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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.

Automatic Looms.

DURING the past month the automatic loom has fallen into the clutches of the daily press, and the general reader has been treated to a number of statements, many of which have been written in pure ignorance of either the facts or the actual position of affairs dealt with. So called "expert opinions" have been well in evidence. But it is a noticeable fact that when a new machine is being discussed, the names given as authorities (?) are frequently unknown, or if some acquaintance with the subject can be traced, it is generally of that variety of knowledge which is proverbially a dangerous commodity. There are many kinds of automatic loom on the market, but with the exception of the Northrop loom very few are working. As matters stand at the present moment, the Northrop loom occupies the best position, for the simple reason that it is the oldest type of any practical value, and hence there has been a longer time available in which to correct its failings, improve its parts, and simplify its motions. It is scarcely necessary at this time to restate the fact that the inventor of the Northrop loom was born in England, that his textile experience was acquired in England with one of our best-known firms of loom-makers, and that the idea of the automatic loom was probably first conceived in this country. But this automatic loom was developed in America, for the reason that America had need of it. Throughout America at the time—as is still the case in many districts—the scarcity of weavers retarded the development of the weaving industry. In England there were enough weavers to keep down wages and allow manufacturers their pick of hands. But American manufacturers were anxious to increase their production, and a machine which would dispense with more than half the number of hands was welcomed, especially as the wage paid to the weaver was unaltered. On the other hand, English manufacturers had their pick of well-trained weavers, at low rates, and could not see the advantage of unnecessarily trying new machinery and going through the trouble and expense of training otherwise expert weavers in the use of the new loom. The position as it stands to-day is only slightly different. America has more available weavers, while we have less, for there are now more openings in other industries in this country for weavers who cannot get looms. Then comes the question, What can automatic looms do for us? A glance into an average Lancashire factory shows weavers minding two, four, and often six looms. The weavers are busy all day long: there are shuttles to change and ends to take up, and there is little or no leisure between. The English automatic looms simply change the shuttle, some also stopping the loom when an end comes down. The weaver must replenish the shuttles with weft, and must also take the ends up, the automatic action simply saving her the throwing-in of a shuttle in one case, and the stopping of the loom in the other, not much of her work being saved thereby, although there are a saving of time and increased output. The Northrop loom places the cops in the shuttles—which is a small step further—but the cops must be previously skewered, so there is not very much gained. It is best to look these facts in the face before going into ecstasies over a type of loom which is far from new, and of which thousands of a fairly perfected build are in use across the Atlantic; whether that build is American or English does not affect the question at issue. We should say here that the last type of English-built automatic loom—the type which stops to change and then restarts itself, one of which is now working at the Glasgow Exhibition—bids fair to eclipse the Northrop. It is, however, newly born, and as yet it is far too early to predict its success or otherwise, although the makers—the same firm who trained the inventor of the Northrop loom—are putting down experimental plants on a very large scale, numbering a few hundred looms, so that something definite will soon be known. But, as mentioned above, the future of the automatic loom in England, we might even say in Europe, is not a matter of mechanical skill—which will be available if required,—but of economy of operation. In this country particularly the tendency is towards finer goods, and automatic looms do not conduce to the perfect weaving of such. If we are determined to keep, in fact it might almost be said branch out into, the manufacture of coarse cloths, the automatic loom will be necessary to enable us to compete with the world in general, for everybody can make these goods, and it is in this class that the automatic loom shows to advantage, it being of special value where strong yarns are used, and where a perfect cloth is unnecessary. There are print and other cloths which could also be brought well within the capacity of the automatic loom, but still the total number of looms is limited. Its adoption in the worsted, stuff, and silk industries cannot be expected, and it is in Lancashire mainly where it could be utilised on a large scale. Whilst discussing the subject, some correction should be made of an assertion made recently, according to a contemporary, by the secretary of the Manchester Chamber of Commerce. According to this report, that gentleman was credited with stating that 60,000 automatic looms are in work in the States. He is approximately correct so far, being only 10,000 looms below the mark, but when he affirms that the makers do not propose to license makers in this country, he should be reminded of the fact that one of our largest loom-makers will be only too glad to supply them in large quantities as soon as there is a demand. This news will probably go a long way to allay the anxiety which that gentleman felt regarding our engineering trade, and the shock he feared it would receive in the event of American looms being imported into this country. It is in the interests of the future of the automatic loom in this country that we have made the foregoing statements. No one wishes it success more than we do, but it will require a good deal of practical proof to induce our hesitating English manufacturers to give it a fair trial. When, however, foolish claims are made, or absurdly impracticable statistics advanced, an interesting article for those who know nothing about looms may be the outcome, but it has a tendency to fill practical men with contempt, and predispose them to regard automatic looms in general with distaste, if not indifference.

The Working Day.

THERE has been no question of greater importance in factory legislation than that of the number of hours in the working day, and it is more than probable that the same question will continue in the future to create food for discussion, if not dissatisfaction, between masters and men. The law on the matter as it now stands is not conducive to much improvement, for the limits of time within which women and young people—and therefore necessarily the remainder of the factory workers—may be employed, give no latitude for either reform or experiment, unless it be in a direct curtailment of the hours worked, a movement which, in the face of present foreign competition, can scarcely be deemed wise. This legal limit within which the working day must come was originally introduced to prevent the shift system, by which a large proportion of young children and women were employed during the night time so as to keep the machinery running, and so as to still come within the Act which limited the hours of work for such persons. Such restrictions are now scarcely necessary. Workpeople are not so dependent on the protection of Parliament as formerly; trade unions are always ready—in fact, too ready—to check a real or imaginary encroachment on their rights, and well-disposed employers — for there are such, and more than usually imagined — are helpless in any attempt to better the conditions of labour without either breaking the law or putting themselves at a great disadvantage compared with their commercial competitors. A matter which is at present of infinitely more importance to the working classes and the future industrial community is that of early working hours. We are glad to see that a contemporary has taken up this matter recently, and we can thoroughly endorse all it says The writer, however, writes from a mechanic's standpoint; but it is unnecessary to say that what is privation for an able-bodied man is doubly so for the women and children in our factories. Taken first from the masters' side, which represents the commercial value of early hours, it is very doubtful whether the hours before breakfast are worked at a profit, considering both the present and after effect. The workpeople are often only half awake ; at such an early hour their vitality is low ; artificial light is required for almost half the year ; much time is lost in getting to work ; the usual cold state of the rooms, and perhaps the damp condition of the workpeople, are not conducive to energetic labour ; many leave their toilet and perhaps part of their dressing to be done in the mill ; and then breakfast is thought of and anticipated, if not actually in preparation, long before the engine stops. Then after breakfast, as everyone knows who has worked two hours previously on an empty stomach, a reaction sets in, and from say ten to twelve o'clock work progresses in a heartless, dull, and mechanical fashion. It is perhaps unnecessary to describe the effect on the workpeople. It is only those with a very robust constitution who can turn out sleepy and hungry on a cold, dark, wet morning, and not suffer later, especially when the custom is kept up perpetually, with no break but Sundays and short holidays ; and where women and children are concerned the results are deplorable. The "early-to-rise" proverb which is so often quoted by those who call eight o'clock an early hour, is not applicable to town life. In the country everything is at its best at five or six o'clock, but in the towns all the mill boilers are getting up steam, and the tall chimneys are belching out smoke and filth without any fear from the sleeping inspectors. There seems to be a great difference of opinion as to the direction in which any change in the working day should be made, and it necessarily means that work is prolonged later in the evening if a later start is made in the morning. Some suggest a seven-o'clock start, but that is very little improvement on the 6-30 of many mills. Half-past seven is suggested by others, but both this and the previous time offer the objection of the present stoppage for breakfast. If, say, eight o'clock was the time for starting, breakfast would be taken before work commenced, and the additional rush to and from the mill, and the bolting of that meal within the half-hour, would be saved. From eight to one is not too long a stretch between meals if time has been available for a proper meal, and then after an hour for dinner work could progress from two to seven. This latter hour is earlier than many shopmen and women leave work, and about the time many warehousemen get away, so that no great disadvantage would be felt on that point, whilst the workpeople could get up at a reasonable hour, and not have to retire before the rest of the world, having their sleep disturbed by the noises of the still busy streets.

Bradford Goods in America.

THE wool and worsted trades appear to have fallen into a chronic state of dulness—not exactly what one would call depression or bad trade, but a state showing little life, and less profit. This condition is the average and not the general rule, for on each side may be found firms who can scarcely keep going, while others maintain a regular and profitable run. The Bradford district has had a glorious past—such a time as may never be expected to return,—and it is only in the ordinary nature of things that business conditions should settle down into some groove distinct from the time when a novelty was in demand, or when the district had the practical monopoly of certain manufactures. The returns of the trade with America are frequently used as a means of gauging the trade of the district. At one time such were fairly correct, but at the present time there are so many outlets that it is impossible to form an opinion without seeing the returns from them all, and in addition there are many fabrics now made in the Bradford district which can be designated as neither worsteds nor woollens. The last returns of exports of Bradford goods to America show a drop which brings the value down to low-water mark—to an amount less than anything touched for many years. The value for the first six months of this year is only £477,370, or less than half the amount for the same period in 1900, and not much more than half for the other periods coming under the Dingley tariff. Previous to that tariff, and going back as far as 1887, with the exception of 1894, when the new Wilson tariff was being awaited, the amount varied from one to nearly four millions for the half-year, so that it will be seen that the last returns show a still more decidedly diminishing trade with the States. This condition of things, however, has been seen approaching for many years by all who have noticed the advances made by Yankee manufacturers. First these competed against Bradford goods with English-built looms and spinning frames, but now they are able to make the greater part of their machinery themselves. Some of the textile machinery builders are branches from English ones ; some are directed by English-trained managers ; the castings are in some cases made from duplicates of English patterns ; and in every way the American manufacturer has the mechanical advantages of his English cousin, perhaps having a balance on his side in the way of cheaper power. Longer hours are worked across the Atlantic, and they are worked energetically, each operative earning as much as possible without the excuse that a large output reduces wages — a usual and very convenient excuse in the mouth of easy-going workpeople. With free wool and a large domestic production there is nothing to be gained on that point, and the only advantage which English manufacturers possess is the low wages paid, which, although appearing small, enable the workpeople to live better than those in any other part of the world. Our adoption of free trade and our ability to buy everything in the cheapest markets enable a seemingly small wage to go a long way—a feature which acts and reacts right through the whole process of manufacture up to the finished goods. This advantage still holds good, or we should not be able to send an inch of cloth to the States, unless it were a matter of speciality which the Americans were unable to make—an exception which every day becomes more rare. Of course, there are many other markets for Bradford goods, and these are gradually being opened up, but only with other countries doing the same thing and offering their goods in competition with ours. One thing Bradford has lost, and a valuable possession it will be difficult to regain—the name for supplying a reliable article. So-called all-wool goods containing 75 per cent. of cotton, worsted coatings and dress goods weighted with chemicals, fugitive dyes, and other modern methods of conducting business, have done a great deal to put foreign makers on an English level, for the lowest species of humanity can devise frauds, while it takes a strong man to remain honest. Some people blame Jewish, German, and other foreign merchants for introducing many of the underhand forms of commercialism practised to-day. It is an easy thing to shift blame on to other shoulders, but it is doubtful if such assertions have much foundation. However, even if they are based on fact, some of our English manufacturers have proved apt pupils ; others have followed from apparent necessity ; while the honester portion are placed in the disadvantageous position of being suspected of indulging in similar practices.

Trade Union Methods.

ONE noticeable feature of the recent differences or alleged wrongs which have been brought forward by the trade unions in the textile trades is the disposition to talk a thing out. This has been productive of a large amount of wearisome chatter, and perhaps some nasty remarks, along with free copy for the daily press. Then, as the matter loses interest, it gradually dies away and is eventually forgotten. Some persons take exception to such a course, but we are disposed to think that it is a very convenient method of airing a grievance, and much preferable to a strike or even the threat of one ; and although it is received in some quarters with ill-advised contempt, it is a good way of ventilating troubles, and causes neither stoppage nor unrest in the industry. It is an inexpensive method, too : very little time is wasted, and that chiefly of trade union officials, who do it in the practice of their profession, and who probably feel an honest satisfaction in devoting so much of it to a good cause. It must not be imagined that the wearisome meetings and speeches bear no fruit, for public interest of a kind is created. Absurd demands are soon sifted by general criticism, but the real wrongs, even if unremedied at the moment, receive a general denunciation which gradually kills the objectionable system in a way which sows little or no ill-feeling between employers and employed. If it is a question like the late attempt to reduce the working week by one hour, general opinion, advice, and criticism are received without in any way deranging the regular routine of work. If it is a trivial matter, only locally disagreeable, like the present trouble anent driving in weaving sheds, there is a pressure put upon the system where persistently practised which makes it undesirable to continue its practice, especially if such means little financial loss. The spread of trade unionism has included a larger set of people; the steadier ones have come in to counterbalance the fiery-tempered ones who were the early upholders of the movement, and there only remains to be instilled the fact that increased output does not eventually injure the operative, to make a textile trade union an institution whose advantage is recognised by master as well as man. The bulk of the privileges obtained by operatives have come through Parliament, and those obtained by trade unionism are only indirectly from the same source. All the protective measures were passed after a hard fight, and only by the constant utilisation and influence of public opinion. If the demands of the unions ever become oppressively aggressive, they will sound the death-knell of their own utility, for the same public opinion which helped the oppressed operative in years gone by would be at once moved to help the oppressed employer, perhaps more so when the power of large capitalists would be available, and when the trade and prosperity of the country were threatened.

