THE TEXTILE MANUFACTURER:

WITH WHICH IS INCORPORATED

The Textile Machinist, The Hosiery, Lace, and Silk Manufacturer, and The Textile Colourist.

No. 321.—Vol. XXVII. SEPTEMBER 15, 1901. Price One Shilling.

IMPORTANT NOTICE.

It having come to our knowledge that subscribers frequently experience difficulty in obtaining copies of "THE TEXTILE MANUFACTURER" through their local newsagents, we would point out that the payment of 12s. per annum will ensure the prompt postal delivery of this journal, together with a copy of the "Annual Diary and Text-Book," at the earliest possible moment after date of publication.

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NOTES OF THE MONTH.

Macclesfield and the Silk Trade.

FOR some reason or other, many people have got into the way of thinking of the Macclesfield silk trade as analogous to the old stage coach or the sailing vessel—in fact, classing it with many other things which are now very much behind the times. This is only very partially true, for there are enterprising silk manufacturers in Macclesfield: there are firms who make handsome dividends and have good prospects. But somehow or other these seem to be forgotten when the general position of the town is being discussed. At the time of writing we have two reports before us, taken from sources of a widely divergent character, and these naturally look at the matter in very different light, although both take a despondent view of the position. One, after commenting on the general favour in which silk goods are held at the present day, and showing that scarcity of demand is no excuse, puts the blame upon the majority of the manufacturers, who are stated to be lacking in enterprise and deficient in practical experience. Both these are hard terms, especially for captains of industry, but every indication points to their truth. It is also stated that the bad and unbusinesslike habit of making to stock is prevalent, which, if once known to buyers, means that they will wait their time and step in when the goods must be sold at any price offered. The other report—in a local paper—attributes Macclesfield's position to the want of male employment. The silk mills engage female labour, but offer only a limited number of situations to men, and as many of these were connected with the silk trade as hand-loom weavers—an occupation fast dying out,—there is nothing now for them to do, or if there is, it is at some very unremunerative work. This is certainly a somewhat difficult position, but it is no worse than may be met with in dozens of Lancashire and Yorkshire factory towns, and should in no way affect the silk industry. It is true that other textile towns sometimes have machine-building works which employ a large number of men. But such is only the case with comparatively few of them, if machine-repairing shops are excluded. Then comes the trouble of finding suitable work for these hand-loom weavers—a thing very difficult to do, unless it is in some trade closely allied to their old occupation. The average hand-loom weaver is usually the most conservative of men: he has been used to working, as it were, in one groove, and it is hard to move him out of it. If he does move out, it is only to get into another, and such men, however willing, are somewhat difficult to manage. For the rising generation there is more hope, and there seems no reason why Macclesfield should not become a centre of silk-machinery manufacture, in addition to being a silk centre, if there is a spark of industrial energy left in those interested in the welfare of the town. If Macclesfield manufacturers continue to prefer old machines, there will, of course, be no opening in this direction, and it will probably need a huge combined industrial revival, caused perhaps by a further threatening of the silk trade, to waken the average Macclesfield manufacturer into energetic industrial life. At the present time he is being offered a chance to move out of the usual rut; but it is more than certain, if not practically a foregone conclusion, that he will contemptuously disregard the opportunity. Automatic looms are being taken up in England, and the more enterprising manufacturers of Lancashire and Yorkshire (especially the former) are putting down plants. Makers of what appears to be the most practicable automatic loom are deluged with orders, and in a few years this class of machine may confidently be expected to be established here. It is being taken up for weaving printers and similar cotton goods; blanket and flannel manufacturers perceive an advantage in it; and even some Bradford dress goods manufacturers see a possibility of utilising it; and so, coming nearer to Macclesfield and the silk trade, why should not the automatic loom be utilised for weaving pongees and other coarse, plain silk goods? Perhaps these cloths are not the regular Macclesfield wares, but they are closely allied to them, and the manufacture on a large, cheap scale would monopolise the trade. If the old, out-of-work hand-loom weavers can be persuaded out of their old groove, and if a few of the manufacturers can be awakened out of their lethargy, there will be a prospect of bringing business to the town, which, if not exactly the general trade of the district, will find work and make money. When Coventry lost the ribbon trade she turned to bicycles; when Bradford lost the lustre trade she turned to worsted; and so any energetic town, deprived of her old position, can usually make headway in some other or in some allied industry.

Cotton Culture in Africa.

ABOUT a year ago, when raw cotton was up to a phenomenal price, there was a great deal of talk as to the advisability of having cotton fields in British colonies. It was only a repetition of what has occurred again and again. The usual criticisms were offered gratis, the usual amount of grumbling was indulged in, and the whole affair was forgotten in the usual short space of time. We have tried ventures before in the cotton-planting line, but somehow or other we always work back to American, although Indian and Egyptian cottons may now be said to hold their own. The oft-repeated experiment began to interest Germany, however, and at the instigation of the German Emperor the idea of having cotton plantations in the German colonies in Africa took definite shape, and may now be said to be fairly established—on a very, very small scale. The region decided on as likely to be most promising was Togoland, which is north of the Gulf of Guinea, and is the district from which most of the American negroes were originally transported. It is the hottest of the German possessions in Africa, lying about 400 miles north of the equator, between the Gold Coast (Britain) on the west, and Dahomey (France) on the east. The area of the colony is 33,000 square miles, with an estimated population of 2,500,000, of whom only 118 are Europeans, principally Germans. For the cotton-growing experiment three negroes, men who had been educated at the Tuskogee Institute, U.S.A., were engaged, all three being experts in cotton culture and agriculture, and having a good knowledge of blacksmithing, carpentry, and other useful trades. These, with their assistants, left America for Germany last November, and after a two months' stay there were shipped to Lome, en route to their new sphere of work. By the middle of January this year the location of the farm was decided, and 100 acres of land cleared and sown with cotton and foodstuffs. There has been good work done: what was a few months ago a waste of bush and elephant grass is now a busy farm; and what is best of all, cotton seems to thrive there. It is said that this first crop surpasses any that the colonists ever saw in America. The main point, however, after climate and soil, is that of labour for gathering, and fortunately this is available in ample quantities. The natives are willing to work for food payment, but their physique is such that they are incapable of any lasting energy. This is thought to be owing to their diet rather than their disposition, for rice is the only food which has hitherto been available. It is hoped that the introduction of corn and other foodstuffs will put more stamina into these willing but weak labourers, and that a short time will see them competent to do all that is required of them. These natives are described as being similar to the uneducated American negro in colour, but of a better disposition. They are anxious to have clothes now that they have had an opportunity of admiring these inconveniences, so that in addition to cotton culture there is every probability that an opening will be paved for imports of manufactured cotton. So far the experiment seems to point towards success; but although it is unpleasant to damp the ardour of enterprise, it is only fair to point out that the new crop is sown in virgin soil, and will require the additional expense incurred by manures in future years. Then, again, the willing native labourer will be affected by other innovations besides clothes, and the luxuries introduced from Europe may do much to make him more difficult to manage and less willing to work. Still, the African climate gives ample variation for all grades of cotton; there are immense areas of waste land only waiting to be tilled, labour (of a kind) swarms in almost every district, and sooner or later this vast continent will be opened up to various agricultural and other pursuits, and there is no reason why cotton should not be the foremost. This adventure is also one made on wise lines, for none are so likely to succeed as the class of experts sent out—men themselves of African descent, but endowed with an education which many Europeans lack.

The New German Tariff.

IT is becoming increasingly evident that the new German tariff is calculated to exercise a serious influence upon the export trade of this country generally, while so far as some branches of the textile and engineering industries are concerned its effect may be little short of disastrous. Some consolation, small though it may be, is to be found in the fact that the Commercial Department of the Board of Trade seem to have at last recognised the danger with which the British export trade is menaced in various directions; but it is to be feared that inviting expressions of opinion from Chambers of Commerce on the latest action of the German Government is all the Department will consider necessary unless they are induced to alter their views by vigorous action from the affected exporters and others interested. It is not surprising that retaliatory measures are being freely advocated by the various Chambers of Commerce, a notable instance being that of Huddersfield, where a committee reported that in their opinion "any action on the part of the German Government calculated to further contract the export of woollen and worsted goods from Great Britain to Germany would impose upon the Government of this country an obligation to adopt retaliatory measures, with the object of keeping in our own country the manufacture of woollen and worsted goods which are at present imported from Germany." A discussion of the matter by the members showed that some very decided views were freely held upon the desirability of adopting some measure of protection, but the general sense of the Chamber was embodied in the following resolution:—"The present German tariff has already entirely stopped the export to Germany of all heavy woollens of a cheaper and medium price, and all woollen and worsted goods containing any admixture of silk, and the only goods now exported from this district are fine cloths made principally from worsted yarns, all of which will be affected by the proposed change from 130 to 175 marks per 1000kilos. The total exports of woollen and worsted cloths from the United Kingdom to Germany in 1900 amounted in value to £879,803, of which this Chamber estimates that more than one-third were sent from Huddersfield; and the probable effect of this increase in the weight duties would mean a gradual extinction of exports from this district to Germany; and the council is further of opinion that any increased Customs duty abroad must prove most damaging and destructive to the textile trade of this district, and therefore strongly recommends the Government to appoint a Royal Commission to inquire into the whole of our fiscal arrangements affecting the trade and commerce of the United Kingdom."

Bengal Silk.

IT is asserted by experts that the English climate is far from unsuitable for sericulture, but that such an industry is not possible in England owing to the dearness of labour. Greater Britain, however, comprises many countries where the climate is equally, if not more, suitable, and where labour is sufficiently cheap. Although scarcely what could be called prominent in the industry, still some of our possessions grow a large quantity of silk. India produces both the cultivated and wild variety, but somehow no marked progress is made in our great Eastern dependency. Many enterprising capitalists have tried the introduction of silk-rearing farms, but sooner or later these are converted into tea plantations. A consular report shows that the Bengal raw silk trade has been practically stationary for some years, whereas with proper care in producing the silk, and, above all, with an organisation for selling it under conditions more suited to the requirements of the market, and sufficient capital to work that selling organisation, it could undoubtedly be materially increased. Taking the Lyons market as an example, the proportion of Bengal silk to other silks was 1·63 per cent. in 1895, 2·2 per cent. in 1896, 1·83 per cent. in 1897, 1·81 per cent. in 1898, 1·7 per cent. in 1899, and 1·98 per cent. last year. This shows a fluctuation with every year, but no definite advance. The Lyons trade is in so few hands that it is difficult to obtain reliable information from silk importers; but the users of Bengal silk are in a minority, and they usually have to buy "for delivery." To put Bengal silk upon a proper footing, and to meet the ever-changing needs of a market like Lyons, it is most important that stocks be kept; and this, it is stated, Bengal silk exporters will not do. It will be naturally seen that a manufacturer will not cover expected orders until he has made his patterns. He needs silk for these, and also requires some understanding that he will be able to get the same silk in larger quantities when he receives orders from those patterns, and this is not possible unless the silk merchants hold sufficient stock to cover and anticipate such wants. It is difficult to find who is most to blame, the exporter or the importer, but it is more than likely that the omission is made by the agent at the Lyons end.

"Motives of Expediency."

IT is no unusual occurrence when a man's character renders it undesirable that his name should be known, for that man to indulge in an *alias* and turn over a new leaf. This fresh leaf is not always the clean page of reform, but very often a repetition, in other spheres, under a new diguise, of past misdeeds. In the same way an article of manufacture which has not caught the market may be sometimes boomed by advertising under a new name, or by the old name translated into some foreign language. This treatment has often been tried with "protection," and the subject continually crops up as "fair trade," "judicious import duties," and other *aliases*—appearing recently at Nottingham, during the meetings of the Association of Chambers of Commerce, as "motives of expediency." At one time Free Trade was not only a direct political question, but also a party one, and as such we should not care to discuss it in these columns; but during recent years it has come to be regarded more as a commercial question, and free-trading principles are upheld by the majority of all parties in the House of Commons, only a few isolated persons holding any definite views against them. The mover of a certain resolution at Nottingham appears to be one of the latter, judging by his proposal that "the fiscal policy of this country be based upon *motives of expediency*, and no longer only on a rigid adherence to the so-called principles of Free Trade." The word "expediency" has two meanings—one definition being "a suitableness for effecting a purpose," and the other, "conduciveness to mere private advantage"; and without knowing anything about the coiner of the phrase, it may be safely asserted that the latter is the underlying motive, either directly or indirectly, of all exponents of protective tariffs. The most bitter opponent of Free Trade in England to-day is a millionaire whose concern paid a minimum of 10 per cent. previous to the introduction of a foreign tariff, and a maximum of $2\frac{1}{2}$ per cent. since. Returning, however, to the Nottingham enthusiast, he asked if Free Trade had made us superior to other nations. Perhaps he is a reader of a frequently erroneous daily, which has long-drawn vivid pictures of England's failing powers. If a study were made of our export returns and buying powers, and if such were compared with those of other nations, the results, if not presented in the racy style of a popular paper, would definitely show that the downfall of England's greatness and trade is still in the very distant future, notwithstanding the much-maligned Free Trade principles. It is true (as was stated at Nottingham) that England is no longer the "workshop of the world," but it is still the workshop of a very large part of it, having enough work in hand to employ all who have the capacity and who really desire employment. This last assertion is made, knowing that there are hundreds of unemployed, but recognising that it is only by competition, internal and foreign, that a standard of excellence can be maintained, and that lazy or incompetent persons—those who neglect the advantages of education in their youth, and those whose activity is blunted by never doing a stroke of work beyond what they are actually compelled to do—are weeded out. This open competition makes the average English workman the finest in the world, the only other who can be compared to him being the American, who is generally neither more nor less than a transplanted Briton. That other countries are buying large quantities of machinery is no argument, for the machinery thus bought is more frequently than not made in England, while the growing expansion in trade makes it impossible for our own little island to supply the countries which are so rapidly being opened out—that is, without getting into a slipshod method of manufacturing, such as is the outcome of absence of competition, otherwise the absence of stimulus. Perhaps the most amusing point which was advanced in favour of protection was the assertion that foreign countries used England as a dumping-ground for their surplus production, as if it were customary for Englishmen to buy what they didn't want. If other nationalities care to slave so that they can sell us goods much cheaper than we can make them, well and good—the advantage is with us; we can turn our industry into more remunerative channels, and benefit to a certain extent by the exertions of others. The usual comparison was drawn between England and other countries by the mover of the proposition. This is a safe device, for only a few of us are travellers and can form a reliable opinion of our own. It is needless to say that protected Germany has recently gone through some very dark times, and many of her industries are at present in a precarious condition; but because she has two or three fast Atlantic liners, persons are apt to conclude that her other acquirements are on similar lines. It is true that Germany is at the top as dyestuff manufacturers, but protection has no hand in that, for we cannot compete with, not even make, some of her dyewares in our own country; and even the United States, protected as she is, is largely dependent upon Germany for her dyestuffs.

ARTICLES.

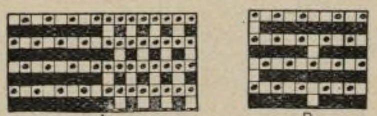
Novelties in Jacquard Designs.

FROM OUR CONTINENTAL CONTRIBUTOR.

ALTHOUGH printed fabrics seem to be attracting the most attention in present and for future patterns, and although jacquard work has only received a comparatively small amount of notice in recent seasons, there is every probability that the latter will soon regain its old position. The present tendency seems to be

FIG. 1.

towards the production of large designs of distinct outline, as will be seen by the accompanying illustrations, which are the reproductions of patterns being made for the coming season. Flowers and



A B

FIG. 2.

leaves are the principal bases upon which designs are built; but the manner in which they are treated by different designers, or by the same designer in different designs, may be very varied, as a comparison of the illustrations will show. These are representations chiefly of high-priced silk

FIG. 3.

goods, are really the leaders of coming styles, and as such will bear imitating in cheaper fabrics for cheaper markets. Many of them, in fact, could be considerably cheapened without much loss in effect, by the use of a fine mercerised cotton warp in place of the organzine.

Fig. 1 is a daffodil design with the figure worked out in warp satin on a cord ground, the shaded edges of the figure being obtained by weft floats. The ground is a Bedford cord, as shown at A in Fig. 2, the weft floats at the back weaving plain and making a specially firm cloth. In a design like this, where the weft-face ground predominates

FIG. 4.

and some of the figure is weft, there is ample justification in using a fine mercerised cotton in lieu of the organzine silk warp, for only a comparatively small proportion of the warp is visible on the face.

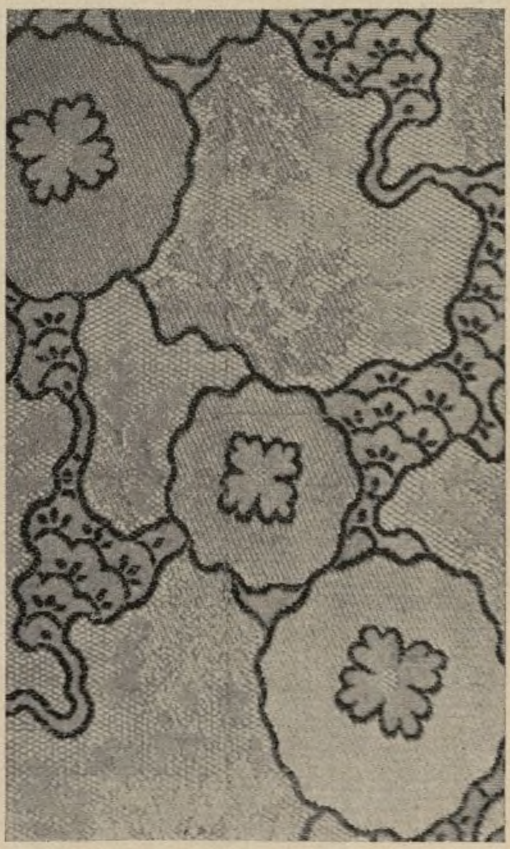


FIG. 5.

Fig. 3 has the same ground as the preceding pattern, and the *fleur empire* design is worked out in a somewhat similar manner in the *art nouveau* style.

Fig. 4 is a Chinese type of design worked out in three colours. The weave of the ground is shown at B in Fig. 2, where it will be noticed that every alternate pick weaves plain throughout. This kind of weave leaves a wide scope for small fancy effects, and such, in the form of zigzags and spots, have been utilised inside the outlines of the flowers and berries. With this ground also two weft colours are available, one (dark) to come on

FIG. 6.

the surface in the ground and inside weaves, and the other (light) to outline the design and make

FIG. 7.

the stem and trailing effects. This design would be very suitable for printed patterns.

FIG. 8.

Fig. 5 is a Japanese *art nouveau* style. The ground weave is similar to the preceding pattern, every alternate (light) pick weaving cord, while the odd picks (black) outline the figures and make the imitation embroidery effects. The warp weaves

NOVELTIES IN JACQUARD DESIGNS.—FIG. 9.

satin or poplin according to the part of the figure, and in this manner gives an iridescent shimmer to the cloth in a marked degree.

NOVELTIES IN JACQUARD DESIGNS.—FIG. 10.

Fig. 6 is another Japanese style worked out similar to the preceding two patterns, but as the

NOVELTIES IN JACQUARD DESIGNS.—FIG. 11.

two wefts in this case are turquoise and pink, the shot effect produced has the appearance of having all the colours of the rainbow. This, however, largely depends upon the lustre of the silk and the judicious build of the cloth.

Fig. 7 is a brocade containing a well floated weft flower in the centre, which is surrounded with a few picks of plain to separate it from the loose armure ground, which is woven by the alternate weft picks. The festoons are chiefly made from the warp in plain and repp weaves and a floated outline.

Fig. 8 is a regular *art nouveau* pattern, the ground of which is composed of minute flowers with plain spacings. The small flowers are formed by the alternate (light) weft picks, while the odd

NOVELTIES IN JACQUARD DESIGNS.—FIG. 12.

picks (black) form the contour of the main design, whose inside is 8-shaft warp satin.

Fig. 9 is a fancy stripe of the Renaissance style, having a novel groundwork composed of undulating herring-bone twill.

Fig. 10 is a pattern of the *style pompadour* worked on a trellis ground formed by the weft, and having a warp figure with plain shadows.

Fig. 11 is a rich cloth having a design made from the Louis Philippe flower in black warp satin. The shaded portions of both flowers and leaves are worked in warp poplin, while the ground is

NOVELTIES IN JACQUARD DESIGNS.—FIG. 13.

composed of wavy weft float figures, a style which seems to be rapidly gaining favour.

Fig. 12 is the *rinceaux Louis XV.* style, worked on an effective diagonal ground, the figure being warp floats, and the shaded portions *gros graine* (warp poplin).

Fig. 13 is a large floral design, both the inside of the flower and the ground being an imitation plain weave—that is, a weave giving a plain appearance, but having long weft floats on the back to give a soft handle.

Fig. 14 is in the *art nouveau* style, having a ground weave like B in Fig. 2. The idea was first taken from a printed pattern, but looks very effective in a woven design. The main figure and trailing work are warp satin, having white lines of weft float.

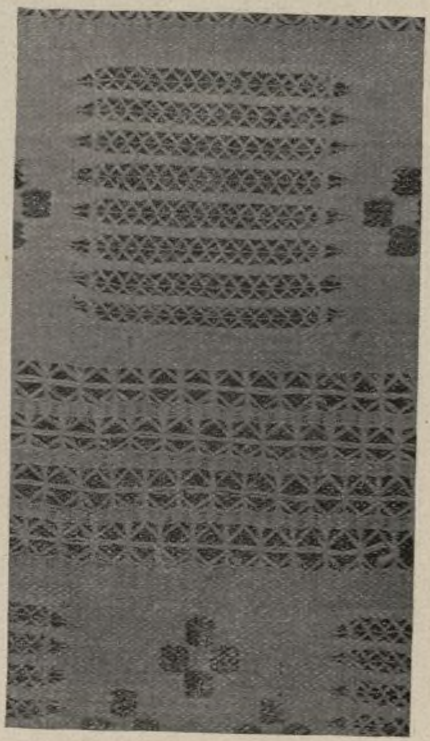
NOVELTIES IN JACQUARD DESIGNS.—FIG. 14.

Figs. 5, 6, 7, 9, 10, and 14 reproduce the actual size of the woven design. Figs. 8, 11, and 13 are reduced to three-fifths the actual size; and Figs. 1, 3, 4, and 12 to three-quarters.

A Gauze and Swivel Pattern.

BY G. WASHINGTON.

THIS pattern, which has been sent by a foreign reader of THE TEXTILE MANUFACTURER, and dissected at his request, is a beautiful specimen of the weaver's art. It is very interesting, not only on account of the intricacy of the gauze crossings and the complicated nature



A GAUZE AND SWIVEL PATTERN.—FIG. 1.

of the mounting required to produce it, but also from the fact that it is further ornamented with swivel spots. A jacquard harness is required for the ordinary weaving, with each thread drawn separately, and afterwards passed through the slips of the douping healds in groups of four. In the mounting illustrated, eight doup shafts and four slackeners are employed; but it is possible that it has been woven in a proper gauze harness, with each doup and corresponding slackener operated upon by a separate hook of the jacquard.

The most striking departure from ordinary gauze is that the crossings are not confined to the number of ends passing through one dent of the reed, but each group is crossed by threads on both sides of it, forming a continuous network, so that the crossings can only be done in front of the reed, necessitating the placing of the doups between the reed and the running board, and the employment of a pin frame to keep the shuttle clear of the doups. (See THE TEXTILE MANUFACTURER, September, 1900, page 302.) A second difficulty is that the threads do not always cross the same distance, but sometimes are over or under two groups, and at other times pass over or under three groups of threads. This is accomplished by drawing some of the warp through two doup slips, thus giving a choice of movement.

The proper tensioning of gauze warps is always a difficulty, because the open sheds, where least warp is required (as when the shed is opened by the harness), have to be very tight to draw the slips far enough to prevent them interfering with and partially closing the shed; while the crossed sheds not only require a longer length of warp to allow for the crossing, but must also be comparatively slack, so that the slips can lift them the proper height, or an imperfect shed will be formed. When the doups are in front of the reed, the small space available for the back crossing between reed and doups increases the difference between open and crossed sheds, and makes them more difficult to tension properly. The movement of the doups and slips will require careful adjustment, both as to time and amount, or they will be very liable to become entangled with the warp. Special means will be required to regulate the setting up during the weaving of the open-gauze stripe, which contains less than half as many picks as the plain.

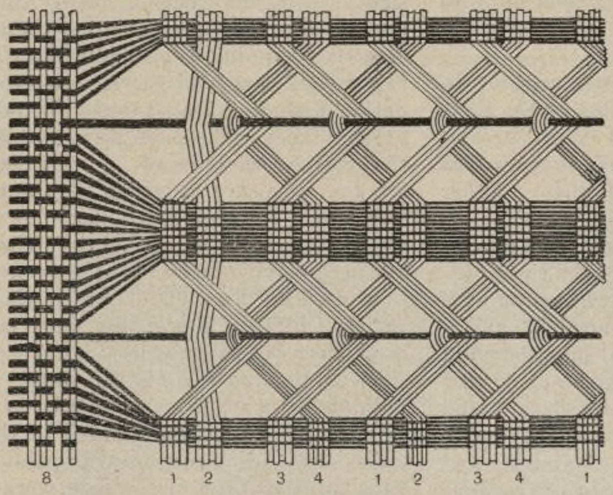


FIG. 2.

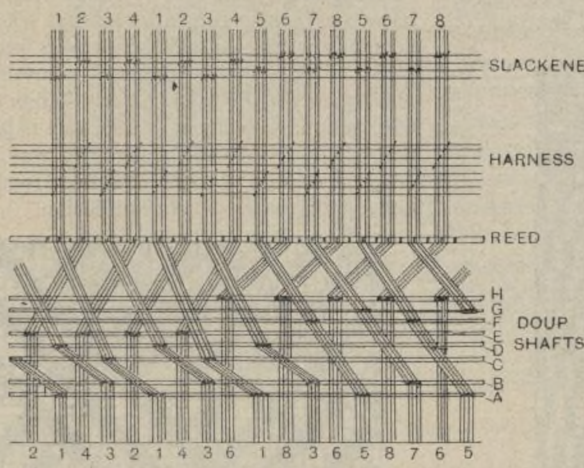


FIG. 4.

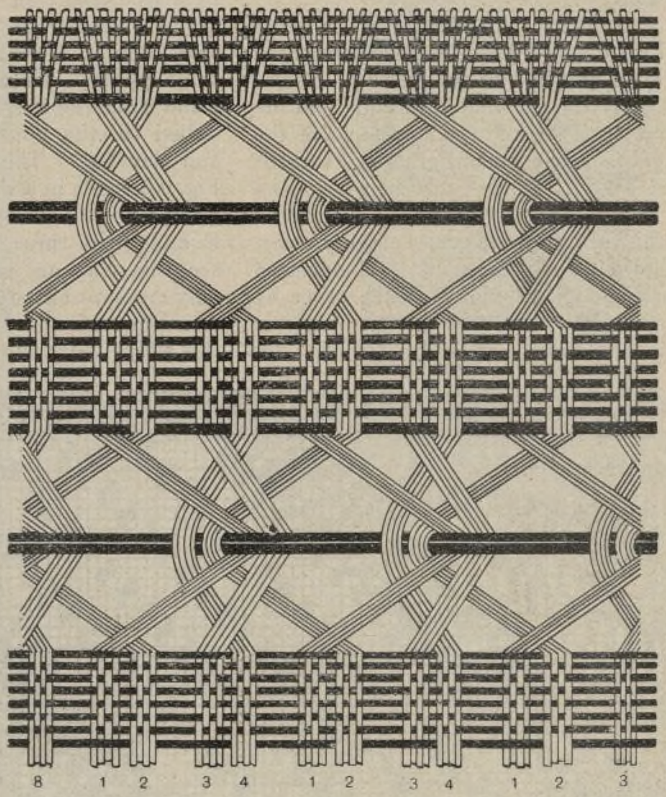


FIG. 3.

FIG. 5.

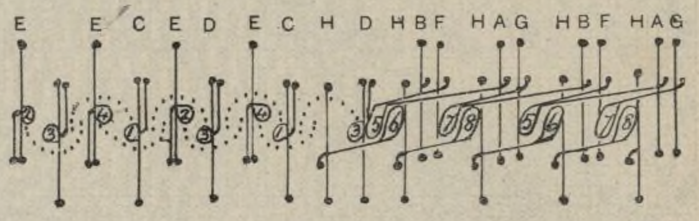


FIG. 6.

Fig. 1 is a photo of the pattern, which may be divided into three parts and considered separately. First, the square of plain fabric containing the swivel effect. Second, the gauze weave sketched in Fig. 2, which alternates with the squares of plain. Third, the intricate gauze stripe Fig. 3, which extends without a break across the fabric.

Fig. 4 shows the method of drawing the warp through the harness, reed, and healds, and their relative positions, also the crossing of the warp threads between the reed and doups. The pattern is complete on 256 threads, divided into equal portions; 32 threads of each are given in Fig. 4. The weave repeats every 16 threads, divided into groups of 4 ends each. The threads for the first half of the design, numbered 1, 2, 3, and 4, are drawn on shafts C, D, and E; while those of the second half, numbered 5, 6, 7, and 8, are drawn on shafts F, G, and H, thus enabling the two portions to be worked independently of each other. Shafts A and B contain the extra slips, and when shaft A is moved instead of shafts C and F, or shafts B instead of D and G, the threads drawn through these slips cross over three groups of threads instead of two. Shafts A, B, C, D, F, and G are top doups, and pull their portion of the warp to the right over the remainder; shafts E and H are bottom doups crossing to the left under the remaining warp. Fig. 5 shows the position assumed by the slips when they are inoperative during the formation of the open shed. All the doups are slack, allowing the threads to be either up or down, as determined by the position of the harness. The letters indicate the shaft to which the doups belong, and the figures the number of the group drawn through them.

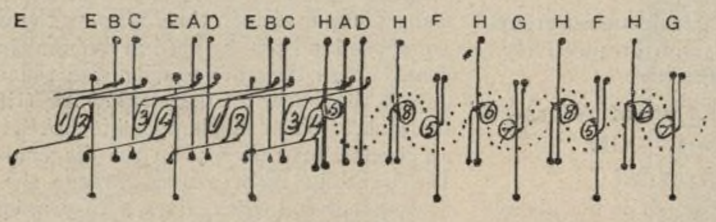


FIG. 7.

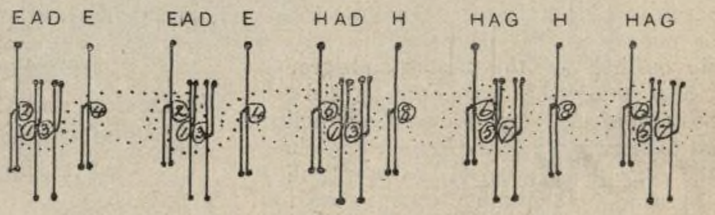


FIG. 8.

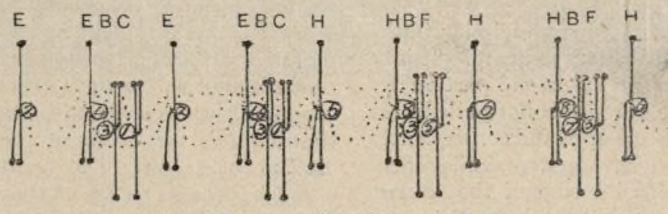


FIG. 9.

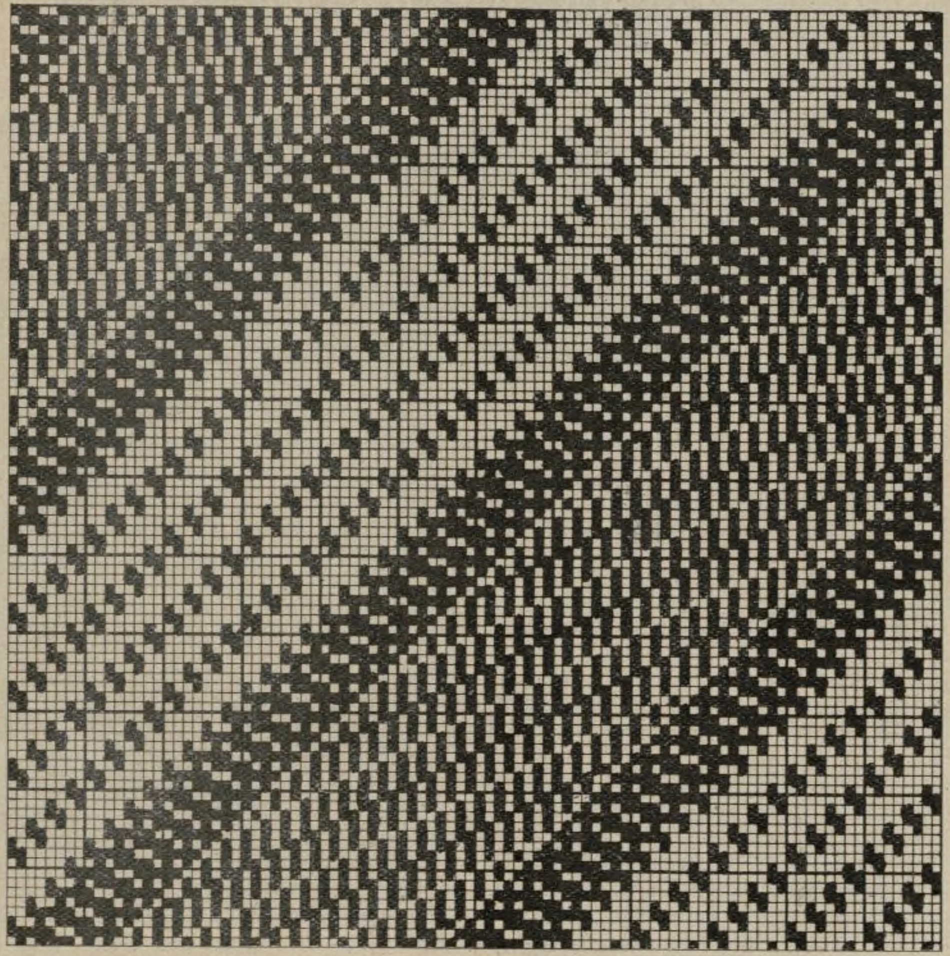
The design for the swivel figuring is very simple, yet it prevents the fabric being woven on shafts, and necessitates the use of harness to open the proper shed; each square consists of four swivel picks of double scarlet yarn floating over twelve threads, so that the centre picks occupy 108 threads, leaving ten plain threads at each side of the figure at its widest part. Circular swivels are most suitable, as there is little difference between the width of the figures and their distance apart. The swivel frame is capable of movement so that it can be placed opposite either portion of the design, and both figures can be woven with one set of swivels. This frame requires placing in front of the doups so that the healds can work between it and the reed.

Fig. 2 is a sketch of the interlacing in the gauze square, and Figs. 6 and 7 show the movement of the healds and slips required to produce the crossed shed. To simplify the sketches, all healds that are inoperative are omitted, and the movement of the slips and crossing of the various groups of threads are indicated by dotted lines, so that when compared with Fig. 5 both the original and crossed position of the various groups can be easily ascertained. As shown in Fig. 2, the square is commenced and the crossings separated from each other by several picks of cord weave, each pick passing over and under four threads alternately; the shed for these picks is opened by the harness alone. Fig. 6 shows the position of the healds for the crossed shed, only one-half of the healds and groups 1, 2, 3, and 4 of the warp being used to make the square. Group 1 has been pulled over 2 and taken down into the low shed by shaft C; at the same time group 4 has been pulled under 3 by shaft E, and taken up into the top shed at the other side of group 1, thus causing 1 and 4 also to cross each other. Group 3, moved by shaft D, passes over 4 into the low shed; and group 2, also controlled by shaft E, passes under 1, and is taken up into the top shed after passing round group 3, which is advancing in the opposite direction to meet it.

It will be noticed that there is a variation in the weave at the edge of each large square. This is caused because the doups in the second portion are not in action, therefore group 7 is not pulled over 8, to meet and cross over group 2, and consequently group 2 only crosses under group 1. A similar effect is produced at the opposite edge of the square. The alternate square is formed by shafts F, G, and H, and groups 5, 6, 7, and 8 in a similar manner.

The gauze stripe shown in Fig. 3 contains two crossed sheds, with the healds in the positions indicated in Figs. 8 and 9 respectively. In Fig. 3 a few picks of plain are shown at the top of the sketch, then a 4-up-and-4-down shed is formed by the harness to separate the warp into alternate groups. This pick is held firmly in position by the crossing of the warp. There is a similar pick at each side of the crossed sheds, which are also separated from each other by six picks of plain weave.

Fig. 8 shows how the first or bottom crossing in Fig. 3 is produced. Group 1 is pulled by the shaft A to the right, over 2 and 4, and it also meets and passes over the next group 2, which is controlled by shaft E and is moving to the left under another group 1 and 3 to meet and pass under it, so that each of these sets of threads have crossed three groups. Group 3 is pulled to the right over 4 and 2 and depressed by shaft D, while group 4 is pulled to the left by shaft E under 3 and 1 and elevated. The second crossed shed shown in Fig. 9 is made in a similar manner, excepting that groups 3 and 4 are operated upon by shafts B and E and cross three groups each, while 1 and 2 are this time moved by shafts C and E, and only cross two groups, thus making the crossings alternate with those shown in Fig. 8. In making this stripe the groups 5, 6, 7, and 8, and shafts F, G, and H, operate in exactly the same manner as groups 1, 2, 3, and 4, and shafts C, D, and E respectively.



Worsted and Union Coatings.—Fig. 46 (Lift Whites).

The Design and Construction of Worsted and Union Coatings.—XIII.

DIAGONALS (*Continued*).—It is not always necessary for the various portions of a diagonal to run at the same angle as the diagonal itself; in fact, some of the best effects are got when the contrary is the case. Fig. 46 is a case in point, where in one half of the design five ribs of warp twill run at the same angle as the design, but in the other half the eight-shaft corkscrew runs at only half the angle. Some care is required in joining the edges of this latter in a neat manner, and as the corkscrew takes 16 ends to complete both as a separate design and in diagonal running, the total ends of the design must be a multiple of sixteen. Fig. 47 interprets this rule in a much broader sense, although it is a simple design, and it gives some idea of the scope available for designs on only a small number of ends.

The diagonal designs treated so far have been all of a class more adapted for all-wool than for union cloths, although where a worsted warp is used in conjunction with a good two-fold cotton weft, they would do equally well. Where a cotton warp is used along with (as is usually the case) a single-fold worsted weft, the designs must be such as to make the most of the weft and keep the warp out of sight. Although there is plenty of scope when upright diagonals are in vogue, there is little for diagonals running at an angle of 45°, the designs being chiefly confined to weft satin rolls in combination with well-floated weft-twill portions. The use of fancy effects is disadvantageous unless the cotton warp is of a very good quality, for the necessary stitching of the warp on the face, even in very small floats, is detrimental to the appearance of the fabric. The chief scope lies in employing fancy weft-face weaves similar to that used in Fig. 48, of which there is a fair variety; in fact, almost any warp-face weave of good cover can be so utilised if turned over on its side, so that weft reads for warp. It must be noticed that warp lifts are painted in this design, whilst weft floats were painted in the preceding diagonals, it being customary to paint the material which appears *least* on the face, work being saved the designer by such a proceeding. It must, however, be also remembered that where the face is chiefly warp, the cloth is woven wrong side up, so as to relieve the jacquard, a method which is also easier for the card cutter. When this is done, the weft marks are cut (when weft is painted), and the cards are laced backwards way, unless the design has been painted running from right up to left, opposite to the usual direction.

Worsted and Union Coatings.—Fig. 47 (Lift Whites).

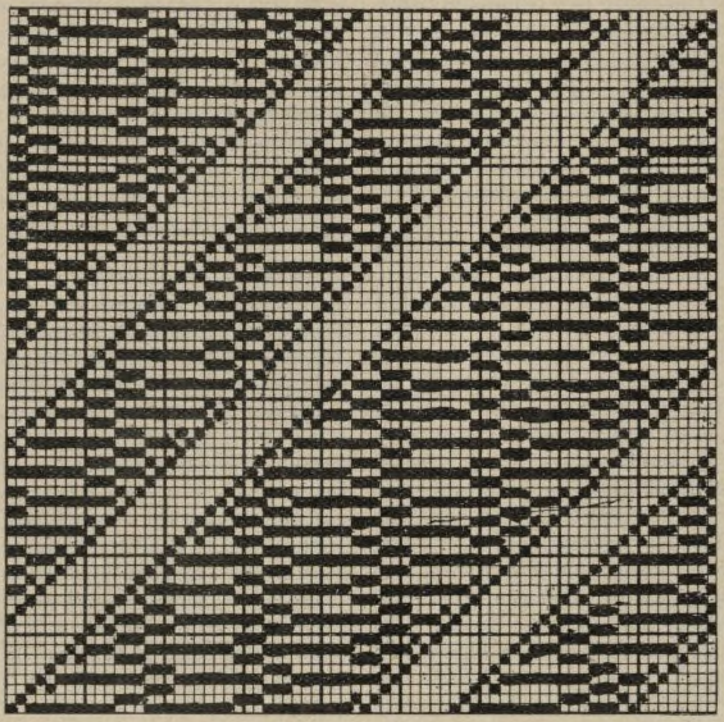
Diagonals running at an angle of 45° are generally of a satin or smooth character, whilst upright diagonals have a more ribbed appearance. The former are best composed of satin weaves, complete on an even number of ends, whilst the latter are more adapted for odd-end satins. The remarks made previously as to joining and fitting will apply equally to upright diagonals, and if anything these latter are generally more easy to put together. Fig. 49 shows a diagonal rising in double steps, and therefore requiring twice as many picks as ends in the design. The weft rolls are of the kind usually used in different lengths of float, and as they are usually well rounded it is only in the longer floats that they are stitched on the back. When this happens it makes the beat-up harder, not easier, as in the diagonals of 45°. The tight five-satin weave, between the loosely-floated four-end effect, gives a very neat appearance in the cloth. Fig. 50 shows a type of design which is always easy to fit and which generally makes neat designs, and effects of the class used may be found in large variety. The eight-shaft effect runs in a different direction from the diagonal, but fits almost as easily as if it ran in the same direction.

Fig. 51 shows a combination of two diagonals running at different angles, a style of design which opens out a wide range for the designer, and which presents little difficulty. It is best, as in the design shown, to have one of the diagonals—preferably the one running at the angle of 45°, if one does so—standing out more prominently than the other, otherwise there is an undecided appearance about the design. It will be noticed that it is necessary to have the upright diagonal on only half the number of ends as the other, so as to make both diagonals complete on the same number of picks.

When upright diagonals move up in steps of three, it is necessary to put double floats in the weft rolls, as shown in Fig. 52, otherwise, the conditions are very similar to the two stepped diagonals. This type is, however, not so common as the preceding kinds, whilst the four-stepped variety is very seldom used.

Diagonals running at a low angle are avoided by the practical designer as much as possible, for they are usually very difficult to weave, the weft taking a lot of beating-in, even with loosely-floated designs. Some of them, however, have a very neat appearance, and if made with a small number of picks per inch and thick weft, give a result almost equal to a diagonal of 45°, requiring less cards and making a slightly cheaper cloth. It is needless to give any of the plain types, and Fig. 53 will suffice to show the method of joining-up the edges. The fancy effect shown in the centre of the seven-satin portion is built up on the satin, and therefore requires little fitting. This centre effect is complete on 21 ends, but diagonally complete on 6 ends, therefore the total number of ends in the design must be a multiple of six.

(CONCLUDED.)



WORSTED AND UNION COATINGS.—FIG. 48 (Lift Blacks).

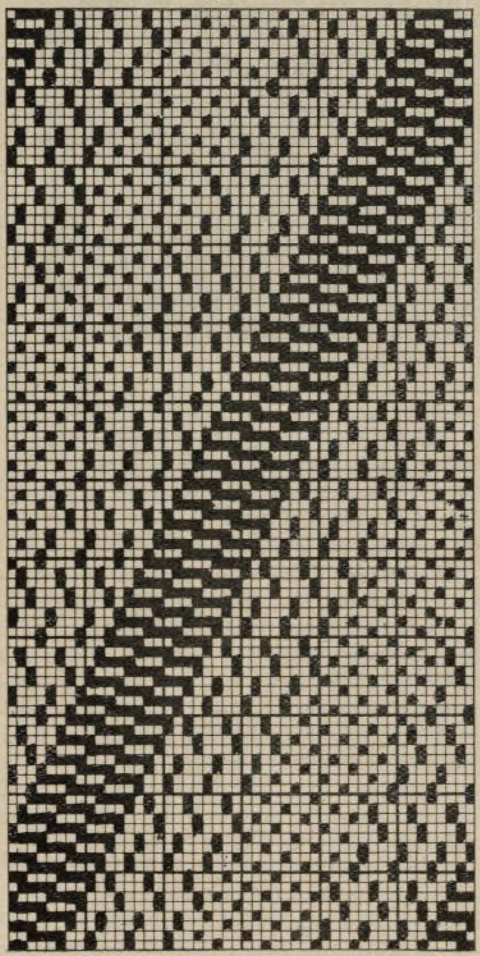


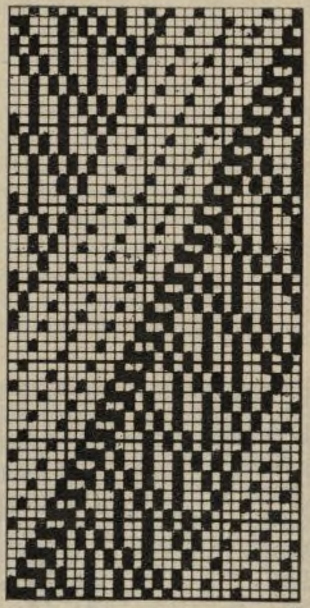
FIG. 49 (Lift Whites).

The Analysis of Grey Cotton Cloth.

By THOS. B. COLE.

WHEN sampling cotton cloth, the portion sent for examination is usually the end of the piece. This, by shaking in the folding, loses some of the loosely-adhering sizing materials, so that it does not fairly represent the bulk. If possible, the portion should be 2 or 3yds. in length, and should be cut, not torn, for the above reason. This will give ample length for a full examination. This sample should be examined for any peculiarity in colour or smell, stains receiving special attention, while frequently the smell will give clue to the character of the size, whether flour or otherwise, and also to the presence of mildew.

A portion of the cloth is then cut from the sample, weighed in a tared weighing tube, heated in an air bath at 212° for two hours, weighed and replaced in the bath, the temperature raised, and after remaining in an hour weighed again. If further loss is noticed it is replaced until no further loss is shown on weighing. The stopper of the tube is replaced before removal from the bath, the tube being allowed to cool in a desiccator only. The dry cloth rapidly absorbs moisture, hence this precaution. The percentage of moisture present in cloths of this description varies with the percentage of added sizing materials, and as these absorb moisture from the atmosphere they vary with the state of the atmospheric moisture. It is advisable on this account, when a full analysis of the cloth is required, to place the sample either in a wide-mouthed glass bottle or in a tin box with a tight-fitting lid.



WORSTED AND UNION COATINGS.—FIG. 50 (Lift Whites).

