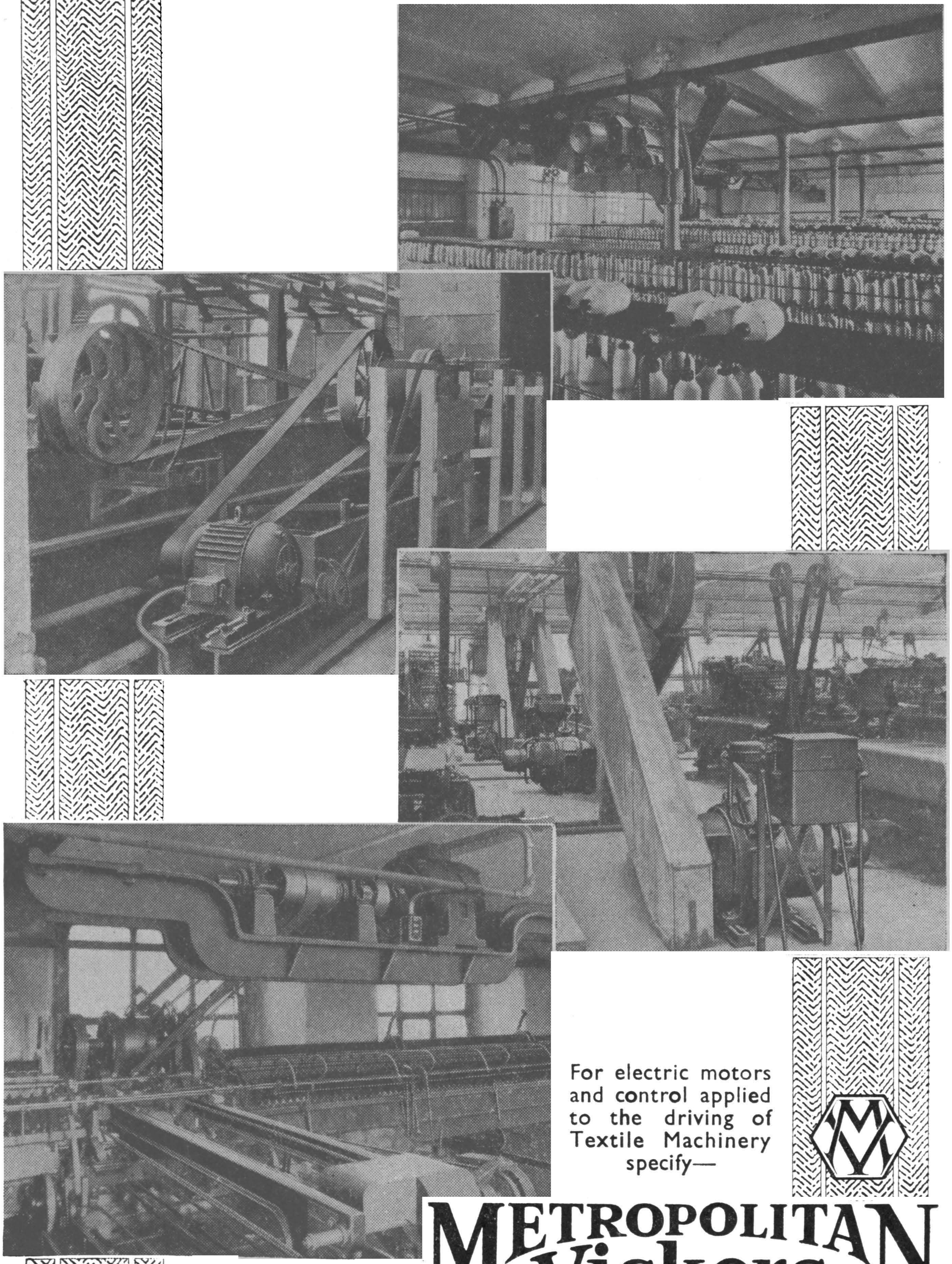

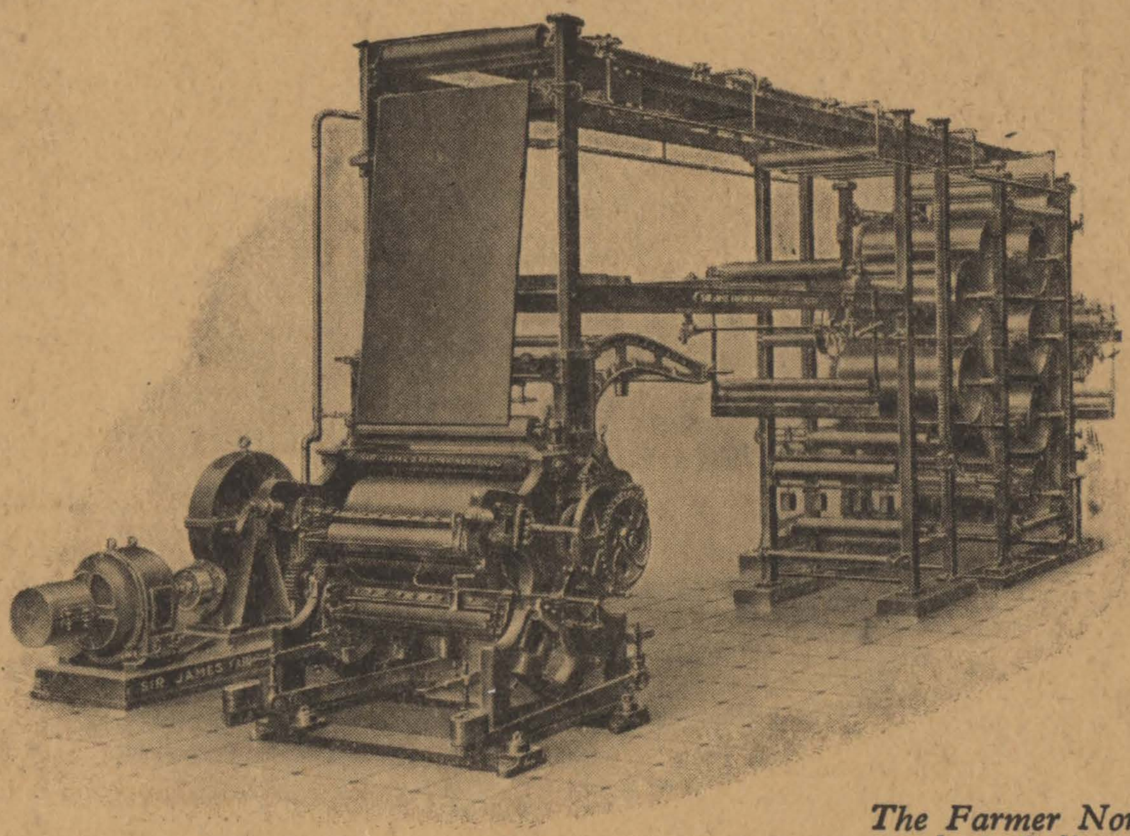

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