ARTICLES.

Rocquetin.

By G. Washington.

ROCQUETIN (or warp bobbin) is the French name for a very interesting method of figuring with extra warp, which is sometimes employed to form an ornamental edge to narrow fabrics. The figuring threads are contained on separate bobbins, so that they can be let off very quickly and irregularly to suit the exigencies of the pattern. They are only slightly tensioned, and are caught by the weft and drawn into the fabric so far as the shed is like the preceding one, so that this thread takes the place of the weft which has drawn it into the shed, and interweaves with the ordinary warp. The loops at the edges are formed by means of strong horse-hairs fastened to special healds, so that they may be either up or down when the rocquetin thread is drawn into the shed; their position in the reed determines the size of the loop, and as they do not move forward during weaving, and are only fastened at one end, they only hold the warp until it is secured in position by succeeding picks.

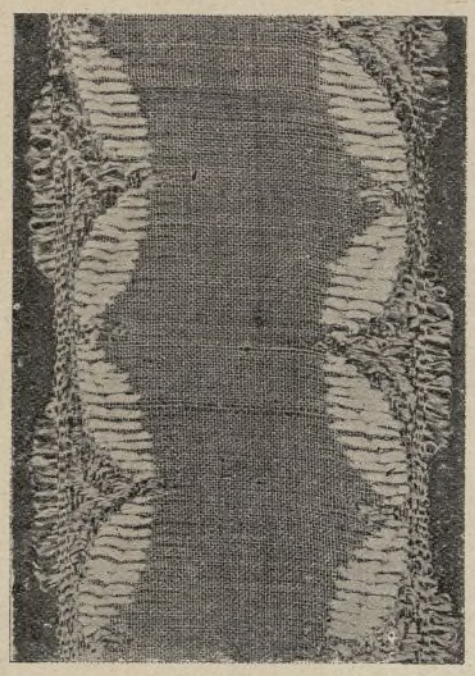
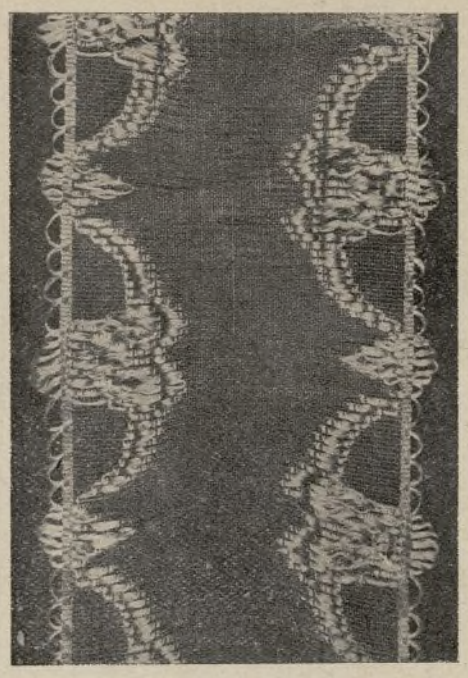
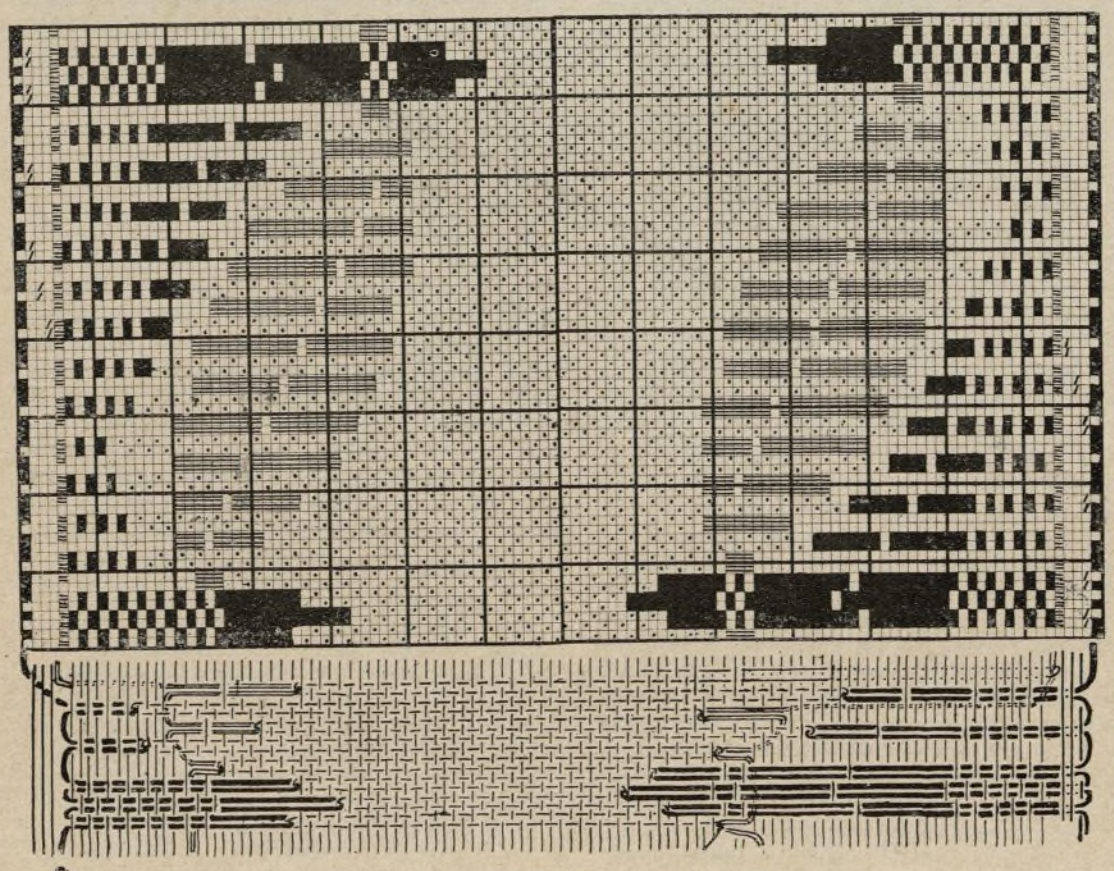


Fig. 1. Rocquetin. Fig. 3.



The fabric illustrated in Figs. 1 and 2 contains two rocquetin threads at each edge. The outside one, marked in full squares in the design, is coloured silk; the second one, marked with a double line, is white silk; the weft and the remainder of the warp are fine coloured cotton. Threads 2, 3, and 4 are horse-hairs used to regulate the size of the loops. The interlacing of the first 16 picks is sketched at the bottom of Fig. 2, which shows clearly the final position of the rocquetin threads in the woven fabric. On the left side the three horse-hairs are up for each pick, and so no loops are formed; on the right, the outside horse-hair is down for two picks, thus allowing the figuring thread to be drawn over it Next time it is up for two picks, and the thread is drawn under it; by this means the rocquetin thread passes round the horse-hair, and the loop is formed.

The shuttle is in the right-hand box before the insertion of the first pick of the design, and passes over the coloured and under the white figuring threads. As the previous pick also passed over the coloured thread, this pick does not affect it; but the white thread which was down for the previous pick is caught by the weft and carried under 31 threads and over 3, when its progress is stopped by the plain weave. The same process is repeated by the next pick at the other edge, excepting that the coloured thread is caught this time and the white remains stationary. The last pick in the sketch is shown passing round the white warp before it has commenced to draw it into the shed, and as the weft passes under several threads of warp without interweaving with them, the white warp figure is formed inside the coloured one. The plain ground under the white figure only contains half as many picks as the centre of the fabric. The coloured figure at the edge is all warp without any weft to bind it together.



Rocquetin.—Fig. 2.

Fig. 3 is a beautiful specimen of rocquetin work in coloured silk. The loops and small pointed figures between the festoons are formed by one thread which is rather lighter in shade than the remainder of the fabric. The second thread forms the festoons, and is the same colour as the plain ground. In this fabric the plain in the centre contains twice as many picks as the plain portions contained between the festoons and the edges, showing that every alternate pair of picks has turned back at the edge of the figured portions.

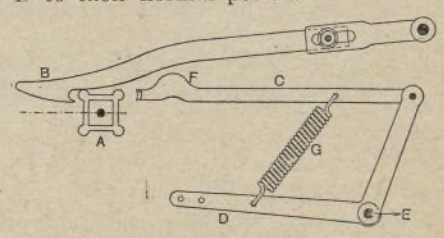
While this method of weaving is only suitable for ornamenting narrow fabrics, still it may be used in broad pieces to form lists entirely different in colour to the remainder of the cloth.

Jute and Linen Weaving.—XIX.

By Thomas Woodhouse and Thomas Milne

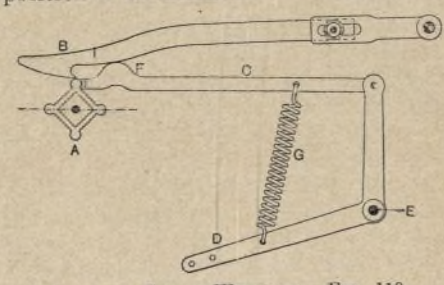
(Head and Assistant Textile Masters, Dundee Technical Institute).

MESSRS. DEVOGE AND CO.'S reversing motion for the card cylinder is shown in Figs. 109 and 110. The former shows the position of all parts when the cylinder A is being rotated in the normal direction by catch B. When it is necessary to reverse the direction of motion, the cylinder A is thrown out clear of the needles and the pushing bar C is (by means of a cord attached to bell-crank lever D, fulcrumed at E) caused to act upon the corner of the cylinder and rotate it in the reverse direction. The elevation F on the bar C raises the catch B clear of the cylinder during this action (Fig. 110). The spring G returns the bar C and lever D to their normal positions.



Jute and Linen Weaving.—Fig. 109.

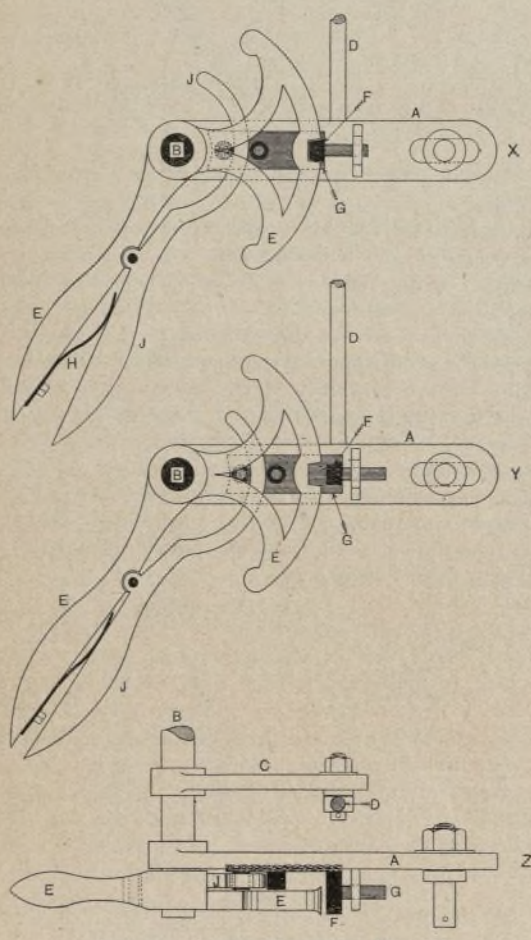
Another familiar cylinder-driving and reversing arrangement is that shown in elevations X and Y and plan Z in Fig. 111. Motion is imparted from an eccentric on the crankshaft to lever A, which is centred loosely on the shaft B; this shaft extends across the machine and carries keyed near each end a lever C (shown only in plan Z). From each lever C, rods D impart through suitable connections the necessary motion to the cylinder. Set-screwed or keyed at the extremity of the shaft B is the peculiarly shaped lever E, which, through the notch in the sector portion of this lever and the part F projecting from the sliding portion G of the lever A, completes the driving connection between the eccentric and the shaft B. Parts are shown in this position in elevation X.



Jute and Linen Weaving.—Fig. 110.

To reverse the cylinder with this motion a double catch is used, and when reversing is necessary the bottom catch is brought into contact with the underside of the cylinder, the top catch at the same time being raised clear. The position of parts when reversing is necessary is shown in elevation Y, where it will be observed that the projection F has been pushed out of contact with

the notch on the lever E. This being so, it is obvious that the shaft B, the levers C, and further connections to the cylinder, may be actuated manually by the lever E independently of the lever A. The projection F is kept fixed in the notch of the lever E by the action of the spring H on the lower arm of the lever J and the curved portion of this lever passing between the two studs on sliding part G ; the disconnection of the levers E and A being accomplished by pressing together the lower arms of E and J, when the curved arm of the latter lever forces forward the part G as shown in elevation Y.



JUTE AND LINEN WEAVING.—FIG. 111.