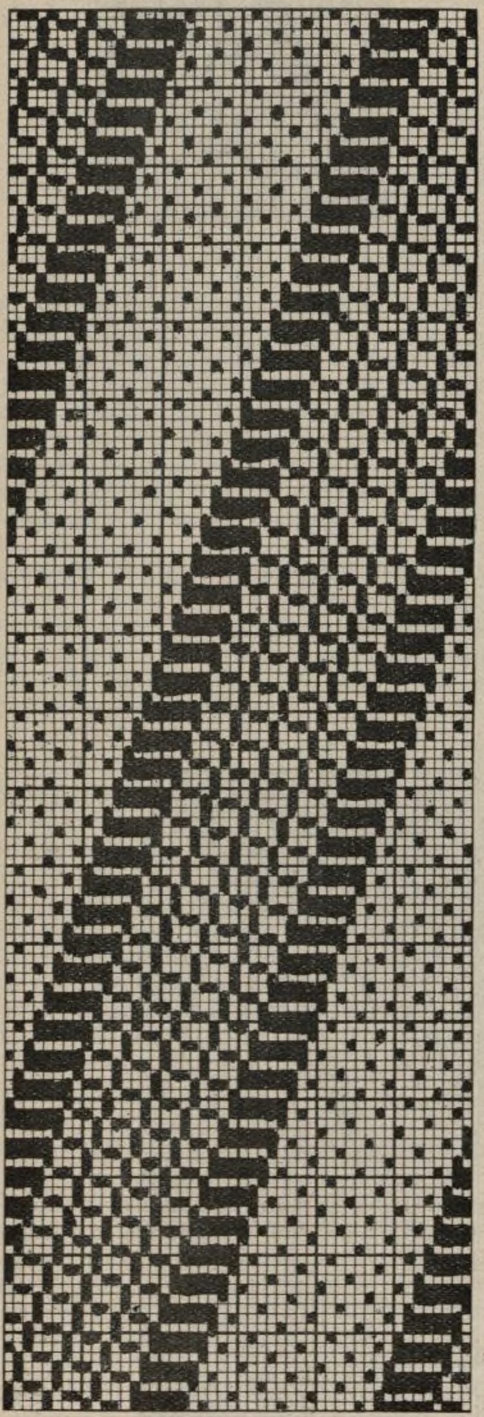
While the determination of the moisture is proceeding, the strength of the cloth and the number of ends per inch, and also picks per inch, can be determined by means of the counter. This may have a square opening either ½ or 1in. across, the latter size being preferable. The strength or breaking strain is determined by means of specially-constructed testers, which are seldom found except in laboratories specially fitted for this class of work.

The fatty matter is determined in another portion cut from the sample, by placing it in a suitable fat-extracting apparatus, and allowing a stream of ether from an inverted condenser to pass over it for some time; this extracts the fatty matter, which can be examined by evaporating in a basin, ten grams forming a convenient sample to work upon, when the fatty matter left in the basin can be readily weighed before being submitted to a further examination. The source of the fatty matter is not readily determined from the small sample in the dish, the melting point frequently giving a clue to its origin. The total added matter is next determined in

WORSTED AND UNION COATINGS.—FIG. 51 (Lift Whites).

another portion of the cloth. In this part care against loss is taken by cutting the sample, not tearing it, for in heavily-sized cloths the added materials, especially china-clay, readily fly off. The sample is placed in a porcelain basin with distilled water, a little malt extract added, and then boiled. This removes the starchy matter, thus allowing the weighting materials, as china-clay, barium sulphate, etc., to fall away. Occasionally this does not entirely free the cloth from all the added matter, so a few drops of pure hydrochloric acid are added, and it is well boiled, rinsed well with cold water, dried in an oven, and weighed, the loss being added matter. In this determination the loss due to moisture should be deducted from the total loss in order to obtain a correct estimation of the above materials. The solution from the above is filtered, and the filtrate, after concentration, is examined as follows:—

To a portion a few drops of a solution of iodine are added, when, if a blue coloration is formed, the presence of starch is shown. If this is present, an



Worsted and Union Coatings.—Fig. 52 (Lift Whites).

aliquot part of the solution is boiled with a little pure hydrochloric acid, and then tested by the addition of Fehling's solution for the presence of starch, shown by the presence of sugar in solution. This may be estimated by means of this solution after neutralisation with caustic soda.

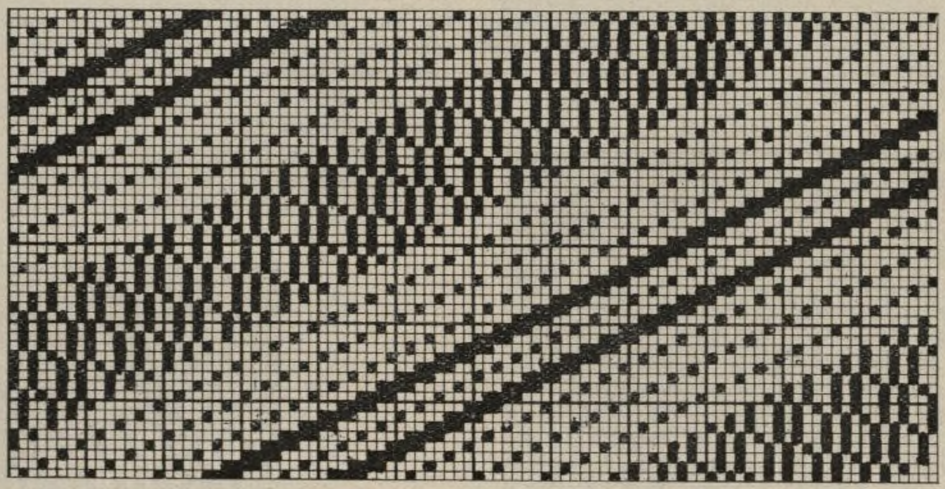
To a portion of the solution from the cloth pure sodium carbonate is added and boiled, so that the whole of the metallic salts are precipitated as carbonates; this is filtered off, and after neutralising the excess of carbonate by means of acid, and concentrating the solution, alcohol is added, which precipitates glue, dextrin, or gums. The glue can be precipitated from solution by means of tannin, but neither this nor ordinary albumen is in great use as a sizing material. Dextrin may be detected by the addition of a few drops of iodine solution, which give a reddish coloration. A solution of basic lead acetate produces no precipitate, while the presence of gum arabic is shown by a white clotty gelatinous precipitate. If a solution of cupric sulphate and excess of sodium hydrate are added, a gelatinous clotty blue precipitate is produced by the presence of gum arabic. An aqueous solution of the above two bodies, on being treated with lead acetate, deposits the gum only in the cold, while on warming both are deposited. As these are unimportant, their quantitative determination may be neglected. A portion of original liquor from the cloth is evaporated to dryness and heated with potassium hydrogen sulphate; if irritating fumes are evolved, these indicate the presence of glycerine.

The amount of mineral matter present is best determined by weighing a portion of the cloth, and burning off the carbonaceous matter in either a porcelain or a platinum crucible; when the residue is perfectly free from charred matter the crucible is cooled in a desiccator and weighed. As cotton has only from 0·5 to 1 per cent. mineral matter, the total added mineral matter is readily calculated. The residue is then carefully treated with boiling water, the soluble zinc, magnesium, or calcium and barium salts being dissolved. To this solution, or an aliquot portion of it, a few drops of pure hydrochloric acid are added, and if no precipitate is produced, ammonium chloride and sulphide of soda, or ammonia, are added. By this means the zinc and any iron or aluminium salts are completely precipitated. These are filtered off and the precipitate reserved, while to the solution is added ammonia and ammonium carbonate. A dense white precipitate produced on heating

precipitate is formed. As, however, a very insoluble body is formed by it in the presence of any soluble sulphate, it will rarely be found in this solution. The magnesium may be estimated by precipitating the salt generally in the form of chloride, by means of sodium hydrogen phosphate in the presence of ammonia, allowing the precipitate to stand, filtering, and weighing the precipitate after ignition.

If sulphate of soda has been used as a weighting body, its presence may be detected by the addition of barium chloride to the solution; but as this indicates the sulphate combined with magnesium in the form of Epsom salts, it is not of much use as a test for this body alone. The total sulphates present are estimated by the precipitation of an aliquot portion of the above liquor with barium chloride, filtering and igniting the precipitate, and weighing the sulphate. The SO_4 may be calculated by multiplying the weight found by the factor $\frac{0·4123 \times 0·100}{x}$, where x equals the weight of cloth taken.

In order to estimate whether the magnesium is present as chloride, if the other bodies, as zinc and calcium, are present, the total chloride is estimated volumetrically with standard silver nitrate, using chromate of potash as an indicator and calculating it as chlorine. The percentage of zinc chloride present having been calculated from the zinc found on analysis, also the calcium chloride from the calcium found, the sum of the chlorine combined with these two when deducted from the total should give that combined with the magnesium as magnesium chloride; and as magnesium may be present as both sulphate and chloride, it is advisable, when there is insufficient chlorine found to combine with the whole of the magnesium as magnesium chloride, and the presence of sulphates has been determined, to calculate the remaining magnesium into magnesium sulphate; and if by



Worsted and Union Coatings.—Fig. 53 (Lift Whites).

indicates calcium and barium, this being also filtered off and reserved. To the solution is added acid phosphate of soda, and if on standing a precipitate is thrown down, magnesium is present. The estimation of the above bodies may be made by dissolving, after well washing the precipitated zinc. The percentage may be estimated by precipitating with sodium carbonate, filtering, and igniting the precipitate, which is weighed as oxide. The most convenient method is to estimate it volumetrically by means of a standard sulphide-of-soda solution, using ferric chloride as indicator. By this means the zinc is readily estimated, and if the percentage of zinc be multiplied by the factor 2·09, the actual amount of zinc chloride present on the cloth is ascertained. The calcium is also dissolved by means of hydrochloric acid from off the filter paper; to the solution ammonia and ammonium oxalate are added, the precipitate is allowed to stand after boiling, then filtered, dried and carefully ignited, the calcium being estimated as carbonate. From the amount of carbonate the percentage of calcium chloride is found by multiplying the amount found by the factor 1·11.

Occasionally barium chloride is used as a weighting agent. Its presence may be detected by the addition of chromate of potassium, when a yellow

this means the whole of the sulphate (SO_4) is not accounted for, the presence of sulphate of soda is shown. The amount can readily be calculated from the sulphate found.

The portion of the residue from the incineration of the cloth left from the treatment with water is the added mineral matter, consisting chiefly of china-clay, and occasionally other substances, as talc; barium sulphate may also be found, and occasionally calcium carbonate is added. The presence of the latter body may be ascertained by treating a portion of the residue with hydrochloric acid: if effervescence occurs, the presence of carbonate may be looked for. The remainder may be fused with dry sodium carbonate in a platinum crucible until the whole is in a fluid state, allowed to cool and then treated with water. The soluble portion contains the acid, the insoluble the silicate and sulphates, which may be estimated by treating with hydrochloric acid, evaporating to dryness, adding a little more acid and evaporating again, filtering, when the precipitate left on the paper is ignited and weighed as silicate. This may occur as silicate either of potassium or aluminium. china-clay, magnesium silicate, talc, or as sodium silicate. Treat the filtrate with barium chloride and allow to stand. The precipitate from the addition of barium chloride is filtered, washed, ignited, and then calculated as SO_4. The portion of the fusion insoluble in water is treated with hydrochloric acid, when aluminium, barium, and calcium are rendered soluble. The alumina may be determined by precipitation with ammonia, the precipitate well washed, ignited, and weighed as oxide. The barium is estimated in the filtrate from the alumina by adding sulphuric acid, the precipitate allowed to settle, filtered, and weighed in the usual manner after burning off. The magnesium is determined by the method previously described.

If alumina in the present silica is found, china-clay may be inferred; while if sulphate and barium, then barium sulphate, either as heavy spar or precipitated in the fibre. If both magnesium and silica are present, and alumina is not found, then talc may also be inferred. As a rule, a complete determination of the mineral constituents of the sizing materials is not needed, only the soluble portions, such as zinc and magnesium chloride, being determined.

The determination of the twist or warp counts is not done readily. The added sizing material prevents the ordinary method of weighing a given length of the yarn being done with accuracy. This could, however, be done by weighing a number of threads of a known length, deducting the sizing materials and any excess of moisture above the natural, and allowing also for the weft when making the calculation for the percentage of size, so that the percentage upon the warp itself is known. From this the actual raw cotton is deducted. Another method by which an approximate result may be arrived at is to place under a glass one of the weft threads alongside another whose count is known, and make a comparison; but this is open to criticism, as a hard-spun yarn is thinner than one of the same count spun soft. This portion of the subject falls more to the manufacturer than to the chemist.

Frequently the chemist is called upon to examine stains upon grey cloth. During the process of manufacture the stains most liable to be acquired are oil and iron mould; while during storing, or even during weaving, mildew is contracted. The position of the stain in the cloth should be carefully examined, and if continued through one or more folds should be traced to the termination of the marks. When the whole of the cloth is stained an even colour throughout, it has been acquired in the preliminary treatment previous to weaving; occasionally iron stains occur across the whole width of the cloth, commencing in a sharp, defined line, and fading gradually away towards the portion of the cloth last woven. This occurs through the warp being damp, and attacking the reed on standing. Occasionally stains pass from the outer to the inner folds of the cloth, being stronger at the outside, these probably being caused by a drop of oil or water falling. Mildew stains are rarely distributed evenly in the folds, and frequently the odour is sufficiently marked to indicate their source. When oil is suspected as the cause of the stain, a faint fluorescence may occasionally be seen on the surface of the cloth if the stain is not too old. If the stain has been in for some time, oxidisation of the oil may have taken place, thus rendering its removal more difficult. In order to determine the nature of it, whether oil or not, the part may be treated with any salt of iron (the sulphate being preferable), and then treated with a solution of sodium carbonate, when the iron buff colour is formed, which, when stripped with hydrochloric acid, shows a bright iron stain. If an iron stain is suspected, the portion stained should be treated with dilute hydrochloric acid and then with a little dilute nitric acid, and a few drops of sulphocyanide of ammonia dropped on, when a bright-red coloration indicates iron as the cause of the stain. The colour of mildew stains varies considerably, and in order to detect their presence the microscope is used. If, however, this is not at hand, the cloth under examination may, after damping slightly, be wrapped in another piece of cloth and placed in a warm place, when any further development will readily be noticed. If the nature of the fungi has to be determined, cultures in either flour paste or gelatine are made, and from these a microscopic examination can be made.

Silk Spinning.—V.

By Filsoie.

After the cleaning process, which is repeated two or more times to obtain the quality and the cleanliness of thread required, the subsequent operations vary according to what it is desired the silk should be converted into—whether no-throw, singles, tram, or organzine.

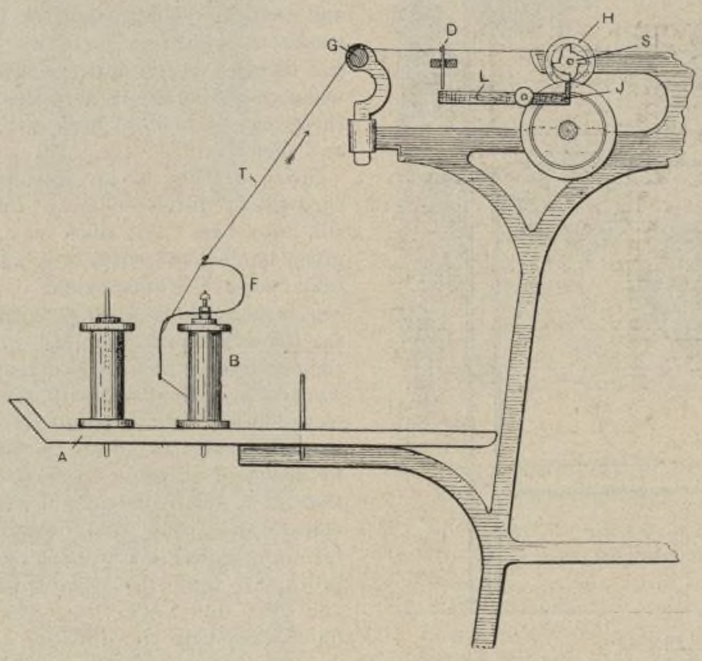
No-throw.—No-throw, as its name implies, has no twist or spin (turns per inch) put into it beyond just sufficient to bind the respective filaments composing the thread together. It is silk taken straight off the cleaning bobbins, two, three or more ends doubled together, and if it could be used in that state would only require reeling into skeins; but, being a most unsatisfactory article to use in that state, most throwsters put in a little twist. Even then great care is necessary in the reeling, or the threads separate and form "loopy" places, which are very objectionable, causing a weak thread, and it is to mitigate such faults that the thread is slightly twisted. Whilst so guarding against "loopy faults" it is essential that care be taken not to have too many turns per inch, or then it would be practically useless for any purpose, being too hard to cover well. The Derby and Nottingham markets take a fair quantity of this class of silk for fancy braids and the covering of cords for tasselling purposes.

Tram.—In the making of tram used as weft or shoot, two, three, or more bobbins of cleaned silk are used, the number varying according to the special requirements of the customer, which may be for what is termed two or three (or more) threads tram.

Two-threads tram and three-threads tram are current productions, but for special purposes where a coarse count is needed, sometimes a four-thread tram is made. No twist whatever is put into the single thread used for tram. For example, if a three-thread tram is needed, three ends of cleaned silk are doubled together on to one bobbin without any twist being put in. The machine used for the purpose is similar to the winding machine described in Fig. 9, but so as to ensure that a two-thread or a three-thread tram has two or three threads throughout its entire length, an automatic stop motion is used which throws the receiving bobbin out of gear whenever a thread breaks between the receiving bobbin and the bobbin from which the thread is being unwound. Fig. 11 shows a side section of the machine and the winding or doubling process. Two, three, or more bobbins, as required, are placed on the bobbin board A in a line with the receiving bobbin. The thread T is passed from the bobbin B through the flyer F over the guide rod G to the detector D, and thence through traverse guide on to the receiving bobbin H. When the thread breaks the detector drops on to the lever L, which is balanced in such a way that the weight of the detector causes the lever to tilt up and project its end J into contact with the star wheel S fixed on the spindle which goes through the receiving bobbin, thus stopping the revolution of the bobbin until the broken end is tied up. The receiving bobbin is revolved in exactly the same manner as shown in Fig. 9. The position of the flyer F is so arranged that the thread does not run any chance of catching against the bobbin head. The bobbin containing the desired ends is then taken to the reel, Fig. 14, or to the spinning mill described under the heading "Organzine," and a very slight twist put in there. This twist, spin, or throw, as it is differently termed—really turns per inch given to the thread,—is varied to suit the purpose for which the silk is required, ordinary twists, suitable for Macclesfield, Bradford, and Glasgow trade, being about 2½ turns per inch, whilst for the elastic web trade and some classes of hosiery a much harder twist is needed—say about five turns per inch.

Organzine.—Like tram, this is made up of two or more threads folded together, but having to be used for warp in manufacturing purposes, it is necessary for it to have enough twist in the single thread and in its folded state to ensure its being able to withstand the strain and friction of the harness, healds, and reeds in the loom. Thus in two essential details does it differ from tram, for whilst the latter contains no twist in its single threads, organzine singles are spun or twisted on the throwing or spinning mill, and are again spun, or twist put in, after being doubled or wound together to make a 2-fold or 3-fold yarn. Again, a great deal more twist is necessary for organzine than for tram, for the latter is kept as soft as possible, so as to make as bulky a thread as can be, for the sake of lustre and fulness in the finished article, whilst the former is fairly hard-twisted to give it strength. A very good twist for organzine of good quality is 19 to 21 turns per inch, but different throwsters hold very varied opinions as to what is best.

The spinning or throwing mill is illustrated in Fig. 12. The bobbin A containing the singles is placed on the spindle B. A circular weight is placed on the top of the bobbin to keep it steady, and above the weight is fixed a light wire flyer C, through which the thread is passed, and from thence on to the receiving bobbin D. This bobbin is often made of lead, and is driven by means of a roller or wheels E, and whilst the thread is passing from the bobbin A in the direction of the arrow to the receiving bobbin D, the spindle is being revolved by means of a band or friction strap passed over the tin cylinder G and spindle wharve H, by which means any requisite amount of turns per inch can be put into the thread. For economy of space and labour, the spinning frame is built in tiers, two or three rows of spindles one above the other, as shown by the drawing. Fig. 13 shows the usual flyer used in spinning and winding, which is fixed so that the leg receives the thread midway between the heads of the bobbin to ensure as little friction as possible on the thread. For various counts of thread different flyers are used. When the folded threads of organzine are twisted



Silk Spinning.—Fig. 11.

together, the twist is put in the reverse way to the twist on the singles, and about nine turns per inch is an excellent twist on the doubled thread. In Fig. 13 the parts marked A are made of metal and the parts marked B of wood.

Singles.—These consist of the single filament of raw silk, either untwisted as delivered by the cocoon reeler, or sufficiently twisted to enable it to withstand the operations of boiling or dyeing through which it may have to pass before weaving. It is used for warp or for weft for different makes of cloths, and is hard or soft spun in accordance with the requirements of manufacturers, whether for use as warp or weft.

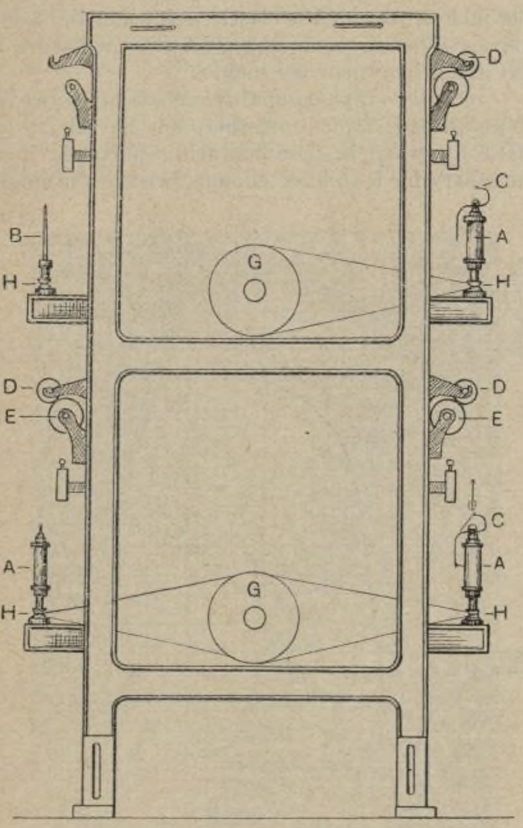


Fig. 12.

Reeling.—The bobbins of doubled silk are taken to a reeling frame, Fig. 14, and placed on the spindles A, which are fitted up and revolved in the same manner as the spinning frame spindles. The thread is passed through the flyer eye and on to the swift B, which draws the thread off the bobbin. The spin or twist necessary is put in during the progress of the thread from bobbin to swift by the revolution of the spindle which is driven by the cylinder C. There are two different terms for reeled skeins—viz., "ordinary" reeled and "grant" reeled. An ordinary reeled skein will measure in length from 1000 to 2000yds., but a grant reeled skein may go up to 10,000yds. in length. The difference between the two reels is in the traverse of the thread during the reeling operation. An ordinary

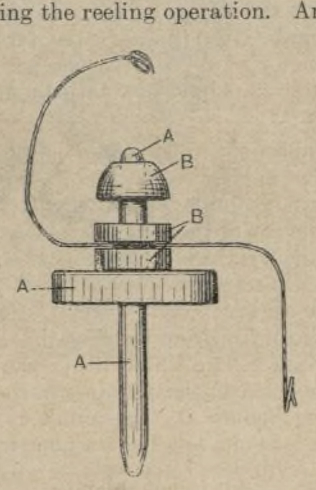


Fig. 13.

reel will traverse the thread from side to side about 1½in., but the grant reel much more; and the traverse of the latter is also very quick, with the result that there is less liability of the thread becoming entangled and matted during boiling off and dyeing. Then, again, in winding from hank to bobbin for warping purposes a grant reeled skein runs better, and that, combined with its great length, is an economy in winding.

Ordinary cross reel skeins in England are reeled 1000, 1500, or 2000yds. long, but on the Continent they vary very considerably, although 500 and 1000 metres are the standard lengths of a skein of ordinary reel. When the skeins are all the same length and the sizes properly divided into bundles or hanks, Continental throwns are termed *tours comptés*—generally written "t.c."; and when the sizes of the skeins vary, and are consequently not carefully subdivided, they are offered as *non tours comptés*—written "n.t.c." English throwsters do not mix up skeins of different lengths in the same parcel of thrown silk like their Continental competitors. Grant reel skeins can be made any length required—very often 5000yds., occasionally as much as 7500 to 10,000yds. Until late years throwsters here used to always reel their thrown silk ordinary reel in the first instance, and weigh each skein for size or count, and then, after sorting into the separate sizes, if the manufacturer wanted grant reel, they would rewind the skeins on to bobbins, piecing each short skein up for requisite lengths, and then re-reeling from the bobbins. By this means the resulting skein was more accurate in size throughout its entire length than is the case when grant reel skeins are reeled straight from the throwing mill bobbins into 5000, 7500, or 10,000yds., and then sized.

Sizing.—This is an important part of the throwster's duties—namely, the dividing of the silk into sizes. All silks vary in thickness in a given length, and when it is understood that the best chops of Chinas yield in 2-thread tram or organzine sizes from 30 to 60 deniers—that is to say, some sizes quite double the thickness of others,—the importance of sizing will readily be recognised. Naturally the finer sizes will do better for finer and more delicate work than the coarser silk. The general way adopted is to "dram" or "denier" the skeins by means of a spring balance, Fig. 15. This consists of a small instrument with a fairly delicate spiral spring, and an index finger attached, the former enclosed in a wooden or metal covering to protect it from the moisture of the atmosphere and from dust. On the outer covering are the figures denoting the different sizes from 1 to 200 or more deniers, or, in drams, 17 deniers to the dram. At the end of the spring is attached a hook on which the skein of silk for sizing is hung. The deniers or drams denoted on the indicator are marked so that the index finger attached to the spring will be brought down to such a size or weight when a skein of exactly the same weight is put upon the hook. Supposing the hank to be sized measures 1000yds., and when put on the hook the index finger points to 3¼ drams, then the actual size is known as 3¼ drams to the 1000yds., or 55 deniers, which is equal to 5·040yds. per ounce. Had the skein been 1500yds., and indicated 4½ drams on the dramming machine, the actual size would be 3 drams to 1000yds., or 51 deniers, equal to 5600yds. per ounce about.

On the Continent the sizing of the silk is done at the conditioning houses: in the case of grant reel filature thrown silks always, and sometimes with regard to ordinary China thrown silks. In the conditioning house wrappings of, say, 100 metres are taken from different skeins of silk, and their weight taken most carefully on well-regulated machines. The sizes of each wrapping are taken (say about twenty from each bale conditioned), an average struck, and the silk offered and sold as such and such sizes, representing the result of the conditioning-house test. Supposing, for instance, the conditioning-house returns showed that out of twenty wrappings tested the result was:—

3 skeins	20 deniers.		The average would be 24·90 deniers, and the silk would be offered as 24/26 deniers.
4 ,,	22	,,	
3 ,,	24	,,	
4 ,,	26	,,	
3 ,,	28	,,	
3 ,,	30	,,	

Generally, the differences are not so great as the above, as the silk is sized to half-denier, but the example given shows the method.

Make-up.—Trams, organzines, and no-throw are made up into hanks, each hank containing a number of skeins, varying, as they are 1000, 1500, or 2000yds. ordinary reel, or 5000, 7500, or 10,000yds. grant reel. These hanks are made up into bundles, the bundles of organzine generally being short and weighing from 6 to 8lb. Tram bundles are long, the length of the reel, in fact, weighing from 12 to 17lb. Different throwsters have their own way of making up. The bundles are tied up in the ordinary way with string, but as there is always an allowance made to the buyer on account of this, throwsters are not very sparing in this respect.

Weights.—On English thrown silks there is what is termed "scorage" allowed, which is 1 per cent. deducted from the actual net weight of the silk in the bundles. Supposing there to be eight bundles of China organzine weighing 50lb. 8oz. net as they stand with the strings on, the weight chargeable is 50lb. only, the 8oz. being allowed to cover string and tie bands. In the case of Continental thrown silks, which are not generally made up in bundle form, but in bunches, the silk is charged conditioned weight. A bale of thrown or "net" silk for conditioning is sent to the conditioning house, where the tare is entirely stripped off and most carefully weighed. First the actual gross weight of the bale is taken, and after taring the net weight of the

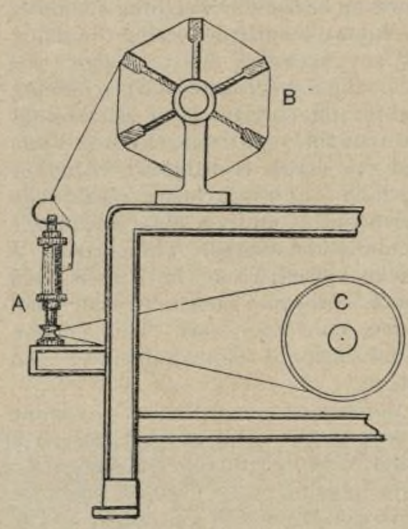


Fig. 14.

Fig. 15.

silk is obtained, and on this weight the subsequent calculations are made. The process of conditioning is a very important work, and the most delicate scales and manipulations are necessary, as only a few heads from each bale are actually tested, and from the result of the weighings of these few heads the throwster has to abide in charging up his bale.

The heads tested, which have previously been most carefully weighed, are dried in a stove until absolutely free from moisture, and then weighed again, and the percentage of loss in weight is taken as compared with the original weight of the silk before drying. This percentage of loss is calculated on the weight of the whole bale, and so the absolute dry weight of the lot is obtained. This, however, does not mean that the silk is to be charged absolute dry weight, as it is a well-known fact that it contains 11 per cent. of natural moisture, which is therefore added to the absolute dry weight, and the result represents the weight chargeable to the buyer, who purchases on the conditioning-house certificate.

To overcome the risk of a seller taking out silk and putting water on the bale to make up weight after the issuing of the certificate by the conditioning house, the latter remake up the bale themselves and seal it with the official seal, and this enables the buyer to see at once if it has been tampered with. The advantage to the buyer of conditioned silk is that he is certain to get the full weight of silk without paying for moisture over and above the legal amount, and there is absolutely no temptation to the throwster to turn out his silk in too damp condition, as he might be a very heavy loser by so doing should the conditioning-house authorities happen to test some heads which were considerably more damp than the actual bale as a whole.

(*To be continued.*)

Designs for Cotton Fabrics.

Specially Contributed.

PATTERN No. 197* is a novel and neat method of making striped designs. The stripe is in evidence without being obtrusive, and the thick mercerised threads of which it is formed weave in conformity to the jacquard figure. The thick ends are well bound both on the face and back, and so do not detract from the serviceability of

Fig. 1.

the fabric. This method of forming stripes is open to several modifications, and suggests a number of attractive stripe effects.

Pattern No. 198* is a gauze pattern in a type of design which has been in favour recently—that is, as regards the "knotted" portion of the stripe. This open knot is formed from one doup, and another

Fig. 2.

is necessary for the three open stripes, the rest of the pattern being weavable on two shafts.

Fig. 1 is a sketch for a cotton all-over cloth made in a 76-reed harness and shot 80 picks to the inch. The black figuring should be weft float, the grey figures 4-and-1 warp satin, and the ground tabby.

Fig. 3.

Fig. 2 is a sketch for a stripe pattern of a fairly good quality of cloth. The warp should be in a 96-

Fig. 4.

reed and shot with 110 picks to the inch. The black figures and oatmeal effect should be warp, the

Fig. 5.

spots on the ground should also be warp bound down with 3-and-1 twill. The grey stripe is intended for tabby or two-pick with weft spots. The ground of the design should be 4-and-1 weft satin.

Fig. 3 is an idea for coloured goods made in an 80-reed harness and shot with about 80 picks to the inch. The stripe should be warped in another colour than the ground and bound down with 4-and-1 satin. The grey figuring should be weft and the ground 2-and-1 warp twill or tabby.

Fig. 6.

Fig. 4 is a good all-over design suitable for a cloth made in a 96-reed harness and shot with 100 picks to the inch. The black figuring should be weft, the grey a warp oatmeal or bird-eye, and the ground tabby.

Fig. 5 is a sketch for cotton dress cloth made with an 80-reed warp of mercerised cotton and shot 60 picks to the inch. The figuring should all be made from the warp, the stripe being bound down with 3-and-1 twill. The ground should be tabby.

Fig. 6 is a design for a cotton brocade cloth suitable for dyeing or mercerising. The warp should

Fig. 7.

be in a 96-reed, and shot about 120 picks to the inch. The figuring should be worked up from the warp with the ground 4-and-1 weft satin. Plenty of float should be left on the flowers where they are painted black, the other parts being bound down. The grey oatmeal should be made from the warp, and have an edging of two-pick or tabby.

Fig. 7 is an all-over pattern for piece goods made in a 66-reed and shot 70 picks to the inch. The figuring should be weft, bound in the larger places with cuttings and 4-and-1 satin. The

* See facing page 318.

ground should be plain. Inside the figures a 3-and-1 warp twill may be used to give a different effect to the ground.

Designs for Silk Fabrics.

Specially Contributed.

FIG. 1 is a sketch for a blouse cloth made with a 2200/2 net silk warp, and shot with 100 picks of tram to the inch. The black figure should be worked up from the weft, with the white inside figure warp satin. The grey leaves

Fig. 1.

should be 2 pick, edged with weft, and the grey scroll work weft, bound down with 3-and-1 twill, except just at the edges, which may be floated a little more. The ground should be 4-and-1 warp satin.

Fig. 2 is a design suitable for a cheap dress cloth made with a 1600/2 thread mercerised cotton warp,

Fig. 2.

and shot with 90 picks of tram to the inch. The black figuring should be made from the weft, and floated as much as possible with the grey figuring (3-and-1 weft twill) and the ground (3-and-1 warp twill). Inside the grey 3-and-1 weft twill figure a crape effect should be used, made from the weft and lying on tabby ground, which will keep the cloth firm.

Fig. 3 is a design for a rich silk brocade made with a 2400/4 net silk warp, and shot with 120 picks of

Fig. 3.

tram to the inch. The black should be weft, the grey 2 pick or tabby, and the white inside the flowers should be 7-and-1 warp satin. The ground should be a weft twill 3 × 1 × 1 × 1. The black spots should be weft and the grey ones 2 pick. Designs worked out after this character show up well in a good quality of cloth, as the satin and weft twill on ground have a good appearance. The portion marked is shown worked out in Fig. 4.

Fig. 4.

Fig. 5 is a sketch for a dress cloth of fairly good quality. The warp should be of net silk in a 2000/4 thread, and shot with 110 picks of tram to the inch. The figuring should be worked up with the black effect weft, the grey 2 pick, and in some parts 3-and-1 weft twill, with weft oatmeal effects. The ground of the pattern should be 7-and-1 warp satin. When binding the weft figure, nice cuttings

Fig. 5.

should be arranged as much as possible, and in the other places a bold satin should be used.

Fig. 6 is a good all-over design, very suitable for an 1800/2 spun or net silk warp, and shot with about 96 picks of tram to the inch. The black figuring should be made from the weft, and well floated with the grey ground (3-and-1 warp twill). The white leaves should be 4-and-1 warp satin, having tabby threads round them, to mark them definitely from the ground. This is a good class of

SILK DESIGNS.—FIG. 6.

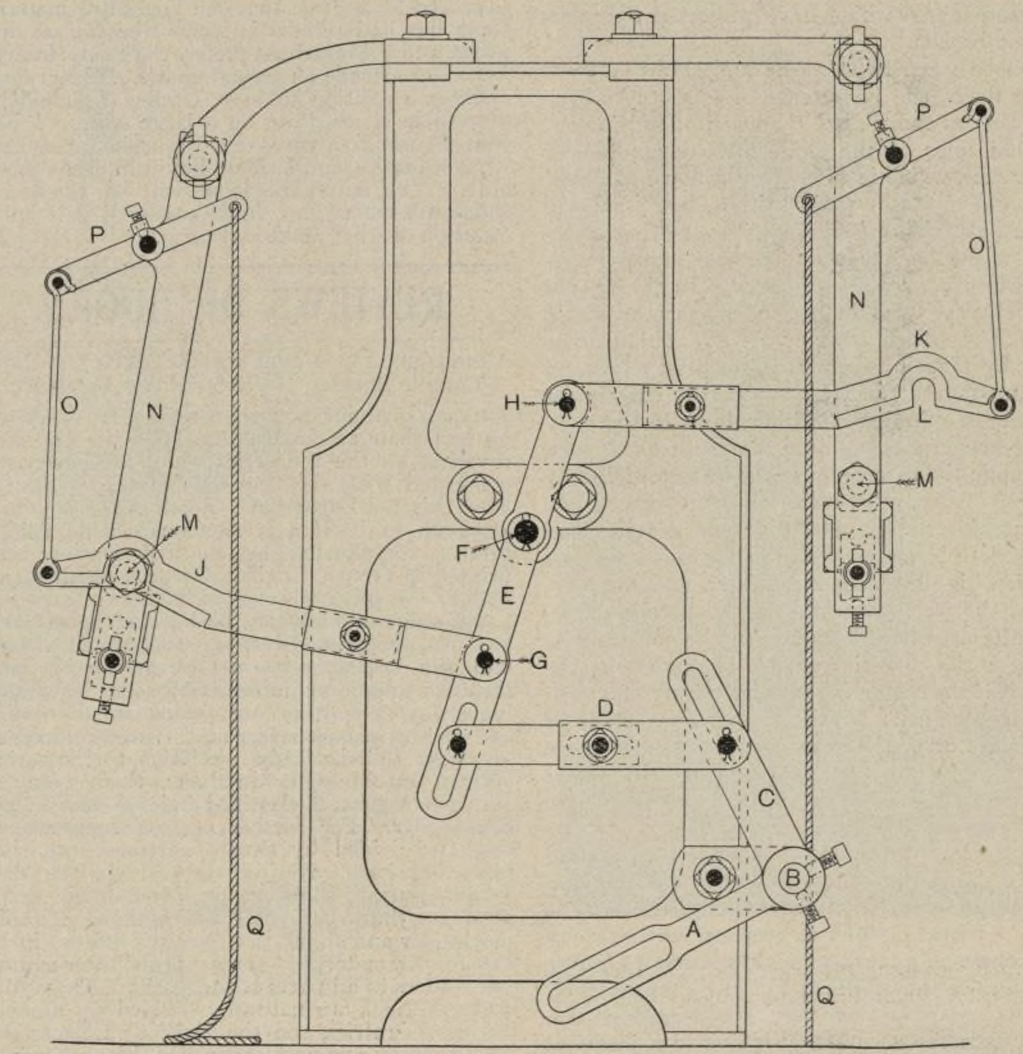
design for shot effects, and is very suitable for dress or blouse wear, as the cloth is very firm.

Jute and Linen Weaving.—XXI.

BY THOMAS WOODHOUSE
(*Of Dundee Technical Institute*)
AND
THOMAS MILNE
(*Of Dunfermline Technical School*).

CROSS-BORDER JACQUARDS.—In by far the greater majority of figured jute fabrics (with the possible exception of Brussels carpeting) no cross-border or other similar effect is ever introduced. In the particular exception mentioned, the carpet or "square" is made up to the requisite size from a number of widths of 27in. each and equal in length, cards being cut to cover this length, which rarely exceeds four yards: the width of the square in all cases being, therefore, a multiple of three-quarters of a yard. On the other hand, however, a considerable quantity of figured linen fabrics are made in bordered cloths, such as table damasks, napkins, etc., necessitating two distinct sets of cards for the alternate working of the border and of the centre of the cloth. Where each design (border and centre) is of such an extent that only one repeat of the centre is necessary to complete the cloth, the cards may be, and sometimes are, in one continuous chain—*i.e.*, two repeats of the border on end, but laced in opposite directions with one repeat of the centre cards. This is, of course, practically one-half more cards than actually represented by the two designs, but the introduction of the extra border set is necessary in order that the pattern of the cloth may be developed in proper sequence. In the great majority of cases, however, the design of the cloth is such that the centre pattern is repeated two or more times between the cross, as well as between the side, borders. For this character of design it is usual to have the cards for the centre and the cross border laced in two distinct sets, and each set brought into operation on the machine when necessary. The simplest method of bringing about this change of cards, and that which is yet most widely practised, is where the change is made manually by the loom attendant or other operative specially employed for that duty. Where this practice obtains no special machine is necessary, and probably this is the main reason why it is still so extensively adhered to. The time lost, however, by this method of changing has led to the introduction of various devices and of special machines peculiarly adapted for cross-border or other similar work where two sets of cards are required to act at any interval on the same threads of the warp.

One of the simplest of these devices is that developed by Messrs. Devoge and Co., who can arrange their double lift, double-cylinder jacquards so that they may be actuated as two separate single-lift, single-cylinder machines; one griffe, with its corresponding cylinder, hooks, and needles, acting for one set of cards, the other griffe, etc., acting for the other set. Where this is the case each griffe is actuated as required by its separate connection from the crankshaft, the method of driving and of bringing the different cylinders into action being shown in Fig. 117. Motion is taken, as is usual for single-cylinder machines, from the crankshaft by a connecting rod to lever A, set-screwed on shaft B, which extends across the machine, and carries (set-screwed near each side



JUTE AND LINEN WEAVING.—FIG. 117.

of the framework of the machine) a lever C, which by link D imparts motion to a double-armed lever E fulcrumed at F. At two points equidistant from F on lever E, two studs G and H are fixed, which carry the connecting arms J and K. Each of the latter arms near its extremity is provided with a recess L, which when required takes hold of the body of a stud M, which projects from the side of each swing batten N. Arms J and K are under the control of the weaver by means of links O, levers P, and cords Q. If both arms J and K were in connection with their respective studs M, it is evident that both cylinders would approach the needles simultaneously. On this account the makers claim that a 400's machine of this type may be used as the equivalent of an 800's single-lift, single-cylinder machine. When used as a cross-border machine, it is, of course, obvious that only one link, J or K, will be in connection at one time, as shown.

(*To be continued.*)

Cotton Fibres in Spinning and Manufacturing.—VII.

BY W. I. HANNAN.

TUFTED YARNS.—Some qualities of American yarns, in counts ranging from 36's to 40's, are interrupted on their surface by tufts of fibres shorter than those forming the body of the yarn. This fibrous interruption causes such yarns to have a ragged appearance, resembling at first sight slubs, crackers, or reps.

In the conditioning stage, where the fibres imbibe moisture, a cohesion and laying down of loose fibres would naturally result; but when the cop is shuttled and the yarn unravelled, the fibres would again assume their spreading character, unless the drag near the shuttle eye was sufficiently powerful to detach them from the surface. The origin of these tufts may often be traced to mixings where too much waste has been used in a weft blending of fibres. Such yarn often has a cloudy appearance, but the short fibres of most tufts seem to gather in the thicker and more solid parts of the yarn.

Tufts may be distinguished from some other yarn imperfections by being more open than slubs. A slub has a soft, wool-like appearance, and the aggregated fibres centre around the yarn, and cause a thin place at one or both sides. A nep is more solid than tuft, and has a hardened centre or knot, while the outer part has loose, broken, radiating fibres, often ending in a dense opaque entanglement. These distinctions are necessitated by the confusion which sometimes arises when weft yarn is defective in glossiness, build, and uniformity of grist: in such cases a uniformity of discriminative terms is desirable. Tufts are sometimes mistaken for crackers. The latter can always be detected when the yarn is distended by the fingers by the cracking sound; or failing this, when the noise of machinery has to be considered, then the loosening and detachment of the fibres can be detected by the very sensitive feel which is acquired by the constant handling of yarn samples. When tufts are only very fine, then the winding and tension faller wires, in addition to their mechanical functions of guiding and tensioning the yarn, often serve to push off from the surface such short fibres that have only a slight attachment. This is readily demonstrated by the quantity of fly that drops upon the carriage board of the mule or the close surface bolster board of the inclined spindles. Occasionally there is a dearth of carriage clothing, and those in use are allowed to become ragged; this causes the fly to become raised up, and it is soon sucked in and attached to the yarn, which is readily denoted by the woolly appearance at a later stage.

In brown Egyptian carded yarns, such small tufts are less frequently met, but when present are easily detected, as they obstruct the light that falls readily upon the yarn surface, and are regarded as yarn impurities. In twist American yarns many of the tufts are caught in the guide wires of the winding frame; others are carried on to the warping frame and are intercepted in the curved loop of the drop pins, which hang suspended on the individual warp threads, as they pass on to the warper's beam. In the looped sensitive hair-pin many short fibres and fragments of flat waste are caught and become attached to the loop, thus increasing the drag and weight on the yarn. There is a cleaning effect in addition to the sensitive action in regulating the self-stopping motion of the beam. The tufty fibres from the drop-pin loop vary in length and ripeness, and their presence disfigures the yarn. When seen under the microscope, they seem to consist of fractured and flat waste fibres which have projected outwards and got broken.

In some warp twist yarns and cloths, such as strong drills, the persistence of some tufts, even when they are small, has the effect of causing the diagonal lines of the cloth to have a pilose or woolly face, which interferes with its use at a later stage and militates against its selling qualities. Where light sizing is desired, recourse has sometimes to be had to changing the sizing ingredients to overcome these defects. In the weft of such drills the tufts are not so conspicuous nor so oozy. The pilose character is obviated to some extent by adapting the weft to the twist way, or by spinning it a little harder, with the consequent necessity of spinning it farther down in compactness to keep up its standard of structure. A weft, when spun the reverse way, may be termed "adaptive weft" yarn, intended to cover up some of the tufts and loose fibres generally; and as weft cover in this cloth is not so great a factor as is the twist, it assists the levelness, cleanliness, and compactness of the weft yarn in drills. Generally speaking, tufts ought to disappear in the constructive processes the material passes through: in the carding, if the cotton is sufficiently bony and well-blended together; in the drawing-out stage of the mules; or in the subsequent changes that are positive to the finish of a complete stretch. Other loose fibres are pitched out or become obstructive in the weaving processes.

The duties of the most experienced weaving managers are often put to test when the preparation and preservation of the twist yarn has to be keenly watched in order to keep up the texture of the cloth face for marketable and utility purposes. In such cases the interlacing of the warp and weft with due regard to their texture is as important a matter as is the accurate designing of a jacquard pattern where the warp and weft form unequal partnerships in texture, or where the size coating of the twist is not of so much importance as drill cloths.

(Concluded.)

LETTERS TO THE EDITOR.

Correspondence is invited upon all practical subjects bearing upon the Textile Trades, Machinery, Dyeing, etc.; but as we allow freedom of discussion, we cannot be responsible for the opinions expressed. Names and Addresses of the writers must in all cases be sent, although not necessarily for publication.

THE CITY AND GUILDS EXAMINATIONS.

Sir,—Having read with interest the letter from "A Border Student" with reference to the City and Guilds of London Institute, I beg leave to trespass upon your space respecting another matter connected with the examinations held by the above Institute. There is a tendency upon the part of some teachers of cotton weaving to enter themselves and some of their senior students who have already passed the honours grade of that subject, for the examinations in silk weaving, jute weaving, and linen weaving. Cloth — *i.e.*, woollen — weaving does not seem to be a great favourite with them, the reason being, I presume, that it is rather a difficult examination, and involves some little amount of reading-up with respect to colour combinations, etc. Now, I think you will agree with me that it is, mildly speaking, unfair to *bonâ-fide* students of these subjects (lads, it may be, from fourteen to eighteen years of age) that their prizes and medals should be snapped up by outsiders who probably have never seen a jute or linen loom, but who, by reason of the similarity of the machinery, patterns, etc., and by spending a few hours looking up calculations, are able to beat their competitors, popularly speaking, "in a canter." This is not technical education, nor is it conducive to the fostering of the same, and I think that if teachers of weaving subjects wish to be examined in kindred subjects they ought to be debarred from taking prizes. I do not mean by this that a teacher of weaving should be prevented from, say, taking a prize in spinning, dyeing, bleaching, or printing, as in these subjects he has no undue advantage, but that he ought to be prevented from taking prizes in all weaving subjects, just as he is now debarred from prizes in the subject in which he is a teacher. Summum Bonum.