Double-lift Double-cylinder Machine.—The principal defect of the single-cylinder is of course the high speed at which the cylinder must be driven if any benefit is to be derived by a double-lift machine over that of a single-lift of the same capacity. This defect, however, has been overcome by the introduction of a second cylinder. The two cylinders, acting alternately, present the pattern cards to two distinct sets of needles and hooks. A 400 machine of this type (a sectional elevation of which is shown in Fig. 112) contains 816 hooks and 816 needles. The griffes F and F^1 are driven as shown in Fig. 108, from the low shaft ; and the knives E and E^1 are inclined in opposite directions as indicated. The two sets of hooks A and A^1, governed by their needles B and B^1, naturally face their respective cylinders C and C^1. These cylinders are supported at opposite ends of a suitable bar, which is actuated by an eccentric on the low shaft, and therefore advances the cylinders C and C^1 alternately to their respective needles. This being so, the cards for the design are laced in two separate portions—one containing all odd picks carried as shown by cylinder C, the other containing all even picks laced in the backward direction and carried by cylinder C^1, the two sets forming the simple weave M. Since each adjacent pair of hooks is connected by K and L to the same neck-band J, it follows that the top needle of one set and the bottom needle of the other, and so on, will govern the same thread or threads in the warp. In this machine, as in all others described, the cylinders must be so timed that the knives E, in their upward movement, must be in contact with the hooks A before the cylinder leaves the needles, otherwise those hooks which should remain down might, in consequence of the action of the springs D, be lifted by the ascending knives. It is evident that if both sets of needles B and B^1 were to receive equal movement from their respective cylinders, the hooks A, actuated by the needles B, would be moved at the top through a greater distance than the hooks A^1. Indeed, a variation of movement will take place throughout an entire set of needles from top to bottom. It is, however, minimised in the two sets by adjusting the needle board G so that a smaller portion of the needles project beyond its face, and by regulating the cylinder C to correspond. Fig. 112 shows the griffes F and F^1 in their highest and lowest positions respectively ; while in Fig. 113 the central position is shown. Here the cylinder C is receding from the needles, being turned meanwhile by the usual catch, while the cylinder C^1 is advancing towards the needles, both of course being about the centre of their travel.

In double-lift machines where a considerable number of harness cords or threads in the warp fall to be actuated by each pair of hooks, and where the threads require to be up for two or more picks in succession, it is evident that a great strain will be thrown on the cords K and L, when, in passing the centre, the load is suddenly transferred from the one to the other. This sudden jerk results in frequent breakages of these cords. When both break, the fault is readily observed in the cloth, but when only one is broken the loom may in some cases run a considerable time before the defect is detected. The link connection, which has almost entirely superseded the old cord tie up, is shown in Fig. 113, and almost entirely does away with the above source of annoyance. Its form and action will be readily understood from its various positions in the figure. In Figs. 112 and 113 similar letters refer to parts of a similar nature.

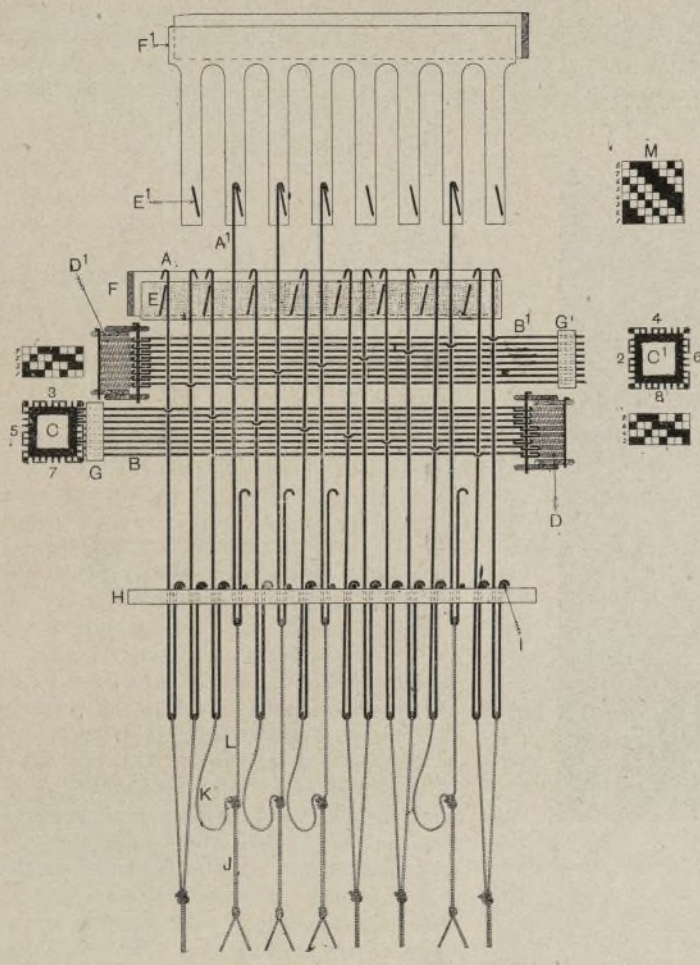


FIG. 112.

JUTE AND LINEN WEAVING.

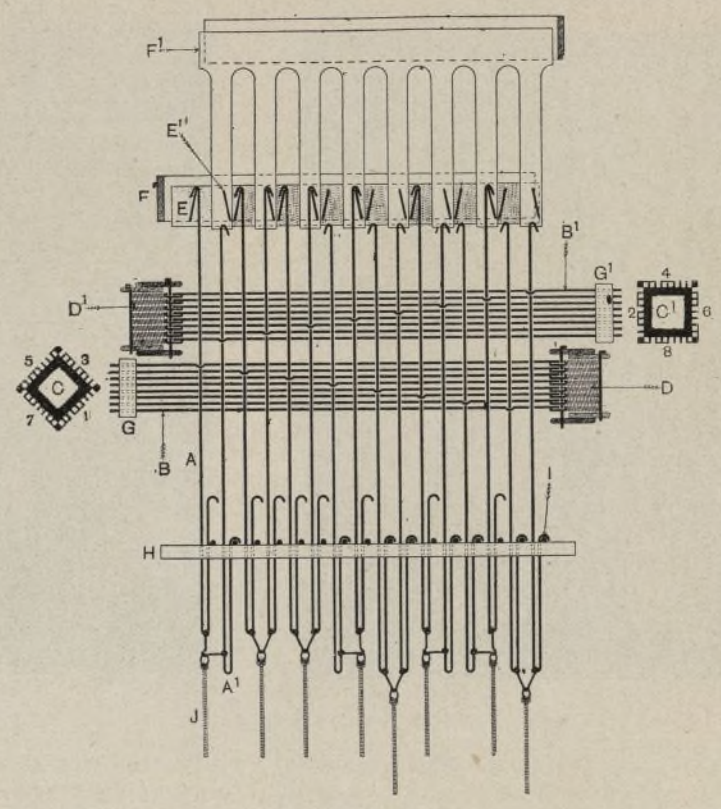


FIG. 113.

(*To be continued.*)

Silk Spinning.—III.

BY FILSOIE.

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RAW SILK (*Continued*).—Another class of China raw silk much in request for silk sewings and other purposes for which coarse threads can be used to advantage are Hangchows and Kalings, which are reeled very similar to the tsatlee, being made up in books of 9/12 mosses. The diameter of the reel is, however, generally larger than the ordinary tsatlee, and in consequence needs larger swifts in winding. Of the Kalings the best-known chops are :—

WHITE KALINGS.	GREEN KALINGS.
EXTRA.	EXTRA.
Tsuky Yuen Kinling.	Cicada No. 1.
Ching Young Kinling.	No. 1 BEST.
BEST No. 1.	Mandarin duck extra.
Tsuky Yuen Fongling.	No. 1.
Ching Young Fongling.	M. Mandarin duck.
Gold lily flower (extra)	No. 2 BEST.
No. 1.	White swan No. 2.
Gold lily flower No. 1.	Green stork extra.
Tsuky Yuen Sueling.	Gold eagle extra.
No. 2.	No. 2.
No. 2 gold lily flower.	M. M. mandarin duck.
No. 3.	Green stork No. 1.
No. 3 gold lily flower.	No. 3 BEST.
No. 4.	M. M. M. mandarin duck.
No. 4 gold lily flower.	No. 4.
	Green stork No. 4.

Of the Hangchows the best-known qualities are shipped under the following chop marks ;—

Extra.	No. 2.
Best No. 1 lily flower.	No. 2 lily flower.
Best No. 1 pagoda.	No. 2 pagoda.
No. 1.	No. 2 blue lion.
No. 1 lily flower.	No. 2 blue horse.
No. 1 pagoda.	Hangchow Taysaams.
No. 1 blue lion.	Double horse No. 1.
No. 1 blue horse.	Double horse No. 2.

The different chops named previously under the heads of tsatlees, re-reels, filatures, Kalings, and Hangchows are all silks shipped from Shanghai, and are the silks universally known as "Chinas."

From Canton there are also different qualities of raw silk shipped, and in contradistinction to those shipped from Shanghai they are known as "Cantons" Chinas and Cantons are two distinct qualities of raw silk. The most striking differences noticeable, even to the uninitiated, are —first, the colour; second, the texture or feel of the silk. Chinas, generally speaking, are a good white colour (although there are a few varieties yellow, but which are comparatively little known), even in the lower grades. Cantons, on the other hand, are a greenish-brown, and vary very considerably. China silk is a firm, compact thread; Canton silk is not so firm, and works "fluffy" in throwing. These two defects are more noticeable when the silk has been discharged of its natural gum, for no amount of boiling—*i.e.*, degumming —will give the Canton the same white bottom as the China. Like Chinas, Cantons are shipped in the tsatlee, re-reel, and filature reels, but as tsatlees they are best known as No. 1, No. 2, No. 3, and No. 4 Cantons, although they have different chop marks; but not so much importance is placed upon these chops as is the case with Chinas. The same remarks apply to the Canton filatures and Canton re-reels, which are likewise divided into grades: extra 1's, 2's, 3's, and 4's. The falling off in the production and export of tsatlee Cantons is more pronounced than with China tsatlees. The shipments go less every year, more silk being filature-reeled and re-reeled for America and the Continent.

Japan Raw Silk.—Practically all Japans are filatures or re-reels, and the bulk of the silk shipped to this country is shipped as filatures, America and the Continent taking a fair quantity of re-reels as well. The re-reels from Japan are very fair for cleanliness, and fairly even in thread. The different filatures have their respective chop marks, some of which are very well known, such as the "Kamiesha stags" and the "Riojiokan," but generally speaking they are bought and sold by grade. For all practical purposes the following represents the different qualities shipped:—Extra: No. 1; Nos. 1, 1½; No. 1½; Nos. 1½, 2; and No. 2; but in buying "to arrive," the throwster or manufacturer generally stipulates the shipper, or shipper's mark, as one mark of Nos. 1, 1½ may only be equal to another shipper's No. 1½ or 1½, 2. In the case of buying on the spot from samples, the shipper's mark is not so important, as the silk will show for itself, except that certain shippers are well known to be careful in their selections and inspection. Japan silk is a good, clean silk, strong and fine fibre. The colour is greyish-white, but not so white as Chinas. Japans are made up in books, but these contain separate hanks. The number of books in a bale varies. Each book weighs from 4lb. 4oz. to 4lb. 12oz., and a bale scales from 140 to 150lb. The great shipping centre for Japan is Yokohama.

Bengal Raw Silk.—Coming west there is the well-known Bengal silks, which are all filatures or re-reels. They are quite a distinct variety from the China, Canton, or Japan silks. The colour is a bright yellow, except some little which is a greenish-white and is not so appreciated as the yellow. Bengals are not made up in books like the other Far-Eastern raws, but are packed in bales with the different heads loose, each bale weighing about 140 to 150lb. Of Bengals there are three crops in the year, and these crops are known as bunds, and the three bunds are named March bund, July bund, and November bund. Of these the last-named is the best quality, and is usually the most sought after. The November bund silk arrives in this country about April or May, the March bund in September, the July in January. The silks are reeled from 10/14 to 45/50 deniers—*i.e.*, from 23,100yds. to the ounce to 6500yds. to the ounce, but the bulk are 16/20, 20/25, and 26/30 deniers —the latter, say 9180yds. per ounce, being a favourite size in this country. The best-known qualities are the Soleil (a special re-reel quality and much appreciated on the Continent), Surdahs, Rose Filatures, Cooldahs (also better known on the Continent), Gonaters, Bangettys, Rangamattys, Bhudderpores, and Chandpores. Calcutta is the great shipping centre for "Bengals."

European Silks.—These are, with the best Japans, the finest and most expensive silks used commercially, and can be had as fine as 8/10 deniers, which is equal to 31,000yds. to the ounce. The district in which the worms are reared and the silk reeled gives the name to the silk, and some of the best-known qualities are the Cevennes, Piedmont, Frioul, Briance, and Messine. All these silks are filature-reeled, but the diameter of the swift used varies. The colour is yellow naturally, but there is a little produced of a greyish-white, which is well liked. A bale of French or Italian raw contains 100kilos. = 220lb. about. These raws are divided into grades: Extra classical, classical, sublime, and common.

Comparatively speaking, very little European raw silk comes to this country except for using in the singles. Very few throwsters buy it, as they cannot throw it to compete in price with the warp and weft made on the Continent, and which can come to us free of duty. The cost of labour is so much cheaper there than in England, and their machinery is so much better adapted for throwing these fine silks than ours, that the Continental throwsters can deliver thrown silk in Manchester from 6d to 9d. per pound cheaper than an English throwster, granted that the latter can buy the raw silk as cheap as the former. Some of the large filatures also have their own throwing mills, so this again tends to diminish the cost of production. On the other hand, America is a large buyer of French and Italian raw silks, but not of their throwns. Fortunately for the American throwster, the raw silk goes into the country duty free, but on warp and weft there is a very heavy duty to pay—viz., 30 per cent. ad valorem.

Doppione.—Another class of raw silk of which mention may be made is the Doppione, which is generally of a light yellowish colour. This raw silk is coarse and uneven, and is reeled from double cocoons—*i.e.*, in the case where the worms have spun their cocoons side by side and so joined them that it is necessary to reel them together, the end of neither cocoon being free without the other. The production is comparatively small, and its unevenness makes it unsuitable for good class work, hence its use is confined to the manufacturing of the cheapest materials and heavy sewing threads.

Silk Crops.—Mention has been made under the heading of "Bengal Silks" of three crops per annum. More than one crop in a season is usual in several districts in the various silk-producing countries, for the reason that in the early spring, with some species, the ova is hatched out, worms fully developed, cocoons spun, moths emerged, and they in their turn have deposited ova which is hatched out quickly; and the whole development from ova to moth and reproduction occupies such a short time that from two to five crops of cocoons are reared in one season.

Shipping Raw Silks.—To combat against the well-known cunning practised in the Chinaman's reeling and packing, the European and American shippers at Shanghai and Canton are compelled to have a fully qualified inspector, with assistants, to examine very carefully every book of raw silk before packing into bales and shipping. As far as is possible without damaging the silk, the books are opened to see if there has been any inferior silk surreptitiously packed inside, which is often the case. Sometimes the outside mosses are really first-class silk, and look exceedingly well, being good colour, bright, and fine in size; but the inside layers have been most cleverly made up of coarser, darker, and inferior silk. There have been cases on record where other material beside silk has been found inside the books to give weight to them, but it is only fair to say that there are some reliable Chinese dealers whose silk can generally be taken to be what it is represented to be, though of late years in Chinas all chops seem to have more or less deteriorated, and on this account the old recognised differences between standard chops such as gold kilins, yellow and blue elephants, can no longer be taken as a working basis of relative values and prices.

After the receipt and passing of the silk, it is packed first in a fine cotton cloth commonly termed a "shirt," which is roped round with a kind of grass rope of native manufacture. The silk in the shirt is afterwards packed in a series of layers of coarse matting and paper, the outside wrapper marked with the shipper's mark and consecutive numbers. On arrival of the silk in London, where it is generally warehoused by the London and India Docks Joint Committee, the bales are carefully examined to see if they have been damaged by sea-water or other cause. This can generally be detected at once without opening the bales, as the outside wrappers will show any trace of dampness. If any of the bales are damaged, the merchant generally gives instructions at once to have the run (*i.e.*, the whole of the bales which make up the parcel) "worked" (*i.e.*, examined). This is undertaken by the Dock Company, who open out the bales and examine each book separately to see if there is any trace of damage. Any doubtful book is placed on one side and replaced by a sound one taken from one of the other bales. This process goes on through every bale, and in a run of, say, 20 bales of Chinas there are frequently as many as 20 damaged books, which are put in the last two or three bales. These last-named bales are then assessed for damaged books by a silk broker, who gives a certificate to say that he has examined them, and considers so many are damaged, for which the insurance company are liable. These bales are now "starred" by the Dock Company, and entered as such in their books. The bale marked thus "*" is always understood to be a damaged bale, and on any bale so marked the buyer is entitled to claim the allowance as originally claimed from the insurance company The damaged silk is not charged for at all; thus, if in the ordinary way a bale was chargeable 104lb. net, and on inquiry it was found that 4lb. had been allowed for damage, the bale is only chargeable at 100lb. net. Generally speaking, all bales are worked by the Dock Company on arrival, but this, of course, is at the discretion of the owner.

After the silk has been worked the books are made up in hessians, of which the uniform weight is 2lb. for China or Canton tsatlee, and 3lb. for Bengal or Japan raw silk. On the outside of this hessian is marked the shipper's mark, the number of the bale, the stock number, the name of the ship in which it arrived, and the date of arrival. The bales are then ready for stocking in the Docks Committee's warehouses or for delivery to the owner. The Dock Company not only undertake the working of the bales, but also the weighing, taring, and sampling, which, being done by an independent party, are accepted by the trade as final in case of a dispute respecting weight.

On bales of tsatlees weighing from 100 to 108lb. there is an allowance made of 2lb. per bale, which is termed scorage. For instance, if a bale scales 106lb. in the hessian with a tare of 2lb., the invoiceable weight is 102lb., although the net weight of silk is 104lb. This 2lb. is allowed for bands and unwindable silk. Odd ounces are not charged for. A bale weighing 104lb. 12oz. is only charged at the same weight as one scaling 104lb. In the case of Japans and re-reels in which there is no unworkable silk in the shape of bands, the actual tare of the paper and strings round the bundles is taken. The Dock Company strip three or four books, and having obtained the weight of the paper and string, take a percentage as compared with the weight of silk stripped, and this allowance is made on the whole parcel. This varies from one to two per cent. on the net weight.

Terms.—Raw silks are bought and sold on what are called "Company's terms," an abbreviation of "The East India Company's terms." Briefly, these terms are understood to be three months' prompt from date of purchase in the case of silk on the spot, and three months' prompt from date of arrival in the case of silk bought to arrive. During these three months the buyer is at liberty to allow the bales to lie in the warehouses or to take delivery of

all or part of his purchase, but only on payment of the proper proportion of value of the silk cleared—*i.e*, delivered. "Company's terms" are also known as "London terms," in contradistinction to "Lyons terms." The latter means silk delivered free in Lyons and conditioned in the Lyons conditioning-house. The weight invoiced to the purchaser is the conditioned weight, no allowance being made

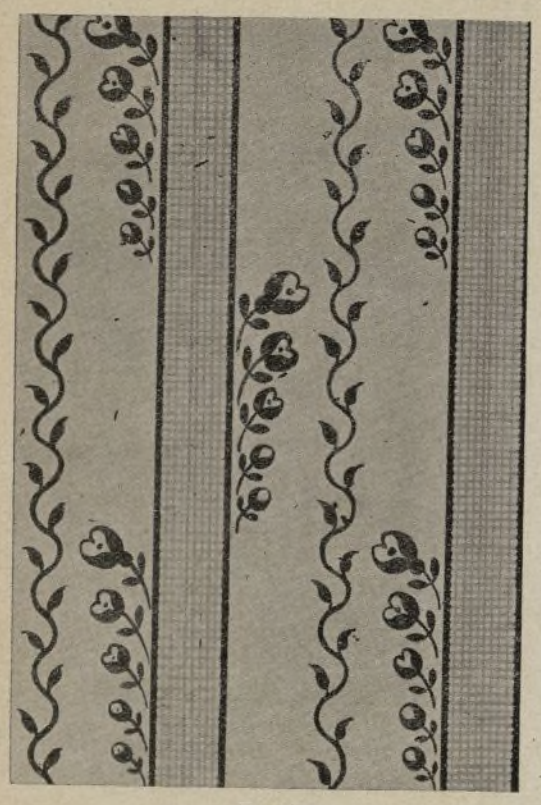


Fig. 1.

for scorage, and cash is due on delivery with a 90 days' rebate at the rate of 6 per cent. per annum.

(To be continued.)

Designs for Cotton Fabrics.

Specially Contributed.

PATTERN No. 189 is a stripe showing a pretty combination of lappet effects. The wavy pattern inside the pink stripe is of an ordinary type, made with one set of needles, but the lappet design in the white stripe is in imitation of a douped or net weave, two sets of needles being required for that portion. This way of utilising lappets is not common, yet by its adoption it is possible to easily obtain weaves which could only be obtained by intricate douping arrangements if made in any other way.

Pattern No. 190 is an ondulé pattern, one of many which are in vogue at the present time, but the result scarcely repays the large amount of extra trouble and preparation in the weaving.

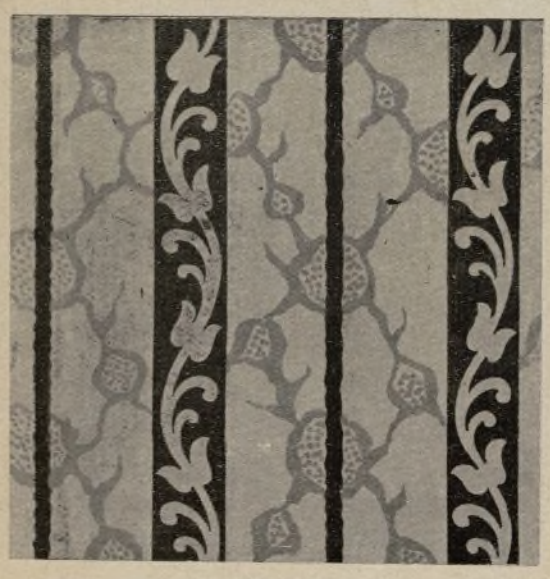


Fig. 2.

The pattern shown is one of the simpler types, and the variation in the width is only about one-eighth of an inch. The ondulé effect is produced by the dents of the reed tapering in batches alternately towards the top and the bottom, the reed being given a slow vertical movement as weaving proceeds. Each tapered group of dents is edged with a thick twofold douped mercerised end, which crosses backwards and forwards over four ground

Cotton Designs.—Fig. 3.

ends, really pairs working as one. All other ends are slayed three in the reed.

Fig. 1 is a sketch for a leno stripe cloth. The warp should be in a 96 reed, and shot about 80 picks to the inch. The black figuring should be

Cotton Designs.—Fig. 4.

made from the warp and arranged to float as much as possible. The lines may be woven with 4-and-1 satin, and the ground should be tabby.

Fig. 2 is another stripe idea, but without the leno. The black on the broad stripe should be 7-and-1 warp satin, and the white figure 4-and-1 weft satin. The smaller stripe should be put in as a cord effect. The grey figuring should be warp bound down with 3-and-1 twill or 4-and-1 satin and the ground tabby.

Fig. 3 is a design for a cotton all-over, and should be made with an 80-reed warp, shot 84 picks to the inch. The black figure should be weft and the

Fig. 5.

grey 4-and-1 warp satin. The ground should be a 2-and-1 warp twill. Inside the leaves a 2-and-2 twill may be introduced to lift them up above the ground.

Fig. 4 is a sketch for a cotton brocade. The warp should be in a 96 reed, and shot with 120 picks to the inch. The black figuring should be made from the warp, and the grey effect inside may be 2-pick. The ground should be 4-and-1 weft satin.

Fig. 5 is a design for cotton dress goods for a 76-reed warp of mercerised cotton, and shot 66 picks to the inch. The figuring should all be made from the warp and on a tabby ground.

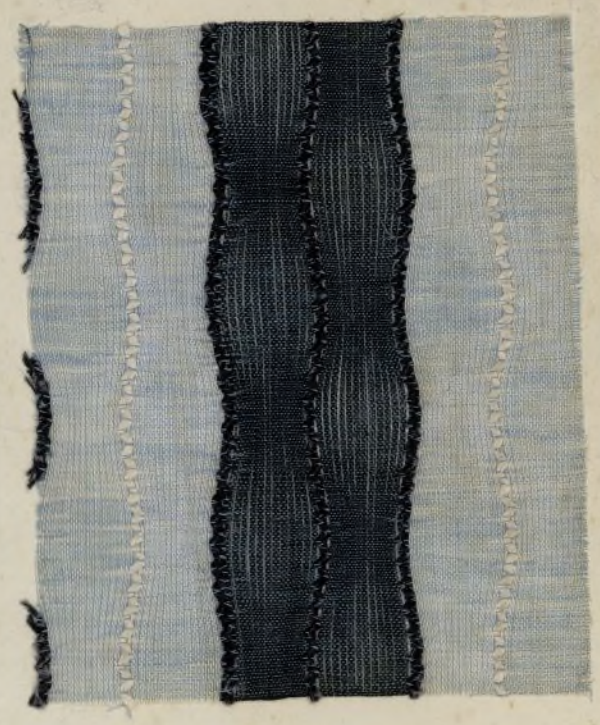
Fig. 6.

Fig. 6 is a design for a cotton all-over cloth made with an 80-reed warp, and shot 100 picks to the inch. The black figure should be warp with the grey effect tabby, and on a 4-and-1 weft satin ground.

PATTERN SHEET No. 102.

Samples of Cotton Cloths.

PATTERN No. 189.

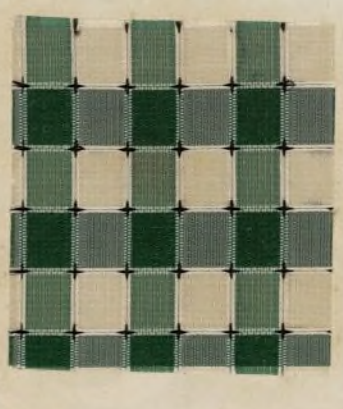


PATTERN No. 190.

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. 103.

Samples of Silk Fabrics.



PATTERN No. 191.

PATTERN No. 192.

CANVAS HOSE. SPHINCTER HOSE.
RUBBER-LINED HOSE. COTTON BELTING.

INDIARUBBER GOODS
For MECHANICAL PURPOSES.

Designs for Silk Fabrics.

SPECIALLY CONTRIBUTED.

PATTERN No. 191 is a neat silk check whose chief feature is the small black star in the corner of each square. This is formed by extra ends and picks, which float on the back, with the exception of the short time they are forming the star. As the check is a small one, these floats

FIG. 1.

on the back are of little importance; but a longer float would necessitate binding, which, however, could easily be done, the extra ends coming directly underneath the corded portion of the design. The design might have been given a much more novel appearance by the addition of an extra black or green star in the centre of the full green squares, or by a white star in the centre of the white portion of the check. The extra black warp will require to be warped on a separate warp roller, and it is also advisable, although not essential, to treat the cotton cording ends in the same manner.

are arranged in six-sateen order, whilst the crocodile weft pattern suggests other designs which would give a wide range of patterns on similar lines.

Fig. 1 is a stripe effect for piece goods, and should be made with an 1800/2 net silk warp and shot with 90 picks to the inch of tram. The black figuring should be weft, the grey warp, and on a 3-and-1 warp twill ground.

SILK DESIGNS.—FIG. 4.