Manchester, September 10.

An experienced manufacturer, writing to us anent automatic looms, says:—"From my investigations I am prepared to say that fully 90 per cent. of cotton goods can be made on automatic looms. That the same applies to many other fibres is proved by the fact that one Yorkshire manufacturer has had automatic looms working on dress goods, and the merchant prefers the goods (from the same yarns) made on the automatic. Were I financially in a position to do so, I fancy I should put automatic looms down on a large scale. I have seen thousands of yards of cloth in similar styles to what we make, and I would buy it in preference to ours. The automatic loom will be adopted in thousands before long in Lancashire—it is only a question of what make and price."

REVIEWS OF BOOKS.

Annuaire de l'Industrie Textile. Paris: Camille Rousset, 114 Rue et Place Lafayette.

This work carries too modest a title, for it is really no less than an International Textile Directory covering all the industries which are in any way connected with the wholesale textile trades. It does this for Europe and North America, which, although in itself a tremendously wide field, is further complicated by the information being printed in French, English, German, Spanish, and Italian. In spite, however, of having to carry such a vast amount of matter, the book, although large, has been compressed into an easily-handled form, and the arrangement of the indices is such that the required information can be readily found by consulting the index in the language of the person referring. These indices are arranged alphabetically in relation to the various articles, machines, or products, there being in addition a general classified index arranged geographically. For further ease of reference the work is divided by thumb cuttings into three main sections, covering respectively the firms manufacturing, spinning, or merchanting textile products; the makers of all kinds of textile and allied machinery and apparatus; and the dealers in the various raw materials—the last of the three embracing traders in all parts of the world. These three main sections are naturally divided up amongst various countries, and the divisions between each are shown by coloured leaves. On these are printed lists of the various textile terms in the five different languages mentioned, thus making the work of some value as an international textile dictionary, in addition to the aim it has in view. There is much credit due to the publishers of a work which must have meant a tremendous amount of labour in many languages, and one which is of as much value to the foreigner as the Frenchman, or perhaps more. The book is one which obviates the need of a collection of separate directories, saving not only space but a large amount of time.

The Indicator Handbook: Part II. The Indicator Diagram, Its Analysis and Calculation. By C. N. Pickworth. Manchester: Emmott and Co. Limited. 3s. net.

The progressive steam-user and the engineer in charge who knows his business have long been fully cognisant of the importance of regularly indicating mill engines; but there are many who still regard the steam-engine indicator with indifference, if not with contempt. Fortunately, however, educational progress is manifesting itself in this as in other directions, and with the increasing cost of fuel we may expect to see more attention paid to the indicator as a means of ascertaining whether steam is being used in an economical and satisfactory manner.

The work before us deals exclusively with the interpretation of the indicator card or diagram, the apparatus and its method of application having been fully described in the first division of the work. The initial chapter explains in a simple manner the elementary diagram, defining the various events which are indicated by the configuration of the card, and also showing the modifications which are met with in practical working. Chapter II. discusses the diagram in detail, following the steam through the cylinder, and illustrating by a number of diagrams the various deviations met with and their cause, cylinder condensation and leakage being somewhat fully examined. Diagram analysis is next considered, the effects of alterations in the various elements of the valve gear being well brought out. Examples of defective valve setting follow, some fourteen pages being given to this important matter. Then comes the consideration of diagrams indicating defects in engine design, leakage, diagrams from under and over-loaded engines, friction diagrams, etc. Diagrams from compound engines are dealt with in Chapter IV., and the usual methods of combining the cards are explained and illustrated by examples. Diagrams from gas and oil engines are dealt with at greater length than has heretofore been attempted, the author claiming that the rapidly growing importance of internal-combustion motors warrants this increased attention. Diagrams from air compressors, pumps, etc., are next considered, the cards from feed pumps and air pumps being of more special interest to mill engineers. The final chapter is on the calculation of the diagram both for horse-power and water consumption. The various instruments used in this connection are fully described and illustrated, and the method of using them explained in a simple manner. The book, which is well printed and neatly bound, should be exceptionally useful to those who take an intelligent interest in the economical working of mill engines and steam plant generally.

Epicyclic Trains of Wheels. By W. Bailey. Manchester: Marsden and Co. Limited. 1s. 6d. net.

This small book is a reproduction of lectures given by the author, and covers ground of special interest to those interested in spinning machinery. Commencing with the simplest examples, the reader is led up to the various forms of jacking and differential motions, of which the types used by the leading spinning machinery makers are illustrated and described, along with the requisite calculations connected with each.

We have also received:—The Annual Report of the Flax Supply Association (1900), 4, Howard-street, Belfast.—Short Prospectus relating to Classes at the Royal Technical Institute, Salford.

QUERIES AND REPLIES.

Heald Varnishing Machines.—Messrs. Pinheiro, Fish and Co., 37, Pe'ourinho, Lisbon, ask makers of above to send prices, weights, etc.

P. H. (New Ross).—The goods are piece-dyed. Try Wool Black N4B (Bayer) and Peri Wool Blue B (Cassella).

J. and J. C. (Coventry).—Messrs. Hutchinson and Hollingworth, Dobcross, make a very good loom of the type you inquire about.

J. A. M. (Mass., U.S.A.).—Yes, the same size is used, although the better qualities have naturally less, if any, weighting added.

R. F. (Durrow).—F. Stephenson and Sons, Lawside Dyeworks, Dundee, and Walker, Drybrough and Co., Arkleston Printworks, Paisley.

H. and Co. (Derby).—The goods are used for upholstery work, such as covering screens and tables, panelling desk tops, etc. The thinner sample is also used for making travelling writing cases and similar wares.

E. W. M. (Montreal).—The subject is far too wide for treatment in this column. We will try to arrange for a series of articles at an early date, which will, amongst other matters, cover your requirements.

H. Y. V. A. (Helsingfors).—There is no really good book on the subject, but some useful information may be obtained from "Dyeing of Textile Fabrics" (Hummel), 5s. You will, however, find the best information in back numbers of The Textile Manufacturer.

E. T. (Tarrasa).—(1.) The subject is scarcely wide enough for a book, and is treated in a chapter of "Dyeing of Textile Fabrics" (Hummel), 5s. (2.) We shall be glad to give an opinion on any samples sent. (3.) You will have to write to some shipping firm like Delius and Co., or Edelstein, Moser and Co., both of Bradford, which is the worsted centre. (4.) The cost of commission spinning varies according to quality, etc. It is reckoned per gross of hanks usually.

L. A. (Barcelona).—There is such an enormous number of manufacturers and shippers, and their productions are so varied, that it would be impossible for us to help you as you suggest. It is very doubtful whether you could open up such business relations as you wish without making a personal visit or sending some representative to arrange for what you require. You might do something by posting circulars, in which case a directory would best supply you with names.

G. C. (Frankford, Philadelphia).—It is difficult for us to point to your mistake without seeing a faulty pattern, but your letter indicates that the fault lies in the finishing. If the goods are drawn out too much, a plain finish results; if they are allowed to shrink too much, mill wrinkles put in an appearance. Note the finished width and length of each extreme result, and order a piece finishing up to the average of the two methods—that is, presuming the grey dimensions are all the same.

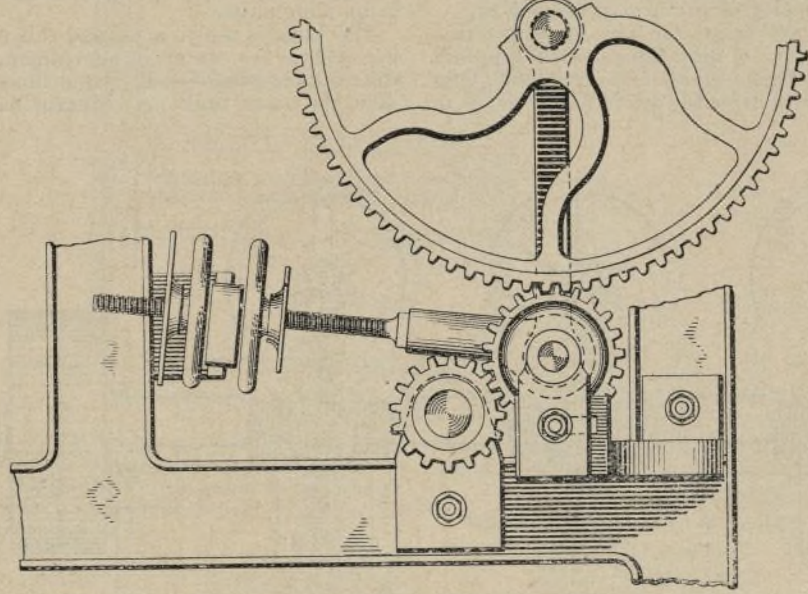
THE TEXTILE MACHINIST:

Devoted to Machinery, Apparatus, Tools, Etc.

Improvements in Sizing Machines.

MESSRS. BUTTERWORTH AND DICKINSON, BURNLEY; AND MESSRS. TATTERSALL AND HOLDSWORTH, ENSCHEDE, HOLLAND.

AS any damage which the warp may suffer in the sizing machine is carried forward to cause trouble in the weaving, and appears later in the form of defective places in the cloth, any improvement in the sizing machine confers a benefit, not only to the machine itself, but



IMPROVEMENTS IN SIZING MACHINES.—FIG. 1.

during the subsequent stages. The improvements at present under notice, however, have a very indirect bearing upon the material, being confined more to structural improvements, although in an indirect way other things are affected.

The first is a better method for adjusting the carrier wheel—that is, the wheel which, driven by a gear wheel on the main driving shaft of the machine, imparts motion to the wood or draw roller. As seen in Fig. 1, the carrier wheel stud is fixed on

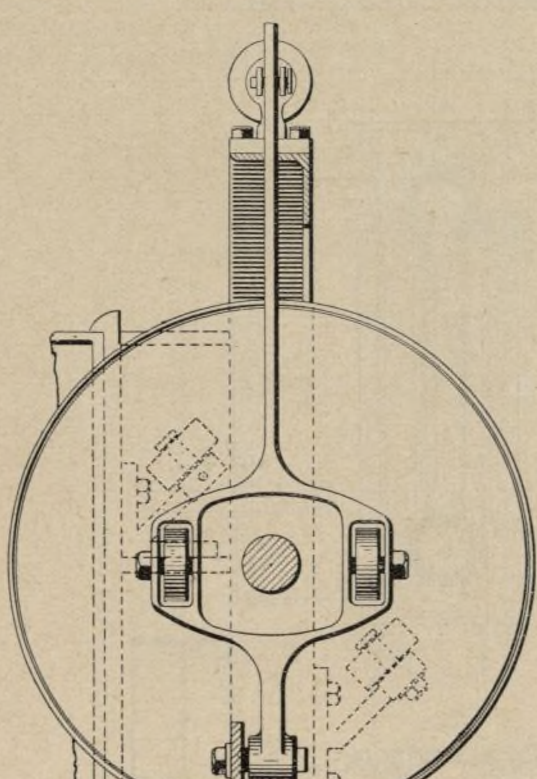


FIG. 2.

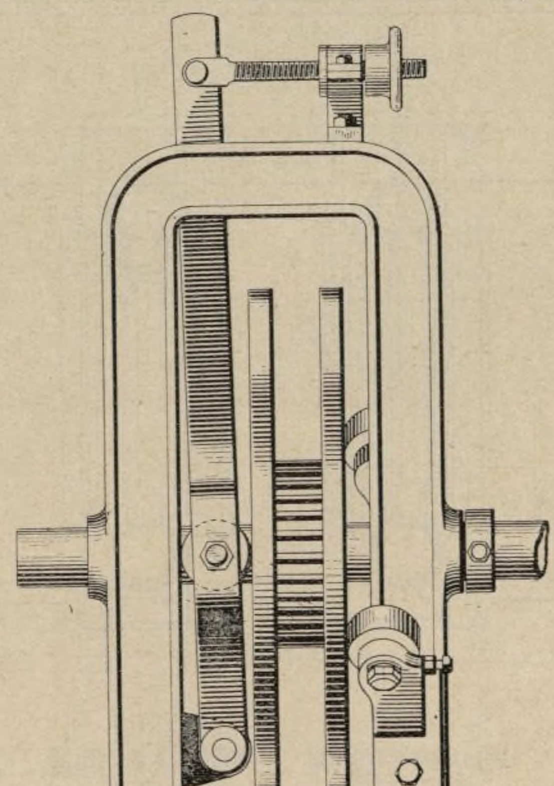


FIG. 3.

IMPROVEMENTS IN SIZING MACHINES.

a pendant arm, the old lever or long arm being discarded. The lower end of the pendant arm is connected to a threaded rod which passes through a hole in a bracket fixed to the framework, and the rod, with its arm and wheel attached, is held in position by hand wheels which screw on the threaded rod. The adjustment of the carrier wheel when being changed to a larger or smaller number of teeth simply requires the manipulation of the hand wheels. According to the size of the carrier wheel being adjusted (smaller or larger), one of the hand wheels is loosened and the other screwed up until the carrier wheel is in its proper position. Then the hand wheel first loosened is screwed back to act as a lock nut. It will be readily seen that the adjustment of the teeth of the wheel can be done to a nicety, a matter of great importance where all changeable toothed gearing is used. In addition to the accuracy which this method accomplishes, the process of wheel changing is made much easier and can be accomplished in less time than by the older method.

The other improvement which has been applied to the sizing machine was devised to prevent the large amount of friction which took place in connection with the frictional plates of the driving gear. Two adjustable anti-friction bowls or runners are mounted at either side of the shaft, as shown in Figs. 2 and 3, which are side and end views respectively, these bowls being arranged so as to take the pressure of the inner friction plate, instead of this latter having to bear and rotate against the framework of the machine. The friction lever is also provided with a like pair of anti-friction bowls mounted in its clip portion, and preventing wear between it and the outer friction plate. These anti-friction devices prevent a large amount of wear and tear, and also, as a natural accompaniment, require less power to drive.

New Hank-mercerising Machine.

MESSRS. CROMPTON AND HORROCKS, WATER-LANE MILL, RADCLIFFE.

SINCE the value of the process of mercerisation first became generally recognised, a large number of machines have been devised for carrying out the necessary operations.

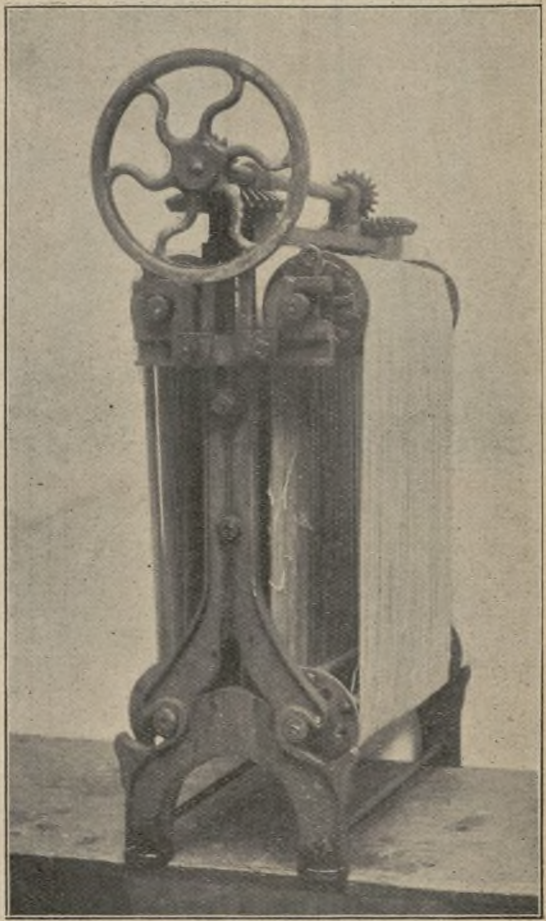
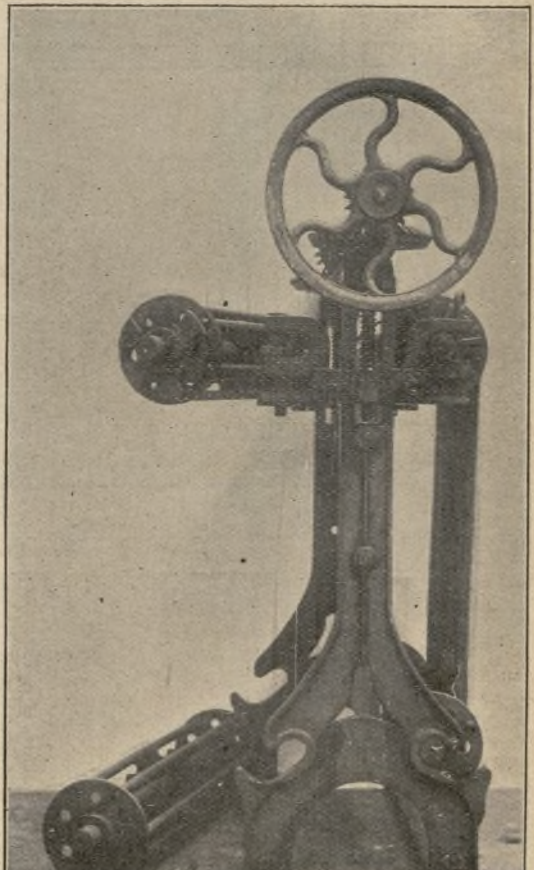


FIG 1.



NEW HANK-MERCERISING MACHINE.—FIG 2.

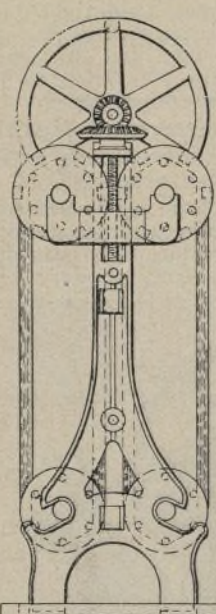
These machines, in addition to being numerous, have been very varied, and nearly every possible means of obtaining the requisite result has been tried. Some machines have done the work rapidly and well, but their use has entailed a serious outlay on the new apparatus, which could only be incurred by firms having limited space and a large turnover; some have been adopted for large quantities, and would not work economically on small lots; others have only been fitted for a small turnover, and unsuited for extensions. There have been good, bad, and indifferent machines, and yet probably the least promising have been found suitable for some outside branch of the trade.

A new type of machine has been recently introduced which combines the advantages of low first cost, simplicity of mechanism, and easy manipulation; in addition, being composed of separate units, it may be adopted for the smallest business or extended to cope with the largest. The makers have had a wide practical experience as mercerisers, and can also give a sort of indirect guarantee as to the legality of using such machines without a licence for the process itself. Recently, in their action with the British Cotton and Wool Dyers' Association, when the Association served them with a writ for mercerising cotton without a licence, they carried the case into the courts, refusing to have their costs paid until the matter was put into more definite form. Finally, when in court, the Association applied for leave to discontinue the action, and paid all costs, a proceeding which practically showed that they were unable to prove the validity of their alleged patent rights. Thus Messrs. Crompton and Horrocks have been of great service to the mercerising trade generally, having shown, as far as was possible under the circumstances, that mercerisation—that is, the process itself, apart from any patented machine—is not the sole property of any firm or association.

Returning, however, to the new machine: this consists of a number of units which, when supplied with hanks, can be moved about as required. One of these is shown filled with yarn in Fig. 1, and as it stands there is ready for dipping into the caustic-soda tank and subsequent washing troughs. Fig. 2 shows the apparatus with the hanks removed on the left-hand side, and from this photograph it will be readily seen how the hanks are fed and removed. The top creel swivels out as shown, being afterwards held in position by the pin shown in place at the right-hand side. The lower creel can be lifted out, but usually rests in the lower groove of its bearings, being drawn into the upper groove (see right-hand side) only when tension is applied. This tension is exerted or regulated by the hand-wheel shown, which, by means of the bevel wheels and screws also seen in the illustration, can be operated to put on any degree of tension necessary.

It will be noticed that the creels are composed of horizontal bars which allow the liquor to circulate as much as possible amongst the threads, and if the machine is worked without power, hand wheels (not shown) are placed on the end of the top creel spindle, thus enabling the attendant to easily revolve the yarn while it is in the liquor. This turning, however, is usually performed automatically, as will be seen in Figs. 3, 4, and 5. These illustrations give side elevation, plan, and sectional end elevation of the combined machine, although it will be seen that this is only a small one, and that the size may be extended to almost any limits by lengthening the tank and using more units.

The tank is shown at A, and this may be either for caustic lye, water, or neutralising acid, for all the tanks are made on the same lines, or, if necessary, the same tank may contain each liquor in turn. These tanks are provided with driving pulleys B, by which rotation is given to the worms C and the worm wheels D. The worm wheels D are carried on a short spindle revolving in a deep necked bearing, and the opposite end of the spindle E is made with a slot into which fits the square end of the spindle F when one of the hank-carrying units is dropped into the trough A. By this means



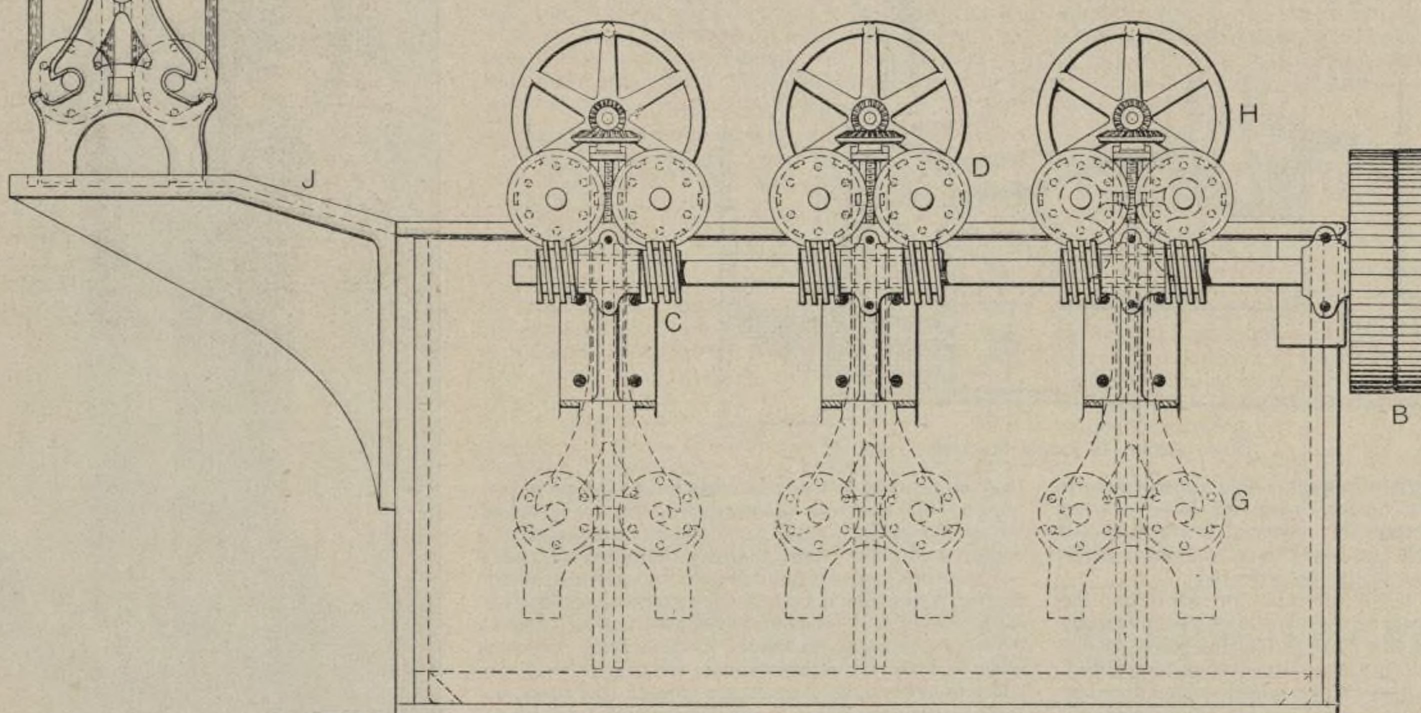
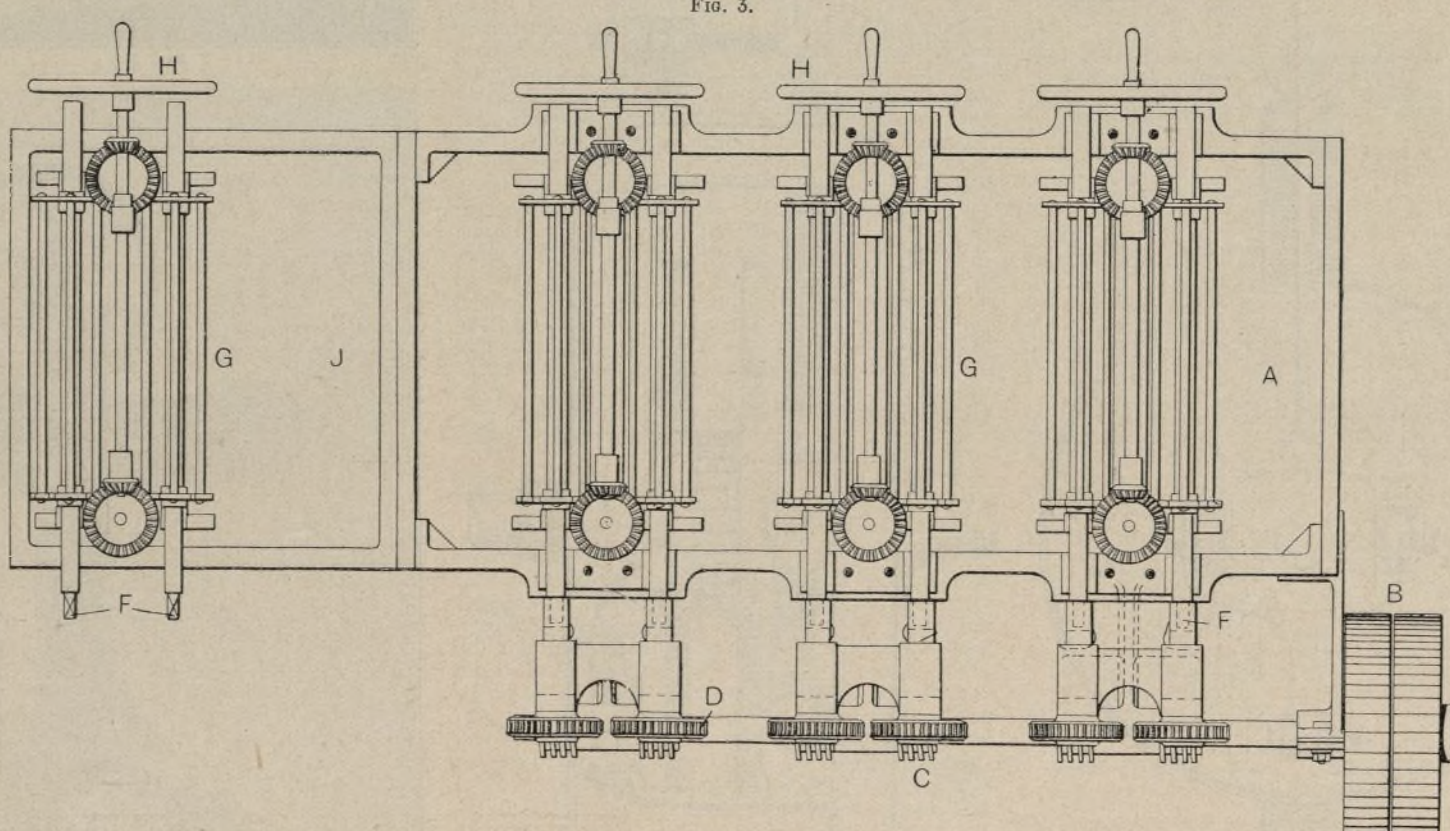
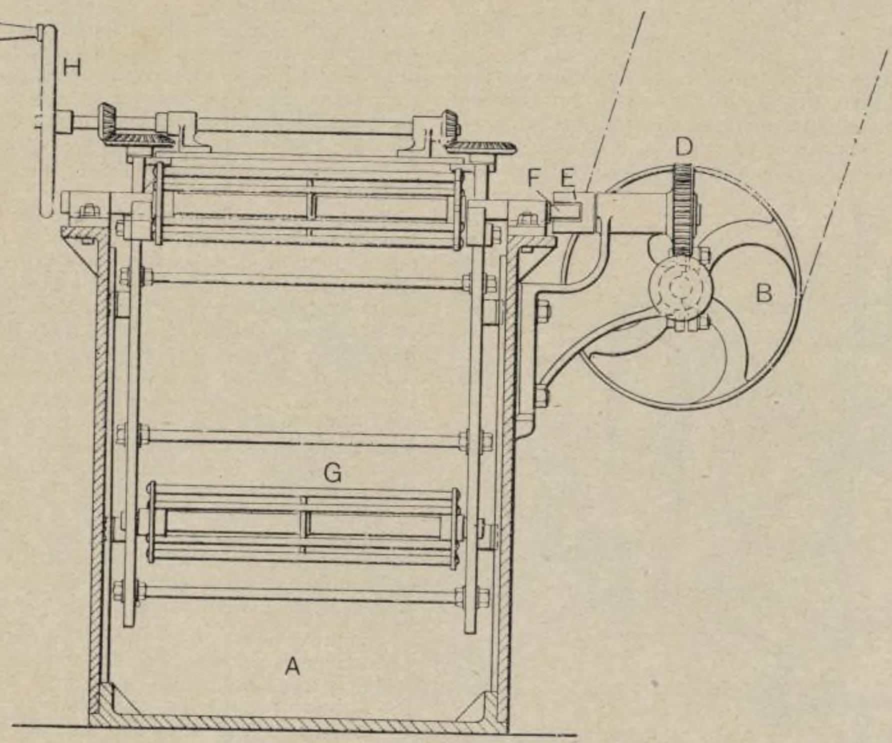


FIG. 3.



NEW HANK-MERCERISING MACHINE.—FIG. 4.

the spindle F is rotated by the spindle E, and the former spindle, carrying in the hanks, causes them to be slowly rotated whilst in the lye. The open bearings of the spindle F are arranged so as to bring that spindle in line with the spindle E, and on these



New Hank-mercerising Machine.—Fig. 5.

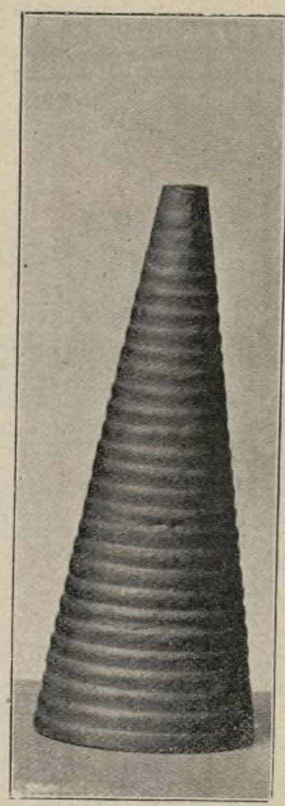
bearings the whole weight of the hank-carrying unit is supported. By supporting from the top in this manner, the lower portion hangs in the trough, the weight of the apparatus tending to lessen the strain on the tension screws.

As shown in the drawings, the creel G alone is submerged in the liquor, but if desired (although unnecessary), the top creel may be arranged to do likewise. The tension is usually put on before the hanks are dipped, but in case an adjustment is necessary while in the trough, the handle H, which controls the tension screws, is quite as accessible as if the hanks were out. As each set of hanks receives sufficient treatment its unit is lifted out on to the draining board J and then passed on to the next trough, or the hanks are taken off to dry. Although each unit of the machine is of only slight weight, it is best—in fact, almost necessary—to have a light travelling crane running the length of the series of troughs, so that each change can be effected rapidly and easily with only one attendant.

Improvements in Winding Machinery.

MESSRS. ROBERT BROADBENT AND SON LIMITED, STALYBRIDGE.

Amongst the many methods of winding yarn, there is perhaps no way which has made more headway towards general favour during recent years than that of cheese winding, which in addition to being used largely in Lancashire and Yorkshire is now almost universally adopted in the hosiery districts. By means of cheeses it is possible to wind a maximum amount of yarn upon a minimum weight of tube, and still have the thread in a form easily adapted for various uses. For conical cheese winding, a spindle is being made which acts on an entirely new principle from those in vogue, and obviates many of the disadvantages of the older types. With a



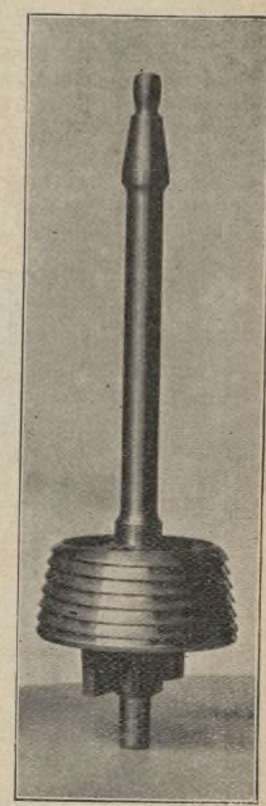
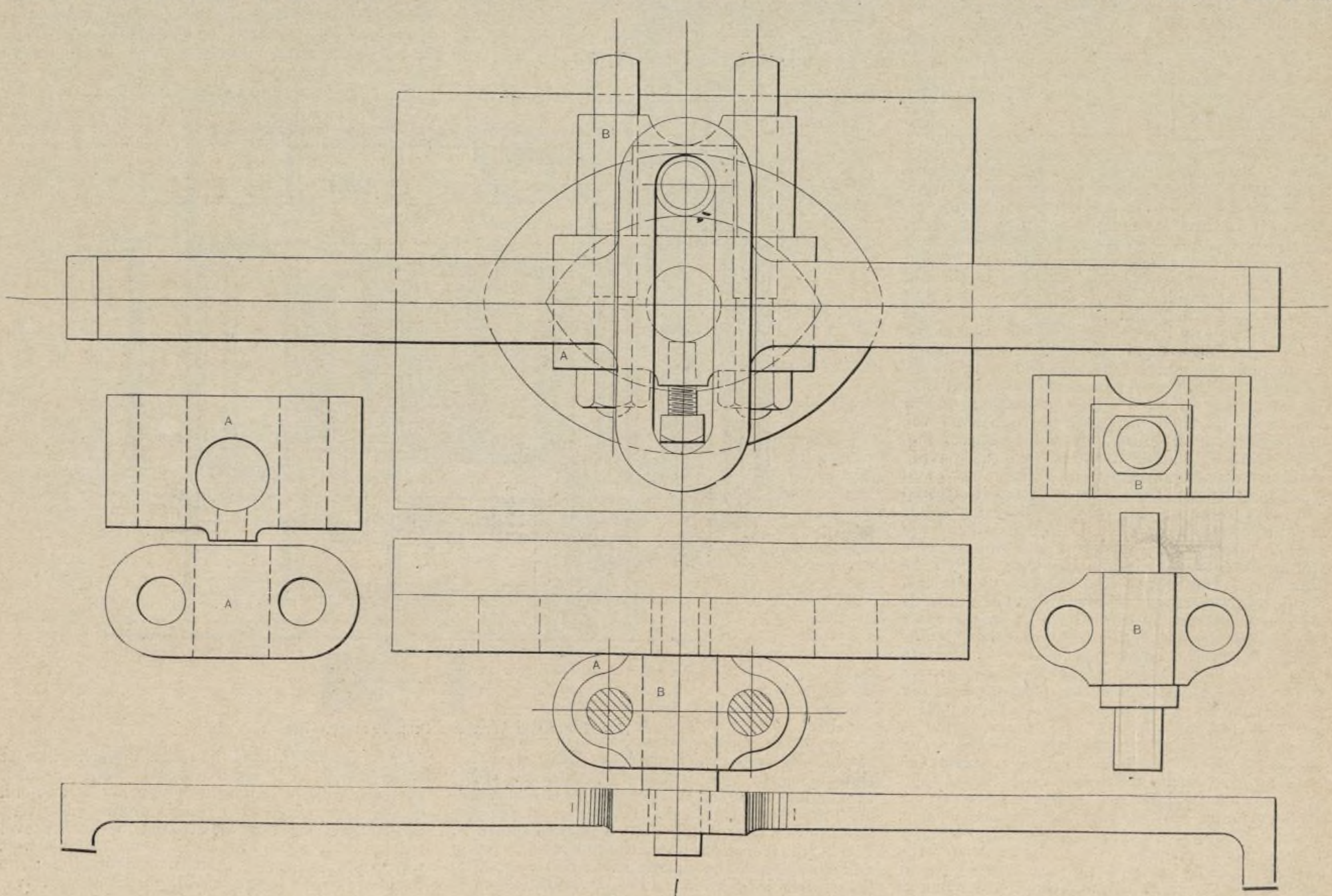


Fig. 1.—Winding Machinery.—Fig. 2.

wooden conical support? it is rather difficult to mount the yarn tube in a firm, tight manner, but with the new form of spindle this is easy and always possible. The ordinary conical tube and its new type of spindle are shown in Figs. 1 and 2, from which it will be seen that at the lower end of the spindle is a brass flange cut with a coarse left-handed screw thread. The diameter of the flange is slightly less than the mouth of the tube, so that



Improvements in Winding Machinery.—Fig. 3.

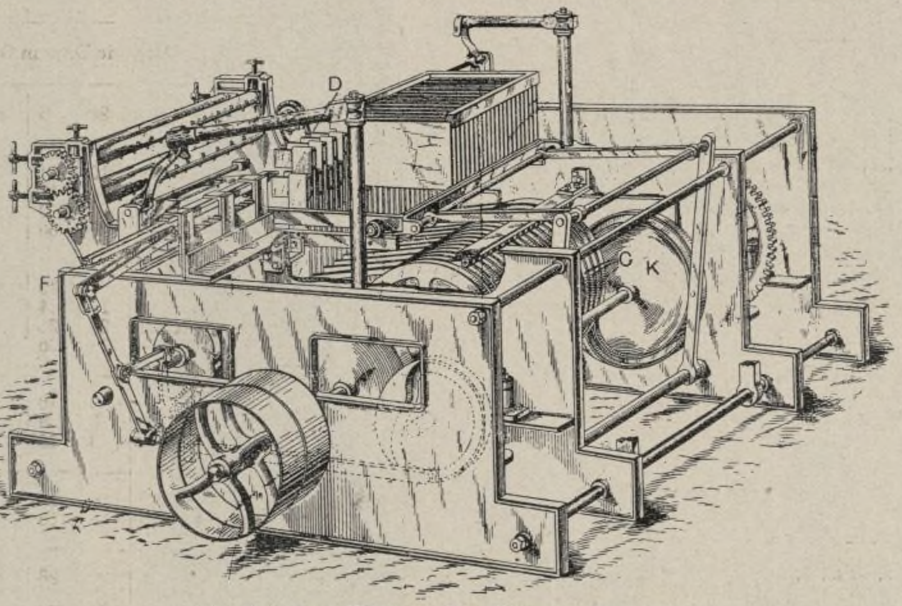
it is possible to put both spindle and flange inside its conical shell. The flange, however, is soon stopped by coming into contact with the narrowing walls of the tapering tube, when a slight turn to the left screws it home, where it holds the tube firmly and at an even pressure all round. It is scarcely necessary in practice to turn the screw, for if simply pressed in, the motion of winding soon adjusts the spindle to its proper position. It is to enable this to be done, and to prevent the spindle working loose when winding, that the flange is provided with a left-handed screw. An alteration—which, however, is very slight indeed—has been made in the shape of the top of the spindle, to allow the flange to enter the tube until it comes into contact with the requisite diameter on which to be tightened up, otherwise it is obvious that if a shoulder prevented the spindle entering far enough, and also prevented the screwed flange reaching a part narrow enough to tighten on to, the improvement would be of no value. The abutment shown below the screwed flange usually gives quite sufficient grip when it is necessary to extricate the spindle during doffing, but a key is placed at hand at different distances along the frame which, fitting on the abutment, gives sufficient leverage to unloosen the most stubborn screw. This key, however, is not generally used, and is only recognised as an emergency tool.

The traverse motion is another part which has been greatly improved, or, one might say, entirely revised. It is placed in the centre of the winding frame and works the guides at each side of it, in the manner shown in Fig. 3. This drawing gives the motion in elevation and plan, and some of the parts are shown separately so as to make it more readily understood. It is generally known that a motion driven by a crank would be the ideal method of obtaining a noiseless, easy-running traverse, but for the simple fact that it is quite impracticable owing to the way it would pile up the yarn at the edges, where the dead centres are in evidence. As the next best method, in the motion under notice the crank has been used along with the accompanying advantage of easy, noiseless running, but a cam guide has been arranged to counteract the dead centres of the crank. As will be seen in Fig. 3, A is a piece of metal bored to take the driving shaft of the motion, and tapped to take two screwed studs, in addition to the screw by which it is adjusted and fixed to the driving shaft. These two studs are prolonged as two slides upon which the sliding piece B may slide up and down. This sliding piece carries a pin, so that it will be seen that, so far, only a simple crank motion has really been described. Under ordinary conditions the crank would be carried round as the shaft rotated, but this would give the undesirable circular motion, with its attendant dead centres. To obviate these, the pin is kept in the fixed cam groove shown in the figure, and as this groove is carefully designed to give the motion best adapted for a perfectly regular traverse, the crank motion is controlled so as to do the work desired. The sliding piece B to which the pin is attached slides up and down the studs screwed into A, and so allows for the difference between the orbit of a circular crank and the orbit of the cam groove. Really, the piece A makes a perfectly circular motion, being screwed to the driving shaft; the sliding piece B and the pin are carried round with it, but oscillate to and from it according as the cam groove guides them. The pin extends on either side of the sliding piece B; one end works in the cam groove as just described, and the other works in the link which is connected to the traverse bars, and so transmits motion to them. During working, the entire motion is enclosed, and the case carries a supply of oil into which the sliding piece B or its slides dip at every revolution, carrying the oil up and keeping every part of the motion well lubricated.

New Loom for Weaving Pile Fabrics.

MESSRS. HODDER AND LESTER, ST. GEORGE-STREET, LONDON.

A TYPE of loom has recently been devised which weaves pile goods in a novel and interesting manner, such being quite out of the usual lines on which these fabrics are constructed. The aim of the builders has been to construct a loom to make coir mats and similar coarse fabrics having a pile surface, but there seem to be indications that some of the motions might be adopted with success in a modified form for making other articles of a finer grade. The principles upon which the main motions operate have a great similarity to those in the netting loom, although they have been modified to suit requirements.



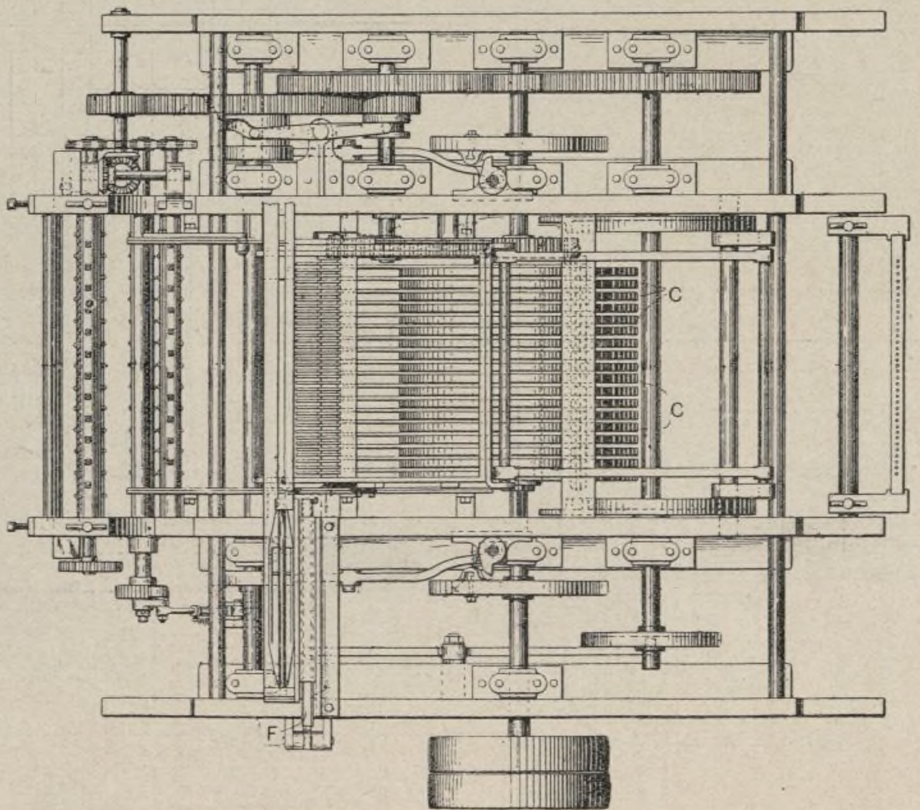
New Loom for Weaving Pile Fabrics.—Fig. 1.

The loom is shown in Fig. 1, where it will be seen that the ordinary overpick motion is used for throwing the shuttles and inserting the ground wefts, whilst a carrier is provided for the insertion of the pile weft, which may be either in a continuous length or in thrums or lengths. It is really the manner in which this pile is formed that is the chief feature of the loom. Fig. 1 gives a perspective view of the machine, but a plan is shown in Fig. 2, whilst sections down the centre of the warp and also across the shuttle race are respectively illustrated in Figs. 3 and 4 As the loom is designed for heavy goods, it will be noticed that it is heavily built, and that substantial frames and numerous stays are provided.

The healds (if such a term can be used) work in vertical guides. They correspond more to the cords and mails of a jacquard than to anything else, for each heald (or pair of mails) has its separate lift and is operated by a separate cam lever. Each heald has two holes near the top, one above the other, these acting as mails through which the warp threads are drawn. The threads through the topmost holes weave plain with each other and make the groundwork of the upper cloth, while the threads through the lower holes work in a similar manner to weave the lower groundwork. The pile threads pass between these two cloths, and, after cutting, there are formed two separate fabrics. It must be noted, however, that the pile yarn is put in by the weft, not by the warp, as is usual with pile goods when woven face to face.

The healds are first operated for the insertion of the ground picks, these being put in simultaneously by two shuttles thrown by the same pick, the top and bottom sheds being necessarily alike, as the threads pass through the same healds, although at a different height. After these ground picks have been inserted, alternate healds are raised to a higher plane than in ordinary shedding, and the intermediate healds are depressed in a like degree. The pile thread is then inserted by a carrier, after which the healds return to their level position, one heald at a time, in regular succession, and so form loops in the pile thread which pass alternately over the higher warp threads and under the lower ones. This movement will be best understood by reference to Fig. 4, which is a section across the shuttle race of the loom, and shows the movement just described when partially completed.