Fig. 2 is a muffler design for a 1600/2 spun silk warp, shot with 100 picks of tram to the inch. The figuring should be made chiefly from the weft with the black portions well floated. The grey may be bound down with 3-and-1 twill or 4-and-1 satin. The white objects inside the circular one may be left warp and bound down with 4-and-1 satin. The ground should be 3 and-1 warp twill.

Fig. 3 is another design on similar lines to above, and can be worked up in the same way, or with a 2000/2 net silk warp and shot 90 picks of tram to the inch. The black figuring should be weft, the grey warp, and the ground 2-and-2 twill. Plenty of tabby edgings or shadows should be used in drafting to give firmness to the cloth.

Fig. 4 is a sketch for a blouse cloth suitable for a 2200/2 spun silk warp, shot with 110 picks of tram to the inch. The black figuring should be weft, with the grey shadow tabby, and the white inside the lacework 4-and-1 warp satin. The groundwork should be brought up as a warp-and-weft crape, with plenty of tabby put in to give firmness.

Fig. 5 is a design for piece goods, made with a 2000/4 net silk warp, and shot 96 picks of tram to the inch. The figuring should be made from the weft, the stripes should be 7-and-1 warp satin, and the ground should be tabby. To give the proper effect, the stripes should be warped in a different

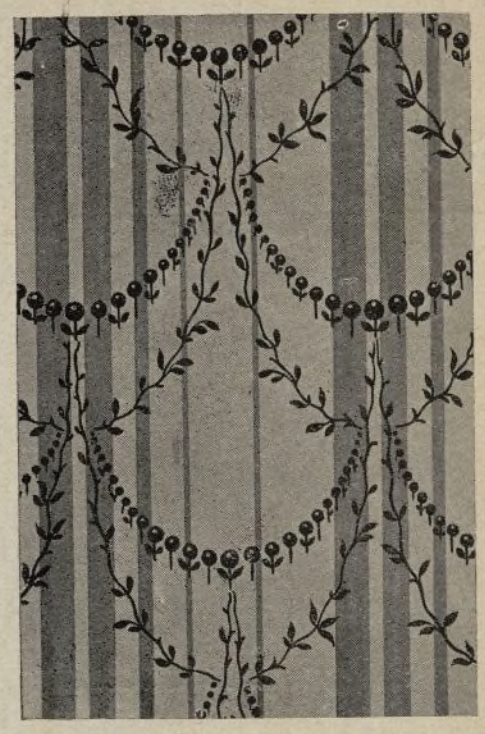


FIG. 5.

colour, so that the weft will appear to have a lying-on appearance.

FIG. 2.

SILK DESIGNS.

FIG. 3.

Pattern No. 192 is a pretty jacquard stripe composed of corded stripes and figured taffeta. The spots formed by the warp show up more prominently than the irregular weft figuring, which acts as a kind of background, although taking a prominent part in the design. The spots

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

[ALL RIGHTS RESERVED.]

DIAGONALS (*Continued*).—In making the design for a diagonal there may be only two, or there may be four or more, fittings to arrange. In a design composed of a line of warp face and a line of weft face it may be possible to arrange, say, the warp portion over the area allotted to it, making it with the best edges and without thinking of the weft portion which is to follow. Then all the fitting may be done when the weft line is filled in. The best way, however, is to work the two together, and by a few rough trials

get the best all-round arrangement in regard to each and every line where the design changes.

It is most important to remember that three perfect joinings will be of little use if the fourth is a bad one, for one such will mar the design and give an appearance almost as bad as if each joining had been carelessly done. To have a perfect diagonal, each change must be well planned, and if the number of ends in the design is awkward and it is impossible to have each perfect, they should be so distributed that they are as similar as possible. It is better to have four second-rate joinings than three first-class and one fourth-rate or undesirable.

When the ordinary plain diagonal is passed and fancy effects or designs different to the ground used, the matter of joining up the parts becomes more difficult, although, on the other hand, these joinings are not expected quite so perfect as in a plainer style, little deficiencies being hidden by the vagaries of the pattern. This knowledge, however, should not prevent perfect joinings being aimed at, for every stitch in a coating cloth is readily noticed when the piece has a clear finish. A reference to Fig. 41 will give a few ideas as to the procedure when perfectly plain diagonals have been passed. One of the parts of this design is composed of five bands or twills A, B, C, D, and E, which make one broad portion separated from the other warp part by bands of weft F and G. When the design was being made it was found that the space available would not allow of five twills of equal float, whilst with six twills the weave would be too tight, and with four too loose. To overcome the trouble the middle twill C was made with shorter floats than the rest, an arrangement which, instead of making the design lopsided, as would have happened if an edge twill had been so treated, gives a better, or at any rate fancier, appearance to the design.

The eight-shaft fancy effect H which forms the centre of the eight-satin portion of the diagonal was the first part painted in, and as its joining with the satin was the most essential part of the design, this was done first in the best possible manner, regardless of the rest of the design, which was filled in later. In using designs like H as a running portion of a diagonal, care must be taken to find whether it will complete on the number of ends it is desired to use. It is an eight-shaft weave, and its construction necessitates that the total ends of the design form a multiple of eight. This is not always the case. For instance, an eight-satin, like the one used at either side of the effect H, only requires that the design should be complete on any even number of ends, as every other end is the same in running diagonal order. If the total

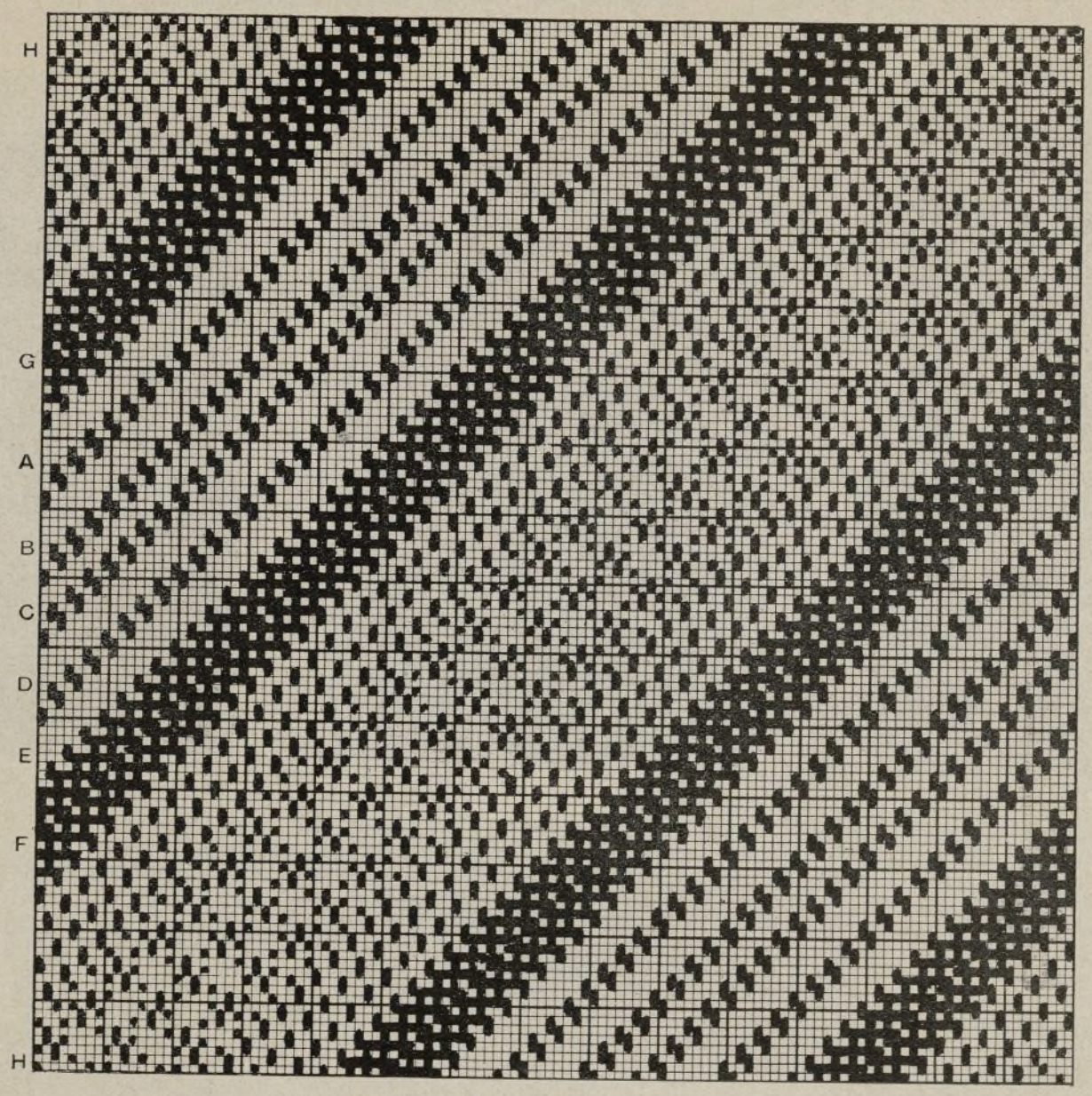


Fig. 41 (Whites Lift).

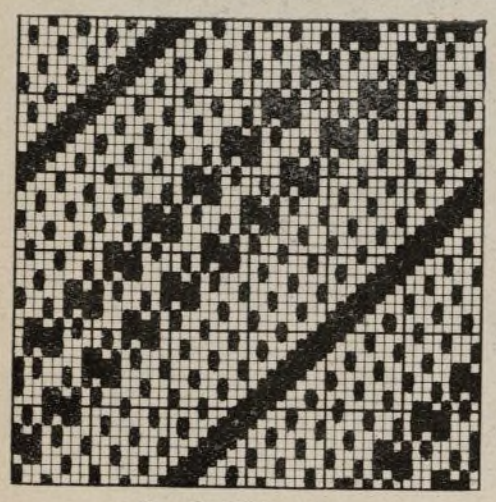
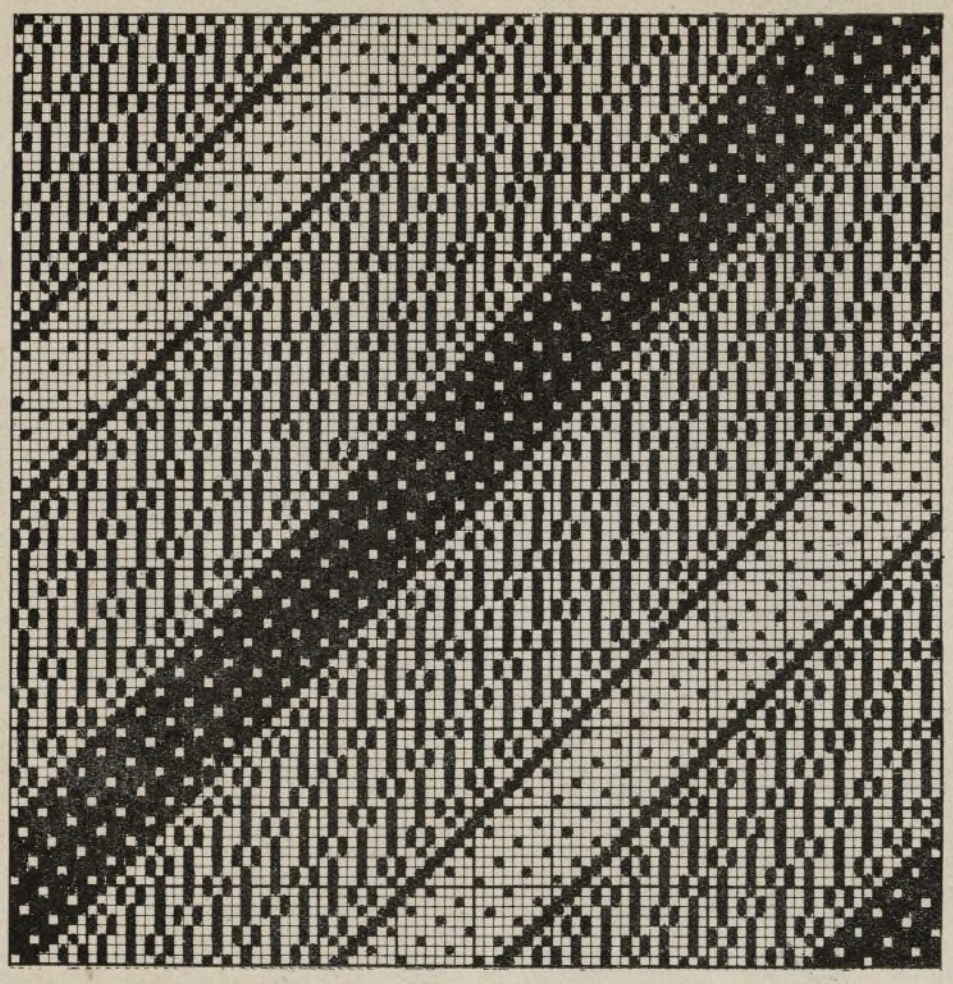


Fig. 42. (Whites Lift).

Fig. 43. (Whites Lift).

number of ends will not allow of the effect repeating properly, the design must be repeated until it will. Taking an example: supposing Fig. 41, instead of having 120 threads in the pattern, was required to have 124 to fit a certain cast-out, then the design would have to be run out on 248 ends (still only 124 picks) to give the eight-shaft



Worsted and Union Coatings.—Fig. 44 (Whites Lift).

weave H the chance to join up properly. If this was impossible owing to the repetitions of the design across the jacquard being an odd number, then the design would have to be repeated weftways instead of warpways—that is, if it was considered worth while to cut a double number of cards.

The weft portions F and G are each composed of double rolls of weft, which are made more rounded

Worsted and Union Coatings.—Fig. 45 (Whites Lift).

and distinct by means of the plain stitching on the back, which also makes this portion much easier to beat up by the reed. This plain stitching on the back is regulated in a manner similar to that of cord stripes as explained in an earlier issue, the roll being made rounder, more lustrous, or otherwise, according to the requirements of the pattern in hand.

The fancy warp effect H is only one of an almost unlimited number which can be brought to bear for this purpose, but it is also possible, where the weft is not of too low material, to use weft effects or weaves which show a combination of both warp and weft. Fig. 42 is an example of such in a simple and small but neat diagonal. A close examination of this design will show that the weft spot effect has been built up on the eight-shaft satin, a method which ensures a good joining. Continuing the remarks made with the previous design, it is necessary that this weft effect always works in a design whose total number of ends is a multiple of four, otherwise the design will have to be repeated till such is attained.

When a loose weave is used to supplement the satin or ground weave of the plainer structure, it is best to run a twill up either side, as shown in Fig. 43. This not only gives a clean and straight edge, but serves to counterbalance to a certain degree the looseness of the central portion. Fig. 44 is an example of the adaptation of a fancy weave for the groundwork, covering also the greater portion of the design. Some very novel and pretty effects may be got by choosing from the vast number of fancy weaves available, but the quality and handle of the cloth usually suffer, nothing being equal to the common sateen weaves for producing a full, soft-handling cloth. As another means of decorating diagonals, the double-cloth principle is sometimes used, either throughout the design or for portions only. By such means, raised, tubular, or blistered effects may be introduced, or fine weaves may be secured by using only a portion of the threads on the face of the cloth. One example of this class is shown in Fig. 45, where a 2-and-2 twill with a plain back (2 face to 1 back) is placed in the centre of the eight-satin portion. Of course, if such an effect is desired for the change of weave, the face is bound to the back, but if a tubular effect is desired no bindings are required.

(To be continued.)

Cotton Velveteens.

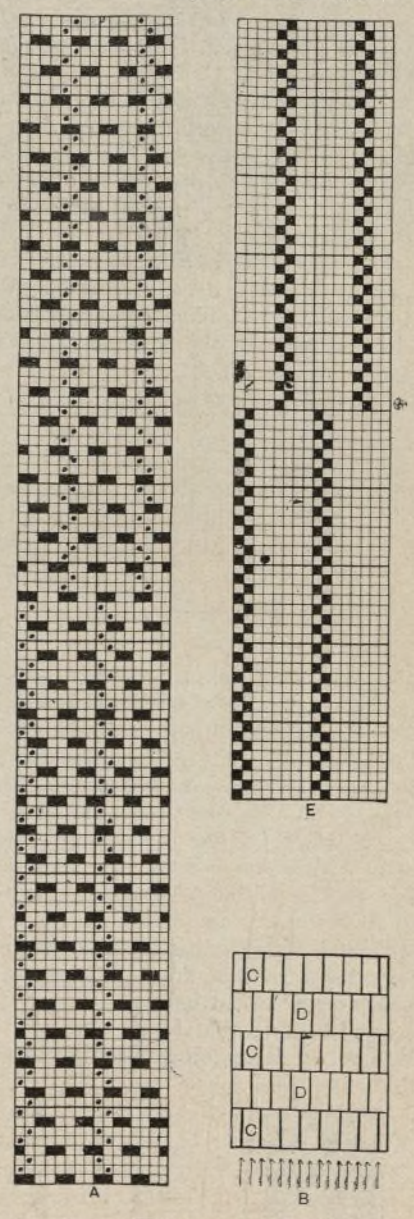
(Concluded from page 189.)

THE earlier fancy velvets were at first produced from combinations of the foregoing methods of drafting, the following types being obtained :—

By combinations of two or more velvets { I. Of the same drafting. II. Of different draftings.

By combinations of velvet and pileless fabrics { III. Various stripes, checks, semi-cords, etc.

I. Fig. 8 gives at A a velvet of the first kind—*i.e.*, a combination of draftings of a single type,—which



Cotton Velveteens.—Fig. 8.

is an alternating semi-cord known as *grain de blé*. The wefting is produced by one ground pick of shalloon twill per two pile threads. B is a sketch of the resulting fabric. The loops marked C are cut by the first stroke of the knife, and those marked D by the second. The arrows show where the cuts take place. A fabric of this kind is produced by a dobby. In cutting the cards a pegging plan similar to E, Fig. 8, is used, indicating the intersection of the pile picks and the number of repetitions. In lacing the cards it is sufficient to interpolate those controlling the ground weave.

II. With the design shown at F in Fig. 9, alternate stripes of velveteen and cord are obtained. Two knives are required for cutting, the corded

stripes being dealt with first, and the plain afterwards. G gives one stripe of *cannele* and one of cable cord, the cutting being performed at twice, as in the preceding case. A large range of stripes of various breadths can be obtained by utilising the same principle. Checks might also be constructed from combinations of different velvets, but these patterns are not much used.

Fig. 10 is a sketch of a semi-velvet in 5-shaft satin, the breadth of the figuring cord being double

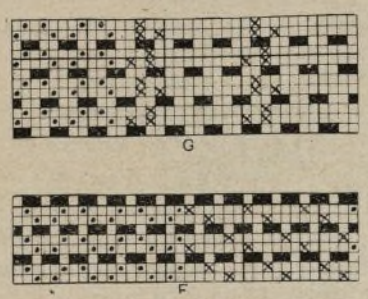


Fig. 9.

that of the ground. The inconvenience of this pattern lies in the large number of cards required for its production. This, however, is common, all cotton velvets being heavily wefted. The figuring loops are cut first, the ground cord being then cut with a finer knife. The arrangement shown in Fig. 10 is very novel, and is well adapted for light velvet dress materials.

Fig. 11 shows at H the combination of a *cannele* and a kinscord, to produce a pattern of the same type as Fig. 10. The kinscord is produced by suppressing the seaming threads of one of the *cannele* cords. A large variety of figures can be produced on this latter principle.

III. This process differs from the foregoing, inasmuch as the fabric does not bear a pile over the entire surface; it is seldom employed except for light dress goods. In the first place, the ground

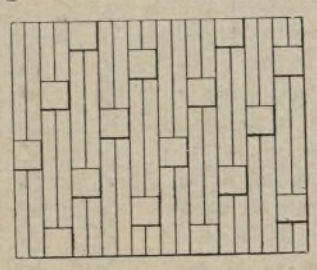


Fig. 10.

fabric can be rendered visible. In this case it is sufficient to pass the pile threads as supplementary picks underneath the fabric. An example of this class is given at J in Fig. 11, there being alternately a stripe of semi-cord and a stripe of 3-shaft weft serge. The section shown at K gives the manner in which the pile threads are interwoven. If these threads were cut on the back, a double velvet would be produced; or again, by suppressing the intersections L and brushing these floating under-threads after cutting the pile, the projecting ends of pile M could be drawn in, and the pattern be made sharper in outline.

It is well to state that in the majority of cases where a velvet is combined with a pileless draft

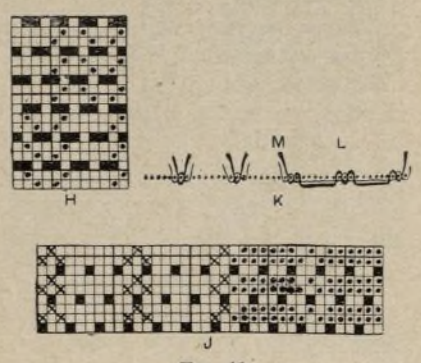


Fig. 11.

the close wefting of velvet fabrics entails the floating of the pile threads in the rear of the plain portion, thus avoiding the shrinkage of the material which the shortening of the threads would produce.

An exception to this rule, however, is furnished by Fig. 12, which represents a stripe of 5-shaft satin on a smooth velveteen ground. Checks on a plain ground, as shown in Fig. 13, are obtained in the same way, one of the squares being in semi-cord and the other in 5 shaft satin. In this figure the squares comprise only 24 picks—*i.e.*, two repeats of semi-cord. To obtain a regular check, about 300 picks per inch are required, the warp count being in the ratio of 1 per 6 of weft. (Cotton velvets have generally 52 warps and 300 picks per inch.)

Jacquard Velvets.—Fig. 14 represents several jacquard velvets previous to cutting, the unbroken lines indicating the arrangement of the seaming threads, and the dotted lines the direction of the cuts. Thus, a velvet of the kind shown at L is cut obliquely from left to right. But this type is rarely produced. In all the other patterns the cut is made in the ordinary manner—*i.e.*, following the direction of the warp threads.

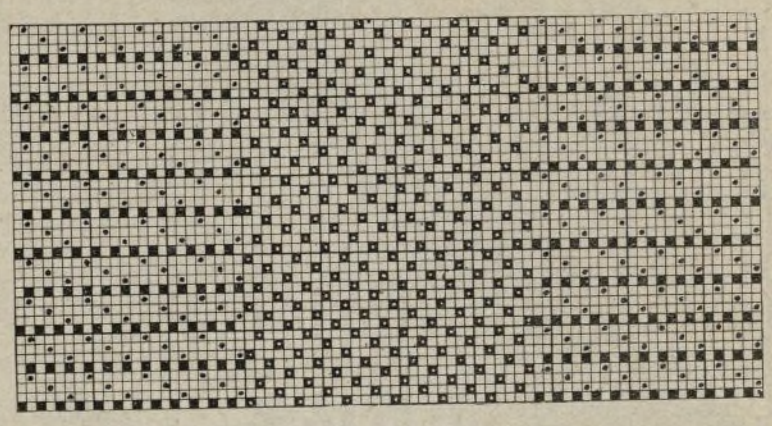


Fig. 12.

The drafting plan, given at T in Fig. 15, is that of the pattern shown at M. It will be seen that the wefting is composed of 1 pick of 3-shaft serge for the ground weave per 2-pile threads. For the passage of the cutting knife it is necessary to arrange certain threads on which the pile picks are left unbound. In this example there is a passage of 8 threads. The plan of N is given in Fig. 15 at U. Here the wefting is composed of 1 pick of plain ground weave to 2 pile threads. The passage of the knife is assured by 3 threads. This pattern furnishes a zigzag cord in current use. The plan shown at V, Fig. 15, represents the pattern given at O in Fig. 14. Cutting is rendered possible by the fact that 5 threads are free from intersection with pile picks, and thus allow the passage of the knife. The cut pile forms a longitudinal cord with fringed or serrated edges. A large number of fancy patterns can be constructed on the same principle.

Fig. 16 represents a sketch of a typical jacquard velvet, the dark parts indicating the disappearance of the pile threads to the underside, whilst the blank spaces show the pile. Any kind of corded velvet is adopted for this weave—*cannele*, kinscord, etc.; for example, the *cordelet* shown at W in Fig. 17. In this case one square on the sketch will correspond to 6 threads in the fabric, and the repeat of the pattern being thirty-two squares, the number of threads to a repeat will thus be $32 \times 6 = 192$. By reason of the close wefting, 16 picks can be allowed to each square, so that there will be $32 \times 16 = 512$ cards in the pattern. A blank square on the sketch corresponds to the plan W in Fig. 17, and a black square to the plan X, Fig. 17. There is 1 pick of plain ground weave to 3 pile threads, and the cordelet-velvet cord pattern will stand out from a plain ground.

In conclusion, it should be added that the jacquard velvets similar to Fig. 16, having had no practical application, have never been a standard article of manufacture, and they are only referred to here as a curiosity. As for double-face velvets, their creation is too recent for them to be dealt with here; they are produced on the usual lines of double-face fabrics, and a velveteen of this kind is illustrated at Y in Fig. 17. The cutting is effected in two operations.

Cotton velvets or velveteens form only one class of the so-called "weft velvets," wherein the pile is formed by special weft threads. Previous to cutting, the goods have to pass through three finishing processes: drying, raising, and liming. The first of these operations is performed at the finisher's, the pieces being passed over a series of cylinders, heated inside by steam, thus drying the goods by contact. These cylinders may be arranged in the same horizontal plane or in one or more superimposed rows, and the number of cylinders may range from twelve to thirty.

The object of raising is to impart thickness to the fabric and to render the underside softer and less cold to the touch. It, however, reduces the solidity of the material, and is therefore omitted in the case of low-quality velveteens or those with silk finish. The machine employed is a large cylinder around which are arranged a number of smaller cylinders covered with card clothing. As shown in Fig. 18, this large cylinder revolves in the opposite direction from that taken by the cloth. As a rule, the piece has to be put through the

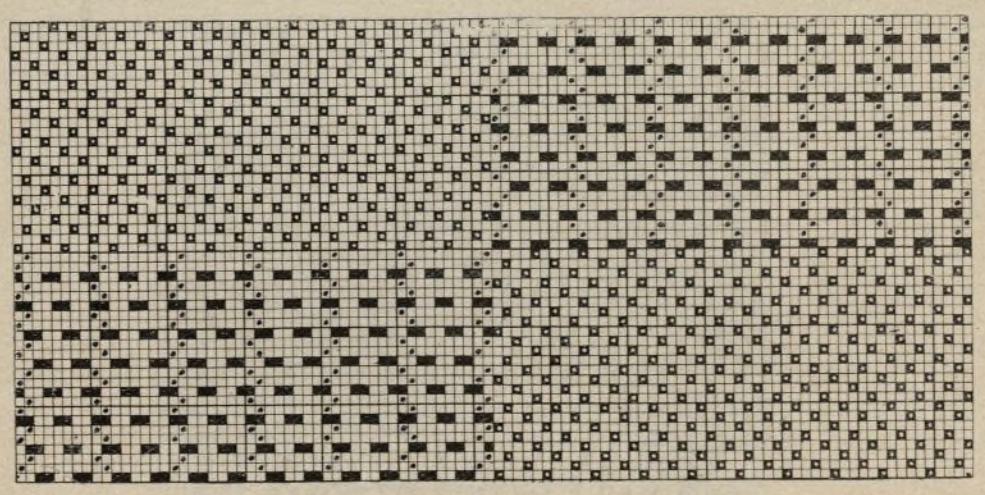


Fig. 13.

machine several times in order to obtain a proper finish.