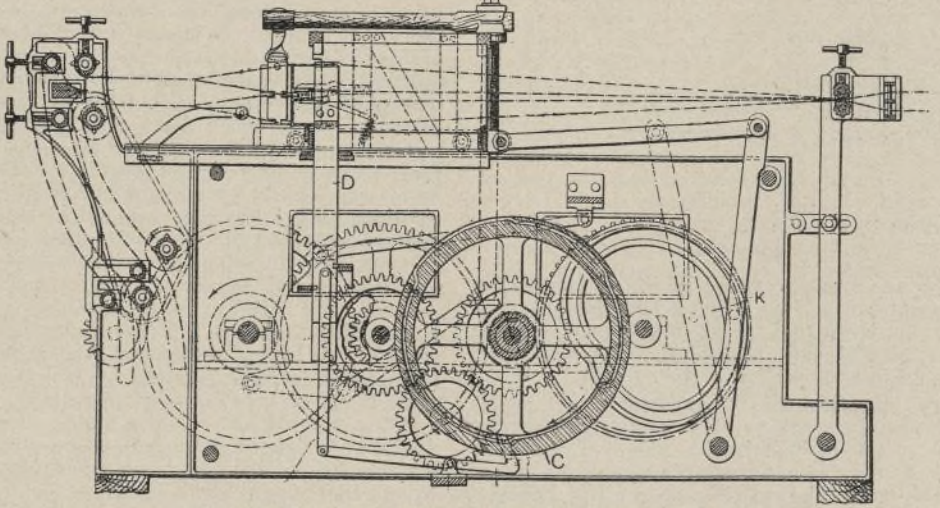
The movements of the healds through all these operations are determined by the cams C, each of which works two healds—one from a lever operated by a bowl running in the groove at the top of the cam, and the adjacent heald from a bowl running in the groove at the bottom of the cam. In designing these cams it is necessary to consider the following movements and arrange the grooves in the cam C which are necessary for carrying them out:—(1) The lowest position for pile weft insertion (the groove nearest the centre); (2) the bottom of the shed for ground weaving (second groove from centre); (3) level position when the pile weft is drawn up into plaits (centre groove); (4) top position of the shed for ground weaving; and (5) the highest position for pile weft insertion (the outermost groove). The grooves Nos. 1 and 5 must be arranged exactly opposite to each other for at least a certain distance around the circumference of the cam, as also Nos. 2 and 4, for the top portion of each cam groove is operating one heald, and the bottom portion the next, causing each pair of healds to work opposite to each other at those parts. The centre groove, however, must systematically vary, and, commencing at one end of the loom, the length of this groove must very gradually increase so as to bring the healds level to each other in rapid succession, for the pile weft would not be let off in regular plaits if all the healds returned to the central position together.



New Loom for Weaving Pile Fabrics.—Fig. 2.

For weaving a pick of pile thread, levelling, inserting a pick of ground, then a pick of pile (over alternate ends), levelling, and then a pick of ground (over alternate ends to previous ground pick), the groove should be respectively in the 1st, 3rd, 4th, 5th, 3rd, and 2nd positions, reckoning from the centre, and by altering the proportion of ground to pile, arrangements must be made accordingly. The method of arranging the levers so as to transmit motion from the grooves in the cams C to the heald rods D is best seen in Fig. 3.

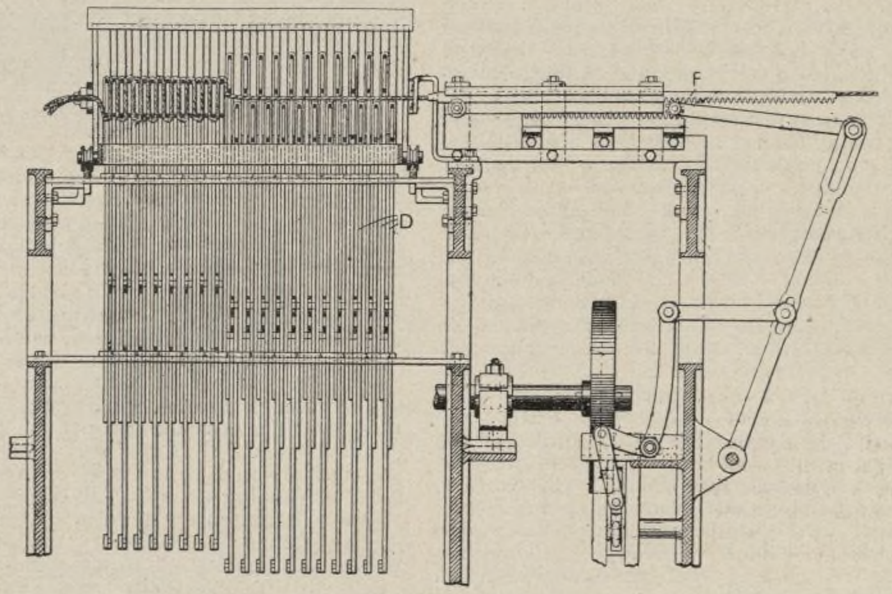
The pile thread is put into the shed by a reciprocating carrier F at one side of the loom. This carrier consists of an inverted rack, moving in slides and operated by the pinion and levers shown in Fig. 4. The thread passes along a groove in the top of the inverted sliding rack, and out through a nozzle having spring tension devices. When the carrier is moved to the opposite end of



New Loom for Weaving Pile Fabrics.—Fig. 3.

the shed, the nozzle pushes open a spring grip which holds the end of the thread until the carrier has returned, and all the healds come to their level position. The tension device in the nozzle of the carrier F lets off the requisite quantity of yarn necessary for the plaited condition taken by the pile thread, and then a knife automatically severs the end of the thread as the lay comes forward, leaving enough projecting out of the nozzle of the carrier F for engaging the catch at the opposite end of the shed at the next insertion. At the same time the catch holding the other end is released by the forward movement of the lay, and the next ground picks can be inserted after the beating-up.

The method of picking has no special feature, unless it be in unnecessary elaboration, for the picking mechanism—which consists of the large cam K (Fig. 3) and its accompanying levers—is not very compact. The take-up and letting-off arrangements are specially designed for heavy wares, and can be seen in the drawings, whilst the method of cutting the pile and so dividing the two fabrics is on the usual lines and requires no description.



New Loom for Weaving Pile Fabrics.—Fig. 4.

Some Experiments on Drag.

By Geo. R. Smith and Geo. Long.

(*Continued from page* 269.)

We have already seen how the drag with different arrangements of washers varies, and we have already agreed that this variation in drag, due to different groupings of washers, is dependent on the centre of resistance of the washer moving nearer to or farther from the centre of the spindle. We have now to show that the resistance to motion, or drag of the washer, is not proportional to the weight of the bobbin. We cannot very well do this experimentally on a spindle, and say that it is true, because we do not know whether the centre of resistance,

TABLE V.

Diam. of Washer.	Load on the Washer, in Lb.	Dynamic Pull on the String to Overcome Friction, in Ounces.	Diam. of Washer.	Dynamic Pull on the String to Overcome Friction, in Ounces.
6in.	0·5 1 2 4 8	5·75 9·25 16·25 27·0 44·0	3in. double.	3·5 6 11 19·25 36
4·5in.	0·5 1 2 4 8	4·25 7·25 12·75 23·25 43·0	2in.	2·75 4·75 9 16 32
3in.	0·5 1 2 4 8	3 5·5 10 18·25 36	1½in.	2·25 4 7·5 14 26

or drag of the washer, remains at the same distance from the centre of the spindle for all kinds of loading. However, by making the washer slide, we know that this variation of centre of resistance is eliminated. Trials were made with the apparatus shown in Fig. 2, where the washers M were loaded by the weights L and made to slide along a smooth yellow pine board A by means of the load in the scale pan W. The second column in Table V. shows the loads on the washers used, which are shown in columns 1 and 4, while columns 3 and 5 show the pull of the string to overcome the drag or friction of the washer. From these experiments we see that if the load is doubled or trebled, the dynamic pull or resistance of the washer does not increase at the same rate.

The reason of the variation appears to be due to the surface of the washer not remaining the same at heavy as at light loads. When the load is light, only the surface fibres of the washer can come into play as rubbing contact with the smooth bed on which the washer slides. When the load is heavy, more fibres of the washer are brought into contact with the bed, and probably these fibres arrange themselves parallel to the line of motion, and so make sliding more easy. The increased pressure per unit of area of the surface of the washer would have a greater tendency to make the fibres take up a position more nearly parallel to the direction of motion than the light loads.

The results given in Table VI. show that the first law of friction does not hold, because in changing from a 6in. to a 1½in. washer, we change from a comparatively coarse to a very fine surface, and this change, coupled with the greater pressure per square inch and reduced radius of centre of drag, is the cause of diminished friction. The law clearly states that the surfaces must be of the same kind—*i.e.*, alike as regards degree of roughness—when the friction is proportional to the pressure between the two surfaces. Columns 3 to 11 give the magnitude of the drag under different loads with different diameters of washers. We see that all the single washers drag unevenly, and that as the size of the washer increases, the drag increases. We also notice that at all loads the double washer drags more evenly than the single one. This is probably due to the more equal distribution of pressure over the surface of the washer. The results from the bulk of these washers show that for any given washer the drag does not increase at the same rate as the load. These conclusions are supported by the results from a 6in. bobbin, as shown in Table VII. It should be observed that the results given in these tables are the amount of drag when once the bobbin is started—*i.e.*, the

TABLE VI.

Weight of 14in. Bobbin, 4½oz.

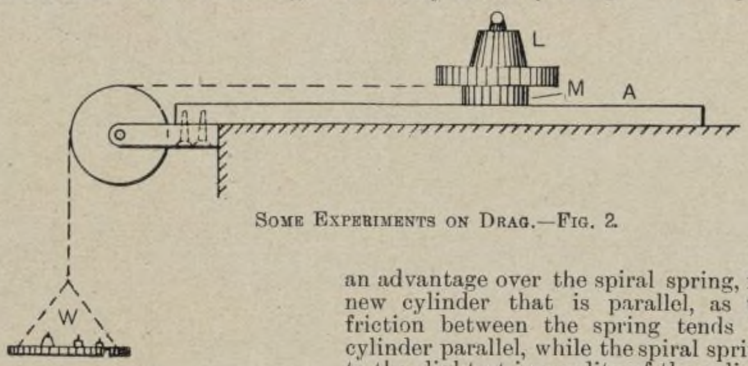
I.	II.	III.	IV.	V.	VI.	VII.	VIII	IX.	X.	XI.
No. of Washers.	Dia. of Washers, in Inches	Load Expressed in 4oz. Units.								
		12	13	14	15	16	17	18	22	26
		Dynamic Drag in Ounces.								
—	No Washer.	16	19	21	24	26	28	28	28	32
1.	2 3 4·5 6	8 13 23 21	9 13 24 22	9 13 24 24	10 14 26 28	11 17 29 30	11 17 30 32	11 17 32 34	16 17 32 34	18 20 36 44
2.	2 and 2 3 ,, 3 4·5 ,, 4·5 6 ,, 6	7 11 20 30	7 12 22 32	8 12 23 34	9 14 24 35	10 14 26 36	10 15 26 38	10 15 28 40	12 16 32 40	14 20 36 44
2.	2 and 3 2 ,, 4·5 2 ,, 6	8 8 8	9 8 8	9 8 9	9 8 9	10 9 10	10 10 11	10 10 12	13 13 14	14 15 16
2.	3 and 4½ 3 ,, 6	12 13	14 14	14 15	15 15	15 16	15 18	17 19	20 26	20 28
2.	4½ and 6	21	24	26	28	28	30	30	32	40
Load in addition to the weight of bobbin in ounces.		8oz.	12oz.	16oz.	1¼lb.	1½lb.	1¾lb.	2lb	3lb.	4lb.

TABLE VII.

Number of Washers Used.	Diameter of Washers, in Inches.	Load Expressed in 2oz. Units.						
		5	7	9	11	13	15	18
—	No washer.	7	8	10	11	14	15	16
One.	1 1·5 2 3	2 3 4·5 7	2·5 4 6 9·5	3 5 7·5 11·5	3·5 6 9 14	4 7 10 16	5 9 12 18	7 11 12·5 21
Two, equal in size.	1 1·5 2 3	1·5 2·5 4 7	2 3·5 5·5 9	3 4 7 12	3·5 6 8 14	4 6·5 10 16	4·5 7 11 18	6 9 13 20
Two.	1 and 1·5 1 ,, 2 1 ,, 3	1·5 2 2	2·5 2·5 3	3·5 3 4	5 4 4·5	5·5 4·5 6	5·5 5·5 6	6 6·5 7
Two.	1·5 and 2 1·5 ,, 3 2 ,, 3	3 3·5 5	4 4 6	5 5·5 7	6·5 6 9	8 7 11	9 8 13	10 11 15
Load in ounces in addition to the weight of the bobbin, which is 6oz.		4	8	12	16	20	24	30

dynamic drag; whereas the static drag—*i.e.*, the pull required to start the bobbin when at rest—is from 10 to 12 per cent. greater than this amount.

Table VII. shows the amount of drag at different loads for a 6in. bobbin, but it should be remembered that all these drags are measured when the pull is at the surface of the barrel of the empty bobbin. Measuring the pull in this manner brings home to us the variation in the amount of drag due to increase in weight of the bobbin. As the bobbin increases in weight, the radius of the surface of the bobbin increases, so that the pull in the sliver or end becomes slightly less, because the leverage increases quicker than the load. As the leverage increases, so does the length of the end or sliver under tension decrease. This shortening of the length for short wools is a great advantage, because it constantly permits an increasing number of fibres to bear the pull or drag. Where the material is long in staple, it is not a great advantage, because there are a large number of fibres bearing the pull between the twizzle and the barrel of the partially full bobbin. These fibres are strong enough to bear the pull, so that a few more fibres coming into play are of no great advantage to the material to bear an extra load.



Some Experiments on Drag.—Fig. 2.

Machinery at the Glasgow Exhibition.—V.

MESSRS. LANCASTER AND TONGE LIMITED are exhibiting five sizes of the "Lancaster" steam traps, ranging from ½ to 2in. inlet, and suitable for pressures of from 5 to 300lb. per square inch; five types of "Lancaster" pistons; also piston rings and springs ranging from 112in. down to 1½in. diameter as fitted to small piston valves; "Lancaster" metallic packings suitable for rods ¼ to 11½in. diameter; and a collection of "Lancaster" steam separators and dryers from 1 to 6in. bore. A small engine is also shown at work, having each of the specialities named fitted to it, so that they may be examined and tested under working conditions.

The "Lancaster" steam trap is so well known that a detailed description is unnecessary. It should be mentioned, however, that several improvements have been recently effected in its construction and action. The special feature consists in the loose disc valve at the orifice of the discharge pipe in connection with a quick-threaded screw motion worked by the float. This valve is frictionless in action, and, being loose, cannot stick to its seat. It is very prompt in its movements for opening and closing the discharge pipe, and the working parts are very simple and easily examined. It also acts as a safety valve, as any excessive pressure exerted against the face of the loose disc valve would, by virtue of the quickness of the screw thread, force it open. The traps are shown in three classes—for high, ordinary, and low-pressure work; and are also made in the lifting types to lift their discharge water from 1½ to 2ft. for every pound pressure of steam used. In many types of expansion traps the valve and seat are continually cutting and leaking. This defect is obviated by the twisting motion which is continually grinding itself steam-tight.

The "Lancaster" rings and spiral springs are shown at work also in an open cylinder fitted with vacuum and pressure gauge for testing purposes. As is well known, these are extremely simple, consisting of two rings forced outwards and edgewise by one spring only. The former are made from a special mixture of iron alloyed with aluminium; they are close-grained, hard, and take a high polish. The spring is coiled by machinery, by which its strength is gauged very exactly. In this way the makers are enabled to supply a steam-tight piston without any friction beyond what is absolutely necessary. To alter the length and tension of the spring, the ends screw into each other. By varying the distance which one end screws into the other, the diameter of spring can be altered so as to put more or less pressure on the rings, thus furnishing compensation for increased steam pressure or wear. Five types of piston bodies are exhibited. In the ordinary cast-iron piston with junk cover as fitted to stationary engines, attention is drawn to the method of coring out the interior. The cores are all brought out beneath the junk cover, the apertures being closed by the latter when screwed down. The use of plugs is thus obviated and a fruitful source of breakdowns avoided. The junk cover is secured to the piston body by mild-steel screws which are fitted with brass washers to prevent leakage under the screw heads.

For cylinders up to 40in. diameter, many engineers prefer the "Lancaster" Serpent Coil, which is made from round steel, and has many advantages over the old style made from flat steel. The latter often becomes solid with the rings, an impossibility with the Serpent, as a round coil against a flat surface cannot bind, but causes a revolving tendency in the packing. The Serpent Coil has an advantage over the spiral spring, if fitted to a new cylinder that is parallel, as the internal friction between the spring tends to keep the cylinder parallel, while the spiral spring beds itself to the slightest inequality of the cylinder.

Several samples of "Lancaster" composite metallic packings are on view at the Exhibition, and this form of packing is found to be very suitable for Corliss and other valve spindles, as it not only keeps the spindle steam-tight, but also acts as a support for it, and prevents the corrosion so often met with in Corliss spindles. It is also in use on air-pump rods, pump rams, hydraulic lift rams, steam hammers, piston rods, and rotary engines. It is especially suitable for use with superheated steam.

A "Lancaster" steam dryer is shown at work, and a 6in. dryer combined with stop valve is also on view, together with a small dryer in section showing the construction in detail. These dryers combine the advantages of the centrifugal system of separation, and of the type in which the water is separated by gravity. The steam is made to enter the separating chamber at a tangent by means of a deflecting plate placed at the inlet, and its own inertia (the usual speed of steam through pipes being a mile a minute) causes it to descend in a spiral direction to the outlet, and in so doing to throw the heavier water to the outside by centrifugal force, where it is collected in recesses or channels formed by a number of vertical inclined ribs and conveyed to the water receiver below. These inclined ribs also act as a brake to bring the steam to rest, so far as its circular motion is concerned, before it passes up the central outlet pipe. The water and dirt in suspension are thus allowed to fall by gravity into the receiver in the lower part of the dryer, while those particles of water and dirt which cling to the inner surfaces of the dryer are led off by specially-arranged channels to the receiver instead of allowing the incoming steam to lick them up again.

The most extensive portion of Messrs. Royles Limited stand is devoted to the numerous and varied applications of Row's patent tube. This invention has effectually secured in a simple manner the impinging or baffled surfaces so highly desirable when transmitting heat through surfaces from one fluid or gas to another, as in evaporators, condensers, feed-water heaters, calorifiers, dyehouses, etc. All these apparatuses are exhibited in various forms of design to meet the exigencies of varying conditions of application, and demonstrate that this firm have given special study to this section of engineering. There are also shown the well-known "Syphonia" steam trap for high and low pressures, reducing valve for steam, surplus valves for steam, test pumps, and gun-metal valves. The firm have also supplied four large feed-water heaters and their valves and fittings for the electric power and lighting plant in the Exhibition.

Four Lancashire boilers for the generation of steam power in the Exhibition have been lent by Messrs. Penman and Co., Glasgow. Each of these boilers is 30ft. long by 8ft. in diameter, and is designed to work daily at a pressure of 120lb. per square inch. The firegrate area in each case is 39 sq. ft., and the flues are fitted with the ordinary cone tubes to increase the water circulation, while the safety valve is of the deadweight type.

A Sturtevant induced-draught plant is placed between the chimney and economiser. It consists of a large fan built alongside of and connected with the interior of the flue by sheet-iron suction and discharge pipes. This fan is driven by a 5¾ by 4in. vertical steam engine at 450 revolutions per minute, and draws the products of combustion from the flue, thus producing a partial vacuum, and inducing the additional air required.

Two large-sized Babcock and Wilcox boilers are working, each having a heating surface of 5137 sq. ft., and each boiler containing 234 wrought 4in. iron tubes with ends expanded into continuous staggered headers. The several sections are connected at the rear with a steel cross drum of 20in. diameter, 8ft. 6in. long, on which is placed a 7in. saturated-steam valve. In addition each boiler is fitted internally with a Babcock and Wilcox patent superheater, capable of imparting from 100 to 120° F. superheat to the steam produced. These boilers are suspended from wrought-iron girders resting on cast-iron columns with cast bases, so that they are sustained entirely independent of the brickwork, and are free to expand or contract. Each boiler is also provided with a Babcock and Wilcox chain-grate stoker, worked by eccentrics on a shaft on the upper front of the steam drums. These boilers are good for 2000 I.H.P.

There is for each of the water-tube boilers a wrought-iron chimney 80ft. high by 4ft. internal diameter, with brick base 8½ft. high and 7ft. square, capped with a cast-iron baseplate, built in four sections and bolted together, every plate being secured to the brickwork by four anchor bolts, each 8ft. long. The four Lancashire boilers have one wrought-iron chimney in common, 80ft. high and 6ft. internal diameter, which also rests on a cast-iron ribbed bedplate, built in segments and secured to a brickwork foundation by long tie bolts. The chimneys and bases are suitably protected by a lining of firebrick, the funnels being maintained in their position by ¾in. flexible steel guys, fitted with tightening screws, etc.

Connected with the boiler outfit are two Excelsior "Wright" patent non-pressure heaters, which contain filter and oil separator, and two No. 12 Berryman heaters. These heaters, which are placed in the southern end of the boiler-house, are 16ft. and 19ft. 6in. high respectively, and 3ft. 6in. in diameter. The Excelsior heaters are supplied by water at gravitation pressure through a 4in. automatic feed valve, falling over spreaders on to a steam baffle plate, and then through perforated grease plates into a chamber, whence it is drawn by the pump. For the Berryman heaters the feed water is forced under pressure by the pump and discharged from the top by a 5in. outlet. These heaters are served by a set of Worthington 9in. and 6in. by 12in. vertical direct-acting feed pumps, capable of delivering 35,000lb. of water per hour against a pressure of 160lb. per square inch.

Smoky Furnaces, and How to Avoid Them.

(Concluded from page 274.)

IN all cases named the best results as regards perfect combustion would always be obtained by firing on the coking system, as in Fig. 1. Where mechanical stoking is employed, the coking system will often prove best in the ordinary furnaces of Lancashire boilers, because, except for the cold furnace crown, the conditions are present for perfect combustion. Where the sprinkling system is employed, there will almost invariably be a steady stream of smoke, aggregating a considerable volume during a day, and of serious moment if it were collected into a number of separate clouds, as in hand firing, but, as it is, passing the eye of the inspector, because, though continuous, it is not dense.

A continuously-sprinkled fire never appears to attain a really high clear temperature, as in intermittent hand firing, and *this shows what is the average condition to be obtained in a furnace more or less water-cooled*, and how essential it is to abolish such conditions with bituminous fuel. In the event of perfect combustion, 1lb. of good coal will give out about 15,000 B.T.U. If its perfect combustion is secured with even so little as 14lb. of air, the resulting products will weigh 15lb., and the temperature will thus be $\frac{1000}{K}$ F., K being the relation of the specific heat to unity. With ordinary furnace gases, the specific heat, as ordinarily accepted, is about 0·2, very nearly. Thus a temperature of about 5000° appears possible. But in ordinary cases, with a total weight of 25lb. of gases produced per pound of coal, and a coal of only 12,500 B.T.U. capacity, the temperature cannot exceed 2500°. This neglects the possible, or rather probable, if not certain, reduction of temperature due to the increase of specific heat of gases at high temperatures. Now with plain carbon fuels all the possible temperature attainable is attained upon the grate, but in the case of bituminous fuels the firegrate temperature is at most three-fourths of that due to an equal weight of pure carbon, and even this temperature is reduced by the duty of volatilising the hydrocarbons. These hydrocarbons only add to the temperature as they burn off, and this must often be many feet from the firegrate. Here we see the difficulty of bituminous coals—an initially low temperature on the grate, and we find this low temperature further reduced by the boiler plates or tubes before the hydrocarbons are well ignited; and they never do become well ignited, for the parts of the boiler continue to absorb heat more quickly than any possibly continuing partial combustion can supply. Herein lies the whole difficulty of bituminous combustion—a difficulty that has apparently baffled all inquirers, but has done so because they have persistently ignored the vital principle of sufficient temperature, and have failed to observe that the locus of heat generation of bituminous fuels is not a point, but a line of considerable length, and it is only by embodying this fact that success is to be attained. Exactly the same error was made by most designers of refuse destructors. Here the burning of a fuel, laden with moisture and containing a large proportion of green vegetable matter, has been attempted upon the grates of boilers which themselves formed one boundary of the furnace. In such circumstances it is impossible for thorough or odourless destruction to take place, and successful destruction is only possible where the furnace is completely refractory, and where there is a sufficient further length of firebrick flue to be maintained at a clear red heat, so that any sudden outburst of polluted steam may be heated to a red temperature before any attempt is made to utilise the heat for boiler purposes. I am perfectly aware that it has been held by men of high standing that bituminous fuels are useless to the extent of the 20 or 25 per cent. of hydrocarbons they contain, and I am as fully persuaded that this false doctrine is merely a form of confession that its propounders have failed to grasp the facts of combustion, not only chemically, but physically and mechanically. Chemically, there appears to be nothing wanting but a certain proportion of oxygen, and, given this, where failure results it is laid to the coal by those who have no remedy but double-priced Welsh, irrespective of even Professor Dixon's statements that the combustion of hydrocarbons demands the presence of water vapour in some proportion, or of the doctrine of mass action, which teaches that combustion or other chemical action does not complete itself to the entire elimination of the constituents concerned.

Physically, there appears lacking nothing but a sufficiency of temperature, and it is in the physical aspect that boiler furnaces appear to me always to have been neglected. Mechanically, attention has been paid in the long furnaces of Lancashire boilers to the mixture of air and gases, and even Belleville attempted to secure mixture by violent mechanical means, so as to burn the fuel gases before they got to the cold tubes. If the North-country coalowners would apply some of the rich harvest of about 20s. per ton in excess of the prices that have ruled for years before the late rise to a repetition of the Wigan coal trials on different lines, they might supply a market that has been handed over to South Wales from sheer ignorance and apathy.

The Wigan coal trials demonstrated that in ordinary Lancashire furnaces the bituminous fuels of Lancashire and Cheshire could be burned smokelessly by good hand stokers, with a nice draught and well-arranged air admission. But I think they also help to prove that the critical margin between success and failure is too narrow, with water-cooled furnaces, to be relied on in most cases in actual practice. What is now wanted is a series of tests upon furnaces designed in accordance with experience, and I maintain that no furnace is so designed which includes a serious area of water-cooled plates. It is pitiable to see the North-country coalowners weeping over a shilling export tax on a very small proportion of their coal, when a subscription of one-tenth of a penny per ton for one year on the 180 millions of tons raised by them and other bituminous coalowners would bring in £75,000—a sum far in excess of what is needed for experiments to show how bituminous fuel might command the same price as Welsh, which price is up to 10s. a ton in excess of bituminous. Like so many of our rich men, the coalowners have waxed so fat and gross that they have lost all that spirit of enterprise and initiative that put England in the first rank. They have not failed to bleed an extra 20s. a ton out of the public "because of the war" on all their production, and now they grudge the paltry 1s. tax on a small fraction to pay a small proportion of the cost of a war that has meant millions to them in extra profit.

Some years ago, when the Manchester Steam Users' Association carried out the Wigan coal trials, they showed that the Lancashire boiler could be fired smokelessly and produce an evaporative effect equal to Welsh if proper care were only taken by skilled stokers and circumstances generally were favourable.

It is my endeavour to point out that circumstances very rarely are favourable in practice. The draught is poor or the flues are bad, or the fireman is inefficient, or some fault is present that militates against success, and it is evidently useless to depend upon a system which has a critical point so close to failure. It is thus really necessary that bituminous fuels should be further tested under suitable conditions, and shown to be capable of true combustion, not simply under favourable conditions, but under ordinary conditions, and this can only be done when the temperature is high. Temperature is, in fact, the prime necessity. Other factors are easy to secure.

The Selection of a Steam Engine.

In purchasing a steam engine for a certain specified purpose, a clear statement and understanding of all the conditions conduces towards a low contract price and satisfactory performance. The first consideration, says Mr. W. D. Dennis in the "American Electrician," is the size. This depends upon the average load, the maximum load, the steam pressure, back pressure, number of revolutions, and point of cut-off.

The most economical point of cut-off is, for simple engines, usually considered to be at from $\frac{1}{5}$ to $\frac{1}{4}$ full stroke. It is usually good practice to buy an engine of suitable size to develop the average amount of power required at $\frac{1}{5}$ cut-off; but if the load is highly variable, it may be necessary to make the engine larger than the rule would require in order that it may handle its maximum load. If the engine drives an electric generator, it should be capable of furnishing the amount of power that the generator will require when carrying its maximum momentary load.

The capacity of the engine depends upon the steam pressure, back pressure, cylinder dimensions, and speed. The horse-power that will be developed in the cylinder is equal to $\frac{P\,L\,A\,N}{33{,}000}$, in which P is the mean effective steam pressure, L the length of stroke in feet, A the net area of the piston in square inches, and N the number of single strokes per minute. The value of P for engines actually in service is, of course, determined by means of an indicator. For a proposed engine it may be computed from the proportions of an ideal indicator card by the familiar formula :—

$$P = \frac{P_1\,(1 + \text{hyp. log. Exp.})}{\text{Exp.}} - p,$$

in which Exp. represents the number of expansions; P_1 the initial pressure absolute; and p the back pressure absolute. For $\frac{1}{5}$ cut-off the formula becomes

$$P = 0{\cdot}5219\,P_1 - p.$$

Allowing 20 per cent. for the difference between the mean effective pressure thus calculated and that obtained in actual practice, the horse-power of a proposed simple engine is equal to

$$\frac{0{\cdot}8\,(0{\cdot}5219\,P_1 - p)\,L\,A\,N}{33{,}000},$$

or

$$\frac{(0{\cdot}4175\,P_1 - 0{\cdot}8\,p)\,L\,A\,N}{33{,}000}.$$

In practice a common piston speed is 600ft. per minute. To compare a number of proposed engines on this basis the horse-power may be calculated by means of the reduced formula

$$\frac{(0{\cdot}5219\,P_1 - p) \times (A - 0{\cdot}5\,a)}{688},$$

in which A is the area of the piston, as before, and a is the cross-sectional area of the piston rod in square inches.

Having determined the size of engine required, from the foregoing and other considerations, there are still many points to be settled. Shall the engine be simple, compound, or triple-expansion? Shall it run condensing or non-condensing? Shall it have a standard girder frame or a self-contained base, or must it be designed on heavy-duty lines? Shall it be slow, medium, or high-speed? Shall it be governed by throttling or by varying the cut-off? Shall the valve gear be plain sliding, Corliss, or gridiron?

For a multiple-expansion engine to be highly economical as compared with a simple engine of the same capacity, the load must be constant within reasonable limits, the units must be large, the initial steam pressure must not be less than 125lb., and the engine must be run condensing. The multiple expansion engine costs more per horse-power of capacity than a simple engine; piping for pressures upward of 125lb. is expensive, but the condenser produces practically no additional cost, as it will be paid for by the increased capacity of the engine when running condensing.

A good condenser with an ample supply of cold water should maintain a vacuum of not less than 24in. on the engine for which it is designed. This is equivalent to 12lb. pressure, and acts for nearly the entire length of the stroke. If from the gain thus obtained we deduct 25 per cent. to cover the cost of power to operate the condenser, and the slightly decreased vacuum at beginning and end of stroke, the saving due to the condenser is

$$\frac{9\,L\,A\,N}{33{,}000},$$

or the engine will use

$$\frac{900}{0{\cdot}41752\,P_1 - 0{\cdot}8\,p}$$

per cent. less steam than before.

If exhaust steam can be used for heating buildings or for warming water, it may be more economical to run the engine non-condensing. Let q = the pounds of steam used by the engine per indicated horse-power per hour. The total amount of steam used per hour is then

$$\frac{(0{\cdot}4175\,P_1 - 0{\cdot}8p)\,L\,A\,N\,q}{33{,}000}.$$

Let r = the percentage of this steam that can be utilised to heat buildings, feed water, etc. The amount of steam that can be utilised after passing through the engine is then

$$\frac{(0{\cdot}4175\,P_1 - 0{\cdot}8\,p)\,L\,A\,N\,q\,r}{100 \times 33{,}000.}.$$

If this exhaust steam can be circulated through coils or mingled with feed water at two-thirds the effectiveness, pound for pound, of live steam, the amount of live steam saved by its use is

$$\frac{\frac{2}{3}\,(0{\cdot}4175\,P_1 - 0{\cdot}8\,p)\,L\,A\,N\,q\,r}{100 \times 33{,}000}.$$

This is to be compared with the amount that might be saved by the use of a condenser, which is $\frac{9\,L\,A\,N}{33{,}000}$. For the operation of a condenser to be economical, therefore, r must have a value less than $\frac{1350}{0{\cdot}4175\,P_1 - 0{\cdot}8\,p}$. Otherwise it will be cheaper to run on back pressure, venting surplus steam to the atmosphere.

The form of frame to be adopted for an engine depends upon the duty, and also upon the condition of the sub-foundations. For loads liable to sudden variations, or where there is a liability to overload of considerable duration, or on soil of such a nature that good foundations are impossible, the frame must be extra heavy. Small engines may be self-contained—that is, having a continuous base under cylinder, guides, and bearings. Larger engines subjected to heavy service, as above described, should have a single body from the cylinder, under the guides, to and including the main pillow block.

The question of speed is important. Generally, high-speed engines, with a comparatively short stroke, are more economical, because of the decreased time and surface for cylinder condensation. They require more attention and a greater expenditure for repairs than slow-speed engines. For direct connection to electric generators, especially in the smaller sizes, high-speed engines are essential. For other purposes they are not in so much favour. The first cost is low, as the frequency of the strokes allows the cylinder dimensions to be made small. The gain in economy due to decreased cylinder condensation is in many cases more than counterbalanced by the defects of the valve gear.

The only economical method of governing an engine is by varying the point of cut-off. This requires a special valve controlled separately from the main gear. The control should be positive, if possible, for the entire stroke, so that the governor will not lose control on light or heavy loads. The governor itself must be sensitive to the slightest variation in speed, and prompt and powerful in its action. These requirements are considered by most builders to be more satisfactorily met by a governor of the "fly-wheel" or "shaft" type than by the older fly-ball governor.

The type of valve gear is usually selected with regard to individual preference. Corliss valves for moderate speeds have shown some advantage over slide and piston valves. In the large units installed in central stations of the present time, the gridiron type of valve, with each port separately and positively controlled, appears to be most in favour.

Other minor points which should receive careful consideration before purchasing a steam engine are the following :—Bearings: Size and proportions, oiling connections and disposition of waste oil. Crosshead: How adjusted, if at all; method of connecting to the piston rod; the connecting-rod connection to the wristpin; the cylinder drips; cylinder lagging or jacket; eccentric straps and rods; piston construction; throttle valve, and belt-wheel or fly-wheel.

THE directors of the Castleton Moor Spinning Company, Rochdale, have placed the order for mules for their new mill with Messrs. Platt Brothers and Co. Limited, of Oldham.

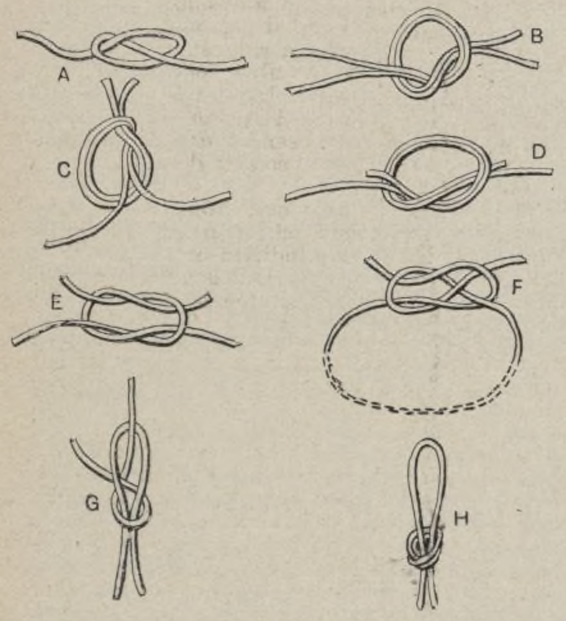
EXTENSIVE repairs have been carried out at the mill of the Garfield Spinning Company, Milnrow. New boilers have been put down and the engines tripled, while provision has been made for a sprinkler installation.

WE are informed by the Pulsometer Engineering Company Limited that owing to the growth of their business they have acquired twelve acres of land at Reading, on which they have erected new works. All communications should now be addressed to Nine Elms Ironworks, Reading, Berks. The offices and showroom at 63, Queen Victoria-street, London, E.C., are being retained.

RAW MATERIALS, PROCESSES, FABRICS, &c.

Weavers' Knots.

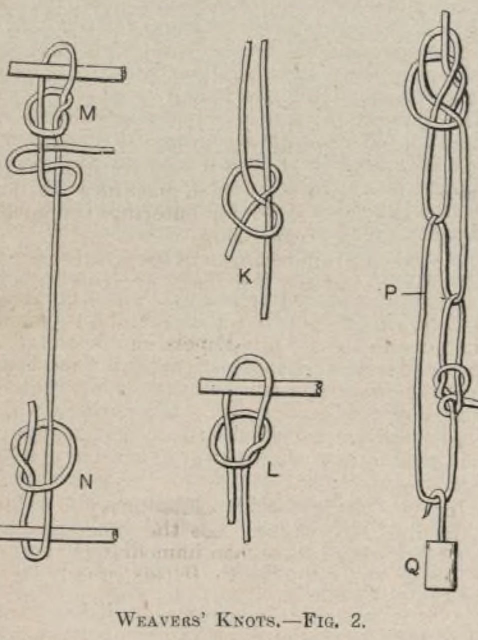
THE round knot is either single or double. The single knot A, Fig. 1, is but rarely used, and then it is employed for preparing a loop or to hold another knot. The double form B joins two ends, and is sometimes used by silk weavers in threading shuttles. In the ordinary knot formed on the finger tips, C, the ends of the threads project in the same direction. This knot, which comes wholly on one side of the thread, is frequently caught by the reed and the heddle eye, and it is best to use that shown at D, where the two ends project in different directions, thus distributing the knot more around the thread so that it passes more easily through the heddle eye and reed than the preceding knot. These two knots (C and D) are used for splicing warp threads: the first when the yarn is fine and the reed coarse; the second when the yarn is coarse and the reed fine.



WEAVERS' KNOTS.—FIG. 1.

When the warp threads are either double or three-ply, and one of the single strands breaks, it is not drawn through the heddles and reed, but is simply twisted around one of the other strands, as shown at K in Fig. 2.

The flat knot shown at E in Fig. 1 is used when it is desired to tie two ends which are to be subjected to considerable strain, such as the lacing of jacquard cards. A weaver's knot is shown at F, which is frequently used in putting new heddles into the jacquard loom and for similar small cords. It is, however, says "Les Metiers à Tisser," less secure than the preceding one E, and is formed by the finger and thumb-nails; it can be quickly



WEAVERS' KNOTS.—FIG. 2.

tied, and there is the additional advantage that it can be formed very close to the end of the thread. The knot shown at G is used more especially to fasten the harnesses. A running knot is shown at L in Fig. 2, which is used when it is desired to connect two parts at a variable distance by means of one cord. When the length is determined, the cord is fastened by a second knot shown underneath the knot at M. Another knot is shown at N, which is frequently used in mounting harnesses on silk looms; a two end knot is shown at H in Fig. 1. A knot called the pulley-tackle knot is shown at P in Fig. 2, and is used for the suspension of harnesses, large reeds, etc. This ingenious arrangement enables the position of the suspended body to be easily adjusted. By pulling the end P downward the weight Q is lowered, and by pulling the end P up this weight is raised.

Points on Loom Fixing.

(Concluded from page 278.)

IN Fig. 15 is shown the wrong method of repairing the picking shaft of the cotton loom, consisting of bracing it with a piece of wood and a bit of leather, as at A and B. This piece of wood is very liable to loosen, through shrinking and warping, and to become useless for the purpose intended. In some places the writer has noticed that defects of this sort are quite frequent among the looms, resulting in bad work throughout. If a loom is thus braced while being used on fine work, the chances are that the finer threads will be chafed, for the reason that with each pick of the loom the lay will be caused to shift slightly from side to side, producing the wear which so often makes unevenness in the finished fabric. The point of the wood brace at C is usually required to rest upon the oil hole. This is a bad defect, for it prevents the weaver applying the proper proportion of lubricant. Just so soon as this part of the bearing of the shaft runs dry there is trouble, and the action of the whole loom is affected. If the bearing is heated in the least, frictional contact will be so increased that wear will occur and loss of power result. In some places a cast or wrought iron piece of metal E is used, which is made just long enough to press down hard upon the cap of the box. As the piece can be bolted to position and caused to rest securely in place, there is not so much danger of its working loose and dropping out, as with the block of wood. The point being smaller, it does not stop the oil channel. This piece is bolted on at F. The box C should be provided with good bolts with perfect threads, and the nuts should be securely tightened, all of which will help in making the parts tight and lasting.

In Fig. 16 is shown how some of the cotton looms are often run with balls completely worn out of form. A picking ball of the shape represented in this illustration, with the grooving cut into it at G through constant contact with the wing of the picking shoe, cannot be made to do the right service, and should be thrown off and a new one replaced. In some mills they attempt to run these picking balls even when badly grooved and scored; but this ought not to be permitted. It may result in a saving in the cost of repairs on the looms at first, but the final repair bill will be all the larger, owing to the general wear of the parts due to the irregular motion of the defective part. These balls are sometimes worn so badly that much of the surface contact on the wing is lost, and only part of the motion results. Loss of motion at the picking ball and shoe means the unsteadiness of the whole shuttle movement, which should not be allowed to run without repairing. The remedy consists in putting on a new ball. In some cases the worn balls have been turned down on lathes and used again; but this method is not advisable.

In Fig. 17 is shown a specimen of one of the picking ball studs in the condition so familiar to the experienced fixer of cotton looms. The picking shoe will wear more or less in course of time with all the parts of the power picking motion. In this case we show the stud which carries the picker ball on the picking arm. The stud may be securely set in the arm and be of no avail, so far as steadiness is concerned, if the ball itself is so badly worn as to tip to one side, or if the stud is cut into, as shown. The depression in the stud is shown at H, where a sort of shoulder is formed in consequence of the wearing-off of the metal. The ball settles into this depression, and there it hangs. This makes just so much lost motion, and lost motion in the shuttle motion of a fast-running modern cotton loom is a bad thing and should be remedied at once. In instances of this kind the stud may be rectified by replacing it with a new one, if badly cut; or if no new ones are at hand, then the best way is to take the stud to the shop and have the smith heat and reforge it, drawing up the end so as to make up for the wear. Then the machinist can turn the stud down to the proper cut in the lathe, and practically a new stud results.

Sometimes the wings of picking shoes are badly cut into, as illustrated at J, Fig. 18. This, of course, is caused by this portion of the shoe receiving the full force of the blow of the picking ball as it comes over in describing its circle. Often this place is so badly cut by constant use and wear

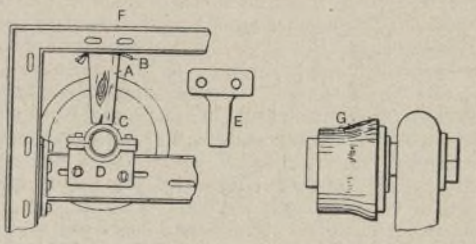


FIG. 15.—POINTS ON LOOM FIXING.—FIG. 16.

of the ball that only a thin piece of metal remains, and this can be readily broken into. As soon as the metal breaks away, corners are formed for the clogging of the motion of the picking ball, and ofttimes this is carried to such an extent as to affect the entire action of the loom. Anyone can put his hand on the lay of the loom thus affected, and he will observe a tremour at every pick. Each revolution of the picking motion means a shock to the entire frame and mechanism of the loom, and

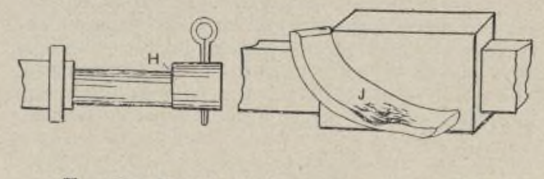
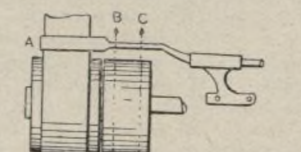


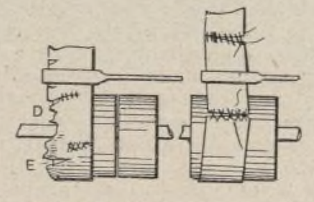
FIG. 17.—POINTS ON LOOM FIXING.—FIG. 18.

it is no wonder that such looms are shaken out of their usefulness in a few years after being put into service. These things perhaps did not happen ten or twenty years ago, when looms were operated at medium speed, but in these days of fast-running looms, says a writer in the "Tradesman," new things occur which must receive the attention of the fixer, in order to keep the machinery from going to pieces prematurely. In the event of a shoe wearing down as shown in this figure, there is only one thing to do, and this consists in removing the defective shoe and replacing it with a new one. Patching the wings of the shoes cannot be done successfully, and should not be attempted.



POINTS ON LOOM FIXING.—FIG. 19.

Many fixers get into trouble with their looms through the defective condition of some of the adjusting screws. It should be remembered that the action of a loom will cause parts to loosen if there be weak places in the threads. There are many instances in which parts of looms will not hold their position securely on the shafts or rods. The fixers would, of course, complain severely, and sometimes state that the loom itself was at fault, and brace and wire parts in all sorts of ways, but to no purpose. An investigation has brought out usually the fact that the set-screws are affected. One side

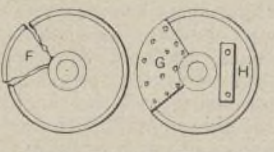


POINTS ON LOOM FIXING.—FIGS. 20 AND 21.

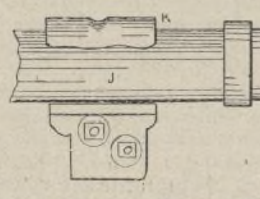
of the threads will probably be stripped off, and perhaps the screw itself eaten into by corrosion or other means. At least the thread is weakened, and the set-screw permitted to lose its proper grip, thus working out of its seat more readily. These defects are, of course, easily remedied by using new screws; but fixers often neglect to do this. The best plan is to inspect the set-screws, and whenever any imperfect ones are found, substitute new ones.

There is a great deal gained when the driving belt of the loom is made to keep its proper position, full and even, on the driving wheel, as shown in Fig. 19, in which the shipper is marked A. Here we have the belt on the loose pulley; and when it is shifted to the fast one, care should be taken that the shipper carries it to the line C, so as to get the full benefit of the wheel. If the belt is sent over only to the first line B, so little of the fast pulley is gripped that the belt constantly slips, and trouble ensues. Many looms which give trouble may be set to rights quickly by simply adjusting the belt shipper so as to let the belt go over far enough on the tight pulley to get the required frictional contact.

In Fig. 20 are shown the conditions that prevail when the belt is allowed to run on the outer edge of the loose pulley. The edges of the belt become torn and ragged, as at D and E, and in a very short time become unserviceable. Many a good belt is ruined this way in a very short time. Again, belts are often discovered running in the way represented in Fig. 21, which is just as bad, for the reason that the belt is caused to wobble from side to side in its course over the wheels, and after a few months' run of this sort the loom pulleys also begin to wobble. The best thing to do with belts like that shown in this illustration is to restore the worst portions with new pieces, but if possible use an entirely new belt. Manufacturers of cotton goods must necessarily economise, and the fixers may not be furnished with the proper supply of leather belting, in which event the only thing to do is to open all of the crookedly joined sections of the belt, and, after cutting the ends evenly, make good lace holes, all cut to pattern, and then close up the butts in systematic order. When this is done it will be found that the belt which previously wobbled will run straight, and will not jar the loom at every revolution.



POINTS ON LOOM FIXING.—FIGS. 22 AND 23.



POINTS ON LOOM FIXING.—FIG. 24.