In the succeeding operation of liming, the face of the goods is sprinkled over with a weak milk of lime, which dries the material and thus facilitates cutting. The piece is passed, face downwards, over a circular brush, which dips into a trough containing the milk of lime, as shown in Fig. 19. Heavy goods, however, do not require liming.

The pile-cutting machines may be divided into two classes: disc cutters and blade cutters, the first named being fitted with cutting discs of accurately-gauged and well-sharpened steel plate, mounted on a shaft running at a speed of about 3000 revolutions per minute, the number of these cutters depending on the number of rows of loops

to be cut. The discs run inside small iron triangles which serve as guides, and when these guides have been put into position in the rows of loops by hand, and the piece of cloth drawn forward by means of cylinders, the cutting proceeds, the guides being driven onwards by the action of a camshaft. Should any of the guides accidentally pierce the fabric itself, only a very small hole will be made, since the guide comes into contact with a metal plate underneath the cloth, and thereby completes an electric circuit by means of which the stop motion of the machine is brought into play. It is, however, considered that these machines give an inferior pile, the cutting action being the reverse way to that of hand work—that is to say, from outside inwards

Knife-blade cutters may be either of the single or multiple blade type. The blades and guides are similar to those of the hand tool, but shorter. The blades, mounted on springs, are held in the hand, and the slightest accident puts an electric stop device into action. The cutting is done in lengths of from 6 to 12yds., and in one or more rows at a time, commencing at the left-hand side. The single-blade machine will cut velveteenes the others cannot deal with. The cutting machines, working after the manner of a plane, are only machine tools, and require the attention of a minder to keep the cutters in position. When the machine is of the multiple-blade type, a special

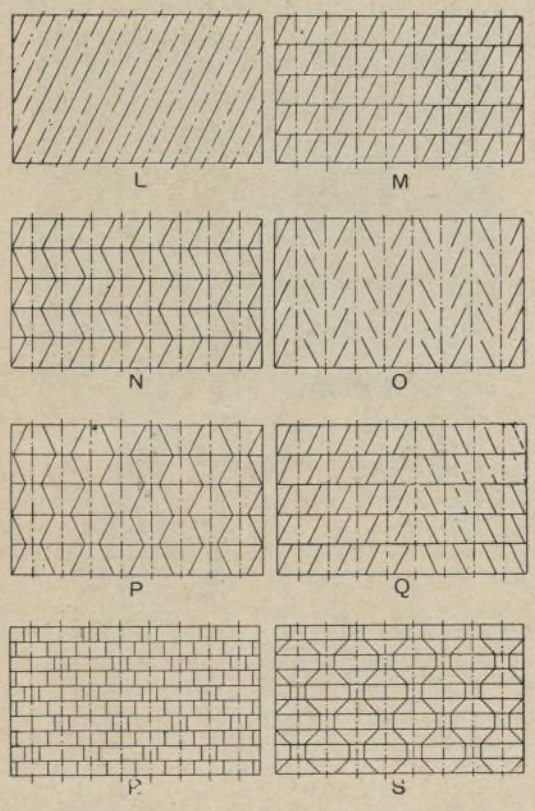
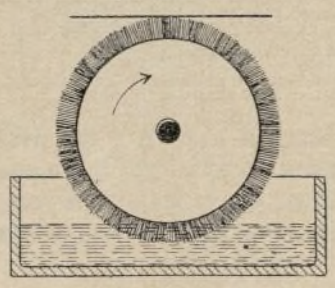


Fig. 14

mechanic has to be kept at work making the guides and sharpening the cutters, and unless the tools are kept exactly true to gauge, the cut pile will have a stripy appearance, due to uneven cutting. As these machines cut lengths of from 6 to 12yds. at a time, and the pieces are usually some 75yds. long, three



Cotton Velveteens.—Fig. 19.

cuts are made with the machine, and the rest is cut by hand. Seeing that the machines require a force of about 2H.P. for driving them, as well as the services of an attendant, it will be evident that machine cutting is not always an economical procedure. Whilst it is possible to cut corded velveteens on the loom simultaneously with the operation of weaving, the goods cannot then be raised without tearing the pile, and for this reason the method in question has not made any headway in practice.—"L'Industrie Textile."

Cotton Fibres in Spinning and Manufacturing.—VI.

By W. I. Hannan.

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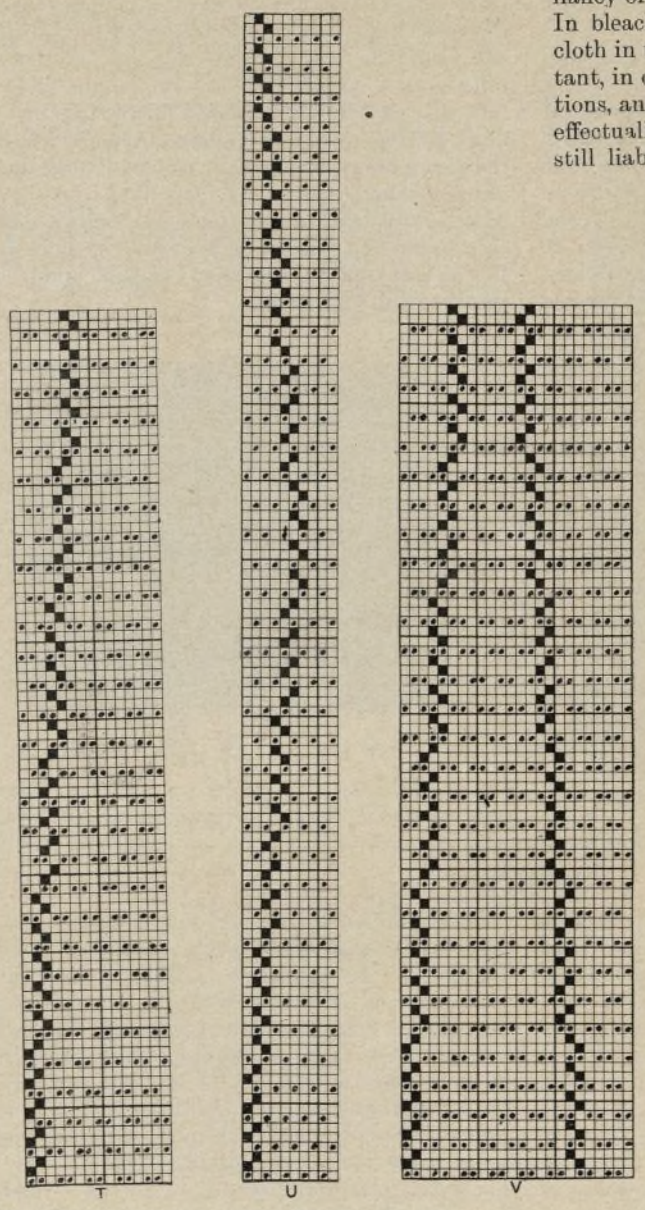
THE glossy face of dyed, bleached, and finished goods is sometimes interrupted by some other colour which causes a disfigurement. These defects are not always due to the dying or bleaching processes, for they can often be traced to defects in manufacturing, or to the structural build of the yarns and behaviour of



Cotton Velveteens.—Fig. 15.

the fibres in the elongating, twisting, and winding processes. The singeing process to which sateen cloths are submitted is intended to remove all loose surface fibres by burning them slightly and sufficiently to give the cloth a smooth surface. The machine cannot well be set to give two different heats at one time, and what is found suitable for the fine fibres can hardly be suitable for snarls, motes, and neps, which require more singeing to remove them; but a regulation of the speed at which the cloth travels through the flame is often effective in clearing the principal defects of the cloth surface. The minute particles of bearded motes are often suppressed by bleaching; their surface attachment to the cloth is not so stoutly held as is the basal part of a snarl, which is interwoven with the cloth. For some colours the bearded mote particle is not so destructive to the appearance of the cloth, but others are more sensitive to the oleaginous character of the mote particle.

The singeing of a snarl from a piece of cloth often leaves a trace behind which shows up in the dyeing and finishing. When a sateen fabric is well dyed and finished, the face weft shows a nearly parallel but level surface. The dye will appear the same on all parts of the cloth face, but where a snarl has been singed off it is distinguished by a variation of colour often darker than that of other parts. No matter how closely the singeing has been done, this difference will be shown, and cannot well be avoided; it began with a structural defect in the build of the yarn, followed on by a slackness of weft from the chase of the cop, and was pushed up to the fell of the cloth by the reed and slay of the loom. A little drag in the proper place might have avoided it, but once it appears on the cloth face it is difficult to remove. Machine oil-smeared yarns are local defects, and may be traced to the spinner or the manufacturer. As a rule, dyes have little or no affinity for dirty or black oil that has penetrated to the core or adhered to the surface of the weft yarn. Some remedial agents are used to remove the defects, but the brilliancy of the colour of the cloth is rarely restored. In bleaching and dyeing, the preparation of the cloth in the first stage by singeing is most important, in order to remove all impurities, imperfections, and surface fibres. Even when this is done effectually by the machine process, the cloth is still liable to show up some departures from the dyed colour of the fabric. Perhaps no cloth is so difficult to dye uniformly as indigo-coloured fabrics. Often there appear minute white specks in the cloth, for the removal of which singeing is non-effective, and their origin is probably due to the presence of dead fibres at intervals in the yarn used for the covering weft. It is just possible that kempy, gin-cut, and dead fibres play some important part in the repulsion of the colouring matters that other fully ripe fibres so readily take up.

Fig. 16.

Fig. 17.

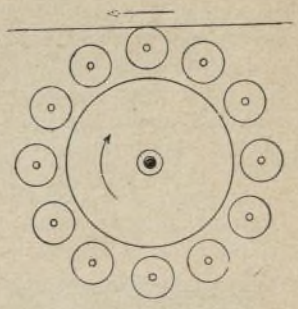


Fig. 18.

(*To be continued.*)

The Mechanism of Spinning.—XV.

By H. R. Carter.

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THE SPINNING OF VEGETABLE STALK FIBRES (*Continued*). — Proceeding with the machines for preparing stalk fibres for spinning, we come to the hemp softener, Fig. 35. It is a characteristic of hemp fibre that it may be more easily split up and spun fine after it has undergone a rolling and softening process. European hemp, which is generally used for spinning the finer yarns, is almost always subjected to this operation either in the machine illustrated or in a more old-fashioned one which is almost identical

in principle with an ordinary mortar mill. In Fig. 35 the fluted rollers A, B, and C, D are pressed together by strong springs, and have a reciprocating rolling motion given to them by gearing combined with cranks and ratchet wheels. The throw of the cranks is so arranged that the forward movement of the rolling rollers is greater

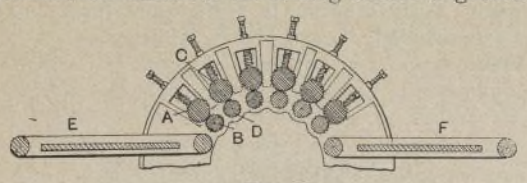


FIG. 35.

than the retrograde, and the hemp being spread upon the table E is, after being well rolled, delivered upon the apron F.

Hemp is nearly always too long to be prepared and spun over comparatively fine machinery without being cut into lengths of about 24in. A cutter, as represented in Fig. 36, is generally employed for this purpose. A is the circular knife or cutter, about 22in. in diameter, and driven from a line shaft by the belt G at a speed of about 600 revolutions per minute. B, B, B, B are the four pairs of holding rollers, each two pairs being acted upon and pressed

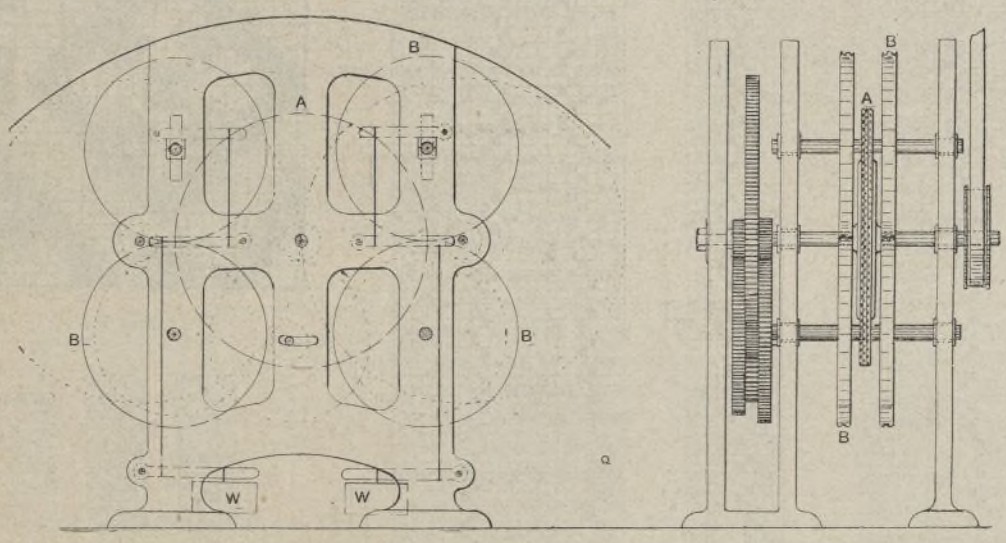


FIG. 36.

by the weight W, acting through compound levers, as shown, and exerting a pressure of more than one ton, distributed between two pairs of holding rollers. The cutter blade A consists of three discs of steel, each about ¼in. thick, placed side by side and keyed upon a shaft supported by the gables, and carrying the driving pulley keyed on one end. From this shaft a retarded train of gearing drives the bottom holding rollers, which are of cast iron, 14 to 15in. in diameter and 2in. face, with vertical or circumferential grooves or flutes of 1in. pitch. The bottom roller has two flutes, and the top roller one, with two grooves. Each pair of bottom rollers is keyed on a shaft at any required distance from the cutter, the ends of the shaft being supported by blocks or brasses set in the standards. The top or pressing rollers are free to move up and down in slides in the gables, and are turned by friction. The "nip" of the holding rollers should be horizontal with the centre of the cutter, and in a vertical plane about 1in. nearer the centre of the cutter than its periphery. The rollers are set one on each side of the cutter with a space of about ⅛in between them. Upon the rim of each of the plates composing the cutter are projecting teeth of a diamond-shaped construction, and placed at distances of about 3in. apart. It is most important that these teeth should be the proper shape and bluntness to cut through the fibre without shearing the ends quite square, which would seriously affect the combing and spinning properties of the fibre. The holding rollers make two to three revolutions per minute.