In Fig. 22 is shown how pieces of the balance wheels of cotton looms are sometimes snapped, and even lost, in which case the driving belt may be cut, unless the defect is covered with sheet metal, as is usually the case. But the main idea is that in replacing the broken piece and securing it with an additional patch, as at G, Fig. 23, we throw the wheel out of balance, and a shaky loom is the result. This irregularity of motion can be regulated to a considerable degree by simply attaching to the opposite side of the wheel a bit of metal large enough to counterbalance the weight of the patch on the opposite side, and so balance the wheel. The additional piece is marked H.

In Fig. 24 is shown the shaft J of a loom, and that part of the cap of the box which should protect the shaft is gone, being broken off at K. The result is that flyings of all kinds get into the bearing and absorb the oil and make the bearing run poorly. Then, if the flyings get to choking the parts, enough of the foreign substance may get wedged into the remaining portion of the cap to cause the action of a brake, and this will produce loss of power. If several bearings on one loom are thus affected, that loom will require considerable extra power to drive it. The loom should be examined for broken caps, and whenever any are found, they should be replaced with new, or the old pieces should be secured and carefully patched in.

The Speed of American Spindles.

SOME time ago a discussion took place as to the relative speeds of English and American spindles, which was rendered futile by the absence of reliable data. This scarcity of information, as regards the American side of the question, has been overcome by the "Textile Excelsior," of Charlotte, whose representative has collected from thirty different mills all available data and other interesting information. The statistics refer to Southern mills only, but the Southern States, being latest in the field, are naturally supplied with the newest machinery. The particulars given are accurate, with the exception of the figures shown in columns under "pounds per spindle per week of 66 hours." It is impossible to appreciate the difficulty in getting the production per spindle unless one has undertaken the work. The average manager keeps a poor record of his production per spindle, and when he does give a figure it is often approximated, and falls short of showing the actual conditions.

The speeds of spindles were calculated from the diameter of the cylinder and spindle whorl, and speed of cylinder. In making these calculations, the smallest diameter of spindle whorl was used, with 12 per cent. off for band slippage, which gives about the same result as allowing $\frac{1}{16}$in. on diameter of whorl for band surface, and deducting 5 per cent. for slippage. To get the actual speed of spindle the conditions of the bands must be taken into account; however, the above will cover the average conditions.

WARP YARN.

Name of Spindle.	Dia. of Ring in Inches.	Length of Traverse in Inches.	Number of Yarn.	Revs. Front Roll.	Dia. of Cylinder in Inches.	Speed of Cylinder.	Dia. of Spindle Whorl in Inches.	Speed of Spindle.	Pounds per Spindle per Week of 66 Hours.
D 72	2	6½	8's	148	7	765	13/16	5,700	5·50
Whitin......	1¾	7	10	145	7	850	13/16	5,560	4·80
Whitin......	2	7	10½	130	7	875	7/8	6,160	4·50
McMullen.	1⅞	7	12½	162	7	1070	13/16	7,950	—
Whitin......	1⅞	6	13	147	7	1100	7/8	7,740	4·02
49 D	1⅞	6	13	148	7	1020	13/16	7,740	4·16
McMullen.	1⅞	6¾	13	154	7	982	13/16	7,560	4·47
D No. 2 ...	1⅞	6½	13	150	—	—	—	—	4·12
49 D	2	6	13	158	7	1050	7/8	7,390	—
D No. 2 ...	1⅞	6¾	13	122	7	908	13/16	6 890	—
Whitin......	1⅞	7½	13	144	7	1020	7/8	7,180	4·12
D No. 2 ...	1⅞	7	13	160	7	1150	13/16	8,720	4·48
Whitin......	1⅞	6½	14½	128	7	1060	13/16	8,040	3·50
Whitin......	1¾	6	14½	132	7	1075	3/4	8,830	2·65
D No. 2 ...	1¾	6	15	148	7	1025	13/16	7,780	—
D No. 2 ...	1¾	6	15½	132	7	995	13/16	7,390	2·90
Whitin......	2	7	15	130	7	1025	7/8	7,220	—
McMullen.	1¾	6	16	148	7	1300	7/8	9,150	—
D No. 2 ...	1⅞	6¾	16	123	7	990	13/16	7,350	—
McMullen.	1¾	6	16	155	7	1075	13/16	8,160	—
McMullen.	1¾	6	16	143	7	1080	13/16	8,190	—
D No. 2 ...	2	7	20	126	7	1150	13/16	8,725	2·25
Whitin......	1¾	6	20½	120	7	1150	7/8	8,100	2·27
Whitin......	1¾	6½	21	135	7	1300	7/8	9,150	2·45
McMullen.	1⅞	6½	21	136	7	1220	13/16	9,250	—
D No. 2 ...	1⅞	7	21	122	7	1135	13/16	8,510	—
Whitin......	1¾	5½	22	104	7	1075	3/4	7,570	2·00
Whitin......	1⅝	6	22	100	7	850	3/4	7,000	—
Whitin......	1¾	6	22	140	7	1200	13/16	9,100	2·20
D No. 2 ...	1⅞	6½	23	112	7	1120	13/16	8,500	1·70
D No. 2 ...	1¾	6½	23½	118	7	1200	3/4	9,850	1·85
D No. 2 ...	1⅝	5½	28½	112	7	1115	3/4	9,160	1·52
D No. 2 ...	1½	6	29½	116	7	1185	3/4	9,730	2·32
D No. 2 ...	1¾	6½	30	104	7	1175	3/4	9,650	1·31
D No. 2 ...	1⅝	6	30	115	7	1225	3/4	10,060	1·53

WEFT YARN.

Name of Spindle.	Dia. of Ring in Inches.	Length of Traverse in Inches.	Number of Yarn.	Revs. Front Roll.	Dia. of Cylinder in Inches.	Speed of Cylinder.	Dia. of Spindle Whorl in Inches.	Speed of Spindle.	Pounds per Spindle per Week of 66 Hours.
Whitin......	1⅝	6½	7's	150	7	625	7/8	4400	6·36
Whitin......	1⅝	6½	11	120	7	750	7/8	5280	4·90
McMullen.	1½	6½	12½	188	7	980	13/16	7440	—
D No. 2 ...	1 7/16	6	13	142	7	770	13/16	5840	—
McMullen.	1½	7	13½	185	7	900	13/16	6830	4·47
Whitin......	1⅜	5½	14	138	7	875	3/4	7188	3·00
Whitin......	1½	6	14	165	7	860	7/8	6056	3·75
Whitin......	1 7/16	6	14¾	165	7	905	7/8	6360	4·07
D No. 2 ...	1⅜	6½	14½	170	—	—	—	—	3·93
49 D	1½	6	15	174	8	960	7/8	6730	—
Whitin......	1⅜	6	15	136	7	755	3/4	6200	—
Whitin......	1¾	6	15	108	7	600	11/16	5280	—
49 D	1⅜	6	14½	151	7	775	3/4	6370	5·01
Whitin......	1¾	6	15½	140	7	850	7/8	6000	4·80
49 D	1⅝	6	16	150	7	740	3/4	6080	—
Whitin......	1⅜	5½	15½	142	7	820	3/4	6740	—
D No. 2 ...	1 7/16	6	16	149	7	900	13/16	6380	—
49 D	1 7/16	6½	17	138	7	950	13/16	7210	3·93
49 D	1⅜	6	16	125	7	775	3/4	6360	4·96
McMullen.	1½	6½	22	136	7	990	13/16	7510	—
D No. 2 ...	1⅜	7	18½	141	7	950	13/16	7210	—
D No. 2 ...	1⅜	6	22½	125	7	950	13/16	7210	—
D No. 2 ...	1¼	5½	23	131	7	890	13/16	6750	—
McMullen.	1½	6½	24	148	7	1065	13/16	8080	—
Whitin......	1 7/16	6½	24	146	7	1300	13/16	8550	2·31
Whitin......	1 7/16	6	24	140	7	1090	7/8	7675	2·24
49 D	1⅜	5½	24	114	6¼	1015	3/4	7450	1·89
D No. 2 ...	1⅜	5½	24	140	7	990	3/4	8120	—
Whitin......	1½	5½	26	100	7	850	13/16	6450	1·75
D No. 2 ...	1¼	6	36	108	7	980	3/4	8050	1·18
D No. 2 ...	1⅜	5½	40	96	7	1040	3/4	8540	1·00
D No. 2 ...	1⅜	6	42½	107	7	935	3/4	7680	1·13
D No. 2 ..	1⅝	5½	46	96	7	920	3/4	7560	1·12

THE statistical department of the Government of India has prepared a return showing the quantity of yarn spun and woven goods produced in British India and in Berar and the native States during the twelve months ended March 31, 1901, and for each of the two previous years. The production of spun yarn in 1898-99 was 512,385,105lb.; in 1899-1900, 513,923,248lb.; and in 1900-01, 352,973,087lb. The production of woven goods was, in 1898-99, 101,689,943lb.; in 1899-1900, 98,064,807lb.; and in 1900-01, 99,047,500lb.

Carbonising Light Woollen Goods.

THE carbonisation of woollen goods is considered by many to be a simple and easy operation, which, however, it is not, for the process is based on the careful employment of acids, requires high temperatures, and involves the use of strong alkalies. With these, if the proper precautions be neglected, the process will prove fatal to the wool fibres, and result in defects that will not only be perceptible during the subsequent operations, but will also be irremediable. Carbonisation has become such an indispensable part of woollen goods manufacture that no prudent manufacturer will do without it, because the advantages of its use are so great that the disadvantages, and possible losses weigh but lightly in the balance.

The manufacture of dress goods has likewise drawn upon the assistance of carbonisation within the past few years to a large extent, on one hand to meet the increasing refinement of the customers' taste, and on the other to make use of foreign wool and noils, according to need and price. As a general thing, in order to obtain complete success in carbonisation, the goods are carbonised before being milled. By this arrangement two advantages are gained: First, in the subsequent carding, all burrs are entirely removed; secondly, the dyeing is made considerably easier, because by reason of the use of alkalies in the subsequent milling every trace of acid disappears. Up to the present time it has been found most advantageous to use sulphuric acid as a chemical means to remove burrs, etc., and this process is divided into the following stages:—

The pieces, as they come from the loom, are taken to the washing machine, and with the aid of warm water with the addition of soda later, are freed from all impurities such as glue, starch, etc. The use of warm water is urgently recommended, as it is only with warm water that such substances as glue, starch, etc., can be removed. The manufacturer therefore must not be afraid of the slightly additional expense, if a sure and safe result be desired. In the case of many washing machines it is possible to connect a steampipe, so that the preparation of warm water becomes a slight consideration. The addition of soda causes the removal of oily ingredients. Care should be taken that this cleansing be thoroughly and carefully executed, as upon it depends the dyeing and finishing results. The pieces are then rinsed and whizzed, and are ready for carbonisation.

For this process the pieces are put into a tub or vat filled with clean water. The bath is given a strength of 4° Bé. by the addition of sulphuric acid, the tub being provided with a winding apparatus moved by means of belting. The pieces are entered into the sulphuric acid bath, and remain there from twenty to thirty minutes—that is, until the burrs and vegetable parts, such as cotton and jute, have thoroughly taken up dilute sulphuric acid. The pieces are then rolled upon the winding apparatus, allowed to drain off completely, and are then placed, in a folded state, upon a truck and conveyed to the hydro-extractor. This machine, to be adapted to carbonisation, must be very carefully and strongly built, and should be obtained only from a first-class, reliable machine building firm. Furthermore, care must be taken that the hydro-extractor, while in operation, runs at a very high speed, and in order to make sure of this, the machine should always be kept well greased. Again, the belts must never run slack, but must always be kept at a good tension. Therefore, as the uniformity of evolutions is not so easy to regulate in machines driven from above, the latter are frequently given the preference for piece carbonisation, although such machines are not so conveniently arranged for entering the goods as are those driven from below.

When the goods come out of the hydro-extractor, the selvedges, if any ornamental cotton threads be contained in them, are stroked with soda solution or water-glass. The pieces then come into a drying room heated to 40 to 50° C. After the goods have here been well dried, they are exposed to a heat of 80 to 100° C. and kept in that heat as long as is needed to destroy all burrs, naps, etc. The goods are then cooled off and brought upon the wash machine. Here they should first be thoroughly rinsed with cold water for twenty to thirty minutes, when the soda solution may be added, as required to the water. Let the goods again run thirty minutes, rinse, then immediately take them to the milling macchine. If this cannot be done at once it is advantageous to let the pieces dry and let the milling follow when practicable. If the pieces be thoroughly freed from acid by means of the soda addition, says the "Deutsche Faerber Zeitung," the milling with soap, and eventually with the assistance of ammonia, becomes an easy matter. The cleansing, after the completion of the milling process, may readily be accomplished by good washing in full water. To make quite sure that no impurity has been left in the goods through the soap, take the pieces to a boiling machine and treat them for about twenty minutes at the necessary temperature. With these precautions, everything will have been done to deliver thoroughly clean goods to the piece dyer.

Silk Tests.

To test the quality of silk, as used in the construction of a fabric, tear the latter both lengthwise and crosswise. If it gives way readily in either direction, either the dye has destroyed the strength or the threads are composed of silk waste. Pure silk properly dyed is the strongest of fibres. Nearly all the cheaper dyes, particularly the dark and black ones, have a basis of metallic salts which weaken the colour. Next test the construction of the fabric—*i.e.*, its texture and weave, by scraping diagonally across the fabric with the thumb nail. If the fabric in question is durable and worth buying the threads will not slip, otherwise the thumb nail will soon make a space of loose threads. After that ravel out the silk and examine carefully the quality, warp and weft. Sometimes a pure silk warp has heavily loaded weft; at others, so much of the weft as comes on the surface in the fabric is of pure silk, while the remainder is inferior silk.

Pure unloaded silk is of a brilliant lustre and soft to the touch. If the lustre has been artificially produced the fibre is harsh and brittle. If it is silk, but loaded with metallic dye, the fibre looks like cotton, but is somewhat softer. Another test of quality is to pull out threads, warp and weft ways, and try their strength. Catch them with both hands about 1in. apart, give a quick outward jerk and note the force necessary to break them. Then try to tear the silk along the line that the threads came out of. If it parts so obstinately that there are puckers along the tear, it is proof that it will wear well.

A valuable test for either the weighting or adulteration of the silk fibre is fire. If it is pure and properly dyed, it will take fire with difficulty. It will go out as soon as the flame is withdrawn, leaving ashes that are nearly jet black. Weighted silk takes fire readily, and once burning, will smoulder through the piece, leaving ashes that keep the shape of the cloth and are of a light yellowish red colour. If cotton is mixed with the fibre, the smell will betray it. The requisites of a thoroughly good silk, says the "American Textile Record," are strength, smoothness, lustre, and richness, without weight, no matter how thick the texture. Adulteration invariably causes a harsh feeling. In heavy weaves, such as brocade, it is particularly important to see that the foundation is of sound, firm silk, as otherwise the fabric will not repay the cost of making. For ascertaining the presence of artificial silk in a fabric the best test is by combustion. Artificial silk burns up quickly, almost like paper, and gives off a smell similar to burnt cotton, while the genuine article burns slowly and curls up while burning, giving an odour that is peculiar to it.

The Hand-painted Cloths of India.

The competition of mill-made European cloth has not only affected hand weaving, but has also crippled the ancient Indian industries connected therewith. The trade in *khalam-kar*, or hand-painted cloths (literally "pen work," being drawn with the reed pen of India and the East—*Kalam*), which was once flourishing in Bandar (Masulipatam), Cuddalore, and other places, has of late steadily declined. The famines of recent years have also helped to stamp out this decaying industry, by contributing to the poverty of the classes engaged in it. As a class, weavers and painters of cloth are rarely well-to-do, the majority of them being in the hands of the usurious cloth merchants, who take their finished goods in repayment of advances made to them. In famine years, the celebration of marriages being retarded, the demand for cloths of all kinds is diminished, and very often the weavers and the cloth painters have to give up their looms and brushes for field labour or some other occupation. On the return of favourable times most of them return to their profession from the out-door labour, while others, either owing to want of sufficient encouragement in the trade, or the loss, to a certain degree, of their professional skill and delicacy, abjure the craft altogether. The State, of course, intervenes to help such persons to tide over the famine; but that cannot lead to the material development of the industry, or to a substantial amelioration of its condition. The one satisfactory remedy seems to lie in finding a market for it. *Khalam-kar* cloths cannot be placed in competition with European productions of a similar character, which, so early as the days of the Moghul Emperor Akbar, attracted the remark of being "the wonderful works of the European painters of world-wide fame." But the boldness of the designs, with the careful draughtsmanship of the minutest details, and their general finish and harmonious colouring, give them a fascination of their own, and this, taken with their cheapness, would necessarily find them favour in the eyes of many purchasers if they could only be introduced in merchantable quantities into Europe. They can be utilised as tablecloths, bed-sheets, curtains, and other articles.

The process of making these cloths is remarkably primitive and simple. The first stage in the process is the preparation of the cloth for the painting. This is done as follows: A sufficient quantity of gall-nut is powdered and boiled in water, and the sediment is removed, after which one-fourth measure of buffalo's milk or one-half measure of cow's milk, is mixed with water; the cloth is then put into it and saturated; and after a time it is taken out, strained, and allowed to dry. It is subsequently folded and beaten down with a dyer's block. The cloth is now ready for the purposes of painting. The painter takes a quantity of alum and boils it in water. With this solution—which gives a pale dark colour—flowers and other objects are drawn artistically with a brush, or printed with a block on the cloth. The cloth is now dried, and gently washed in water. It is then boiled in water with pounded roots of *nuna* (Morinda umballata). During the continuance of the boiling process, which lasts for nearly three hours, the cloth is freely stirred up with a stick. It is then taken out and left to cool. When cooled, it is immersed in water mixed with sheep-dung, and immediately taken out. It is again washed well, and dried by spreading for nearly six hours over the damp sand in the river bed. This process renders the vacant spaces between the flowers white. The white portions are then coloured with dyes of local manufacture, or with any European dye, after it has been boiled with gall-nut water. White and black are believed by the Hindus to be the origin of all colours, and are looked upon as extremes and as the component parts of the other colours. Indigenous black colour is obtained by burning pieces of old iron in dry plantain leaves, and then boiling them in water with sugar-cane jaggery and pounded marking nut (Semicarpus Anacardium). Yellow is manufactured by dissolving Bengal saffron with *aplakaram*, a substance akin to soda, and boiling in water with gall-nut "flowers." Green colour is obtained by dissolving pure indigo in similarly-treated water. Other colours are prepared by similar devices, and each colour is painted in separately. Finally, the cloths are soaked in boiled rice water and strained. They are then ready for the market.

The price of a bed-sheet of *khalam-kar* ranges from 2s. to 2s. 8d. It is durable and of fast colour, and is commonly used by Mussulmans of Singapore and Sumatra and other places. In India it is largely in demand on marriage occasions, when it is used by the middle classes as a covering, or *palang-posh*. It is also largely utilised in the decoration of Hindu cars. The art was apparently introduced into India by the Mogols from Persia and in the days of Akbar, who showed a great predilection for the art of painting in all its applications, and gave it considerable encouragement. Abul Faz writes that the work of all painters was weekly laid before the Emperor, and they were rewarded according to the excellence of their workmanship; that in this way much progress was made in the commodities required by painters, and that the mixtures of colours was especially improved. Although the Mussulman religion prohibits the drawing of likenesses of living objects, yet Akbar, with his wonted liberality of thought, not only encouraged the art of such painting, but even censured those who had on religious grounds imbibed a hatred for it. It is to be hoped, says a writer in the "Journal of the Society of Arts," that the *khalam-kar* cloths may find a market in England, Europe, and America, in which case this vanishing industry will be resuscitated in India, and thus a portion at least of the Indian population, whose sole occupation is agriculture, will be better able to withstand the calamities to which they are recurringly exposed in seasons of scarcity.

The Revolving Flat Card.*

In introducing the above subject I am fully aware that on account of time this paper will necessarily leave many interesting points untouched. Yet I believe there is matter to provide interesting and profitable discussion. The process known as carding cannot be too carefully watched, since upon its success in a large measure depends the proper carrying-out of all succeeding operations in a spinning mill. It is a sound view which regards good carding as the soul of cotton spinning. I intend to deal with the revolving flat card, it being now universally adopted for all classes of yarn. It has won this position on account of its presenting a greater carding surface than any other card; the material is therefore better cleaned; it turns off a more uniform sliver, and possesses advantages as regards stripping, grinding, and easy handling which no other card can equal; it is also more economical to work, from the productive and labour points of view. The construction of present-day engines has attained to a high degree of excellence, but perfection will be most difficult to attain collectively when we remember the varying nature of the materials employed, the wearing of parts of machines which produce other parts for machines on the copying principle, and the ever varying quality of the human factor, over which we can never hope to have above partial control.

The framework of the carding engines of the best makers is sufficiently heavy, and is tied together in such a manner as to prevent vibration. Pedestals for supporting the main cylinder are variously made, but my experience teaches me that the simpler the construction the more accurate the result. Plain ordinary pedestals with a good ordinary surface, made of the proper materials, with a cylinder revolving, properly balanced, an ordinary tight strap, and the machine efficiently lubricated, will give a result that cannot be beaten. We thus establish a base to work on. On the other hand, pedestals which have adjusting wedges, screws, or eccentric bearings, are liable to be improperly handled; and assuming that they are handled as the makers intended, the effects of raising the cylinder bearings destroy concentricity of the cylinder with the flat course on most cards. The only card which would enable concentricity to be still maintained is the one fitted with flexible bends and five setting points on each side. I therefore contend that under all circumstances that occur in ordinary practice the fixed pedestal will give the best results. Concentricity and parallelism are two conditions which must obtain for the best work. The taker-in pedestal might, with advantage, be given a greater length of bearing, and if cast-iron bushes were fitted over the taker-in shaft, thus allowing cast iron and cast iron to work together, with proper lubrication, we should get a much better result. The axis of the taker-in rarely runs long parallel with the cylinder axis, consequently it feeds at a tangent. How many are there who have not seen these shafts run crooked, vibrate, and heat badly even after running only a short time? The screws and nuts attached to the doffer and taker-in pedestal as now made facilitate quick setting, and springing can be entirely avoided thereby. The dish feed-plate, designed for the cotton it has to work, is one of the best parts which make up a good card; yet there are spinners to-day using and advocating the two-feed roller system. I should use the dish feed for even working droppings, or for the lowest to the highest classes of cotton, when designed for its work. The adjusting screws for the cylinder under-casing, on the outside of the card, are an advance on the inside clip, but I believe we shall see this casing raised and lowered by one light lever on a system which will keep the casing firm and concentric with the cylinder, requiring only half the time and trouble it does at present in taking it out and replacing it. The division sheets separating the taker-in and the cylinder fly ought to be made stiffer and be more securely fastened to the frame. The cylinder front and back making-up sheets should be of strong section, the flexibility and consequent buckling causing much rubbed wire, cloudy webs, and unequal strips. The small bend carrying the cylinder grinding brackets and the front sheet should have an additional side support, to prevent tight stripping or grinding bands from pulling the sheet into the wire. Assuming our cylinder and doffer are in position, and that they revolve at their highest speed free from vibration or throw, then, whether the card is new or old, previous to covering with wire these organs should be tested, to see that they are absolutely correct circumferentially across their width. This can be best done by an emery-wheel grinder, mounted on a large diameter shaft in suitable frames, and traversed by the ordinary double-way screw, the whole being firmly bolted to the engine frames. New cards are sometimes damaged in transit, and the precaution mentioned may save the card wire from having two or three years of its life ground away before any two surfaces set evenly all across.

I believe it is good policy to buy the best clothing made for cards; and we shall be called upon to decide what counts of wire we intend to use—whether it shall be plough ground, bisectional, or in any other form, and whether it shall be hardened and tempered, and in what sort of foundation it shall be set. You are all aware that opinions differ very much on these points; but generally speaking, has not wire too fine for its work been in prevalent use? Comparing the relative speeds and the number of wire points, the cylinder has something like four times as many points as there are fibres of cotton, and the doffer about twice as many. Assuming 44 flats at work on the cylinder at once, here are seven or eight times as many points of wire as there are good fibres of

* A paper read by J. Thorpe before the Oldham Mill Managers' Association.

cotton. I think the tendency has been to use wire too fine. The governing factors in relation to counts of wire are the load it is intended to put through the card, and the quality of the cotton to be operated upon. For medium counts 90's cylinder and 100's doffer and tops, and for Egyptian and the finer counts of cotton 110's cylinder and 120's doffer and tops are ample, in my opinion. Plough-ground wire seems to be the favourite, because with this section more space is provided for dirt on account of the reduced section from the point to about two-thirds down to the bend. With the bisectional form we have the same section from point to bend, and the grinding does not increase the section in this form of wire, as is done in the plough-ground variety. However, there is little to choose between the two if they be made equally well. If anything, the bisectional should be smoothest. Another advantage these forms or sections of tooth possess is that they come to have carding points on them sooner when ground than with broader sections. Hardened and tempered steel wire is used because its life is longer than mild-steel wire, provided it is properly tempered; if not, it breaks out. It is better able to treat a larger body of fibres on account of its stiffness and resilience; it therefore conduces to better carding and larger productions. The wire needs less grinding, which also aids production, inasmuch as the card is stopped fewer times. If this class of wire is set in a good foundation, which will stand the strain put on the clothing without distorting the angle of the wire or unduly opening the punctured holes for the wires, it is difficult to get a better clothing. Any day we can come across failures with this kind of wire, through breaking out or being left rough (both causing dirty carding), but these defects are largely overcome by good makers. Flat wire which sticks to the fibres, causing felting, may be due to roughness of the wire when received from the makers, or through not having angle enough in. The roughness can be produced at the mill by dampness. The highly-polished state the wires should be in is very susceptible to moisture. In one case I know of, a steampipe passed over one series of card tops effectively cured them from sticking. Other causes are defective stripping combs and brushes, and that fatal cause, wire ineffectively ground.

Foundations should be made sufficiently rigid to keep the wires firmly in position and yet be springy, but they should always be able to keep the wire well up to the grinding roller pressure. Every man has his own ideas as to which is the best foundation, and goes in for rubber entirely for cylinders and doffers, or cotton-woollen, cotton entirely, or a compromise of rubber cylinders and cotton-woollen-cotton doffers. For tops we have the strong linen foundation, and occasionally you will meet with rubber foundations. We all know the bad effects of the sun's rays or even a strong light on rubber, and also the effects of oil drops, so that one should be very cautious before adopting rubber foundations for doffers; they ought never to obtain for flat wire.

Nearly every machine maker has a bend of his own for supporting the flats in their passage over the cylinder, and each claims his as the best. I have worked cards with conical, concentric, or rigid bends, with flexibles supported on pins and set from one point; with flexibles containing three setting screws and two supports; and with flexibles adjusted by five setting screws on each side. I have also seen flats working supported by a revolving ring, which required milling after grinding; also flats supported on a rigid bend with steel bands thereon of varying thickness, one of which is taken out and a thinner one substituted after grinding, otherwise the cylinder is raised. I have just seen a notice of a card, the flats of which are supported on a flexible ring which revolves with and is secured to a non-flexible ring with slots cut in at a slight angle to its periphery. The slots are supposed to allow the flexible ring to expand or contract concentrically when setting is done, the whole being secured by two screws. In my opinion, the flexible bend which is carried on a fulcrum from its centre and adjusted by five setting screws on each side, in conjunction with a cylinder the construction of which allows the fixed bend to go inside, or just under the inside edges of the cylinder, will give results second to none, and far superior to any other construction.

Flats are fairly free from deflection in the narrow cards, and in the wider cards the strengthening rib should have increased depth, with the weight not increased if possible; increase of depth increases the strength as the square of the increase. Grinding of the wire is an important process, and we have two rollers which answer their purpose fairly well—the Horsfall roller and the solid roller. Both should be constructed as light and strong as possible. It is essential that they should be truly cylindrical and parallel, and when in the stands or grinding brackets they should be parallel with the axis of the cylinder. We cover these rollers with emery powder of different size or grade. I take it we use emery because it is the only substance which will cut the steel wires except corundum, and emery, being the cheaper and more plentiful, is adopted.

We used to be told that needle-pointed cards were the best, but we have since found out that a card with points on like a needle could not card. What we now seek to obtain by grinding is the abrasion of the points. When we set a grinding roller to work, we set it, or rather should set it, sufficiently hard on so that the emery will cut the wire and produce on the extreme end a series of small channels or grooves, or a sort of very fine fringe. It is these edges, along with good setting, which make good carding possible.

Many failures have arisen with hardened and tempered steel, owing to the grinding rollers not being set on sufficiently hard to cut it. Instead of cutting it, they simply polish it, evidently forgetting the difference in the composition which obtains between mild and hardened and tempered steel. Polished wire will not retain the fibres when once the point has taken them up. They are subsequently rolled, and make a large number of neps. Well-ground wire, on the other hand, acts individually on the fibres so far as it is possible to do so. It is generally accepted that the Horsfall roller grinds more level than the dead roller. The reason is largely due to the difference in the weight of the two rollers. But a more important point is the fact that the Horsfall grinds highest to highest, and can be best illustrated by a turner turning any piece of metal up: he always traverses his tool repeatedly across the work to remove the highest point, then he gets on the solid all across; so with the Horsfall, and we thus get our surfaces ground cylindrical and parallel. The solid roller is generally credited with deflecting in the middle, and thus grinding our surfaces concave at that point.

Have any of you ever given a thought to the possibility of cylinders rising slightly in the centre, due to centrifugal force? I believe that for cards wider than 40in. the best construction of cylinders will be one divided at the centre, made with faced or turned joints, thus having at the centre an additional set of arms around the cylinder shaft. This construction would effectively stop any effect produced by centrifugal force. The self-acting grinding strickle, provided it be allowed to pass off at each side of the card, is a valuable adjunct, but seldom obtains, except in fine spinning. In setting, we ought to aim at parallelism, which is of much more importance than extreme closeness. Electricity and centrifugal force are unseen powers which contribute to good carding in a way seldom thought of.

The old flat stripping comb works under imperfect conditions, since the comb works from a radius different from that which the flats move round. This defect has caused much wire to be broken out, and has caused a good deal of raised wires and sticky flats; raised wires are a grave evil, inasmuch as good setting is not possible with them. There are several comb motions which overcome these objections. The Higginson and McConnell flat-grinding apparatus is about the best of its kind I have ever seen. It requires care in the handling if good results are desired. If this and the hundred-and-one self-acting patents required no care, we should soon be in a business where intelligence and skill would be at a discount, and the labourer would replace us; but happily all the improvements yet introduced require skilled oversight.

Flying Shuttles.

A SHUTTLE never flies out of a loom without cause, but sometimes it is extremely hard for the fixer to locate the trouble. If he be a man of limited experience, he will spend many a weary hour in fruitless search, and finally have to call on a more experienced man for assistance. The causes of shuttles flying out are numerous, and at times their actions are so irregular that to the uninitiated it does not appear reasonable to assert that a single cause is responsible. At times a shuttle will fly out of the shed repeatedly, and then it will run for hours before it will again leave the loom. A broken thread in the shed will often throw the shuttle; but as this can be easily located by the weaver, and soon remedied, nothing need be said about it. Sometimes the picker spindle is not exactly parallel, so that the picker does not give the shuttle a straight blow, but one that deflects it, causing it either to fly out, or the loom to bang off. Sometimes the hole into which the tapered end of the spindle fits is a little too large, and as the picker moves back and forth on the spindle, the latter moves also, imparting an uneven blow to the shuttle, thus causing it to fly out.

By packing the hole with thin leather, the tapered end of the spindle will remain firm, and the spindle will not vibrate as the picker moves back and forth. If the spindle hole of the picker is not perfectly reamed out, the shuttle may be thrown out The sweep of the strap also has an influence on the movement of the shuttle. If the strap is made so short that the blow of the picker ball is immediately communicated to the picker stick the movement of the shuttle will be jerky, and the probabilities are that it will be occasionally thrown out. The slash or sweep of the strap should be sufficient to impart the blow of the picking ball gradually to the picker stick. The slack of the strap is first taken up by the blow, and then the f rce is imparted to the picker stick, with the result that the blow of the stick on the picker and shuttle is free from jerkiness. If the picker stick is not true and square where it fits into the picker, it may impart an uneven blow or movement to the picker, thereby causing the shuttle to move out of a straight line. Anything which has a tendency to throw the shuttle out of a straight line while it is moving from box to box will cause it to fly out. The reed forms the back guide, and the raceboard the bottom guide for the shuttle in its passage across the warp, leaving the top front and both ends open for the shuttle to leave the loom if its course is diverted by a broken thread or knot in the shed or by an uneven blow of the picker. If the hole in the picker head is uneven, it will cause the shuttle to fly out by imparting a crooked motion; but it may not do so every time, as the deflecting motion may be imparted only at intervals, and instead of throwing the shuttle out of its shed, the tip may be raised, so that it will break the warp threads With the picking motion properly working, which includes picker, strap, spindle, and picker stick, there is not much liability of the shuttle being thrown out unless there is a defect in the raceboard or reed.

It is not a difficult matter for the skilled fixer to detect the causes of shuttle throwing when they arise from badly-adjusted pickers, too much power, defective pickers and spindles, or when the drop boxes on fancy cotton looms are too high or too low, and he can quickly remedy them. If the reed does not form a perfectly straight line with the back of the boxes, the shuttle will be deflected from a straight line and thrown out of the shed. A straightedge laid from box to box, says the "Wool and Cotton Reporter," will always tell whether the reed is out of truth or not. A bent dent in the reed will deflect the shuttle from a straight course and cause it to leave the shed. It is the hidden or unusual defects that cause the fixer the most trouble, and these are generally found in looms provided with an iron raceway. Sometimes they are plainly visible, but they appear so insignificant that only the fixer of long experience recognises their importance. A shuttle may get caught between the batten of the lay and breast beam, causing the batten to spring, which in turn affects the iron raceway, and the result is the same as when a bent dent exists in the reed. Sometimes the rise in the raceway is only a small spot that would escape detection unless tried with a straightedge. In such cases the fixer will be sorely puzzled to locate the trouble. The loom may be run for several hours, and the shuttle may not fly out, and then for a number of picks in succession the shuttle will strike the defect in the raceboard in such a manner that it will be thrown out every time. A worn raceway, whether of wood or iron, will cause trouble by occasionally throwing the shuttle. Whether the raceboard is dented, sprung, or worn, the only cure for it is to take it out of the loom and have it perfectly planed down.

Gleanings from Consular Reports.

BOHEMIA.—In the cotton industry, spinning was, as in the previous year, favourable throughout 1900, but in the textile branch it was not so.

Cotton and woollen printing is principally carried on in the Königinhof and Warnsdorf districts, as also in the neighbourhood of Prague.

Cotton spinning is carried on in the districts of Reichenberg, Taunwald, the valley of the Elbe, Tetschen, and Bensen, many factories using manual labour.

The linen industry in Bohemia has its spinning mills in the Trastenau and Auss Thale districts, and the weaving principally in Starkenbach, Hohenelbe, Kroh, Eipel, and Schönberg. The decrease in the linen industry of Austria during the last decade was caused chiefly by the increased duties imposed, especially by Germany (July 15, 1879), Italy, and Switzerland, and the rapidly increasing import duties of the United States of America. The cultivation of flax has also considerably decreased, for thirty years previously 80 per cent. of the flax required was grown in the Empire, whereas at present not 40 per cent. is home grown, and therefore the remainder has to be imported. In the year 1872 there were 420,794 spindles at work, which have been reduced in consequence of the decline in this industry to 297,988 in the year 1899; the production has at present a value of about £1,700,000 yearly.

The number of looms employed in the linen-weaving industry is difficult to state; the yearly manufacture is valued at about £1,600,000.

In Bohemia there is a large manufacture of carpets, such as tapestry, velvets, Brussels, Kidderminster, Axminster, etc. The prices range from 3d. per metre in length to £4 per square metre.

This industry is carried on in the Reichenberg, Reussberg, and the Eger districts. There is a large foreign export trade to the United Kingdom, France, Germany, and other countries. Oriental "prayer" carpets are made by the people in their own homes in forty villages from chenille thread, which, with the bright colouring and cheap prices, are in great demand in Cairo, Alexandria, Smyrna, and other places in the Levant, to which they are exported in large quantities.

Resht (Persia).—The trade in piece-goods is divided between Russia and Manchester. The proximity of Russia and cheapness of transport of Russian goods, combined with industrial progress in Russia, have no doubt been dominant factors in the increase of Russian imports into North-Eastern Persia at the expense of British exporters. In spite, however, of the enormous advantages enjoyed by Russian merchants through the geographical position of Ghilan, a very considerable quantity of Manchester goods of all descriptions finds its way to the Ghilan bazaars.

There is no direct trade between the United Kingdom and Rhest, and all the prints, shirtings, etc., reach Resht through Bagdad and Tabriz.

Manchester white shirtings practically enjoy a monopoly in Ghilan.

The following table shows the quantity of dried cocoons exported from Ghilan since 1893, and the value:—

Year.	Quantity. Lb.	Value. £
1893	76,160	6,475
1894	167,552	11,780
1895	235,760	15,505
1896	229,040	14,040
1897	346,080	23,550
1898	614,880	55,800
1899	1,178,688	112,350
1900	1,615,488	150,265

It will be seen from the above table that the cocoon export business has, with only one break in 1896, been making continued progress, especially during the past three years. The figures for 1900 would no doubt have been very much higher had holders not held out for prices which buyers were unable to pay in consequence of the fall of prices in Europe. The persons who were not satisfied with the prices offered, spun silk instead of selling the cocoons.

During the year 1899 the average price of fresh cocoons in Resht was 22½ krans (equivalent at exchange of 51·80 krans per £1), to 8s. 8d. for 1 shah maund (13lb.). In 1900 the average price was 20½ krans — about 10 per cent. lower; but as exchange was lower—viz., 50·40 krans—there is a disproportionate difference in the sterling equivalent which works out to 8s. 2d. for 13lb.

When the cocoons are ready they are packed in bales and despatched to Baku by sea, thence by rail to the port of Batoum, whence the remainder of the journey to Marseilles is accomplished by sea.

The Persian Government charges an export duty of 5 per cent. *ad valorem* on cocoons, but there are no other Government taxes.

Silkworm eggs are imported principally from Broussa and Gimlek in Asia Minor. A small quantity of French eggs is imported. The supply usually greatly exceeds the demand, the natural consequence being violent competition between the various "graineurs," who are for the most part Levantines.

Leghorn (Italy).—The raw cotton which comes into Leghorn is almost exclusively for the use of a company owning the only important factory in West Tuscany. The drop in import may be due to some extent to the high prices which have ruled in the past year, and to the fact that a good stock was laid in in 1899.

The statistics which follow of cotton yarns, threads, and tissues eloquently show, by the gradual drop in the import, that Italy is more and more every year supplying the country's demand from her own factories. So popular is the Italian-made articles that plain tissues are even being exported to Alsace and Switzerland to be stamped and figured in those manufacturing centres. There is, indeed, even a growing feeling among Italian manufacturers that they no longer need the heavy protective duty of the Italian tariff, so confident are they of being able to hold their own in cheapness and excellence against foreign competitors. Small as the import trade now is, it is at least some satisfaction to note that last year 97 per cent. of the yarns and threads, and 60 per cent. of the tissues, came from British sources. It will be noticed that there was a slight increase in the import of cotton tissues in 1899 (61 per cent. British) and 1900. This was mainly due to the popularity of a very light British-made article having something of the appearance of a "foulard." Being light in weight, the duty was low, and as a novelty the article was much in request. Indeed, it is only by striking and pleasing novelties of light weight that even the present small quantity of British cotton tissues can be kept in demand:—

Year.	Raw Cotton.		Yarns and Thread.		Tissues.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£
1891	13,669	29,186	1234	9681	7201	65,920
1892	15,792	30,508	1088	5530	5323	43,296
1893	23,514	49,959	1164	7098	4350	35,366
1894	26,922	60,412	776	7010	3040	36,149
1895	10,191	20,429	1767	8849	2917	30,512
1896	12,523	22,880	383	2973	1713	16,685
1897	22,104	44,871	277	2281	1480	14,790
1898	12,334	23,012	232	1721	1134	10,341
1899	16,339	27,861	364	6019	1313	12,449
1900	6,598	11,052	270	4034	1395	13,220
Average, 1891-99	17,043	33,234	810	5684	3163	29,511

The import of wool, washed and unwashed, remains steady because Italian manufactures of woollen yarns and tissues are on the increase. The import of these two latter articles in 1900 shows a noteworthy decrease, and speak eloquently of the success of the home-made article. Such yarns and tissues as are still imported here are, however, principally of British make (98 per cent. of yarns and 85 per cent. of tissues in 1900), which is the satisfactory feature in this branch of trade from the point of view of the British manufacturers.

Prices of hemp have greatly risen during the past year, being on an average 15 per cent. above the prices of 1899. As a consequence the demand for the United Kingdom has slackened, but the United States and Germany have taken their usual quantities, and although the total export of hemp from Italy is less, Leghorn has maintained the quantities of the year preceding. The quality of the hemp has been excellent, but the quantity insufficient, not, as might be supposed, from hail or inclement weather, but because so much ground once given to growning hemp is now given to the cultivation of beetroot for the sugar factories and refineries. The following table shows the quantity and value of hemp exported during the last ten years:—

Year.	Quantity. Tons.	Value. £
1891	6,265	186,017
1892	4,625	142,924
1893	4,723	140,215
1894	5,801	198,058
1895	7,190	251,051
1896	7,608	262,568
1897	11,019	344,454
1898	9,457	291,816
1899	10,196	314,602
1900	10,643	328,390
Average, 1891-99	7,431	236,794

Chefoo (China).—The import of cotton goods declined almost without exception in 1900. Shirtings dropped over 87,000 pieces; T-cloths, 41,000; drills, 27,000; sheetings, 33,000; and towels, 10,000 dozen. The Indian T-cloth is coming into favour again, whilst American jeans are gradually ousting their British rival. Indian and Japanese sheetings are also making their way. Yarn showed a decrease of 70,000cwt., the import of the Japanese product being five times greater than that of the British and Indian article combined.

This trade, in common with all other industries in North China, suffered seriously from the unsettled state of the province, and there were no "seasons" practically all through the year. The Chingchow-fu district was closed to foreigners and almost to all buyers, owing to the insecure state of the roads, before the spring market had fairly opened. The tussah trade, however, was fairly supplied all through from the Yalu River districts through the port of Tatungkou, the neighbourhood of which was not so affected by the disturbances. The production of yellow silk was estimated at about 2200 boxes in the year under review, as compared with 3300 boxes in 1899, a falling off of about 33 per cent., which was attributed to the inferiority of the silkworm of this season. The supplies from Manchuria were not forthcoming this season. Coarse spinnings were more in evidence, meeting with greater demand, and consequently commanding higher prices than they have done in other years. In brown tussah or wild silk the falling-off was more marked, there being only about 3000 boxes, as against nearly double that quantity in 1899. The imports of native-spun tussah from Newchwang were only about one-quarter (500 boxes) of the bulk of that of the previous year, but the importation of tussah cocoons from Tatungkou exceeded that of 1899 by about 25 per cent.—namely, 15,000 baskets as compared with 12,500 baskets. At the opening of the year there were 10 filatures, native-owned, in operation, but of these two were closed during the year, both with heavy deficits. One new filature on a large scale, under British auspices, has been constructed and will shortly be in running order. On the whole the year was looked upon as unsatisfactory to the native merchant, prices generally ruling against him.

Kobe (Japan).—Of raw cotton imported to be spun into yarn in the Osaka and other spinning mills, only some 136,000 tons, value £5,288,000, came in during 1900, as against 180,000 tons, value £5,512,000, the preceding year.

There was thus a decrease of nearly 25 per cent. in the quantity, but of little more than 4 per cent. in the value. It was the deficiency in the crops of American, Indian, and Egyptian cotton simultaneously that so forced up prices. This rise of the market concurred with the increasing tightness of money to produce a crash about the end of March, and Japanese dealers were unable to take up their engagements. Thereupon the North China troubles supervened, enhancing the distress, and it was not till towards the close of the year, when the cessation of the military movements at length came in sight, that business again became brisk. Thus the commercial activity of the year in this, the most important staple of the port, was virtually condensed into the opening and closing quarters.

The shares contributed by the three great sources of supply were as follows:—

COTTON IMPORT IN 1900.

—	Quantity.
	Bales.
Chinese cotton	297,000
American cotton	252,000
Indian cotton	207,000
Egyptian cotton	6,000
Total	762,000

As regards the ports of provenance, about nine-tenths of the Indian cotton is shipped from Bombay, and nearly nine-tenths of the Chinese cotton from Shanghai. Of the American cotton, New York sends more than one-third, and the two Californian ports, San Francisco and San Diego together, send more than one fourth.

The total import of raw cotton into the whole of the Japanese Empire in 1900 was 155,243 tons, value £6,140,000, and of this the port of Kobe alone took 135,525 tons, value £5,360,000, or about 87 per cent.

Indian cotton fell off most in 1900, being less than a-third of the 1899 report. Both American and Chinese cotton, on the other hand, showed an increase, the former of about 30 per cent., the latter of 140 per cent., on the figures of 1899.

The check in the export trade of cotton yarn was caused by the military outburst in North China, and yarn, the leading staple, felt first and worst the disastrous effect of the disturbance. To estimate aright the gravity of the blow it suffered it is not sufficient to compare the figures of 1900 with those of the preceding year only. How rapidly and vigorously this export trade was rising when the sinister stroke fell upon it will appear from the following table:—

EXPORT OF YARN FROM KOBE.

Yarn.	Quantity.	Value.
	Tons.	£
1895	1,341	67,873
1896	6,020	317,164
1897	21,170	1,161,786
1898	36,000	1,797,763
1899	50,941	2,400,341
1900	30,574	1,725,561

Thus, judging from the normal rate of increase, it seems clear that the Boxer disturbance and its prolonged consequences cost this port the loss of about half-a-year's income from a single staple, amounting, on a moderate computation, to £1,250 000. If any corroboration were required of the casual connection of the two facts, it would be found by glancing at the monthly returns. These show that in the half year January-June the exports of yarn amounted to 20,246 tons, value £1,197,806, as against 10,329 tons, value £582,328, exported in the half-year July-December. It was in the end of May that hostilities broke out, and the export of yarn during that month amounted to 9023 tons, value £397,708, being the largest export for any one month in the whole history of the trade. In July came the full force of the check, and it was not till the closing month of the year that signs of slow recovery appeared.

The production of plain yarns by the Osaka mills remained about stationary, nor was the output of gassed spinning materially increased, the quality showing little if any improvement. Thus there does not seem any likelihood of the native-made supplanting the imported article in the near future.

Corea.—While the heading of cotton goods showed an increase of £14,297 over the figures for the year 1899, there was a falling-off as regards British importations in the use of shirtings of no less than £59,069, and in the case of yarn of £3056; a small decrease was also observable in the item of British sheetings.

Japanese cotton goods, on the other hand, showed the following increase:—

	Increase.
Shirtings	£1,731
Sheetings	30,422
Other piece goods	25,675
Yarn	11,329

This increase in the importation of Japanese cotton goods took place mainly at Chemulpo and Wonsan. The Acting Commissioner of Customs at the latter port pointed out that the import trade of the port in Japanese piece goods increased from £38,223 in the year 1889 to £56,679 in 1900. Till 1894 British shirtings practically monopolised the market. After the war there was a largely-increased demand for foreign piece goods, an opportunity the Japanese seized by pushing their goods, which are made in imitation of the strong native material, the pattern and texture of which are copied so closely that the imported goods are hardly distinguishable from those of native manufacture. Since then Japanese shirtings have not only held the place they gained, but are threatening to drive British goods from the field. The average retail price of these Japanese shirtings per piece of 26yds. in length, with a width of 14½in., is 1 yen 15 sen (about 2s. 3½d.), which works out at less than 11 cents per square yard, whereas the retail cost of British shirtings averages about 13½ cents for the same quantity. This Japanese imitation of the Corean cotton cloth in question is falling out of favour with the Coreans, who prefer to import Japanese yarn and weave it into cloth themselves.

Woollen goods, which are chiefly of British origin, also showed a slight decrease.

This decline in the British share of Corean trade is due in a great measure to the reason already given—namely, the effect of the disturbances in China on the business conducted by Chinese merchants in Corea, who are the largest importers of British goods.

Oregon (United States).—At the beginning of the year of 1900 there was very little wool on hand in this district, all having been sold at good prices. Growers expected to secure high prices, as the wools were of better quality. The first sales were at 6½d. for Eastern Washington, shrinking about 68 per cent., and Oregon at 7½d. As the season progressed the demand was found to be very limited, and few sales were made at even 6½d. for high-grade wools of Eastern Oregon. Most of the clip went into warehouses, or was consigned to Boston, where it did not realise over 5d. advanced to growers. In December 6d. to 6¼d. was paid. At least half of the Oregon clip was in store at the close of the year. The quality was generally fair.

The following are the United States official figures of the clip of this district in 1900:—

States.	Quantity.	Shrinkage.
	Lb.	Per cent.
Oregon	18,810,192	70
Washington	6,454,892	73
Idaho	19,321,800	68
Total	41,586,884	—

Of the Oregon wool as above, about 1,500,000lb. were Valley and Southern Oregon wool, and the rest Eastern Oregon. The total consumption by woollen mills was light, probably not over 1,250,000lb.

The consumption of jute bags and bagging, all of Indian manufacture with the exception of about 1,000,000 bags of prison make, was very large, and the average price for standard bags was about £1 5s. per 100 bags. Hop cloth sold at an average of 6d. per yard for 44in. double warp, which is more used than the single warp, which sells at 1½d. less. Wool bags averaged 16d. for 4lb. and 14½d. for 3½lb. The consumption in this district was about 17,000,000 wheat bags, 660,000yds. hop cloth, and 125,000 wool bags.

Norway.—The textile industry, which might be thought likely to succeed in Norway, has prospered but little since the abrogation of the Customs agreement with Sweden in 1897. The result for 1900 was even less favourable than before, because the factories had to face high prices for raw materials, and most of them found it necessary in consequence of shrinkage to discharge hands. So long as the agreement existed, Sweden was Norway's best customer for textile goods; now the export to Sweden is insignificant, while the importation of textiles from Sweden has not declined in proportion. The causes are alleged to be that wages and taxation are so high in Norway that the Norwegian duties are not sufficiently protective to allow of competition with the sister-country.

In woollen manufactures prices fell both for raw material and, though in a less degree, the manufactured articles; but the difference was not such as to benefit the manufacturers in any great degree.

The importations into Christiania in the last two years were:—

Articles.	Quantity.	
	1900.	1899.
	Tons.	Tons.
Wool	280	318
Woollen yarn	528	567
Knitted goods	36	39
Other woollen goods	657	876

For knitted goods also the profits were not favourable.

In the cotton industry the prices for war material fluctuated greatly, but always towards a strong rising tendency, while the manufactured article followed more slowly, thus having an unfavourable effect upon the manufacturer's profits.

The importation into Christiania was as follows:—

Articles.	Quantity.	
	1900.	1899.
	Tons.	Tons.
Cotton	1841	2174
„ yarn	677	654
Printed and multi-coloured fabrics	251	311
Single-coloured or bleached fabrics	607	702
Unbleached fabrics	347	401

Jute, hemp, and flax factories were fully employed in jute goods for packing, hemp thread for fishing nets and sailcloths, linen, string, etc. With this business, too, prices for the raw material were unusually high, while owing to severe competition abroad it was impossible to obtain compensating prices for the finished article. Thus the earnings of Norwegian manufacturers were not proportionate to their sales.

Constantinople.—Owing to the rise in the price of the raw material, which produced a corresponding increase in the price of all manufactured goods, the year 1900 was very disappointing in the cotton market. A general increase in prices of from 30 to 40 per cent. limited purchases to immediate requirements, and this exceptional circumstance makes it difficult to arrive at an accurate estimate of the extent to which British goods have suffered from foreign competition. Italian manufacturers continue to show great activity in this market, and the industry in Italy is steadily developing.

The advantages possessed by Italy as an exporter to this country are obvious; the raw material can be obtained from Egypt more cheaply, owing to cheaper freights, than it can in the United Kingdom, and the manufactured article has a correspondingly less distance to traverse to reach the consumer, so that a two-fold advantage is thus secured. Hitherto local mills have maintained the contest so far as the coarser counts are concerned, but prices have been unremunerative, and the mills do not pay, but the finer counts, 16 to 32, have been imported in increasing quantities from Italy. At first Italian competition was limited to grey and extra water yarns, but Italian mills are gradually producing bleached and dyed yarns, which, if not equal to the best British manufacture, are daily approaching more nearly to that standard. They are also turning out sewings, and especially a quality largely used by fishermen, which hitherto came exclusively from the United Kingdom.

Mexican T-cloth and grey shirtings made their appearance in small quantities from Italy, but the superiority of the British article was well maintained. A new competitor in this line is Holland, and Dutch cottons are being actively pushed. Both Italy and Holland have adopted the system of dealing direct with an agent, to whom a commission of 2 per cent. is allowed. The British practice handicaps British goods. The manufacturer deals through his agent with a merchant established in the United Kingdom, who in his turn deals with a middleman in Turkey.

The United Kingdom has a virtual monopoly of bleached calicoes. Beyond occasional parcels from Holland, the market is held by the British article.

The progress made by Italy in the production of prints and cotton flannels was mentioned in the last report from this Consulate, and samples were sent of the goods selling on the market here. The Italian industry continues to progress, and the quantity of Italian cotton manufactures exported to Turkey in 1899 was more than four times what it was in 1895.

The following figures represent approximately the weight of cotton goods exported from Italy to Turkey in the years named:—

Year.	Amount.
1895	185,000lb.
1899	787,000lb.

In the year 1900 there was a drop owing partly to the rise in price and partly to the lack of purchasing power, which has already been noticed. The Italian returns showed 449,593lb. as the weight of cotton manufactures shipped to Turkey during 1900. There are general signs of a revival in this trade.

THE GAZETTE.

ENGLAND.

Partnerships Dissolved.

Fleming Keane and Abraham Wolstencroft, woollen manufacturers, 9, Red Lion-street, Manchester, as Keane, Wolstencroft and Co., and as quilt manufacturers at 61, Addington-street, Manchester, as David Moore and Co.

Newton and Pycroft, lace machine and jacquard builders, Alfred-street Mills, Nottingham.

S. Tweedale and J. Dawson, yarn workers, Halfpenny Bridge, Hare-street, Rochdale.

J. West (deceased) and W. West, cotton manufacturers, Belle Vue Shed and Spring Gardens Shed, Burnley, and Harlsyke Shed, Harlsyke, near Burnley, trading as Simpson and West.

D. Dott and H. H. Spencer, manufacturers of wadded quilts, Friday-street, Newton-street, Manchester, trading as Spencer and Co.

Riley and Sutcliffe, cloth manufacturers, Victoria Mill, Nelson.

Preston and Davies, Warser-gate and Stoney-street, Nottingham, lace manufacturers.

Alfred William Robinson and Frederick Devereux Colebourne, cloth raisers, etc., as Terry and Carter, 5, Commercial-street, Knot Mill, Manchester.

Richard Hothersall and William Moorhouse, calico printers and merchants, 66, Mosley-street, Manchester, as Richard Hothersall and Co.

Christopher Horner Gill and Cecil William Holt, woollen warehousemen, 22, Glasshouse-street, Regent-street, London, as Holt, Son and Gill.

Adam George Rankine, Herbert Edward Wild, and Edward Banks Orme, cotton and commission merchants, Liverpool and America, as "Rankine and Nicholson" in England and "Rankine and Wild" in America, as regards A. G. Rankine.

Holden and Darlow, cotton and cotton-waste dealers, Mount Pleasant Mill, Oldham.

Voluntary Windings-up.

Machine Dyeing Company Limited; Mr. G. F. Gardner, Bradford, and Mr. P. E. Roberts, Nelson, joint liquidators.

Accrington Textile Machinery Company Limited, Moscow Works, Church; Mr. T. Waterworth, Blackburn, liquidator.

The Bankruptcy Acts, 1883 and 1890.

Receiving Order.

S. Walbaum and Sons, woollen merchants, 35, Booth-street, Bradford.

NEW COMPANIES.

Dunnicliffe and Smith Limited.

Registered July 31, with a capital of £30,000, in £1 shares, to adopt an agreement with R. W. Smith for the acquisition of the business of a lace finisher and manufacturer, carried on by him in Nottingham, as Dunnicliffe and Smith, to develop the same, and generally to carry on the business of dressers, bleachers, dyers, importers and manufacturers of and dealers in textile fabrics of all kinds, etc. No initial public issue. The number of directors is not to be less than two nor more than seven; the first are R. W. Smith, A. Fraser, T. J. Bembridge, W. Randall, and H. Bates; qualification, 200 shares; remuneration, as fixed by the company. Registered office, 34, Stoney-street, Nottingham.

Whiteley and Green Limited.

Registered August 2, with a capital of £15,000, in £1 shares, to acquire the business of woollen and worsted manufacturers, carried on by H. Whiteley and H. Green at Hinchliffe Mill, near Holmfirth, Yorkshire, as Whiteley and Green, and to carry on the same and the business of cotton and silk spinners, dyers, bleachers, and general textile manufacturers. No initial public issue. The number of directors is not to be less than two nor more than five; the first are H. Whiteley and H. Green (both permanent); qualification, 100 shares; remuneration, as fixed by the company. Registered office, Hinchliffe Mill, near Holmfirth, Yorkshire.

A. Shaw and Co. Limited.

Registered August 6, with a capital of £2000, in £1 shares, to adopt an agreement with A. Shaw for the acquisition of the business carried on by him at Hollins Marsh Mill, Huddersfield, and to carry on the business of fancy woollen manufacturers, combers, scribblers, spinners, dyers, weavers, dealers in wool, silk, cotton, hair, alpaca, flax, hemp, jute, and mohair, etc. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are to be appointed by the subscribers; qualification, 50 shares; remuneration, £215 16s., divisible. Registered office, Hollins Mill, Marsh, Huddersfield, Yorkshire.

J. and H. Fisher Limited.

Registered August 9, with a capital of £15,000, in £1 shares, to adopt an agreement with J. Fisher for the acquisition of the business of a worsted spinner, carried on by him at the Union Mills, Idle, Yorkshire, and to carry on the business of combers, spinners, dyers, and manufacturers of and dealers in wool, worsted, hair, cotton, flax, silk, rhea grass, alpaca, mohair, and other fibrous substances, yarn merchants, grease extractors, millowners, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are J. Fisher, H. Fisher, and H. E. Featherston; ordinary qualification of directors, £100; special qualification of John Fisher as permanent governing director, £1000; remuneration, according to profits. Registered by Waterlow Brothers and Layton Limited, Birchin-lane, London, E.C.

John Whitehead of Elton Limited.

Registered August 10, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of John Whitehead, of Elton Works, Bury, to adopt two agreements with the Bleachers' Association Limited, and to carry on the business of dyers, finishers, dressers, textile printers, and manufacturers, etc. No initial public issue. The general managers or general manager for the time being shall be the director or directors of the company. Registered by Patersons and Co., 25, Lincoln's Inn Fields, London, W.C.

Mercerising Company Limited.

Registered August 19, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of the Mercerising Company Limited, and to carry on the same for the benefit and under the control of the British Cotton and Wool Dyers' Association Limited, who are the permanent managers. No initial public issue. Registered office, 23, Cheapside, Bradford.

Greatwich Limited.

Registered August 13, with a capital of £15,000, in £1 shares (5000 6 per cent. cumulative preference), to carry on the business of wool factors, woollen, worsted, linen, flax, hemp, jute, and mixed and other fabrics and goods, wool combers, carders and spinners, cotton spinners and dealers, weavers, dyers, and general textile manufacturers, and to take over the business of W. R. M. Greatwich, of the Caldwall Spinning Mills, Kidderminster. Minimum cash subscription, 20 per cent. of any shares first offered to the public. The number of directors is not to be less than two nor more than six; the first are W. R. M. Greatwich, H. M. Westcott, and W. F. Davison. Registered by Quayle and Ouvry, 9, Arundel-street, London, W.C.

Romiley Spinning Company Limited.

Registered August 16, with a capital of £10,000, in £5 shares, to adopt an agreement with W. Tipping and F. G. Plant of the one part, and G. R. A. Ashworth, Joseph Hall, James H. Pickup, and H. W. Whitworth of the other part, and generally to carry on the business of spinners, doublers, weavers, dyers, printers, and manipulators of cotton, flax, wool, silk, or other fibrous substances; also to carry on the business of brick and tile makers, but only to the extent of using any clay found on the company's land. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are H. W. Whitworth, G. R. A. Ashworth, T. Walton, J. Hall, and J. H. Pickup; qualification, 50 shares; remuneration, £250 per annum, divisible. Registered by C. Doubble, 11, Serjeants' Inn, London, E.C.

Tudor Mill Company Limited.

Registered August 14, with a capital of £70,000, in £5 shares, to adopt an agreement between A. B. Wilkinson of the one part, and A. Lees (for the company) of the other part, to erect a cotton spinning mill in Portland-street, Ashton-under-Lyne, to contain about 80,000 spindles, and to carry on the business of spinners, doublers, weavers, bleachers, dyers, printers, and manipulators of cotton, flax, wool, jute, silk, and other fibrous substances and goods in a raw or manufactured state. Minimum cash subscription, 10,000 shares. The number of directors is not to be less than three nor more than seven; the first are T. Cooke, L. H. Marland, E. Barlow, S. Newton, D. G. Isherwood, J. B. Pownall, and J. W. Pollitt; remuneration, £420 per annum, divisible; qualification, 200 shares. Registered by Bower, Cotton and Bower, 4, Bream's Buildings, Chancery-lane, London, W.C.

Rhodes Patent Machine Dyeing Company Limited.

Registered August 14, with a capital of £1500, in £1 shares, to acquire the business of Rhodes Patent Machine Dyeing Company, now carried on at Dock Mills, Shipley, Yorkshire, to adopt an agreement with John Rhodes, John Rhodes, jun., Joseph Rhodes, and B. Scarf, and to carry on the business of dyers, finishers, fullers, makers of dyeing materials, waterproofers of dress, mantle, and other cloths, etc. No initial public issue. The number of directors is not to be less than three nor more than five; Benjamin Scarf is the managing director; qualification, one share. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Dock Dyeworks, Shipley, Yorkshire.

William Bodden and Son Limited.

Registered August 17, with a capital of £150,000, in £1 shares, to adopt an agreement between W. Crellin, J. Buckley, and G. Harrison, of the first part, Emma Crellin, Sarah Harrison, Jane Buckley, W. Bodden, H. Bodden, R. Bodden, G. D. Bodden, and the said W. Crellin, J. Buckley, and G. Harrison, of the second part, and the company of the third part, for the sale and purchase of the business of spindle and flyer manufacturers, machinists, and mechanical engineers, carried on at Hargreaves Spindle Works, Oldham, as William Bodden and Son, and to carry on the same and any other business which can be conveniently carried on in connection therewith. No initial public issue. The number of directors is not to be less than five nor more than seven; the first are W. Crellin, J. Buckley, G. Harrison, W. Bodden, H. Bodden, and F. Ashton; qualification, £1000; remuneration, as fixed by the company. Registered office, Hargreaves Spindle Works, Coldhurst, Oldham, Lancashire.

Carding and Combing Machine Makers Limited.

Registered August 21, with a capital of £25,000, in £1 shares, to adopt an agreement made by T. W. Holme, of Dale-street, Bradford, of the one part (for the company), and the Patent Conveyer Company Limited of the other part, and generally to carry on the business of machinists, patternmakers, fitters, founders, millwrights, wire-drawers, mechanical engineers, enamellers, heating and ventilating engineers, etc. Minimum cash subscription, £3500. The number of directors is not to be less than three nor more than five; the first are J. F. White, E. Holt, T. Priestman, S. Ormondroyd, and J. Priestman; qualification, £100; remuneration, as fixed by the company. Registered office, 168, Thornton-road, Bradford, Yorks.

Manchester Tucking Machine Company Limited.

Registered August 23, with a capital of £2500, in £1 shares, to adopt an agreement between C. Welsh, sen., and C. Welsh, jun., of the first part, C. Mayall of the second part, F. Foster of the third part, W. Whiston of the fourth part, and this company of the fifth part, for the acquisition of the business of the Manchester Tucking Machine Company, to manufacture sewing-tucking machines, etc., and to carry on the business of mechanical engineers, manufacturers of machinery of all kinds, bleachers, dyers and calico printers, textile manufacturers, shippers, etc. No initial public issue. The number of directors is not to be less than three nor more than five; the first are C. Mayall (managing director), F. Foster, and C. Welsh, sen. (managing director); qualification, £100; remuneration, as fixed by the company. Registered office, 87, Cannon-street, Manchester.

Sykes and Tunnicliffe Limited.

Registered August 22, with a capital of £5000, in £1 shares, to carry on at Clayton West, near Huddersfield, the business of mohair, plush, velvet, velveteen, and cloth manufacturers, silk, wool, flax, hemp, and jute manufacturers, importers of cotton, silk, and wool, spinners and doublers, combers and weavers, bleachers, dyers, and cleaners, dealers in dyeing and bleaching materials, textile manufacturers, etc. No initial public issue. The first directors are J. H. Sykes, C. F. Sykes, G. Tunnicliffe, A. J. Brook, and B. Tunnicliffe. Registered by Jenkins and Co., Chapel-place, 31, Poultry, London, E.C.

Robert Usher and Co. Limited.

Registered in Dublin, August 23, with a capital of £10,000, in £1 shares, to acquire and carry on the business of linen manufacturers and bleachers, now carried on as Robert Usher and Co., at Greenhills, Drogheda, co. Louth. The number of directors is not to be more than five; the first is C. F. Allen; qualification, 50 shares. Registered office, Greenhills Factory, Strand-road, Drogheda.

General Fire Alarm and Automatic Sprinkler Syndicate Limited.

Registered August 28, with a capital of £6500, in £1 shares, to adopt an agreement between E. B. L. Morris of the one part, and R. Withington (for the company) of the other part, to acquire Gray's Automatic Fire Alarm and certain other inventions for use in automatic sprinkler installations and in connection therewith, to work and turn to account the same, and to carry on the business of engineers, metal founders and workers, etc. Minimum cash subscription, £1500. The first directors (to be not less than three nor more than seven) are G. W. Beldam, H. Dunderdale, T. Hargreaves, H. J. Rogers, H. B. Muir, and E. B. L. Morris; qualification, £100. Registered office, 26, Pall Mall, London, W.

Mitcham Wool Company Limited.

Registered August 31, with a capital of £4000, in £10 shares (200 preference), to adopt an agreement with Mary C. Hooper, J. P. Hooper, and S. A. Cheale, for the acquisition of the business of flock manufacturers carried on by them as trustees of the will of the late W. E. L. Hooper, at Chilworth and Eashing, Surrey, as the Mitcham Wool Company, and to carry on the said business. No initial public issue. The number of directors is not to be less than two nor more than five; the first are W. W. Hooper and J. M. Hooper; qualification, £100. Registered office, 72, Finsbury-pavement, London, E.C.

Monarch Mill Limited.

Registered August 29, with a capital of £80,000, in £5 shares, to carry on the business of spinning, doubling, weaving, bleaching, dyeing, printing, or manipulating cotton, flax, wool, jute, silk, or other fibrous substances, to buy and sell in Great Britain or abroad any such substances in their raw (unmanufactured) state, and to erect and maintain mills, factories, engines, machinery, etc., for the purpose of the company or otherwise. Minimum cash subscription, 12,000 shares. The number of directors is not to be less than five nor more than seven; the first are C. Bradbury, F. E. Robinson, F. G. Isherwood, S. Burgess, J. Horrobin, and J. Travis; qualification, 100 shares; remuneration, £350 per annum, divisible. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, 48, Union-street, Oldham.

JOTTINGS.

THE Home Secretary has appointed Miss Geraldine Hodgson to be temporarily an inspector of factories and workshops.

THE Master Cotton Spinners' Federation is growing in strength year by year, the increase of spindles this year being 1,720,763, bringing up the total to 20,068,678, against 18,347,915 last year.

DURING the past ten years Germany's lace industry has been greatly developed, especially in the cotton branch, and since the ratification of the commercial treaties the exports have increased very materially. The imports and exports of linen and woollen laces, and the imports of silk laces and embroidery, show a heavy decrease; but on the contrary, the exports of silk laces and embroidery show a considerable increase. The United Kingdom is stated to be the principal buyer of cotton laces.

THE production of raw silk in Japan in 1900 was 1,754,874 kamme (kamme = 8·2817lb.), as against 1,754,242 kamme in 1899, and that of waste silk 738,660 kamme in 1900, against 1,523,216 kamme in the previous year. The cocoon crops in 1900 had shown an increase over the preceding year by 240,052 koku (koku = 4·96 bushels), and naturally the production of raw silk and waste should have made a corresponding increase, but owing to the low price of silk, as well as the scarcity of money, the silk producers seem to have diminished their work and left a great quantity of the cocoons untouched for the present year.

THE Board of Trade returns show that the imports for August amounted to £40,937,140, compared with £42,097,059 for the corresponding month last year, being a decrease of £1,159,919. The exports for August were £24,205,569, against £24,984,623 for August last year, showing a decrease of £779,054. The imports for the eight months ended August 31 amounted to £346,318,351, against £337,967,068 for the corresponding period last year, being an increase of £8,351,283. The exports for the eight months were £187,387,738, compared with £193,911,944 for the corresponding period last year, showing a decrease of £6,524,206.

DURING the first half of 1901 there were 261 textile mills (including one in Canada) constructed or planned in America, a gain of 37 over the last six months of 1900. Of these 261 mills, 143 are for the manufacture of cotton goods, 35 of woollen goods, 48 of knitted goods, hosiery, etc., and 25 are for miscellaneous purposes, such as silk, linen, and jute manufacturing and bleaching, finishing, etc. The number of woollen mills shows the greatest increase, whilst the knitting industry is also extending rapidly, knitted goods being exported in larger quantities each year. Of the 261 mills, 186 are in the Southern States, 74 in the Northern States, and (as noted above) one in Canada.

THE following return of the acreage under flax in Ireland in 1900 and 1901 has just been issued by the Department of Agriculture:—

	1900. Statute Acres.	1901. Statute Acres.	Increase or Decrease. Statute Acres.
Ulster	46,929	54,927	7,998 increase.
Leinster	99	191	92 ,,
Connaught.	324	304	20 decrease.
Munster	99	49	50 ,,
	47,451	55,471	8020 increase.

Showing an increase in 1901 of 8020 acres, as compared with the acreage under flax in 1900, or 16·9 per cent.

WRITING from Montgomery, Ala., on the 31st ult., Messrs. Marks and Gayle report that the crop in the section appears to be good both in quantity and quality. As to its condition at present, they believe that the deterioration in this State since the last Government report is about 2 per cent. The storm which passed over the section about the middle of August did a good deal of damage to cotton which had almost reached maturity or was of considerable size. The smaller plants were not hurt much, nor do they think the damage was as great as reported. Since then there has been some complaint of shedding and rust, but they believe even this to be exaggerated to some extent. The cotton crop in the section is still from two to three weeks late, and the amount that will be marketed during the season will depend largely upon the date of frost.

WE regret to hear of the death of Mr. John Hall, Waterloo, Manchester-road, Bury, on the 11th inst. The deceased gentleman was head of the well-known firm of Messrs. Robert Hall and Sons (Bury) Limited, Hope Foundry, Bury, makers of weaving and allied machinery. He was 62 years of age and the son of the late Alderman R. Hall, of Bury, who was mayor of the borough in 1881-2. In 1875 Mr. Hall was elected a member of the last Board of Improvement Commissioners of Bury, and he occupied a seat on the Town Council for the first six years of its existence. In 1890 he was elected for Church Ward. In 1894 he became alderman, and during the same year was elected mayor of the borough, this being the first occasion on which a father and a son had both occupied the mayoral chair in Bury. He was re-elected mayor in 1896, but when his term of office as an alderman expired—in 1897—he did not seek re-election.

A NEW medium for waterproofing fabrics is prepared as follows:—Anthracene which, as usually purchased, contains a large proportion of anthracene oil, is melted and mixed with pulverised alkaline carbonate, preferably barium carbonate, by which such acid as may be present is neutralised and the impurities carried down. The molten fluid is separated from the deposited impurities, and while it is still in a fluid condition copal resin, such as gum animi or gum elemi, is added, and the heat of the mixture maintained at a temperature not exceeding 400° F., until combination of the gum with the anthracene is completed, as is indicated by cessation of the ebullition. The proportion of the gum to the anthracene may be varied. When the material is desired to be comparatively soft and flexible, about equal weights of gum and anthracene are used. When great plasticity and flexibility are required, a non-drying oil such as bituminous shale oil or crude castor oil is added, in more or less quantity according as the product is desired to be more or less plastic and flexible. When the material is desired to be hard and rigid, a large proportion of gum, such as two up to six parts of gum to one of anthracene, is used. This can be dissolved in volatile spirits, oils, naphtha, and other known solvents, so as to produce a waterproofing substance.

THE report of the changes in the rates of wages and hours of labour in the cotton trade in the United Kingdom during last year shows that during 1900 125,689 textile operatives, or about 10 per cent. of the total number employed, were affected by changes in rates of wages. The total increase in the weekly wages of these workpeople is computed at £6010, or an average of 11½d. per head. The total advance (if spread over the total number of employed) is equal to an average weekly increase of 1¼d. per head. Fifty per cent. of the workpeople engaged in the spinning branch received advances which, if spread over the total number employed, are equal to an increase of nearly 6d. per head per week. In the spinning branch of the cotton trade the rate of wages is now higher than at any other time during the last fifteen years. In the weaving branch, general wages have only changed once during the last fifteen years. From 1886 to 1899 wages were 10 per cent. below price list. In that year they were advanced to 7½ per cent. below list, and are therefore now roughly 2½ per cent. higher than in the period 1886-1893. In 1900 employment was not so good in either of the branches of the cotton trade as in 1899. Employment was not much disturbed by disputes in 1900, the time lost from this cause forming quite an insignificant proportion of the total time worked. The cotton-spinning industry was the branch in which the greatest amount of time was lost by strikes and lock-outs in 1900.

THE TEXTILE COLOURIST:

DEVOTED TO

Practical Dyeing, Calico Printing, Bleaching, Finishing, Etc.

The Soaping Machine.

THE manufacturer who has never used a modern soaping machine for soaping the goods for fulling will most likely say that he has no use for it; while the one who has used one to the best advantage, and noted all its good points, will say he would not be without it. This implies that the machine possesses merits that are not generally known, and the mere soaping of the cloth is not the only advantage of the machine. A writer in the "Canadian Journal of Fabrics" had his prejudice against the machine, because it looked as though its use was to some extent a waste of time and expense, as well as of space in a mill. Having had in charge the equipment of a woollen mill with ample funds, and a desire to secure the latest and best, he was induced to try the soaping machine. The modern soaping machine is arranged so that the cloth passes through the soap, and then through rollers with adjustable pressure, by which the desired moisture can be obtained and the surplus soap retained in the tank. In its use it is best to have a good supply of soap in the tank, and to add after soaping each set of pieces sufficient fresh soap to keep the tank filled to a uniform depth all the time. By this means the soap is kept at a uniform strength, while if it were not replenished regularly, and allowed to run low, it would also tend to run weak by having its original strength exhausted. By a careful test and adjustment of the pressure rolls it can be easily determined what pressure will be required, and after once secured there is seldom any need of a change, unless the character and weight of the goods should vary. The first, and perhaps the most important advantage of the machine, is the uniform moisture obtained. Every finisher of experience knows how important it is to have just the right moisture for fulling, and how impossible it is to secure it by soaping in the fulling mills when there is a constant variation in the length of the pieces. With the soaping machine the amount of soap per yard is always the same, and whether the cloth be 30 or 40yds., it always gets just the required amount of soap. By this means the cloth is always in the best possible condition for fulling, and the risk of having imperfect work from either a lack or excess of moisture is entirely done away with.

The second advantage of the machine is the saving of time, and this is of more importance than is at first apparent. When the cloth goes to the fulling mills, it is evenly wet, and by the pressure of the rolls the grease has been loosened up, and the cloth is in a condition to at once begin to full; while in case the cloth is soaped in the mill, it ordinarily requires from 10 to 15 minutes for the soap to become evenly distributed and the grease to get well started, causing a delay in the work to just that extent. Another important feature in the saving of time is the fact that while one set of cloth is being fulled, another can be soaped in readiness for the fulling, so that the fullest possible benefit of the fulling mills is obtained by securing as nearly as possible their continuous service. Another advantage of the machine is its promotion of cleanliness in the fulling room. When the cloth is soaped in the fulling mills it is thrown into all the parts of the mills, coating the sides and being absorbed by the flocks and flyings in the mills until it is noticeable that a large percentage of the soap is wasted by its never having served the purpose for which it was put into the mills. By the use of the soaping machine, the only soap used goes with the cloth, and by a correct moisture there is never any surplus to go where it is of no use, and the inside of the mills, as well as around and about them, is kept free from the excess of soap, which so often destroys the lasting qualities of the fulling mills by its tendency to cause decay to the wood and constant corrosion to the bolts and screws that are used in the machine.

It was found that by the use of the soaping machine the saving in the condition and consequent service of the fulling mill, by its freedom from excessive moisture in and around its parts, was a most desirable attainment in connection with other advantages; and having started with new machinery, it was plainly evident, as the newness seemed to be retained by the cleanliness maintained. It is useless to speak of the advantage of the saving of soap, as nothing more can be said than that every drop of soap used counts for good service. Another feature which was found more noticeable on goods that did not run long in the fulling, was that they uniformly washed easier. The pressure of the rolls started the dirt and grease, and where the fulling was not sufficiently long to ensure a thorough loosening up of all the dirt, the soaping machine aided very much. Upon some dress goods that did not require any fulling, it was found worth while to use the soaping machine before entering the goods to the washer.

Some very heavy goods that did not get thoroughly saturated by one run in the machine were run a second time before fulling. The uniformity of the soaping, the promptness with which the fulling begins in every part of the cloth at once, and the freedom from over or under-soaping, are points that are of great importance in assuring good work, and making it absolutely impossible for the appearance of cockles caused in fulling, providing the strength of the soap is right; and taken altogether, it will certainly be found, by a fair test, that the modern soaping machine will soon pay for itself in the quantity and quality of work it renders possible in the fulling department, and cause a saving in soap and profanity that the old-fashioned method cannot assure.

The Management of Teasels.

THE process of gigging in the finishing of woollen goods often varies according to the kind of goods to be treated, but, generally speaking, the end to be attained is to raise a heavy nap—a part of which is to remain upon the cloth as a part of the face finish,—or else the principal point is to clear up the felt upon the face of the cloth, so as to bring out clearly the colouring and pattern, and give the cloth a soft and agreeable "feel." The former is the method employed upon face-finished or, as sometimes termed, steam-finished goods, such as broadcloths, beavers, kerseys, etc., while the latter applies to goods which have a close or thread finish, such as cassimeres and the like. While the same general rule would apply to all, the goods requiring a steam finish would call for more work; and the work upon cassimeres, etc., would depend largely upon the amount of felt the cloth had received, which must be raised in gigging sufficiently to enable the shearing to be properly done, so as to bring out the pattern clear and distinct. It is often the case that heavy-felted cassimeres require nearly as much work as the face-finished goods, while others require less, ranging down to such as would clear up with very little gigging, or perhaps with only a good, stiff brushing. So we will at present confine ourselves to such work as would apply to a good quality of close-felted cassimere. Before proceeding, however, we will say something in reference to the machines and teasels used. The old-fashioned up-and-down gig is not very generally in use now for raising the nap, but is employed somewhat in wet gigging, which is a finishing process after the nap has been made, and previous to steaming. When these machines were in more general use for nap raising they did very good service, but, like all old methods, they were too slow for modern ideas. We now have in more general use the single and double cylinder rotary machines, all of which do the work upon the same general principles, the double cylinder machine, of course, doing it more rapidly on account of the increased number of contacts of the cloth to the working cylinders or teasels at one run of the cloth.

One advantage of the double-cylinder machine is the possibility of running the cylinders in opposite directions when desired, which is sometimes desirable upon heavy felted goods. Whatever the style of machine used, the general directions which we may give regarding the change and care of the teasel slats will be applicable. Regarding the teasels, which play so important a part in the work, there is sometimes an ignorance or carelessness in the selection and care of them which is expensive to the manufacturer in more ways than one, and a little study of their peculiarities may not be out of place. First, we will say that it seems as though Nature intended the teasel for the specific purpose of the use it is put to in the finishing of woollens, because nothing has ever been discovered or invented which was so admirably adapted for raising a nap upon woollens, and there has never yet been found any other use for it. The fine and evenly-constructed points of the teasel, together with the tough surface from which it grows, and its connection with the interior pith which gives to the points their peculiar elasticity or tendency to hold and return to their original position when in use, render them perfect beyond the skill of man to invent for the use to which they are put, and a little study of their construction and the possibilities that are in them when properly used and cared for will be worth consideration in the selection of teasels for use. It should be borne in mind that the best are always the cheapest, and they can generally be distinguished by their bright, greenish shade. Those which are dull in shade, and which tend to a brownish cast, are likely to be either over-ripe or else have been impaired by an excess of moisture, either in their growing season or after they have been harvested. If they are over-ripe, the tendency will be for the points to break off in use; and if they have been injured from any cause, it can be discovered by breaking them open, when a part of their pith will be brownish or of a dull shade, instead of bright and light, as when perfect. Teasels thus injured lose the elasticity above referred to, and soon become useless. So it will be seen that it is very important that the quality of the teasel be all right from the start.

The cultivation of the teasel is said to be very uncertain in its results owing to the danger attending the extremes of weather, more especially the injury caused by a wet spell at a certain period of its growth, rendering the teasel of less value in consequence. Sometimes the manufacturer makes the mistake of storing his teasels where they will absorb moisture, which, reaching the centre, will soon injure their usefulness to some extent. They should always be kept in a perfectly dry place. Having secured a good, serviceable teasel, the next matter of importance is the setting of them in the slats for use. The closer they are set, the more even will be the surface, and the less likely will they be to cause stripes in gigging. The large "king teasels," so called, are useless except for coarse blanket work, and the small "button" teasel is only suitable for goods that require a little more than a good brushing to clear them up. A medium-sized teasel, of sufficient length for two of the average length to fill the slat crosswise by lapping a half-inch, should be all right. The teasels set next to the cross irons of the slats should be of a soft, bushy kind, and on being pressed firmly against the iron on either side should very nearly cover it, thus avoiding continuous open spaces around the cylinder where these occur, and a consequent danger of gig marks by a deficiency of gigging at these points.

This is a seemingly small matter, but will count for much in the perfection of the work if acted upon. There are two methods of teasel setting. One may be called the dry, and the other the wet method, the latter of which is by far the better, provided certain precautions are taken. By having the teasels wet, they can be much more closely set, making evener work, as well as being much more easily handled in setting. The precautions to be observed are on account of the danger following the moisture remaining in the teasel for any considerable length of time. For this reason we would advise only wetting a few at a time, say enough for three or four hours' setting, and then dry them as soon as possible, as each slat is filled, in which case the moisture will not be in them long enough to cause serious results. The best way to wet the teasels is to place them in a basket or some vessel with openings in the bottom. Then throw over them one or two pails of boiling hot water, and cover up immediately with a cloth. The water runs directly off, which, with the steam held in for a few minutes by the cloth, will render them soft and pliable, without retaining a dangerous amount of water. Set them quickly, and dry promptly. But no teasles, says the "Wool and Cotton Reporter," should be left wet over-night or be subjected to the wetting process the second time. By the wet method of setting, the teasles can be pressed firmly together, giving a much smoother surface with a larger number of points to the square inch than by the dry method, which counts considerably in the excellence and rapidity of the gigging.

Single-bath Dyeing Composition.

IT is often very convenient to have some composition or base ready at hand, to which it is only necessary to add the colouring matter when about to commence dyeing. Such a base may not be of value in the ordinary practice of dyeing, but where small lots of a miscellaneous character are either the regular or occasional thing, its use is more evident. The composition in question consists of a combination in variable proportions of the following substances:—Sulphate of soda, gum arabic, sugar, animal gall or bile, starch, glycerine, formol, Panama-wood, and the colouring matter, preferably the well-known aniline dyes. A little perfume may also be added if desired. To make in the form of a paste, 1kilo. of the composition is made up as follows:—

540grms. of calcined sulphate of soda.
100 ,, gum arabic.
100 ,, raw sugar.
100 ,, animal gall or bile.
100 ,, potato starch.
20 ,, glycerine.
40 ,, aniline dye.
1 ,, perfume (if desired).
10 to 20 drops of formol.

Instead of 100grms. of gall, only 90grms. may be used, and 10grms. of extract of Panama-wood, or 90grms. of the latter and 10grms. of gall. The extract of Panama-wood is obtained by boiling in water; 10kilos. of the wood, boiled down to 1kilo. of extract, would be of suitable strength. More or less water may be used in making this decoction, but by way of example 10 litres of water may be used to 1kilo. of Panama-wood. Instead of the gum arabic, any suitable equivalent of a gummy, sizing, or stiffening nature may be used to form the paste.

The method of preparing and making the composition is as follows:—The gum arabic is added to the gall, which must be put fresh into a hermetically-closed vessel or receptacle; it is then boiled in a water bath during a few minutes. When it has become cold, the formol is added, and also the extract of Panama-wood, if employed. Then all the remaining ingredients are introduced (except the dye and the starch) into this liquid, stirring them and mixing them thoroughly; and lastly, the colouring substance or dye, with the starch, is added, and the whole mass blended into a perfectly uniform paste. It is not necessary to boil the gall, but if not boiled care must be taken to add the formol while the gall is perfectly fresh, and to store it in an air-tight vessel or receptacle. If a powder is desired instead of a paste, the mixture is effected in the same manner as above described, omitting, however, from the ingredients mentioned the gum arabic, the sugar, and the glycerine. The following quantities may be taken, approximately, as necessary to make 1kilo. of the powder:—Sulphate of soda (calcined), 700grms.; gall, 130grms.; starch, 130grms.; aniline dye, 40grms.; other substances being added proportionately, or substituted, as the case may be, according to what has been stated above.

New Dyeing Materials.

NOTES ON THE PATTERNS ILLUSTRATED.

PATTERN No. 1 is a cotton stripe dyed with Irisamine G (Cassella). The material is previously mordanted with 3 per cent. tannin, 1½ per cent. antimony salt, and is then dyed with 2 per cent. Irisamine G.

Pattern No. 2 is a mercerised cotton sateen mordanted in the same way as the preceding pattern, and dyed with the same dyestuff.

Pattern No. 3 is a raised cotton cloth dyed with 2 per cent. Diamine Dark Green N (Cassella), with the addition of 20 per cent. Glauber's salt.

Pattern No. 4 is dyed in the same way as the preceding pattern, after which the pink is discharged with Irisamine G discharge, and the yellow with Thioflavine T discharge. The pink discharge is prepared by dissolving 100 parts of Irisamine G, pat., in 200 parts acetic acid 8½° Tw., thickening with 60 parts gum thickening 1:1, adding 240 parts tannin acetic acid 1:1, and stirring with 400 parts tin crystals discharge (all parts being by weight). The yellow discharge is prepared by dissolving 60 parts Thioflavine T, pat., in 180 parts acetic acid 8½° Tw., and 60 parts ethyl tartaric acid, adding 300 parts tannin acetic acid 1:1, and stirring into 400 parts tin crystals discharge for coloured discharge (all parts being taken by weight). The tin crystals discharge for coloured effects is prepared by stirring 120 parts wheat starch into 400 parts acetate of tin 28° Tw., and stirring this into 140 parts white dextrine, adding 20 parts citric acid, boiling together, adding 240 parts tin crystals, and when cold adding 60 parts acetate of soda (all parts by weight).

Pattern No. 5 is a sample of cotton yarn dyed with 1 per cent. Diamine Brilliant Scarlet S (Cassella), 2 per cent. soda, and 20 per cent. Glauber's salt.

Pattern No. 6 is a sample of cotton yarn dyed with 2 per cent. Diamine Brilliant Scarlet S (Cassella), 2 per cent. soda, and 20 per cent. Glauber's salt.

Pattern No 7 is a sample of cotton yarn dyed with 1 per cent. Diamine Catechine 3 G (Cassella), and 20 per cent. Glauber's salt.

Pattern No. 8 is a sample of cotton yarn dyed with 4 per cent. Diamine Catechine 3 G (Cassella), and 20 per cent. Glauber's salt.

Pattern No. 9 is a cotton sateen dyed with 20grms. Coriphosphine O (Bayer) dissolved in 100grms. acetic acid 9° Tw., and 160grms. water. There is then added 600grms. thickening A and 120grms. acetic-acid tannic-acid solution 1:1. This is steamed for one hour without pressure, run through tartar-emetic solution, and soaped for twenty minutes at a temperature of 75° F. The thickening A is prepared by boiling 142grms. wheat starch, 286grms. mucilage of tragacanth 65:1000, 286grms. acetic acid 9° Tw. (30 per cent.), and 286grms. water. It will be noticed that the new Coriphosphine is much purer than the older brand of that name.

Pattern No. 10 is a sample of cotton yarn dyed with 4 per cent. Pluto Black F extra (Bayer), 40 per cent. Glauber's salt crystals, 1 per cent. soda ash, and worked for one hour at the boil.

Pattern No. 11 is a sample of cotton yarn dyed with 5 per cent. Katigen Indigo B (Bayer), 3·75 per cent. sulphide of soda crystals, 2 per cent. soda ash, and 5 per cent. Glauber's salt crystals, and then after-treated with 3 per cent. bichromate of potash, 3 per cent. copper sulphate, and 5 per cent. acetic acid.

Pattern No. 12 is a sample of cotton yarn dyed with 20 per cent. Katigen Indigo B (Bayer) 15 per cent. sulphide of soda crystals, 8 per cent. soda ash, and 20 per cent. Glauber's salt crystals. It was then after-treated with 3 per cent. bichromate of potash, 3 per cent. copper sulphate, and 5 per cent. acetic acid.

When dyed direct, Katigen Indigo B (Bayer) produces a slightly greenish blue of a tone very similar to indigo, but by a simple after-treatment with metallic salts, more bloomy and redder shades may be obtained without topping with basic colours. When treated with alum and sulphate of copper, the shades acquire fastness to boiling, but if treated with bichromate of potash and sulphate of copper this fastness is not so good, for under the usual boiling test with 1oz. of soda and 1oz. of soft soap per gallon of water the whites in fancy goods are slightly tinged. The colours, however, have a much more brilliant shade than those treated with alum. By steaming the direct-dyed shade, similar results can be produced to those effected by an after-treatment with metallic salts. One noticeable feature is that the direct-dyed shades have a tendency to become redder and brighter with storing, so that some allowance should be made for this slight change, but the fastness of these direct-dyed shades is only slightly inferior to that of those which are after-treated, and where the goods are exposed to the air and are liable to oxidise, the direct-dyed shade will answer all requirements. There is one very distinct attainment possessed by Katigen Indigo B, and that is, that with the exception of fastness to chlorine it is said to be superior in all other respects to indigo.

The Action of Caustic Soda on Wool.

By C. E. Washburn.

IT is claimed that the action of caustic-soda solutions of certain concentrations on wool is to increase the tensile strength of the fibre, and also its affinity for dyestuffs. It was decided to make a thorough investigation of the subject, and to discover the conditions for obtaining the maximum effect. The following is an outline of the method pursued in making the investigation:—

1. Determined the original strength of the yarn.
2. Steeped in caustic soda for 5 minutes at the following concentrations:—5, 25, 35, 40, 60, 70, 80, 82, 90, and 100° Tw.
3. Selected degree giving maximum strength and steep for: 1, 5, 10, 20, 30, and 60 minutes.
4. Steeped in the best degree of concentration and for the best time varying the temperature: 0, 10, 15, 20, 30, 60, and 100° C.
5. Used different qualities of wool under the best conditions.
6. Used different methods for washing after steeping.
7. For dyeing qualities.

Dyed skeins of treated yarn and also untreated in same bath with (1) acid dyes, (2) basic dyes, (3) mordant dyes, (4) substantive dyes.

Samples of worsted yarn having a tensile strength of 41·3lb. were treated with caustic soda of varying strengths for five minutes. They were quickly washed in water, then in a 1 per cent. solution of sulphuric acid, followed by a washing with water, after which they were dried and their tensile strength redetermined. When solutions of caustic soda of 5 to 60 per cent. Tw. were used, the wool was found to rapidly disintegrate, and as long as the yarn remained wet would be drawn out to nearly twice its original length. On drying, the yarn was very much felted, and had greatly decreased in strength. It was found that caustic-soda solution at 35° Tw. had the most powerful action on the yarn, it being entirely disintegrated at this point of concentration. It was observed that in solutions from 70 to 100° Tw. the yarn was not felted. The maximum tensile strength of the yarn was found to be at 82° Tw., when a tensile strength of 55·5lb. was found. It was found that if the caustic soda was allowed to act for a longer time than five minutes the tensile strength was reduced. Wool which had been treated with concentrated alkali solutions showed a greater affinity for colouring matters than ordinary wool.

Forty strands of 2/36 yarn were placed in the clamps of a tensile-strength machine, so that the strands were parallel and that each might exert the same resistance to strain. After having arranged the yarn in the upper clamp, the lower clamp was placed in such a position that the distance between the upper and the lower was exactly 1in. The power was now applied, and the dial was found to register 38·5lb. The above operation was repeated ten times, with the following results:—

Forty pounds: 38, 40·5, 38·5, 42, 37·5, 39·5, 40, and 38. Taking an average of the above results we have 41·3lb. for the original tensile strength of the yarn to be used in making the tests. After having determined the original tensile strength, we now proceed to experiment with the yarn in caustic-soda solutions of varying strengths at different temperatures and for varying lengths of time. The first of these experiments was made under the following conditions:—

Strength of bath .... 5° Tw.
Temperature .... Ordinary.
Time .... 5 minutes.

It is to be understood that in all the following experiments the yarn was lifted from the caustic-soda solution. It was first washed thoroughly in water, then run through a bath of 1 per cent. solution of sulphuric acid, and then again washed in water and dried before the tests were made.

Experiment No. 1.

Conditions: Strength of bath, 5° Tw.; temperature, ordinary; time, 5 minutes.

Results: 38·5lb., 40, 38·5, 40·5, 38·5, 42, 37·5, 39·5, 40, and 38lb.

Taking an average of the above results, we have 39·4lb. for the tensile strength of the yarn under the above conditions. The yarn had not changed in appearance at this point, but had decreased 1·5lb. in tensile strength. It will be seen that even at this slight concentration of bath the fibre was uninjured.

Experiment No. 2.

Conditions: Strength of bath, 25° Tw.; temperature, ordinary; time, 5 minutes.

Results: 28·5, 26, 28, 26, 28·5, 28·5, 29, 26, 28·5, and 29. Average, 27·8lb.

The tensile strength, it will be noted, has decreased 13·5lb. from the original. The yarn had a yellow appearance, was very harsh and brittle, and was greatly felted.

Experiment No. 3.

Conditions: Strength of bath, 35° Tw.; temperature, ordinary; time, 5 minutes.

Results: The yarn at this concentration was entirely dissolved, imparting a yellow colour to the bath. At this point it was observed that the caustic soda had the strongest and most injurious action. HCl was added to the bath, and the wool was precipitated as a yellow, slimy mass.

Experiment No. 4.

Conditions: Strength of bath, 40° Tw.; temperature, ordinary; time, 5 minutes.

Results: The yarn at this point was greatly disintegrated, and had the appearance of a transparent, slimy mass, and the tensile strength was not determined. The action of the caustic soda at this point, however, was not as injurious as in the preceding experiment.

Experiment No. 5.

Conditions: Strength of bath, 60° Tw.; temperature, ordinary; time, 5 minutes.

Results: 25 5, 24·5, 26·5, 25, 24, 26, 26·5, 25, 24·5, and 25. Average, 25·3lb.

The yarn was very much felted, had a yellow appearance, and was very brittle and weak. When the yarn was wet it could be drawn out to nearly twice its original length, or, in other words, was very elastic.

Experiment No. 6.

Conditions: Strength of bath, 70° Tw.; temperature, ordinary; time, 5 minutes.

Results: 29·5, 31·5, 30, 31, 32, 28, 30, and 30·5. Average, 30·5lb.

The yarn had the same appearance as in the previous experiment, and was very much felted.

Experiment No. 7.

Conditions: Strength of bath, 75° Tw.; temperature, ordinary; time, 5 minutes.

Results: 39·5, 39, 40, 41, 40·5, 39·5, 39, 40, 41, and 40 5. Average, 39·5lb.

It will be noticed that at this point of concentration the yarn had nearly gained its original tensile strength It had a high lustre and a silky feel, and in general had improved greatly over the previous experiment.

Experiment No. 8.

Conditions: Strength of bath, 80° Tw.; temperature, ordinary; time, 5 minutes.

Results: 54·5, 54, 53·5, 53, 54·5, 54·5, 55, 55·5, 53, and 53·5. Average, 54·5lb.

The yarn had a very high lustre, a silky feel, and also had a rustle similar to silk; was not harsh or brittle, and was perfectly white.

PATTERN SHEET No. 106.

Samples of Cotton Cloths.

PATTERN No. 197.

PATTERN No. 198.

NOTE.—*The samples of Woven Fabrics—except those marked as specially designed and woven for this Journal—may have been registered under the "Patents, Designs and Trade Marks Act."*

PATTERN SHEET No. 107.

Illustrating New Dyeing Materials.

No. 1.

No. 2.

No. 3.

No. 4.

No. 5.

No. 6.

No. 7.

No. 8.

No. 9.

No. 10.

No. 11.

No. 12.

The Dyed Samples Nos. 1 to 8 have been supplied by Messrs. Leopold Cassella & Co and Nos 9 to 12 by the Farbenfabriken vorm Fr. Bayer & Co.

EXPERIMENT No. 9.

Conditions: Strength of bath, 82° Tw.; temperature, ordinary; time, 5 minutes.

Results: 55·5, 55, 56, 56·5, 54·5, 54·5, 55, 56, 56, and 55. Average, 55·5lb.

The yarn had the same appearance as in the previous experiment, but had slightly increased in strength.

EXPERIMENT No. 10.

Conditions: Strength of bath, 85° Tw.; temperature, ordinary; time, 5 minutes.

Results: 51, 52, 51·5, 53, 52·5, 53·5, 51, 51, 53, and 53·5. Average, 52·4lb.

Appearance unchanged, but the tensile strength had decreased.

EXPERIMENT No. 11.

Conditions: Strength of bath, 90° Tw.; temperature, ordinary; time, 5 minutes.

Results: 47, 47·5, 46, 46·5, 47, 48, 47·5, 46, 47, and 48. Average, 46·5lb.

Appearance unchanged, but the tensile strength had greatly decreased.

EXPERIMENT No. 12.

Conditions: Strength of bath, 100° Tw.; temperature, ordinary; time, 5 minutes.

Results: 38·5, 37, 37·5, 36·5, 36, 38, 36, 38·5, 36·5, and 37. Average, 37lb.

The yarn at the above concentration had begun to have a yellow colour, and become brittle and harsh. So it was not deemed necessary to carry out the investigation any further, as far as the strength of bath was concerned.

From the foregoing experiments it was found that the yarn had the greatest tensile strength at 82° Tw. Also at this point the yarn had the best appearance. Thus, having found the best concentration of bath, we now proceed to find at what length of time the yarn will be found to have the greatest tensile strength in a bath at 82° Tw. The following experiments were carried out:—

EXPERIMENT No. 13.

Conditions: Strength of bath, 82° Tw.; temperature, ordinary; time, 5 minutes.

Results: 55·5, 56·5, 57, 56·5, 57, 56·5, 57, 56·5, 57, and 57·5lb., the average being 56·5.

EXPERIMENT No. 14.

Conditions: Strength of bath, 82° Tw.; temperature, ordinary; time, 10 minutes.

Results: 54·5, 55·5, 56, 55·5, 55·5, 55, 56·5, 56, 56·5, and 56lb. Average, 55·5.

It will be noticed that there was a decrease of 1lb. from the previous experiment.

EXPERIMENT No. 15.

Conditions: Strength of bath, 82° Tw.; temperature, ordinary; time, 15 minutes.

Results: 49·5, 52, 51·5, 53·5, 50, 51, 49, 48, 51, and 52lb. Average, 50·5.

Although the yarn had decreased in tensile strength, its appearance had not changed.

EXPERIMENT No. 16.

Conditions: Strength of bath, 82° Tw.; temperature, ordinary; time, 30 minutes.

Results: 46·5, 48, 48·5, 46·5, 47·5, 47, 47, 48·5, 46·5, and 47lb. Average, 47.

The tensile strength continued to decrease, and the yarn had a yellow colour, was slightly felted, and harsh.

EXPERIMENT No. 17.

Conditions: Strength of bath, 82° Tw.; temperature, ordinary; time, 60 minutes.

Results: 28·5, 28, 31, 30·5, 30, 28·5, 30, 31, 30·5, and 30. Average, 29·5.

The yarn had a permanent yellow colour, was felted greatly, and was brittle and harsh. Thus it will be seen that when the yarn had remained in the caustic-soda bath for 5 minutes it had acquired the greatest tensile strength.

Having determined the best strength of bath and period of steeping, we proceeded to find the best temperature.

EXPERIMENT No. 18.

Conditions: Strength of bath, 82° Tw.; temperature, 100° C.; time, 5 minutes.

Result: At this temperature the yarn was entirely dissolved.

EXPERIMENT No. 19.

Conditions: Strength of bath, 82° Tw.; temperature, 60° C.; time, 5 minutes.

Result: The yarn was dissolved as in the previous experiment.

EXPERIMENT No 20.

Conditions: Strength of bath, 82° Tw.; temperature, 30° C.; time, 5 minutes.

Results: 35·5, 35·5, 33·5, 33·5, 34, 34, 33·5, 33·5, 35·5, and 35·5. Average, 34lb.

The yarn was very harsh and brittle.

EXPERIMENT No. 21.

Conditions: Strength of bath, 82° Tw.; temperature, 20° C.; time, 5 minutes.

Results: 55·5, 55, 55, 55·5, 56, 56, 55, 55·5, and 55. Average, 55.

The yarn at this temperature had a very high lustre, a silky feel and a rustle when pressed.

EXPERIMENT No. 22.

Conditions: Strength of bath, 82° Tw.; temperature, 15° C.; time, 5 minutes.

Results: 56·5, 56, 56, 56·5, 57, 57, 56, 56·5, 56·5, and 56. Average, 56·5 b.

The yarn at this temperature had the greatest tensile strength, was very lustrous, had a rustle like silk, and was very white.

EXPERIMENT No. 23.

Conditions: Strength of bath, 82° Tw.; temperature, 10° C.; time, 5 minutes.

Results: 52, 52, 50, 50, 53·5, 53, 50·5, 50, 52·5, and 50·5. Average, 51·5lb.

By comparing the two preceding experiments it will be seen that the yarn is decreasing in strength.

EXPERIMENT No. 24.

Conditions: Strength of bath, 82° Tw.; temperature, 0° C.; time, 5 minutes.

Results: 50·5, 49·5, 49, 49·5, 49, 50, 49·5, 49, 49·5, and 50. Average, 49·5lb.

We thus found that the yarn had the greatest tensile strength, was most lustrous, and was the best in all respects, when treated at 15° C. in a bath standing at 82° Tw. for a period of five minutes. The above series of experiments were made with 2/36 yarn.—"Textile World."

(To be continued.)

Colours Fast to Milling and Washing

(Concluded from page 283.)

COTTON.—Whereas wool has been dyed for many centuries fast to milling in all varieties of shades, the dyeing of cotton in colours fast to milling is an art of more recent date. Indeed, cotton has thus been dyed for a long time in the most important colours—*i.e.*, black, blue, brown, red, and yellow, with logwood or aniline black, indigo, Turkey-red, cutch, and chrome yellow. The number of shades which could be produced thereby was very small indeed, but manufacturers had to be satisfied with these. The great success of the coal-tar industry, however, has brought forward new developments in all branches of textile manufacturing, and has continuously created new methods of production and new kinds of fabrics. The demands on the part of the manufacturers have been very great indeed, and with the increasing possibilities they have continuously required the solution of more difficult problems, with the object of producing fine goods from low-class materials by improved processes of dyeing and finishing. I venture to say that both colour makers and dyers and finishers have been equal to the task, and have placed the manufacturers in a position to improve their production greatly in every direction.

The first artificial dyestuffs used for dyeing colours fast to milling, apart from aniline black, were the basic colours. These, however, are not very satisfactory, as the milling process causes the colour to come off. The Alizarin colours, Alizarin-red for Turkey-red of course excepted, have never acquired any great importance in cotton dyeing, although they are very fast; but their fixing on the vegetable fibre offers great difficulties, and their shades lack body and brightness. A great impetus, however, was given to the dyeing of cotton both for pure cotton goods and for cotton to be mixed with wool for the manufacture of union goods by the invention of the Diamine and other direct colours. I have mentioned the Diamine colours before as dyeing wool very easily and rather fast to milling, and on the other hand it is well known that they bleed more or less into white cotton when dyed on this vegetable fibre. It therefore seems almost a paradox that the Diamines should be suitable for cotton to be interwoven with wool. But this apparent inconsistency is easily explained by the fact that the Diamines do not dye wool very readily, or not at all, in an alkaline liquor as used for milling, and therefore the colour which may be stripped from the cotton is not easily taken up by the wool.

Light colours as a rule may be dyed on cotton with Diamine colours without any after-treatment, a good number of Diamines being sufficiently fast in light shades, and some of these colouring matters appear even fast enough for medium shades. But for all shades a fixing of the direct dye is required as a rule. There are three ways of fixing applicable to a good number of these colours: the diazotising and developing method, the treatment with metallic salts, and the coupling process. These fixing processes being very well known to every dyer, I may be allowed to abstain from describing them in detail. The method of diazotising and developing yields shades very fast to washing, and in some cases also to light—*e.g.*, with Diaminogene and Diaminogene Blue very fine blacks and blues are obtained. Other colouring matters which can be fixed by this process are Diamine Black B H, B O, and R O, Diamine Beta Black, Diamine Jet Black S S, Diamine Azo Black, Diamine Brown V and S, Diamine Cutch, and Primuline. Of the various developers, beta-naphthol, diamine, and resorcine have found most favour. A special method consists of developing simply in a warm solution of soda which yields with Diamine Cutch a handsome cutch-brown. Diazotised Primuline, treated with a warm solution of chloride of lime, yields a very fast golden yellow. The treatment with metallic salts gives excellent results with a large number of Diamine colours, and always increases, if applied to the suitable products, the fastness to washing and frequently the fastness to light.

Blue vitriol improves enormously the fastness to light and increases also the fastness to washing of Diamine Sky Blue F F, Diamine Blue R W, and Diamine Brilliant Blue G, so as to make them very fast against washing and faster to light than Vat Blue, whereas the direct colours are not fast. Some other colouring matters are also greatly improved by the treatment with blue vitriol. Bichromate of potash enhances the fastness of some colours against washing to a still greater degree than blue vitriol, and is especially useful in connection with Diamine Jet Black, Diamine Dark Blue, and Diamine Brown M and B. A treatment with a mixture of blue vitriol and bichrome improves equally the fastness to light and to washing of Diamineral Blue, Black and Brown, Diamine and Catechine, Diamine Dark Blue, and Diamine Brown M and B. Colours of excellent fastness to washing are obtained by fixing Diamine Bronze, Diamine Green G, Diamine Brown M, Diamine Fast Red F, and Diamine Yellow N with fluoride of chrome. The latest method of fixing is that by coupling with Nitrazole C or diazotised paranitraniline. This coupling process yields colours of very great fastness to soap and milling, and is extensively employed for yarns to be interwoven with cotton or woollen yarns, and then washed or milled in the piece. Loose cotton is also dyed in large quantities by the coupling process, which has the special advantage of darkening the colours considerably, and therefore reduces very much the cost of dyeing. Brown and black shades principally are obtained. Golden yellows are dyed by coupling Diamine Fast Yellow A or Primuline. The shades of these coupling colours can be enhanced in a very simple way by adding basic colours to the Nitrazole bath, as these latter are easily fixed on the fibre in the coupling bath itself.

The latest development in dyeing colours fast to milling with the Diamines is, strange to say, the dyeing in the milling machine itself. Although the milling, as it is generally executed, is an operation rather calculated to strip colours off than to work them on to the fibre, it can, under certain conditions, be coupled with the dyeing operation so as to save the time taken up by separate dyeing. Nearly all the Diamine colours are suitable for dyeing in the milling machine, but only a small number will withstand the following cross-dyeing unless fixed by the diazotising or coupling method, which would impair the simplicity of the process. A dyestuff, however, which is exceedingly well adapted for this purpose is Diamine Milling Black, since it conforms excellently with the conditions of dyeing in the milling process, and withstands the cross dyeing in an acid bath without any material deterioration. From 1 to 1½ per cent. Diamine Milling Black B conc. (calculated on the weight of the union piece) is added to the fulling liquor, and the mill is set in motion. The composition of the soap liquor varies, of course, with the character of the goods; a liquor containing 7 or 8oz. of soap and 1½oz. of soda-ash to the gallon will be found to answer in most cases. When the milling is finished, the cotton will be dyed to the desired shade, and the piece is then washed off rapidly with cold or, better, with lukewarm water. It is then dyed in a bath distinctly acid, the acid tending to fix rather than strip the black. It is therefore important to keep the bath distinctly acid from the beginning. A red of more recent date, of great fastness to milling, is Paranitraniline Red, which is produced on the fibre itself by preparing the material with an alkaline solution of Beta-naphthol, and, after drying, passing it through a solution of diazotised Paranitraniline or of Nitrazole C.

Within a few years the sulphur dyes have acquired an immense importance, and are consumed in enormous quantities, and the curious thing is that these large quantities of dyestuffs are produced without anybody knowing their composition. So far, it seems, no certain results as to the constitution of these colours have been obtained. From the colourist's point of view I do not expect very much at present from an exact knowledge of the chemical constitution. The chief point seems to me to be the finding out of the best ways and means for dyeing each product, and especially the most suitable methods of after-treatment.

A special group of these colours are the Immedial colours—*i.e.*, Immedial Black, Blue, Brown, and Bronze. With these colouring matters a fair variety of extraordinarily fast shades can be dyed in a simpler way than was known before for the production of fast shades. The great favour the Immedial colours have found is due, apart from their extreme fastness and their fine shades, to the fact that nobody has had ill success with them who has worked in the right manner. Although the method of dyeing differs in some points from the common way of working, it is not at all complicated, no costly appliances nor difficult operations being required. The colours are dyed in a hot alkaline bath, with the addition of soda, salt, and sulphide of soda, the latter being essential to work the colour on to the fibre. Since the colours behave similarly to vat indigo in being permanently fixed on the fibre by the oxidising action of the air, the goods should be kept under the surface of the liquor during the dyeing, so as to be protected against the air, and when coming out of the bath they should be freed rapidly from any surplus of the liquor, to ensure evenness. For these purposes in yarn dyeing the ordinary yarn sticks are replaced by bent iron pipes, which cause little expense and will last an unlimited time, and a very simple squeezing arrangement, consisting of two wooden rollers to be pressed together in a slit of hoop iron, is used for squeezing off the surplus liquor. There is still one special feature to mention—viz., that no brass or copper must be used in the dyevat.

Immedial Black F F Extra is the principal brand for deep blacks, and yields shades similar to aniline oxidation black. It is equal to the same in fastness to light, washing, milling, acids, and alkalies, and superior in so far as it does not turn green, and that it does not tender the fibre if dyed in the right way. Immedial Black V Extra yields a more bluish black, and Immedial Black G Extra a greenish black. The fastness of the direct Immedial blacks is almost absolute, and although an after-treatment with metallic salts is usual, it can hardly be said to be required for improving the fastness, though the after-treatment will enhance the bloom of the shades. The after-treatment for bluish blacks is carried out with a little bichrome; for greenish blacks, with chrome alum; and for the most usual shades of black, with a mixture of bichrome and chrome alum. The two brands, Immedial Black N G and N B, dye very fair blacks, equal to those of the Extra brands in fastness, but inferior in shade. They possess, on the whole, the same tinctorial character as the Extra brands, but, as a rule, after-treatment is not applied to them, no material improvement being obtained thereby.

A near relative of the blacks is Immedial Blue C, which is dyed exactly like the blacks, and then developed either by peroxide of hydrogen or by the combined action of air, heat, moisture, and alkali. The latter method is now generally used in preference to the more expensive one with peroxide of hydrogen, which was proposed at first. For the production of the blue shade, cotton is dyed as with Immedial Black, with the only difference that a little caustic soda lye is added to the bath. The material, when coming out of the bath, is wrung, but not rinsed, as the presence of caustic alkali is very important for the development of the blue. The cotton is then brought into a steam box of any construction whatever, which need only be supplied with an air injector to introduce the necessary air; or yarn may be hung up in an ordinary empty dyevat, covered with blankets, and steamed by slowly opening the valve of the steampipe. It is even sufficient to wrap the dyed cotton in oil-paper so as to prevent drying, and place it in a heated drying-room; enough steam will be produced in the material to develop the blue. Immedial Blue is equal to indigo in fastness to light, acids, and alkalies, and superior in fastness to washing, and as also its shade comes very near to that of indigo, and the colour does not rub off as indigo does, it has replaced indigo in many cases and in many dyehouses. Of special importance is Immedial Blue in combination with vat indigo, since by topping with indigo in the vat the true indigo shade is obtained. In this case no special developing of the Immedial Blue is required, the cotton, after dyeing with Immedial Blue, being simply rinsed in water, and subsequently dyed in the indigo vat, when the blue will be developed by the action of the vat. As Immedial Blue is much cheaper than indigo, the application of indigo, natural or artificial, is thus rendered possible in many cases where indigo alone, on account of its high cost, would be prohibited if it were not done on a bottom of Immedial Blue. Immedial Blue can also be brightened by topping with the basic colours, for which it serves as an excellent mordant. New Methylene Blue, Indazine, and Naphtindone especially are very well suitable for topping Immedial Blue without in the least affecting the fastness of the colour.

Immedial Brown and Immedial Bronze are useful for dyeing browns and mode shades in combination with Immedial Black and Immedial Blue, and also with Diamine Fast Yellow B and Diamine Orange B, in the latter case fixed with blue vitriol and bichrome. The Immedial colours are suitable for all kinds of cotton materials, yarns, piece goods, and loose cotton. They are distinguished by their remarkable fastness to almost all influences and the very simple methods of fixation, and therefore have readily found introduction into many dyehouses, and their use is steadily increasing everywhere. Up to now the range of shades obtainable with them has been limited, but it will doubtless be enlarged within a short time, so that they may conquer new fields now occupied by colouring matters of minor fastness.

Colloid Salts.

DYEING is in most cases to be regarded as a separation of colloid salts upon or in the fibre. Dyestuffs of low molecular weight have to be converted into lakes, which are insoluble colloids. With basic dyes the mordants used are soap and tannin, which are colloids; and with the acid dyes, metallic mordants containing colloidal oxides, such as those of iron, chromium, aluminium, and tin, are employed. The direct dyes, on the other hand, such as the azo dyes, are of a high molecular weight, and require no mordant, either because they are insoluble in water, or give colloid bodies which swell up in water. A writer in a foreign contemporary has succeeded in preparing sesquioxide of iron in colloid solution by floating a 10 per cent. solution of ferric chloride for four weeks, first in a running stream, and then in distilled water. The solution behaved as if it contained free hydrochloric acid and free oxide of iron. Aluminium chloride diffuses completely through parchment, but if hydrate of alumina be dissolved in it, and the solution dialysed, a solution of pure hydrates is obtained. This can be concentrated to ½ per cent. strength without gelatinisation by evaporating at 20° C. under a pressure of 12 millimetres. Chromium and tin hydrates cannot, however, be got in solution quite free from hydrochloric acid.

When a salt is formed by the combination of a colloid acid and a colloid base in aqueous solution, and at ordinary temperatures, it is usually itself colloid. This is the case, for example, with the insoluble soaps, which in their formation are precipitated in a globomorphic and pasty state. The expression globomorphic means that the soap separates out in the form of microscopic spheroidal particles which can cohere to form very thin elastic membranes. This observation was first made with the palmatites of iron, aluminium, chromium, and tin.

The colloid character of the dyestuff, such as rosaniline, is markedly increased by the addition of low terms to the fatty acid series. The tannates of the dyestuffs are got by carefully mixing their hydrochlorates with accurately their own weight of sodium tannate, and are then precipitated as colloid masses, which are very difficult of solution in water. Mordants alone, or low molecular fatty acids alone, have, however, been shown not to give completely satisfactory results. The production of a fast Turkey-red, for example, requires for its production high terms of the fatty-acid series of low melting point.

At present it is uncertain whether antimony tannin lakes are chemical compounds or colloidal mixtures.

Wool and silk dyeing is also attended by a separation of colloidal or membranoid salts, but the fibre also takes part in their formation, which is not the case with cotton. In fact, the action of the nitrogenous bodies in silk and wool during dyeing is analogous in some respects to the behaviour of the corresponding compounds in a hide during tanning.

The Action of Sunlight on Organically-dyed Fabrics.

FASTNESS to light is one of the most desirable properties in a dye, and the efforts of artificial dyemakers to secure it have resulted in some very encouraging successes. It may, however, be safely prophesied that much better results will be attained in the future as a consequence of better knowledge of the various forms of radiant energy which reach us from the sun. Every colour chemist knows how his ignorance on this matter makes the carrying-out of tests of the effect of light very difficult, and also how hard it is to subject two samples to an exposure for the same time to light of the same power. The intensity of light is usually tested with a woollen fabric dyed with indigo carmine, a substance which is altered by light in a very steady and uniform manner. The wool is then exposed to the sun during five hot days (best in August). By removing some of the pieces each day we get a series of shades corresponding respectively to exposures of 0, 1, 2, 3, 4, and 5 days. The colour to be tested is exposed with a fresh piece of indigo-carmined wool, and the amount of light it has been subjected to is known by the change which takes place in the indigo carmine.

The effect of light on a colour depends, of course, also upon the concomitant access or not to it of other agencies, such as air and moisture. It is a remarkable fact that some dyed stuffs, after suffering in colour by exposure to daylight, recover partly or completely after a shorter or longer sojourn in the dark. Roloff divides the effect of light upon dyes into chemical and physical ones. Photo-chemical changes are such as cause interchange between the molecule, as in photography. Photo-physical changes, however, do not involve the interaction of molecules, although they may change the internal structure of any single one. An example is the polymerisation of aldehyde. Marckwald, who attempted to explain the recovery of colour in the dark—as, for example, when Chinochinolin, turned greener by daylight, completely recovers its yellow hue, or when beta-tetrachlorketonaphthalene again becomes colourless after having been made violet by light—failed to discover that the change was photo-chemical or photo-physical, and he called it phototropical. Hence we have three sets of change undergone by colour—photo tropical, photo-physical, and photo-chemical. There can be no doubt, says the "Chomiker Zeitung," that a discovery to which of the three classes the effect of light is to be referred would be of the greatest assistance in the yet-to-be-done labour of making a theory of the dying art, and thus making a complete science of it. It would, for example, tell in favour of the Witt solution theory if it could be shown that there is chemical action between the fibre and the dye during exposure to actinic rays. Ciamician and Silber seem lately to have shown that certain substances dissolved in alcohol oxidise it in the sunlight. One of them is benzophenone, which the alcohol reduces to benzpinacone and aldehyde.

Silk Finishing.

(Concluded from page 283.)

FINISHING TAFFETAS, FOULARDS, ETC.—The ingredients are mixed in the following proportions: 2¼lb. of gum arabic and 1½oz. chloride of tin to each 10gals. of water. The gum is first dissolved in cold water and the tin then added to the solution. The tin is used for the purpose of giving a scroop to the silk. The goods are impregnated with this mixture and then pressed. If the silks to be treated are black or blue, or have been printed on a very dark ground, a more dilute finishing solution should be used in order that the colour of the goods may appear brighter. In such a case a mixture made up of the following proportions answers the purpose: 4½lb. of rice, 2½gals. of water, and 4½oz. white gelatine. The rice is first boiled in water, the gelatine added, and the mixture strained.

Amber Finishing Mixture.—This is a patented mixture, which increases the elasticity, durability, and improves the appearance of silk cloths. Clear transparent amber is dissolved in chloroform in the proportions of 1oz. of the former to 2oz. of the latter. After letting this solution stand for two or three days, the undissolved amber is pressed from the mixture, and the silk goods coated with the residue. The goods are then dried in a room where the evaporated chloroform can be reclaimed. After drying, the cloth is hot pressed. This process is said to make the goods very soft and elastic and to greatly improve the appearance.

Finishing Half-silk Satins.—Most of the finishing of these goods is done during the dyeing operation. While general directions can be given, says "Die Appreturmittel," it must be borne in mind that success cannot be obtained by simply following recipes, for it is essential to have the experience obtained only by long experience in the finishing-room. The operations consist of singeing, dressing, calendering, breaking, and pressing. The singeing is partially done before dyeing, in order to remove the loose fibres from the face of the goods. The operation is conducted on the ordinary singeing machine; the face of the goods passes over a gas flame, the back side of the fabric resting on a pipe which is kept cool by the circulation of water. For dressing the goods, tragacanth and glue mixed with a small proportion of finishing oil is used. A very pure grade of glue should be used in order to avoid the disagreeable odour which is nearly always emitted by the cheaper grades of glue. The quantity of these ingredients depends upon whether a hard or soft "feel" is wanted. The glue and oil increase the lustre. The materials are mixed by boiling together in water and applying to the back side of the goods when cool. The goods are then dried on steam cylinders and wound on rolls. In the application of this dressing, care should be taken that none of it is absorbed by the fabric and passes to the face. This can be done by regulating the consistency of the mixture. Calendering, which follows, increases the lustre, particularly of the cotton. The breaking operation is for the purpose of softening the handle of the goods, which have been made stiff by dressing and calendering. For this purpose they are run over a roll which is provided with blunt knives running lengthways and in a spiral direction. After this operation the goods are pressed, which completes the finishing process.

Bleaching and Whitening Half-silks.—This whitening of half-silk goods is employed only for such fabrics as are intended for printed designs on a very white ground. The following mixture is employed for this purpose: 20gals. of water, 18lb. of stiffening, 1¼lb. gum, ½lb. of soap, and 1¾oz. of wax. The soap and wax are first dissolved by boiling in water, and the previously-dissolved gum is then slowly added. The stiffening is then added while stirring the mixture vigorously. The material is applied to one side of the goods, which are afterwards dried and then pressed. A mixture for dressing both sides of half-silk goods is made up as follows: 33lb. glue jelly are dissolved in 25gals. of hot water, and 1lb. of gum tragacanth, 1lb of soap, and 1lb. of cocoanut oil are added slowly.

Testing Peroxide of Hydrogen.

It has lately been affirmed that some makers adulterate their peroxide with oxalic acid. Now as the value of the reagent is always tested volumetrically by the bleaching of permanganate, the presence of oxalic acid, which has the same effect, would cause the percentage of H_2O_2 to seem much greater than reality. Besides, oxalic acid has a destructive action on the peroxide. The analytical process which buyers are recommended to adopt for detecting this adulteration is to dilute the peroxide with about its own volume of water, make it distinctly alkaline with ammonia, and then add neutral calcium chloride in excess. This reagent will, it is said, give a precipitate if any oxalic acid is present, which will if pure calcium oxalate be crystalline and adhere to the sides of the vessel. It will be observed that the mere formation of a precipitate proves nothing, as it may be sulphate or phosphate of lime or a mixture of one or both of these salts with calcium oxalate. The safest plan is therefore said to be to filter off and wash with very little dilute ammonia any precipitate with calcium chloride, and then treat it with very dilute warm sulphuric acid. Any oxalic acid present will then be dissolved out from it, and can be detected in the filtrate with ammonia and calcium chloride.

A writer in the "Moniteur Scientifique" is of opinion that this method is inexact and is capable of including oxalic acid when it is not present. The following observations have been made by him:—

1. The wash waters from the first precipitate with calcium chloride, when acidulated with sulphuric acid, always have a slight bleaching action on permanganate. The precipitate must then dissolve slightly in ammoniacal water, which oxalate and lime will not do. Besides, if the washing is finished with distilled water, the washings remain slightly alkaline.

2. The dilute sulphuric acid in which the precipitate has been dissolved immediately bleaches permanganate in the cold, which oxalic acid will not do.

The acid solution neutralised with ammonia never grows turbid. It should, however, throw down calcium oxalate in time, but it will only do so if oxalic acid is purposely added to it. The same solution gives off with permanganate pure oxygen and no carbonic acid, a gas which would certainly be produced in the presence of oxalic, and it gives the ordinary reactions of peroxide of hydrogen distinctly. It may be added that the precipitate with chloride of calcium, although at first brilliant and transparent, effloresces and becomes opaque in dry air. After drying at 100° C., or in vacuo, it is very alkaline, an impossibility if it were a mixture of neutral lime salts such as oxalate, sulphate, phosphate, etc. The writer is forced to conclude that this precipitate, slightly soluble in water, and capable of forming peroxide of hydrogen when acted on by dilute oil of vitriol, is simply hydrated calcium peroxide, and not oxalate of lime at all. He has found that peroxide of hydrogen accused of adulteration, and which gave 8·28 on titration with permanganate, gave 8·19 with peroxide of manganese and sulphuric acid, the gas evolved being quite free from carbonic acid. He has tried the effect of adding oxalic acid to pure hydrogen peroxide showing 10·7. A litre of this was treated with 20grms. of oxalic acid, and another litre with 10grms. The following were the titrations on the dates given:—

	With 20grms. Oxalic.	With 10grms. Oxalic.
March 13	12·2	11·3
March 21	10·19	10·44
March 28	9·5	10·11
April 5	9·15	9·92

This shows that the decomposition is rapid at first. In a week, the strength is below the original figure. The peroxide with 20grms. of oxalic acid gave off gas, especially during the first week, and hence would have burst any closed vessel in which it might have been despatched. If alkaline oxalates were added, the solid residue at 100° C. would betray them It may be remarked in conclusion that the usual $\frac{N}{50}$ solution of permanganate, taking 2cc. of peroxide, and dividing the number of cubic centimetres of permanganate used by three, does not give the result supposed—viz., the number of volumes of available oxygen. The error is a positive one of about 20 per cent., as a result of 10 by the usual method corresponds to a true titration of 8·38 only. The permanganate should be not $\frac{N}{50}$, but $\frac{N}{35\cdot78}$—*i.e.*, 5·659grms. per litre instead of 3·163, used with 1cc. of the peroxide of hydrogen.

NOTES ON DYEING, BLEACHING, FINISHING, &c.

Specially compiled for THE TEXTILE MANUFACTURER.

Katigen Blue Black R and B.—These new colours (Bayer) produce a pronounced bluish-black shade, the R brand being of a bloomy and violet tone, while the B mark yields a very deep blue black, very similar in shade to Oxidation Black. With regard to the method of dyeing and after-treating these new colours, the same means are adopted as for the earlier katigen blacks. Both are said to be possessed of the same excellent fastness, and have very good level dyeing properties.

New Patent Black E and B.—These two new brands of black (Kalle) are for dyeing wool in an acid bath, and are said to be remarkably fast to washing and soaping, not bleeding into the white when washed with dyed goods. Dyeing is carried out as follows:—Prepare the bath with the necessary quantity of colouring matter and Glauber's salt; enter at about 40° C., raise slowly to the boil, and dye for one hour at this temperature with the addition of 5 per cent. acetic acid (or the corresponding amount of sulphuric acid).

Acetylene Black.—The product known as "Acetylene Black" is simply a pigment black obtained by exploding acetylene at a pressure of more than two atmospheres by means of an induction spark. This black, which contains 99·8 per cent. of carbon, may be said to be practically pure. It has a constant composition, mixes well with water, and in all proportions with oils, gums, glue, and other vehicles. A writer in the Bulletin of the Mulhouse Society recommends the black as being exceedingly well suited for calico printing. A colour containing 50grms. of the new black per litre of albumen thickening yields a good black print.

Sulphaniline Brown P.—This new brown sulphide colour (Kalle) has a fine yellowish tone which renders it especially suitable for the production of fashionable shades. On account of its excellent fastness to acids, soda, soap and water, it is very useful for the dyeing of loose cotton, cotton hanks, and hosiery goods. It is dyed with the addition of common salt, sodium sulphide and soda, and presents the advantages that it can be worked during the dyeing operation without the risk of getting uneven shades, and that it does not require any subsequent chroming.

Iron in Turkey-red Oil.—Whilst Turkey-red dyers and printers take great care to ascertain that the alumina and other mineral compounds used in the process are free from iron, there is a tendency to overlook the fact that Turkey-red oil is also liable to contain iron in sufficient quantity to damage the red, the more so as the presence of the oil interferes with the detection of the metal by the usual reactions. Even the minutest traces of iron may be detected by the following simple and rapid method:—Place in a stoppered cylinder 10cc. of oleine, add 20cc. of 50 per cent. sulphuric acid and a few drops of yellow prussiate solution, and shake well. Next add 50cc. of ether, again shake and let settle for some time. The oil remains dissolved in the ether, which floats over the acid, whilst a blue ring of greater or lesser intensity forms between the two layers, if iron be present.

Naphthamine Blue G E.—This is a new colouring matter of a more greenish shade than the older B E brand (Kalle). The direct shade does not offer any particular interest, but by diazotising and developing with beta-naphthol it is transformed into a nourished indigo dark blue with a greenish tone, which is said to be distinguished by a remarkable fastness to water, alkalies, soaping, and acids; these properties render the product especially adapted for dyeing cotton yarn, loose cotton, and hosiery goods. It is dyed in the usual manner from a feebly alkaline salt bath; it goes on well and evenly, and shows no tendency to get bronzy. The following is an example of the treatment when dyeing cotton:—Dye one hour boiling with the addition of from 20 to 30 per cent. common salt or Glauber's salt, and 1 to 2 per cent. calcined soda. Then diazotise in a cold bath (3 per cent. nitrite, 15 per cent. muriatic acid, and a quantity of water equal to thirty times the weight of the goods), and develop, preferably with beta-naphthol (2 per cent. naphthol, 2 per cent. caustic soda 40° Bé., and a quantity of water equal to fifteen times the weight of the goods).

Embossing Cloth.—A German manufacturer has introduced a method whereby cloth is embossed on one side and raised on the other. The cloth is first roughly raised on one side, whether in the grey, in the bleached, in the plain dyed, or in the dyed and printed state. Then the cloth thus prepared is sized, which is done by either applying the sizing to the upraised side or by passing the cloth through the sizing or gluing liquor. These operations are then followed by the embossing and the raising and brushing of the other side of the cloth, which is still hot from the previous operation, and which had been already roughly raised. By this method, owing to the cloth being sized while partially raised, the pores are open and allow the entrance of air, and owing to the cloth's raised, velvetlike back, in many garments made from it linings are unnecessary.

Naphthamine Blue B E.—This is a new blue (Kalle) for the direct dyeing of cotton, which is said to be very fast in its diazotised and developed shades. The direct dyeings show a greyish-blue tone; by diazotising and developing with beta-naphthol, these are converted into brighter, reddish blues, which are said to be particularly good in fastness to water, alkalies, and acids. The dye-stuff goes well on the fibre, dyes evenly, and has no tendency to turn bronzy, even in heavy shades. For dyeing cotton: Dye one hour, boiling with addition of from 20 to 30 per cent. common or Glauber's salt, with or without a little soda. Then diazotise in a cold bath (3 per cent. nitrite, 10 per cent. muriatic acid, and a quantity of water equal to thirty times the weight of the goods) and develop, preferably with beta-naphthol (2 per cent. beta-naphthol, 2 per cent. caustic soda 40° Bé., and a quantity of water equal to twelve times the weight of the goods).

Thion Black B E.—This is a new sulphide black (Kalle) which dissolves easily at ordinary temperature; it dyes cotton direct in a boiling bath with the usual additions of salt, soda and sodium sulphide. The shade can be rendered more bluish by an after-treatment with bichromate and alum. In order to avoid a premature oxidation of the colour by the air, it is advisable to keep the material as much as possible below the surface of the bath during the dyeing operation, and to squeeze off and rinse the goods well immediately after taking them out. After the washing the influence of the air is favourable rather than detrimental. In consequence of the solubility of Thion Black a very slight addition of sodium sulphide is quite sufficient for the dyeing process; when dyeing in apparati this addition may be reduced even to from one-fifteenth to one-twentieth of the quantity of colour used. When dyeing, prepare the first bath with 20 per cent. colouring matter, 5 per cent. crystallised sodium sulphide, 6 per cent. soda and 50 per cent. salt, and a quantity of water equal to fifteen times the weight of the cotton. Dye one hour at a temperature of from 90 to 95° C. For the subsequent lots the additions of colouring matter, sodium sulphide, etc., are correspondingly reduced. The goods must be squeezed off and rinsed well immediately after taking out. For the subsequent treatment, if such should be required, use a fresh bath containing 3 per cent. bichromate and 4·5 per cent. alum, and treat the goods therein for half-an-hour at 90° C.

Combined Washing and Bleaching Process.—A process which combines the properties of both scouring and bleaching for cotton and other vegetable fibres, and which makes soapy matters entirely unnecessary, consists of using a silicate of some alkali—sodium of potassium, for instance,—in order to hold in suspension the soluble and insoluble particles of matter during the operation of washing, and to emulsify the fatty or greasy matters contained in the fabric to be treated. A solution of an oxygenated compound of an alkali is taken, and to it is added metallic zinc or zinc dust (or it may be a zinc salt, say zinc sulphate), for the reason that the zinc acts highly beneficially upon the cellulose of the fibre. The following combination gives very high results:—Take a lye of hydroxide of sodium having a strength of about 24° Tw. (15·4° Bé.), and add to this about 5 per cent. of the quantity of lye of the zinc, or if a salt of zinc is used, a quantity yielding the same percentage of zinc. The lye is heated until the zinc has been dissolved, when the whole is allowed to settle and cool down, so that any impurities may be precipitated. The clear liquor with the zinc in solution is then drawn off, and to 35 parts by volume of this liquor added 35 parts by volume of a solution of silicate of sodium of a strength of about 140° Tw. (89·8° Bé.), stirring the whole well until it is thoroughly mixed, when it is ready for use in a liquid form. It is found most convenient for commercial purposes to produce the product in a non-liquid form, and to this end there is added to the above solution sodium when the lye is of sodium, or potassium when the lye is of potassium, in such quantity as to make the mass stiff or pasty, when it is allowed to set and harden. It is found unnecessary under some circumstances to use the zinc, as the hydroxide solution in itself has a very powerful bleaching action when in combination with alkaline silicate. A compound produced as above is said to have very high bleaching, cleansing, and purifying qualities, and, according to the Bristol firm who have introduced it, may be used without soap for washing cotton or linen or other vegetable fibres or textiles.

THE TEXTILE MANUFACTURER PATENT GAZETTE.

Manuscript Specifications of patents can be examined at the Patent Office, London, after the Complete Specification has been accepted, on payment of One Shilling. The printed Specifications are usually published in about one month after acceptance of the Complete Specification, and any single copy may be obtained by remitting 8d. in stamps (or by special postcards sold at the Post Offices at 8d. each) to the Comptroller General, Patent Office, 25, Southampton Buildings, Chancery-lane, London. When a number of specifications are required, remittances may be made by P.O.O.

Applications for Patents.

(Where complete specification accompanies application an asterisk is affixed.)

1901.

6th August.

15,785 J. HETHERINGTON AND SONS LIMITED and OTHERS, Manchester. Spindles for ring spinning and doubling frames.

15,828 J. HUMPHRIES AND SONS LIMITED and J. P. HUMPHRIES, London. Feed bars or yarn carriers of Axminster and like looms.

15,829 F. M. WHARTON, London. Waterproofing and preserving from decay and attacks of insects canvas, paper, etc.

15,837 G. A. LOWRY, London. Apparatus for ginning cotton and similar material.*

7th August.

15,868 A. F. MCCOLLUM, Manchester. Pile fabrics.

15,869 J. H. SOUTHWORTH and OTHERS, Manchester. Looms for weaving.

15,924 R. B. RANSFORD, London. Manufacture of dyestuffs. (*L. Cassella and Co., Germany.*)

15,925 F. HASS, London. Shearing or finishing fabrics.

8th August.

15,933 W. E. BAKER, London. Rotary washing machines.

15,943 J. AUCHINVOLE, Glasgow. Washing, bleaching, etc., yarns or like fibrous materials.

15,992 G. BERNARDI, London. Washing and sterilising linen and the like.

9th August.

15,997 S. WOODHEAD and S. SMITH AND CO. LIMITED, Bradford. Pressing of textile fabrics.

15,998 A. E. WALKER and OTHERS, Bradford. Looms.

16,001 J. W. NASMITH, Manchester. Detaching mechanism of combing machines.

16,003 A. MELLOR, Huddersfield. Stop motions for twisting frames.

16,007 J. SHORROCKS, Farnworth. Flyers for roving, slubbing, intermediate, and other analogous machines.

16,019 R. H. S. READE and OTHERS, Manchester. Hackling machines for flax and other long-staple fibres.*

16,017 J. AUCHINVOLE, Glasgow. Washing, bleaching, dyeing, etc., yarns or like fibrous materials and fabrics.

16,046 O. SCHIERITZ, London. Harness for jacquard looms.

16,061 H. FERGUSON, London. Washing, softening, and dyeing machines for rhea filasse or hanks of yarn.

10th August.

16,125 H. J. J. FROSSARD, London. Improved spindle for throstle frames.

12th August.

16,141 M. LUTZ, London. Knitted fabrics, and process for producing them.*

16,142 E. W. KEMNA, Barmen. Loom reeds.*

16,156 E. A. WALKER and OTHERS, Bradford. Looms.

16,160 A. J. BOULT, London. Seamless woven pockets.* (*A. Mills, United States.*)

16,170 H. E. NEWTON, London. Manufacture of white and coloured discharges on cotton dyed with sulphurised dyestuffs. (*The Farbenfabriken vormals Friedrich Bayer and Co., Germany.*)

16,173 C. D. ABEL, London. Colouring matters belonging to the triphenyl- and the diphenyl-naphthylmethane series. (*Actien-Gesellschaft für Anilin-Fabrikation, Germany.*)

16,176 H. PAATZ, London. Drying apparatus.

16,210 G. W. JOHNSON, London. Colouring matters. (*W. Epstein and E. Rosenthal, Germany.*)

13th August.

16,233 G. and C. W. MELLOR, Manchester. Smallware looms.

16,234 H. O. BRANDT, Manchester. Drying yarn, textile fabrics, etc.

16,252 W. F. and J. W. SETTLE, London. Tentering machines.

16,254 M. ZOBER, London. Brush-shaped tongue openers for knitting machines.

16,285 G. J. NOPPER, London. Cloth cutters.*

14th August.

16,309 R. RUDD, Bradford. Letting-off mechanism of weaving looms.

16,310 W. A. WINDER, Bradford. Yarn skeps.

16,322 A. SHORROCK, Manchester. Means for applying tension to warp beams in looms for weaving.*

16,329 A. TCHERNIACK, London. Method of driving the flats and "doffer" of carding engines.

16,345 R. B. RANSFORD, London. Colouring matters. (*L. Cassella and Co., Germany.*)

15th August.

16,387 A. R. ROBERTSON, Glasgow. Centrifugal machines. (*A. Freitag, Holland.*)

16,395 K. L. THORP, London. Electrolytic production of bleaching solutions.

16,409 O. IMRAY, London. Orange-yellow to red monoazo-dyestuffs suitable for the preparation of lakes. (*Farbwerke vormals Meister, Lucius and Brüning, Germany.*)

16,417 H. E. NEWTON, London. New basic dyestuffs. (*The Farbenfabriken vormals Friedrich Bayer and Co., Germany.*)

16,420 J. Y. JOHNSON, London. Manufacture of initial materials relating to the production of indigo colouring matters. (*The Badische Anilin and Soda Fabrik, Germany.*)

16,421 J. Y. JOHNSON, London. Indigo reserve printing, and means to be employed therein. (*The Badische Anilin and Soda Fabrik, Germany.*)

16,425 J. A. SPARROW and J. F. MARKES, London. Producing so-called "Teneriffe" lace and like work.

16,429 A. COHN, London. Glossing leather, paper, etc.

16th August.

16,445 G. F. PRIESTLEY, London. Metallic bobbins used for textile purposes.

16,446 G. F. PRIESTLEY, London. Metallic bobbins used for textile purposes.

16,487 J. T. THOMPSON, London. Clearers for spinning mules, ring frames, etc.

16,489 A. J. BOULT, London. Weights or lingoes for weaving machines. (*H. Tohang and Co., Germany.*)

16,494 J. CRYER and J. WEBSTER, London. Weaving shaped articles.

17th August.

16,526 R. TAYLOR, Bradford. Letting-off motion applicable to looms or other machinery requiring sensitive tension.

16,528 R. BROOKSBANK, Nottingham. Winding brass bobbins used in twist-lace machines.

16,530 J. BEEVER, Huddersfield. Hearthrugs, mats, carpets made from rags, list yarn or waste cuttings, from woollen, cotton, silk or union fabrics or from woollen, cotton, silk, or tow yarns.

16,538 H. E. AYKROYD and OTHERS, Ilkley. Machine for mercerising, bleaching, preparing, etc.

16,542 H. JONES and J. H. BRINDLE, Manchester. Rings for spinning.

16,543 D. H. THORNTON and THORNTON, HANNAM AND MARSHALL LIMITED, Bradford. Finishing of certain "embossed" textile fabrics.

16,584 C. D. ABEL, London. Colouring matters belonging to the triphenylmethane series. (*Actien-Gesellschaft für Anilin Fabrikation, Germany.*)

16,591 R. GLEDHILL and T. LUMB, London. Cloth-perching apparatus.

16,592 G. W. JOHNSON, London. Colouring matters containing sulphur. (*Kalle and Co., Germany.*)

16,593 J. Y. JOHNSON, London. New azo colouring matter. (*The Badische Anilin and Soda Fabrik, Germany.*)

19th August.

16,648 G. PLATT, Manchester. Reeling machines.

21st August.

16,765 R. MELLOR, Huddersfield. Means to be employed in dyeing yarns of woollen, worsted, silk, or other like fibres.

16,772 H. O. BRANDT, Manchester. Treating fabrics with dyes and other liquids.

16,785 THE COMMERCIAL TRADING SYNDICATE LIMITED and C. J. DEAR, London. Process for the treatment of fibres and fibrous substances.

16,811 J. Y. JOHNSON, London. Azo colouring matters. (*The Badische Anilin and Soda Fabrik, Germany.*)

22nd August.

16,876 A. G. BLOXAM, London. Greenish-black sulphurised directly-dyeing dyestuffs for cotton.* (*Chemische Fabrik Brugg, A. G. vormals Zimmermann and Co., Switzerland.*)

16,901 J. Y. JOHNSON, London. Printing of vegetable fibre with colouring matters. (*The Badische Anilin and Soda Fabrik, Germany.*)

16,905 R. E. EVENDEN and G. W. BUTT, London. Looms.

16,907 J. MEYER, London. Pile fabrics.

23rd August.

16,919 C. O. WEBER and I. FRANKENBURG LIMITED, Manchester. Recovery of volatile solvents used in the treatment of textile fabrics.

16,938 P. R. J. WILLIS, Kingston-on-Thames. Machines for cleaning flax. (*T. F. Lowery, United States.*)

16,957 O. IMRAY, London. Disazo dyestuffs for wool, and an intermediate product (*The Farbwerbe vormals Meister, Lucius and Brüning, Germany.*)

16,960 A. J. BOULT, London. Devices for unrolling, stretching, and measuring woven fabrics.* (*C. J. C. Gierisch, Germany.*)

24th August.

16,988 R. and J. CLEGG, Manchester. Self-acting mules.

17,008 A. HITCHON, Accrington. Appliances connected with ring spinning and twisting frames.

17,009 J. T. BATTERSBY, Heywood. Preparing, spinning, and drum winding machines.

17,015 A. TURNER and OTHERS, London. Knitted underwear.

17,038 A. BREESE, London. Reciprocal cutters for fabrics and other materials.*

26th August.

17,064 J. H. HOLT, Manchester. Measuring devices for yarn and other materials.

17,094 O. IMRAY, London. Manufacture of orange-yellow to red mordant dyestuffs. (*Farbwerke vormals Meister, Lucius and Brüning, Germany.*)

27th August

17,129 A. and H. BARRACLOUGH, Halifax. Improved manufacture of yarn.

17,135 E. TAYLOR, Manchester. Preparation of warps for looms.

17,141 A. G. BROOKES, London. Means for preventing singles in slubbing, intermediate, and roving frames.* (*G. O. Draper, United States.*)

17,147 J. SCOWCROFT, London. Card flat-grinding machines.

17,178 O. BULLOCK and W. H. FORTY, London. Looms for the manufacture of coir mats.

17,204 F. A. WARDWELL, London. Drop-box pickers for looms.*

28th August.

17,273 J. Y. JOHNSON, London. Production of new substantive colouring matters containing sulphur and intermediate products relating thereto. (*The Badische Anilin and Soda Fabrik, Germany.*)

29th August.

17,294 W. TETLEY and OTHERS, Halifax. Automatic shuttle-changing looms.

17,295 W. TETLEY and OTHERS, Halifax. Automatic shuttle-changing looms.

17,308 W. MONTGOMERY, Addlestone. Washable and waterproof carpet.

17,335 C. H. ALDRIDGE, London. Rotary or flat-bar knitting machines.

17,356 J. Y. JOHNSON, London. New azo colouring matters. (*The Badische Anilin and Soda Fabrik, Germany.*)

30th August.

17,370 A. WOOD, Manchester. Looms.

17,379 H. SMITHSON and E. R. SHARPE, Manchester. Ring-spinning frame appliances.

17,403 R. BELT, London. Machine for fireproofing fabrics.

17,405 J. SKINNER, London. Device for cutting fabrics or materials into samples or patterns of predetermined size.

17,443 H. FERGUSON, London. Machine for treating vegetable fibres such as hemp, ramie, jute, and the like.

31st August.

17,452 J. M. DAVENPORT, Manchester. "Long collars" of the spindles of slubbing, roving, and intermediate frames.

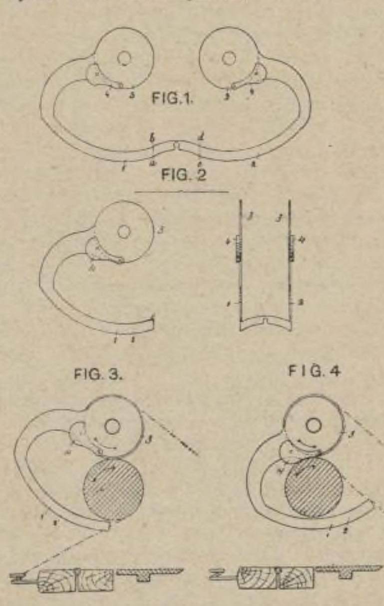
17,504 TAYLOR, LANG AND CO. LIMITED and OTHERS, London. Belt-controlling mechanism and apparatus for self-acting mules.

Recent Textile Patents.

The following are abridgments of patents recently published. The date given at the beginning of each is that of application, whilst that at the end is the date of acceptance of the complete specification. The period of opposition expires within two months of the latter date:—

1900.

6796. Stop motion. April 11. M. Klinger, 26, Unterkotzauerweg, Hof, Bavaria. Relates to devices for stopping the delivery of the yarn or thread in spinning machines when an end breaks. Figs. 1 and 2 exemplify the construction of the device, and Figs. 3 and 4 its inoperative and operative positions respectively. A metal frame in the shape shown in Fig. 1 is bent along the lines *a b* and *c d*, so that a three-sided frame results, whose side members 1, 2 are parallel to each other, as represented in Fig. 2. Each disc portion has an aperture for fitting upon the spindle of the upper delivery spindle so that the frame may freely oscillate thereon, and at the lower edge of the portion is eccentrically arranged a cushion or pad (4) of leather. Normally the device is supported by the yarn or thread, since the part intervening between its side members is adapted to rest directly upon the yarn or thread, this part for the purpose conveniently being notched or arched, as shown in Fig. 1, and the right-hand side of Fig. 2. However, assuming breakage of the yarn or thread occurs, then the frame, being now unsupported, swings forward or falls by its own weight, whereupon the cushions or pads 4, 4 are applied to the lower roll or cylinder and press upon it, with the result that the upper roll or cylinder is raised vertically in its seat out of contact with the lower roll or cylinder safely and without jamming, consequently the former roll or cylinder, which is normally rotated

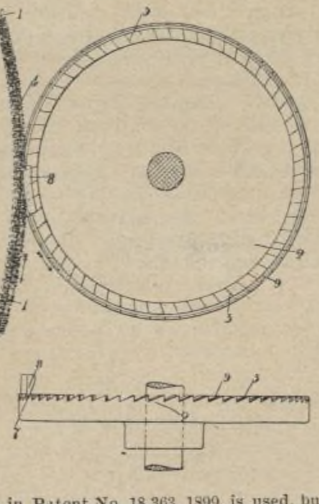


by the other, stops, and the supply of the yarn or thread is interrupted for the time being.—July 11, 1901.

8843. Finishing cloth. May 14. H. S. Smith and A. Thomson, Bowling Dyeworks, Bradford. Relates to improvements in machinery for finishing dress goods, suitings, linings and other like cloth, and its object is to provide a machine that will cheaply and expeditiously impart a press finish. A heating drum or cylinder is employed, and a cooling drum or cylinder mounted on hollow shafts, one in front of the other and preferably in the same framework. The peripheries of the drums are covered with paper or other suitable material having a sufficiently smooth and polished surface. When paper or other material in the sheet is used the sheets may be cut to an annular form and be placed side by side on the drums with the face of the paper radially disposed, and the outer edges form the external periphery. The inner edges of the annular sheets are made with a number of radial projections which may be of dovetail form to fit similar longitudinal grooves in the periphery of the drum and assist in securing the facing material to the drum. The sheets are pressed tightly together by stout end flanges coupled together by heavy bolts. A number of pressure rollers bear against the lower half of each drum, and hydraulic rams may be used in connection with the bearings of these rollers arranged to press the rollers with the desired pressure against the drums. Weighted levers may be employed to force the rams into their barrels when the hydraulic pressure is taken off. Other means of applying pressure may be employed. The periphery of the heating drum is heated by a number of electrically-heated rollers revolving in contact with or almost in contact with its upper side. The rotation of the rollers constantly brings a freshly-heated surface in contact with the drum, and the peripheries or the rollers may be covered with copper or other good conductor of heat.—Aug. 14, 1901.

12,550. Treating slivers with liquids. July 12. H. F. A. à Brassard, 46, Vicar-lane, Bradford. Relates to a machine for treating slivers of cotton, wool, and other fibre and yarn with liquids. A bath is fitted with an endless travelling belt or apron from end to end, the upper face of which is below the level of the liquid, and travels in the direction it is desired to pass the material through the bath. The apron is grooved in the direction in which it travels to support the slivers laterally, and keep them separate, and rollers are provided at intervals to prevent the slivers rising in the liquid.—July 12, 1901.

12,563. Combing. July 12. J. Cooper, Exchange Mills, Frederick-street, Bradford. Relates to improvements in Platt's and other machines for combing camel's hair and the like, and its object is to improve the noil. A drawing-off plate 2, similar to

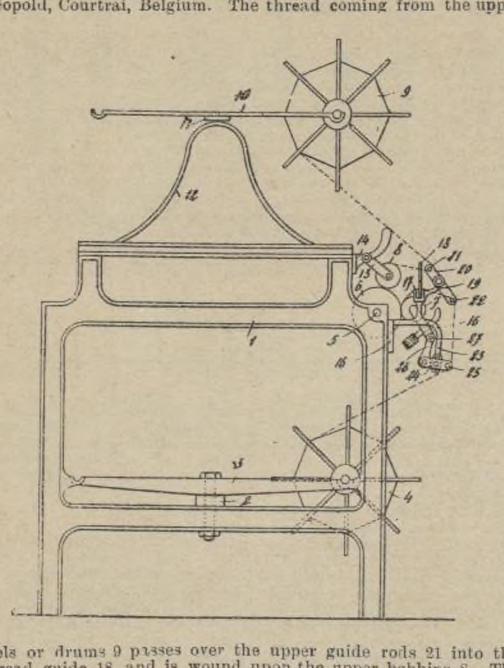


that described in Patent No. 18,363, 1899, is used, but instead of making the press bar 8 long enough to completely draw off the fibres 4 of noil from the comb 1, it is only made long enough to partly withdraw them. The noil is then removed in the usual way. The arrows indicate the direction of rotation. The plate 2 is made with serrations 3 and a groove 9 to take the edge 7 of the press bar 8.—July 12, 1901.

12,628. Burring rollers. July 13. W. G. Heys, Manchester (communicated by F. Mérelle, 19, Rue Cambon, Paris). These rollers are being provided with teeth, by winding strips of saw-toothed metal, edgewise, in spiral grooves on the periphery of the roller. There are as many of these grooves as may be convenient, and the saw-teeth strips are separately wound in each of them in such a manner that the points in any one strip are respectively in line with spaces in contiguous strips. When the roller is completely set, in this manner, the points are ground by an emery wheel. With this arrangement the teeth can be drawn closely together, and it is not easily possible for burrs to lodge between them.—July 13, 1901.

13,011. Dobbies. July 19. J. Highton, 111, Gill-street, Blackley, Manchester. Has reference to improvements in dobbies employed in looms, so as to positively or directly actuate the hooks worked by the "griffe" knives from the pattern barrel or cylinder, to dispense with the use of feelers or needles by mounting the cylinder on a system of pivoted levers and links (or on slotted levers), the levers being rocked from a moving part of the loom, and so arranged that the raising of one cylinder into action lowers the other cylinder out of action, and *vice versâ*.—July 19, 1901.

13,824. Winding machines. Aug. 1. E. de Witte, 4, Rue Léopold, Courtrai, Belgium. The thread coming from the upper



reels or drums 9 passes over the upper guide rods 21 into the thread guide 18, and is wound upon the upper bobbins 8. The thread coming from the lower reels or drums 4 passes over the lower guide rods 25 and 22 into the thread guide 18, and is wound on to the lower bobbins 7. The two series of bobbins 7 and 8 are simultaneously set in rotation by the pulleys 6, which actuate them by friction.—July 13, 1901.

13,897. Carding machines. Aug. 2. H. Gilljam, Laurensberg, near Aix-la-Chapelle. The present invention relates to improvements in and relating to carding machines, and has for its object to lessen inconveniences and the necessarily frequent cleaning of the cylinders of a carding machine. For this purpose the machine is so constructed that during work the principal parts, such as the carding drum, the doffer, and the worker cylinders, are cleaned automatically.—Aug. 2, 1901.

13,953. Drawing warp threads. Aug. 3. H. Pardon, 209, Inraterstrasse, Crefeld. Relates to an improvement in machines for drawing warp threads through the reeds of looms for weaving, consisting in mounting the reed in a horizontal plane, and the resulting vertical rise and fall of the knives adjustable horizontally and parallel nearer to or farther from each other, the bottom knife being formed with a notch for the reception of the warp thread for the purpose of enabling the work to be seen from the seat of the workman, and thus allowing any mistakes which may occur to be immediately detected and rectified.—July 20, 1901.

14,014. Combing machines. Aug. 4. W. B. Lee, Providence Ironworks, Thornton-road, Bradford; and W. Fisher. Relates to improvements in drawing-off mechanism for machines for combing wool and other fibrous material. It consists of a grooved rotary drawing-off device in combination with a travelling wire or band and a pressing device for pressing said wire or band against the fibres crossing the groove where required, and a guide for holding said wire or band out of contact with said groove where required.—Aug. 3, 1901.

14,836. Dyestuffs. Aug. 18. R. B. Ransford, Upper Norwood (communicated by Leopold Cassella and Co., Frankfort-on-Main). By heating oxyderivatives of bodies which contain an azine group, with alkaline sulphides and sulphur, a great number of valuable dyestuffs are obtained which, from a bath containing sodium sulphide, produce on cotton shades varying from violet to claret.—July 20, 1901.

15,185. Colouring matters. Aug. 25. J. Y. Johnson, London (communicated by The Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). Halogen derivatives of isomeric diamido-anthraquinones can be prepared (see Patent 21,572 of 1899), and these upon suitable treatment with aromatic amines, not merely in the isolated form, but in admixture with one another and with the $1{\cdot}4^1$ compounds, yield colouring matters of the new series.—July 27, 1901.

15,333. Fixing metallic wire. Aug. 28. G. Harrison, London (communicated by La Société Cudey et Cie., Usine de Fontaine-le-Bourg, France). Relates to improvements in the method of fixing or securing metallic wire teeth or wires in bands or ribbons of caoutchouc, leather, or fabrics such as are used in cards.—Aug. 10, 1901.

15,347. Knitting machines. Aug. 29. J. J. Ward, Redcliffe Works, Mansfield. Relates to improvements in circular knitting machines of the automatic type, the object being the production of "lace" or "open work." The instep set of needles are, according to one method, arranged in groups according to the pattern to be produced, each group of needles containing two or more sets. One of these sets in each group is actuated to form loops at every revolution of the knitting cam, while the other set produce tuck stitches at every two or more courses, or, according to another method, tuck stitches can be produced on any or all of the instep needles in any determined order.—July 13, 1901.

15,391. New dyestuffs. Aug. 29. H. E. Newton, London (communicated by Friedrich Bayer and Co., Elberfeld). On treating alpha-nitroquinazarin with primary aromatic amines, such as aniline, ortho or para-toluidine, alphanaphthylamine, or the like, the nitro group is substituted by the alphylamine radicle, colouring matters being thus obtained.—July 27, 1901.

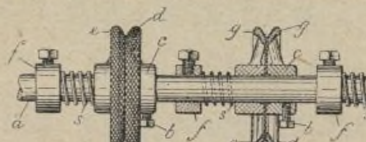
15,904. Hooking cloth. Sept. 7. P. Higson, 42, Spring Gardens, Manchester. Relates to improvements in compound hooking or folding and cutting tables for cloth, such as described in Patent No. 20,858 of 1898, and the object is to construct such machines so that the cloth can be handled or cut up from both sides of the table.—Aug. 10, 1901.

16,040. Twisting and doubling. Sept. 10. J. H. Craven, G. A. Craven, W. Moore, and J. Emmott, Dalton Mills, Keighley. The tension pulley operating in contact with the driving band is mounted upon lever arms so that by weights or springs it may be made to press evenly thereon irrespective of the contracting or extending of such driving band under any of its varied conditions. The movable bearings supporting the tension pulley are connected by appropriately slotted links, chains or other means to the parts put into action on the breakage or failing of the yarn or thread, so that these latter may overcome this said tension pulley's balancing weight or spring, and move the pulley to slacken the driving band to enable the rotary motions of the spindle to be arrested.—July 13, 1901.

16,109. Gill boxes. Sept. 11. E. J. Smith, R. Hewitson, and J. Day, Dudley Hill, Bradford. The faller bars are supported and traversed on the upper and lower saddle paths by screws as hitherto, but at the end of the upper saddle path where the faller bars are dropped to the bottom saddle, instead of allowing them to drop direct, there is introduced between the sides of the bottom saddle frames—that is, parallel to the horizontal line of motion of the faller bars—a cushion bar the upper surface of which is straight, and parallel with the under surface of the faller bars, and a little distance above the path of the bottom saddle. Connected with the cushion bar is a suitable spring or other yielding appliance, so arranged that, as the faller bars are lowered, they drop upon the cushion bar, causing the same to yield, and thereby gradually retard the downward motion.—July 13, 1901.

16,312. Bleaching. Sept. 13. F. Gebauer, 11, Franklinstrasse, Charlottenburg, near Berlin. The principal object is to provide means whereby the bleaching liquid is caused to act upon the material at high pressure (that is, at a pressure of a number of atmospheres); this object being attained by arranging the material to be bleached around a certain suction pipe within a high-pressure vessel or chamber.—July 13, 1901.

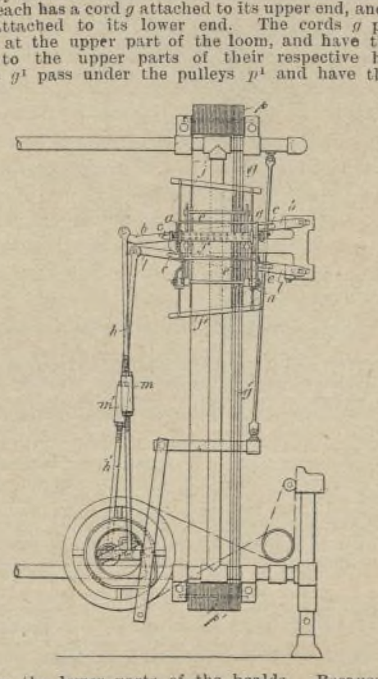
16,504. Thread clearers. Sept. 17. W. E. Heys, Manchester (communicated by S. W. Holden, 10, Anlage, Heidelberg). *a* is the spindle on which the clearers are arranged, one of them being fixed by a set-screw *b*, passing through the boss *c* of the



skeleton frame of the clearer *d*. The other, *e*, is loose on the shaft, and is pressed into contact with *d* by the spiral spring *s*, which surrounds the spindle *a* and abuts at its opposite ends upon the fast collar *f* and the boss *c* respectively.—July 27, 1901.

16,566. Indigo colouring matters. Sept. 17. B. Willcox, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). In order to obtain phenyl-glycocoll-ortho-carboxylic acid for the manufacture of indigo, anthranilic acid is condensed with mono-chlor-acetic acid, and it is found that in this reaction a by-product is sometimes formed, called anthranilo-di-acetic acid. This body can readily be converted into indoxyl compounds, and these again are easily converted into indigo, or derivatives thereof.—July 20, 1901.

16,809. Dobbies. Sept. 21. W. G. Heys, Manchester (communicated by La Société Chaize Frères, 19, Rue Cambon, Paris). A frame *a* is arranged at the side of the loom in such a position as not to interfere with the pattern mechanism. At the same lever there are arranged the two vertically oscillating levers *b*, *l*, each of which has a longitudinal slot *c*. The rectangular tubes *e*, *e*, of which there is one for each heald, may be variously constructed so as to include the centrally pivoted lever *d*, controlled by a spring *s* in each tube. The tubes must each be open at the back and at the front of the lever as shown, so as to permit the ends of the levers to be protruded, and so also as to permit the levers to be operated from the card cylinders *f*. The rectangular tubes *e* may be about one-third of an inch in thickness from side to side, and each has a cord *g* attached to its upper end, and another cord g^1 attached to its lower end. The cords *g* pass over pulleys *p* at the upper part of the loom, and have their ends attached to the upper parts of their respective healds *n*. The cords g^1 pass under the pulleys p^1 and have their ends



attached to the lower parts of the healds. Because of this arrangement, the healds move synchronously and inversely with their respective rectangular tubes, and no weights or springs are required. The card cylinder *f* is oscillated by the lower lever *l*, a projection from which comes into contact with a buffer or part *i* on a horizontal branch from the frame *a* which carries the pattern cylinder. Its rotation is effected by means of a hook *o*, carried by the upper lever *b*. Both the levers *b*, *l* are oscillated by eccentrics, cams, or the like moving with the loom shaft, through the connecting rods *h*, h^1, the lengths of which can be adjusted by the screw couplings *m*, m^1. If the needle *k*, of which there is one to each of the levers *d*, be pushed by the motion of the card cylinder, it will force forward the upper end of the lever *d*, so that it can be engaged by the arm *b*, whereupon the rectangular tube will partake in the motion of *b*, and consequently also the heald *n* attached thereto. Whether or not the needle will be pushed is determined by the pattern card at the moment on the cylinder *f*, as is well understood.—Aug. 3, 1901.

16,816. Spinning and doubling. Sept. 21. E. S. Coats, Ferguslie Thread Works, Paisley; and T. Watson. Provides improved means for regulating the tension of the yarn as it is being wound either on the bare spindle or on a tube or bobbin placed thereon, so that the strain on the yarn or thread shall be as nearly as possible equal throughout from the beginning to the end of the building of the cop; improved mechanism for building the yarn on the spindle so that the yarn can thereby be wound more closely and firmly than by present existing means; an improved drag or brake device, for the spindle, so as thereby to produce a practically equal tension throughout the building of the cop or bobbin at a very high velocity.—July 27, 1901.

16,998. New colouring matters. Sept. 24. B. Willcox, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). If dinitro-meta-dichlor-benzene be treated with alkali sulphocyanides in the presence of a suitable solvent, or diluent, both chlorine atoms are replaced by the sulpho-cyanogen group. The new bodies are well suited for yielding substantive dyes for cotton upon treatment with sulphur and sodium sulphide at a high temperature.—July 27, 1901.

17,062. Knitting machines. Sept. 25. C. H. Aldridge, Pinfold Gate, Loughborough. The object is to produce improvements in rotary or straight-bar knitting machines, more especially the type known as "Cotton's Patents," for producing plain, ribbed or fancy work.—July 27, 1901.

17,219. Displaying patterns. Sept. 28. W. H. Ibbetson, Royd House, Manningham, Bradford; J. Ibbetson; and Armitage and Ibbetson Limited. Relates to improvements in the means or method of making "cards" and the like for displaying ranges of patterns of textile fabrics of different shades or designs; and its primary object is to facilitate mounting the patterns so that the face presented to view is raised and projects or stands without internal support in relief in a convex form, thereby considerably enhancing the effect.—July 27, 1901.

17,558. Drawing in warp threads. Oct. 3. H. Pardon, Inraterstrasse, 208, Crefeld. Relates to improvements in Patent 13,953 of 1900, for drawing warp threads through the weaving reed.—Aug. 3, 1901.

17,737. Spinning and doubling machines. Oct. 6. W. Hilton and Platt Brothers and Co. Limited, Oldham. Consists of an improved automatic stop motion for preparing, spinning, and doubling machines, and is especially applicable for stopping slubbing, intermediate, and roving frames when the bobbins have attained the desired size. This consists essentially of a catch-rod or lever suspended from a stop-rod, and adapted to be engaged therewith during the working of the machine, and to be disengaged therefrom for the automatic stoppage of the machine by being moved laterally, so as to be acted upon by a suitable moving part connected to or moving with the bobbin rail.—Aug. 10, 1901.

17,795. Twisting machinery. Oct. 8. J. Fraser, P. Fraser, and N. Fraser, Westburn Foundry, Arbroath. Comprises improvements in twisting machinery of the kind described in Patent No. 239 of 1895. The endless cords or bands are each driven by a number of coned pulleys instead of a single cylinder as described in the specification hereinbefore referred to. This is of importance, as the use of the coned pulleys is an improvement on the use of cylinders, in that there being less friction on the surface of the pulleys, the machine runs more easily and the cord or band comes away from the pulleys more readily without interfering with the cord or band going on to the pulleys, especially when the machine is being driven at a high speed.—Aug. 10, 1901.

17,873. Printing yarn. Oct. 8. O. Hallensleben, Hilden, Rheinprovinz. Relates to an apparatus for the automatic printing and treatment of yarn for carpets, so that the entire processes which the yarn must undergo before weaving—that is to say, the printing, steaming and washing—follow automatically one after the other in such manner that a printing carriage, provided with two distinct sets of gear—namely, a traversing gear and a printing gear, which always work alternately,—is driven by cord gear along a railway, and is automatically brought to rest at those spots where the printing is to take place, when, the traversing gear being uncoupled, the printing gear is coupled up; such movements being continued until the carriage arrives at the end of the rails, when a reversing gear is automatically put into action and the carriage returns to its original position, and stops there for the purpose of receiving a new colour; and further, the printed yarn without being touched by hand falls off upon a steaming truck which is automatically drawn into and withdrawn from a steaming apparatus and afterwards sunk in a water tank in which the yarn and the truck are separately washed.—Aug. 3, 1901.

18,107. Orange-yellow dyestuffs. Oct. 11. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). On heating tetra-amido-ditolylmethane with methyl alcohol or ethyl alcohol in the presence of hydrochloric acid and under pressure, fine orange-yellow acridine dyestuffs of extraordinarily clear tints are obtained.—July 27, 1901.

18,166. Dyeing wool. Oct. 12. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). The red-violet to blue-violet colouring matters obtained by combining diazotised 2 : 3-amido-naphthol-6-sulphonic acid with certain 1 : 8-amidonaphthol-sulphonic acids, when treated with copper salts, undergo a characteristic transformation; instead of turning black, the shades turn blue, and at the same time their fastness to light and soap is considerably increased.—July 27, 1901.

18,624. Dyestuff for wool. Oct. 18. O. Imray, London (communicated by Meister, Lucius and Brüning, Hoechst-on-the-Main). It is found that ortho-ortho-diamido-oxy compounds may be employed for the manufacture of azo dyestuffs. They are easily diazotised; the tetrazo derivatives produced are stable, and are easily converted by amines or phenols into diazo-dyestuffs.—Aug. 3, 1901.

18,778. Knot tying. Oct. 20. H. D. Colman, 320, North-street, Rockford, Illinois. Relates to a manually-operated portable knot-tying implement adapted to be secured to and carried by one hand of the operator, and comprising automatic mechanism for forming a knot arranged to be operated by a digit of said hand.—July 27, 1901.

18,826. Brown colouring matter. Oct. 22. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). It is found that by heating 2 : 4 : 6-trinitrotoluene with sulphur and sulphides of alkali metals a colouring matter is obtained which dyes unmordanted cotton fine yellowish-brown tints of great intensity.—Aug. 3, 1901.

18,827. Brown colouring matter. Oct. 22. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). It is found that a fine brown sulphurised colouring matter may be produced by heating with sulphur and sulphides of alkali metals the azo-dyestuff obtained from diazotised nitro-amido phenol ($OH : NH_2 : NO_2 = 1 : 2 : 4$) and meta toluylene-diamine.—Aug. 3, 1901.

19,271. Sulphurised dyestuffs. Oct. 27. O. Imray, London (communicated by Meister, Lucius and Brüning, Hoechst-à-Main). It is found that if 1 : 8 or 1 : 5 dinitronaphthalene be heated at a temperature of from 150 to 250° C. with sulphur and sodium sulphide or with sodium sulphide alone in the presence of zinc compounds, very powerful, directly-dyeing sulphurised dyestuffs may be obtained.—Aug. 10, 1901.

19,667. Sulphurised dyestuff. Nov. 2. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). In German Patent No. 113,515 is described a green-black colouring matter directly dyeing cotton, which is obtained by melting with sulphur and sulphides of alkali metals dinitrochloro-oxydiphenylamine of the constitutional formula. It is found that the same parent material yields another sulphurised dyestuff totally different if, instead of being melted with sulphur and sulphides of alkali metals, it is subjected to the action of these sulphurising agents in a boiling aqueous solution. Under these conditions of working a colouring matter is formed which dyes unmordanted cotton dark corinth-coloured shades of great intensity.—Aug. 10, 1901.

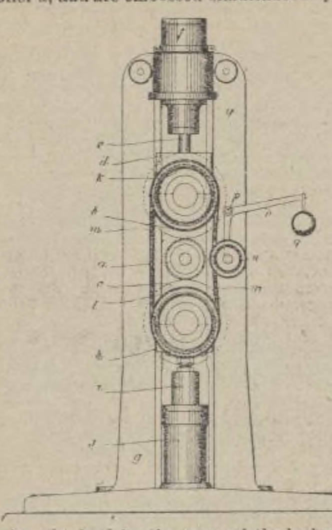
19,827. Fulling machines. Nov. 5. H. Grosselin, 18, Rue Mogador, Paris. The fabric to be fulled is fed by a pair of rollers into a trough along which it travels in zigzag folds while a pair of vertically reciprocating beaters driven by connecting rods from cranks on a shaft below the trough alternately descend upon the fabric. The beaters work in vertical guides and have their lower ends somewhat sloped, so that as each descends on the fabric on the one side of the trough, it pushes it towards the other side to receive the blow of the other beater, and so on alternately. The fabric is caused to take zigzag folds by its advance being checked at a point beyond propellers which are worked by cams on the crankshaft below.—Aug. 10, 1901.

20,276. Mordant dyestuffs. Nov. 10. O. Imray, London (communicated by Meister, Lucius and Brüning, Hoechst-à-Main). It is found that dyestuffs forming lakes and dyeing orange-yellow to red may be obtained if 5-pyrazolone and its derivatives are combined with the diazo compounds of ortho-amidophenol or 2 : 3-amidonaphthol and their derivatives.—Aug. 10, 1901.

21,731. Indigo. Nov. 30. O. Imray, London (communicated by Meister, Lucius and Brüning, Hoechst-à-Main). Relates to a new process for the manufacture of indigo. It consists in heating at a high temperature a mixture of ortho-chloro-benzoic acid and glycocoll (amido-acetic acid), preferably in the form of their alkali salts, with caustic alkalies, and in dissolving the mass when cold and subjecting the solution to oxidation, whereupon indigo separates.—Aug. 10, 1901.

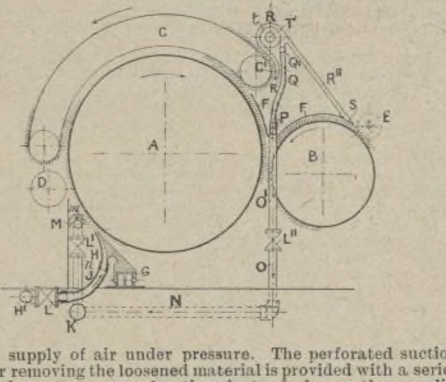
1901.

2137. Embossing. Jan. 31. C. L. Jackson, Wharf Foundry, Bolton. Relates to improvements in machines for embossing textile fabrics, and particularly to those machines in which a central roller engraved with, say, very fine lines or other engraving, is mounted and rotated in fixed bearings in combination with a pair of cotton or other composite calender bowls mounted in movable bearings, one roller above and the other below the engraved embossing roller. In such a machine two pieces or batches of cloth are passed respectively through the upper and lower nips of the calender bowls and the engraved roller, and are embossed simultaneously, the requisite pressure being obtained by hydraulic power applied to the movable bearings of the calender bowls. *a* designates the engraved roller driven by gearing, not shown; *b* and *c* are two calender bowls, one placed above and one below the engraved roller; the axle of the bowl *b* is fitted in movable bearings *d* connected to the ram *e* of a hydraulic cylinder *f* carried by the frame *g* of the calendering machine; the axle of the calendering bowl *c* is supported in movable bearings *h* resting upon the ram *i* of a hydraulic cylinder *j* mounted upon the frame *g*. Upon the axle of each calendering bowl *b*, *c* is secured a grooved pulley *k* *l* respectively for an endless rope or band *m*, which passes over the grooves in both and over a tension pulley *n* carried by an elbow lever *o* pivoted upon the frame at p and weighted at its other end by a weight q. In operation, two pieces of cloth are passed respectively through the upper and lower nips of the calender bowls b, c, and the engraved roller a, and are embossed simultaneously, the requisite



pressure being obtained by the rams of the hydraulic cylinders f and j acting upon the movable bearings d, h, and so long as the machine is calendering the bowls b and c are driven by frictional contact with the surface of the engraved roller a; but if, for any cause, the attendant finds it necessary to move either calender bowl away from the roller a, such bowl will then be driven by the endless band m from the other bowl, the weighted tension pulley n maintaining the band normally tight.—Aug. 3, 1901.

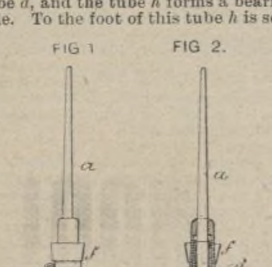
3180. Stripping cards. Feb. 14. T. E. Wilson, 58, Pêcherie, Gand, Belgium. Relates to improvements in pneumatic appliances for stripping or clearing the card surface of carding machines, and is more particularly applicable to the method of stripping described in Patent No. 21,672 of A.D. 1898. In the figure A is the main cylinder, B the doffing cylinder, C the revolving flats, D the taker-in, E the grinding roller, F the cover, all of the ordinary construction. H is the blowing device, which consists of an air blast nozzle mounted on a carriage running on rails parallel to the axis of the cylinder. The air nozzle is connected by a flexible tube J to a regulating valve L communicating with



a suitable supply of air under pressure. The perforated suction tube M for removing the loosened material is provided with a series of detached apertures or perforations instead of a continuous slit. It is provided with a control valve L[1], and is connected by means of the vertical pipe n with the air exhausting main K. A sheet-iron cover m is provided to guide the loosened material towards the suction tube M. The latter may either be a fixed tube extending across the machine from side to side, as shown in the drawings, or a short tube having one or more apertures may be used. In this case a reciprocating motion is imparted to the tube M.—Aug. 3, 1901.

7451. Ring spindles. April 11. N. Ramberg, Moscow. The object is to make a simple and convenient flexible spindle bearing in which the tubes or bushes fitted in the bolster can be removed for cleaning without disturbing the spindle or removing the spindle driving band from the wharve. a designates the spindle, b the bolster secured by nuts c in the spindle rail (not shown), and d a tube fitted loosely, say with $\frac{1}{32}$in. play, in the bolster. This tube has a collar on it, and near the top of the tube are oil-holes e for lubricating the spindle with oil placed in a cup f, which has oil-holes corresponding to the holes e and is formed with or secured to the wharve g, which is fixed on the spindle. Fitted loosely inside the tube d is a second tube or bush h, provided at its upper end with an annular flange, which rests upon the top of the tube d, and the tube h forms a bearing for the footstep of the spindle. To the foot of this tube h is secured a spring

FIG 1. FIG 2.

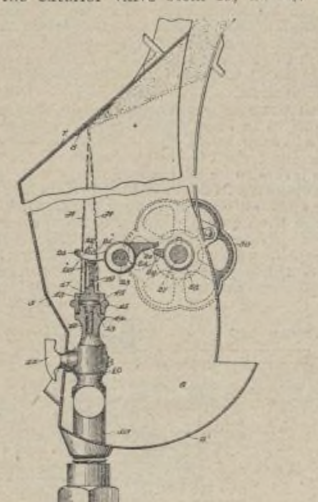


i, formed, say, with three or more members, which when, the tube h is placed in the tube d, rest against the inner wall of the tube d, and so gives the tube h a certain amount of flexibility. Several oil-holes j are made at different levels in the tube h to lubricate the spindle and its footstep by the oil which passes from the oil cup f between the tubes or bushes d and h, while the excess of oil escapes and is retained in the space at the bottom of the tube d. A bush nut k is threaded to screw on to the bolster, and in the bottom of this nut is a hole, through which the end of the tube projects. A spiral spring l is placed inside the bush k between the collar on the tube or bush d and the bottom of the bush k so as to surround the lower end of the tube d and maintain it always in the centre, and at the same time flexible.—July 27, 1901.

7580. Colouring matters. April 12. A. Haagen, 23, Venloerstrasse, Cologne-on-the-Rhine. Relates to a process of obtaining ferro-chromic colouring matters, which consists in causing compounds of iron to act on chromic acid or its salts in alkaline solution, or in adding to the substances an alkali, alkaline earth (including magnesia) of ammonia, or aluminia, or their salts, before or after or during precipitation.—June 8, 1901.

7839. Ramie decorticator. April 16. J. C. Fell, London (communicated by the Eyssen-Packer Defibrator Company, 60, Grand-street, Jersey City, U.S.A.). Relates to a decorticator having a feeding table, separable feed rollers, a rotary slitter, a grooved roller co-acting with the slitter and separable therefrom, a spreader adjacent to the slitter, pressure devices for flattening the opened reed, rotary brushes adapted to act on the fibrous side of the flattened reed, means to support the reed against the action of the brushes, positively-driven devices adapted to grasp the end of the flattened reed and pull it forward, means to deflect the end of the flattened reed into engagement with the grasping devices, and means to strip the wood from the fibre actuated by the friction of the fibre when pulled forward.—May 25, 1901.

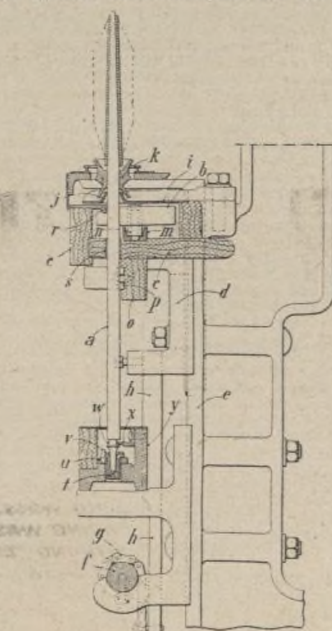
7994. Moistening textile fabrics. April 18. F. B. Comins, North Main-street, Sharon, Mass., U.S.A. Has reference to improvements in devices for dampening textile, fibrous, or other fabrics, particularly to improvements in those parts of dampening mechanism whereby the dampening fluid is supplied. In the illustration, 5 indicates a dampening chamber having ends as 6, the top 7 with its deflector 8, and the drip pan or bottom 9. Through the bottom 9 is formed an opening through which a connection for the stand pipe 10 extends, being thus connected with any water supply, and being controlled by cocks 11 working through openings in the rear wall of the chamber. At the upper ends of the stand pipe are axially perforated fittings 12, having ends 13 and shoulders 14, and screwed on to the end portions of these fittings are collars 15, the bore of which is contracted towards its upper portion to form the truncated conical valve seat 16. Movable in the valve seat collars 15 are valves 17, of a shape and size to closely fit the upper portion of the valve seat 16, and having in their peripheries the orifices or channels 18, inclined laterally to the vertical axis of the valve; this valve is furnished with the exterior valve stem 19, having the curved



shoulders 20—20, and the plate 21 carrying the crosspin 22. In the ends 6 of the dampener chamber are secured the ends of the cam shaft 23, on which, at intervals corresponding to the location of standpipe 10, are journalled collars 24, having curved cam fingers 25, which are engaged between the crosspin 22 and the shoulders 20 of the valve stems 19, the plate 21 working between these fingers, while from this collar 24 extends the cam arm 26. In suitable bearings in the ends 6 of the dampening chamber is journalled the shaft 27 having, at intervals corresponding to the disposition of the arms 26, collars 28 fixed thereon by means of set screws, each of the collars having a radially extended tripper 29 adapted, when the shaft 27 is rotated to lift the free end of the associated arm 26 when the shaft 27 is rotated by means of the handwheel 30. With the valve 17 in the position shown, the water pressing against the larger diameter of the valve will hold the valve against its seat, the pressure forcing the water through the channels 18, whereby it is directed in small jets in the directions shown at A—A, which converge as they approach the deflector 8, and being brought together from different angles are more completely dissipated in the form of spray.—May 18, 1901.

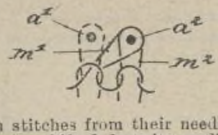
8445. Ring spinning. April 24. V. Belanger, Sea View, Marshfield, Mass., U.S.A. Has reference to spinning or twisting machines of the ring and traveller type, and relates particularly to those of the kind that are provided with rotary rings such as are described in the Specification of Letters Patent No. 122, of the year 1900.—July 6, 1901.

9775. Spinning and twisting. May 10. J. A. A. Imbs, 20, Rue Greuze, Paris. Relates to improvements in the spinning and twisting machines known as ring throstles, in which the spindles are supported and rotate between rollers. Each spindle a is guided between rollers b enclosed in a box c. The spindles



pass freely through this box, which is provided with a removable or hinged cover i, and is supported by a bracket d arranged so as to be capable of being slid vertically on the framing e. This vertical movement may be effected by means of a shaft f which has fixed to it one end of a chain (or chains or the equivalent) g, the other end being attached to a rod h secured to the bracket d so that by partly rotating the shaft in one or the other direction the box with its cover can be lowered or raised. The cover i of the box c is provided with small flanged openings j^1 for the passage of the spindles a. The turned-up edges of these flanged openings engage with the undersides of the wharves, or pulleys k of the spindles passing through the flanged openings, and thus prevent fluff from getting into the box c. To clean or examine the box c the shaft f is rotated in a direction to cause the box with its cover to move downwards, and then after the cover has been removed or raised the box can be easily cleaned or examined. After the box c has been closed by its cover it is returned to its original position by rotating the shaft f in the opposite direction, the box being held in the raised position by a ratchet and pawl on the shaft f, or other equivalent arrangement. The pivots n on which the rollers b are mounted, instead of being fixed, as hitherto, directly to the bottom of the box c, are mounted in a trough m fixed to the bottom of the box c, and forming an oil reservoir. This trough m may be replaced by a flat piece of iron let into a recess in the bottom of the box c of a depth sufficient to act as an oil reservoir. Under the bottom of the box c and at the back of the spindles a is a bar o carrying latches or wedges p by means of which any spindle or any required number of spindles can be made stationary.—June 29, 1901.

10,109. Knitting. May 15. E. Dittrich, Limbach, Saxony. Relates to a special device in French circular-knitting frames for



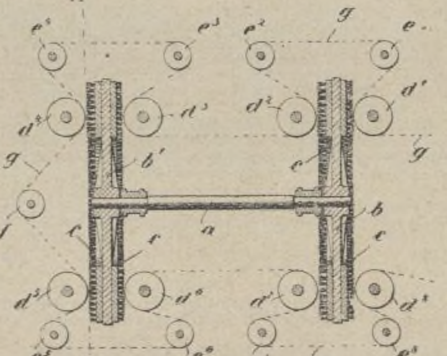
transferring certain stitches from their needles to the adjacent needles, stitch m^1 being shifted from its needle a^1 to another one a^2, leaving the first needle a empty, so that it cannot make a proper stitch, but only a loop in the next row, producing openings or holes in the goods and forming certain lacework patterns.—July 13, 1901.

10,277. Disazo colouring matters. May 17. H. H. Lake, London (communicated by K. Oehler, Offenbach a/M, Germany). Further researches relating to the acidylated derivatives of the amidonaphtholsulphonic acids have led to the discovery that the acetyl-beta$_1$, alpha$_3$-amidonaphthol-beta$_4$-sulphonic acid may be replaced by the benzoyl-beta$_1$ alpha$_3$-amidonaphthol-beta$_4$-sulphonic acid, thus obtaining dyestuffs of the same valuable properties, but more particularly yielding brighter tints, ranging more in the deeper region of the spectrum, due to their more bluish shades.—June 29, 1901.

10,279. Weft-replenishing looms. May 17. W. E. Moore, 803, Broad-street, Augusta, Georgia, U.S.A.; and F. R. Clark. The bobbins are fed into the shuttle from the side instead of from the top of the shuttle or shuttle box by making the lay itself act as the pusher. A magazine carrying the filled bobbins is secured to the loom frame in such a way as to automatically bring the bobbins successively into the proper position to be fed into the shuttle whenever the bobbin in use becomes practically empty, or the weft thread becomes broken. The position into which the bobbin to be fed into the shuttle is brought by the magazine is the same that the bobbin would occupy upon the extreme forward beat of the lay were the bobbin already in the shuttle, so that as the bobbins are caused to occupy this position, the lay upon its forward stroke drives the shuttle into engagement with the new bobbin, which pushes the old bobbin out of the shuttle and takes its place. The shuttle springs, which engage the bobbin when the lay beats up, holding the bobbin much tighter than its fastening in the magazine, will cause the new bobbin to be released from the magazine as the lay starts on its backward stroke.—July 13, 1901.

10,427. Cloth finishing. May 20. F. Stiner, Lawrence, Mass., U.S.A. Relates to a cloth-finishing machine having a sprinkler comprising a pipe provided with one or more openings for the discharge of a liquid, and a deflector having a surface inclined towards the fabric to be dampened against which the liquid impinges, and adjusting means for the deflector whereby the inclination of the surface may be varied.—June 29, 1901.

10,830. Napping and brushing machine. May 25. E. Hambloch, 200, Ross-strasse, Crefeld. On a shaft a are located the discs b, b^1, which are provided on both sides in any width

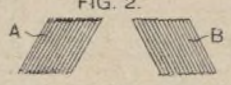


desired with teasels or brushes c. d^1, d^2, d^3, d^4, d^5, d^6, d^7, d^8 are rollers placed parallel to each other, which are arranged with regard to the discs b, b^1 in such a manner that a strip of fabric stretched over them is operated by the teasels or brushes c. Means (which, however, form no part of the present invention) are provided for regulating the distance of the rollers d from the discs b exactly to correspond with the thickness of the fabric. The parts marked e^1, e^2, e^3, e^4, e^5, e^6, e^7, e^8 are guide rollers which are at a greater distance from the shaft a than the diameter of the discs b, and are arranged farther from the front and back of the latter than the rollers d.—June 29, 1901.

11,039. Spiral cutters. May 29. J. Dickson and H. Smith, Waverley Works, Effingham-road, Sheffield. Relates to an improvement in spiral cutters, such as are used to produce a clean surface upon fabrics. Fig. 1 is a short length of a spiral cutter, of the section shown, having two series of diagonal serrations with cutting edges facing in one direction. Fig. 2 is an enlarged diagram of the two serrations. The object is to embody in one serrated spiral cutter the capabilities of both a right and a left-handed one, by means of which the fabric will be as effectually

FIG. 1.

FIG. 2.



cleared and surfaced by one pass, as by two passes according to the present practice in single machines, and renders it unnecessary to go to the expense of either two or four-cylinder machines. A continuous series or succession of diagonal serrations are made, A the cutting edges all facing one way, and a similar series of serrations B across the first series and at the opposite angle, or diagonal inclination, and these serrations have also their cutting edges facing in the same direction as the first series.—July 27, 1901.