The machine being started and having attained full speed, the boy takes a large handful of fibre, and holding it with one hand on each side of the place where he requires to cut it, extends it across the face of the holding rollers as flat as possible, and near the point where the top and bottom rollers make contact. It is soon caught, held by the great pressure, and carried forward against the knife by the revolving rollers. After being cut, the pieces are released as the rollers diverge again Besides being used to cut long fibre into shorter lengths, this machine is often employed to remove the impure and inferior ends of shorter fibre such as flax, leaving a pure and valuable middle for spinning superior yarns.

With the same aim in view another class of machine, termed an "ending machine," is often employed, the operation being effected after hackling, and not before, as with the cutter just described. Figs. 37 and 38 are two types of this machine working on different principles, the object of the former being to cut off the bad end, and of the latter to improve it by additional hackling with a fine and quick hackle. A in both figures represents the extended end of the "channel" of the hackling machine, while B is the "holder." In Erskine's "ender," Fig. 37, a pair of clamps E are hung from brackets attached to the channel A. While the "head" is raised these clamps hang clear of the piece of fibre, but as it descends they are brought together by the friction rollers C and D, the latter upon the end of a lever as shown. The object of the clamps E is to hold the piece firmly in close proximity to the place where the revolving ending rollers F and G grip it, draw away any loose fibres and cut away the remainder. To act properly, the ending rollers must be accurately ground to secure a perfectly parallel face. In order that they may bite the better, one or both of them is often scored

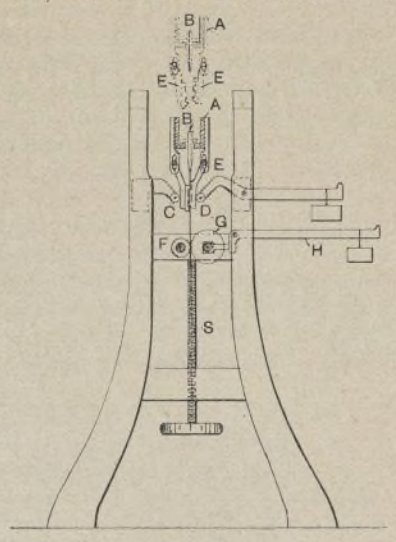


FIG. 37.

spirally. The smaller roller F works in fixed brasses, while the bearings of the larger roller G move in a slide, the two rollers being pressed together by the thrust of the tail end of the weighted lever H, as shown. The rollers are driven by a chain from a sprocket wheel upon the extremity of the brush shaft, and may be raised

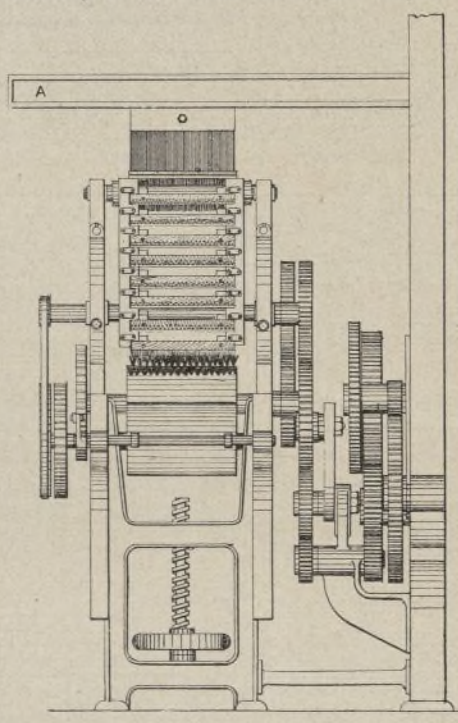


FIG. 38.

or lowered bodily by means of the screw S to suit various lengths of fibre, or to remove more or less of the end. The ending machine, Fig. 38, is a brush and doffer hackling machine in miniature. Like Fig. 37, it is applied to the fine end of the hackling machine, and is often particularly useful in removing "naps" from the end of fine fibre.

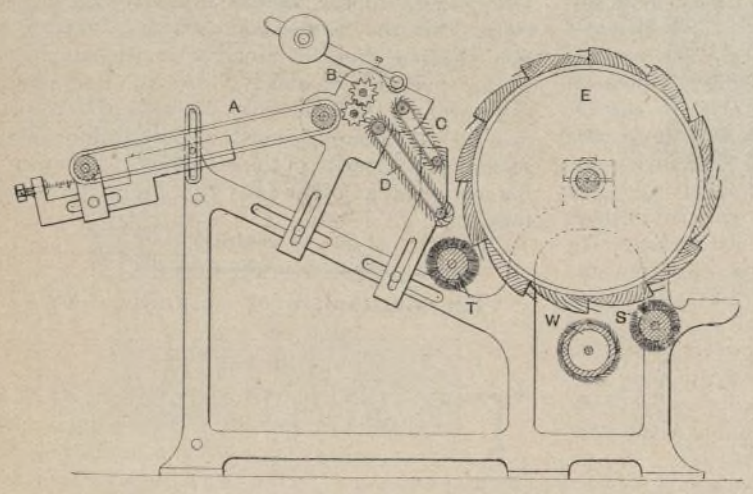


FIG. 39.

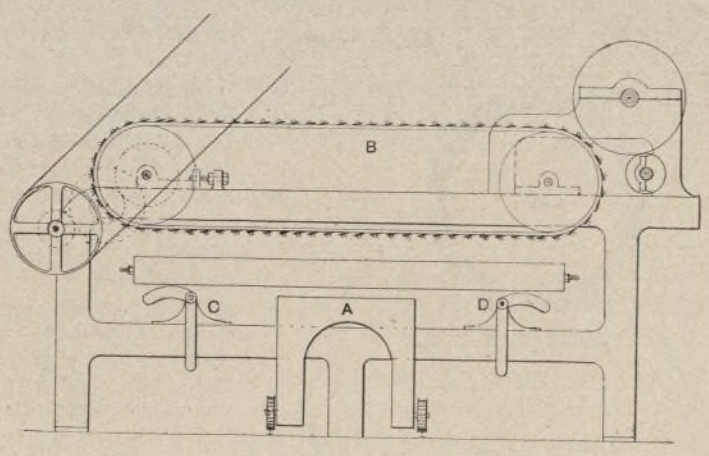
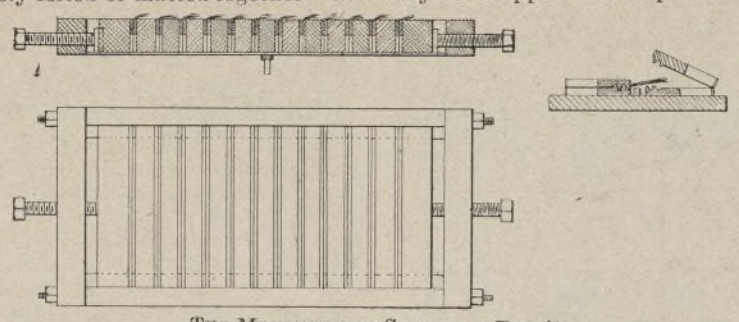


FIG. 40.

The height of the sheet may be adjusted as in the Erskine machine, so that any required part of the end may be operated upon.

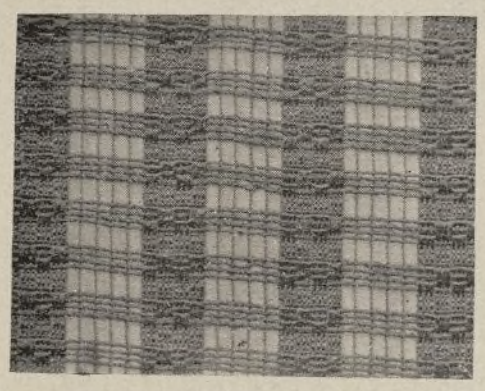
Figs. 39 and 40 represent two machines borrowed from another industry, but used by the most

successful ramie spinners to prepare their fibre for spinning. The ramie fibre, as it comes bleached or degummed from the steep or from the boiling kier, is considerably felted or matted together It



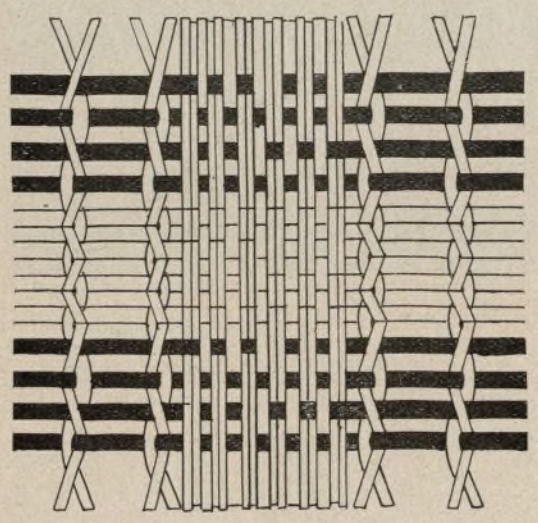
THE MECHANISM OF SPINNING.—FIG. 41.

is consequently spread upon the endless sheet A of the machine (Fig. 39), delivered through the pair of fluted feed rollers B, to the toothed feed sheets C and D, which hold and straighten it while the teeth of the cylinder E carry it gradually away. It is further parallelised upon the surface of the cylinder by the action of the worker W. This worker and the feed sheet are kept clean by strippers S and T, which are in turn stripped by the cylinder. The cylinder has no stripping mechanism, so that the fibre accumulates upon it, enveloping it completely, when it is stopped for stripping by hand. The cylinder is clothed with heavy wooden laps bevelled off in the manner shown, leaving recesses, in the edges of which strong teeth



FANCY DRESS FABRICS.—FIG. 185.

are set. When the workman wishes to strip the cylinder he takes a large pair of shears and cuts right across the face of the cylinder at each recess, dividing its fibrous envelope into sheets of fibre about 10in. long. The next machine (Fig. 40) is a sort of combing or hackling machine, the object of which is to comb out the short and doubled fibres which are unavoidably produced by the previous machine. The narrow sheets of fibre from the latter are placed in wooden holders or "books," shown in detail in Fig. 41, a number of these books being then tightened together in an oblong frame, as shown, with the ends of the fibre projecting. The book frames



FANCY DRESS FABRICS.—FIG. 186.

are then placed upon a carriage A (Fig. 40) and run under the combing or hackling sheet B, which is stretched between and runs round two pulleys at either extremity of the machine, as shown. The book frame is then raised from its carriage and into close proximity to the combing sheet by means of the handles and cams C and D. When one end of the fibre has been combed it is turned in the books, and the other end subjected to the comb sheet in a similar manner. The comb sheet may be stripped and kept clean by a brush and doffer arrangement working upon the same principle as in the brush and doffer hackling machine.

(To be continued.)

Fancy Dress Fabrics.—XIX.

By G. WASHINGTON.

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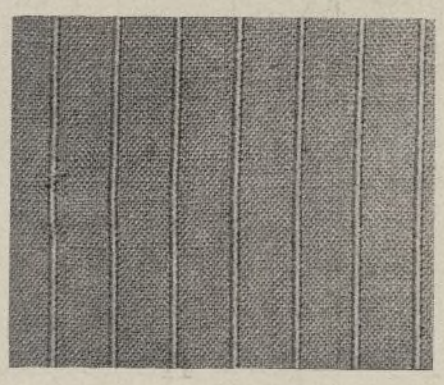
A FANCY GRENADINE is shown in Fig. 185. Only half of the repp stripe is given in the sketch, Fig. 186. Leno is used instead of the ordinary gauze weave for the open part of

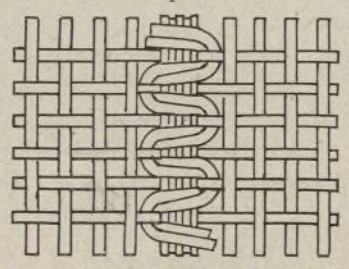


FANCY DRESS FABRICS.—FIG. 187.

the design. Each group or pair of leno threads are separated by two empty reeds, and the repp portion is 3 ends in a reed :—

Warp.

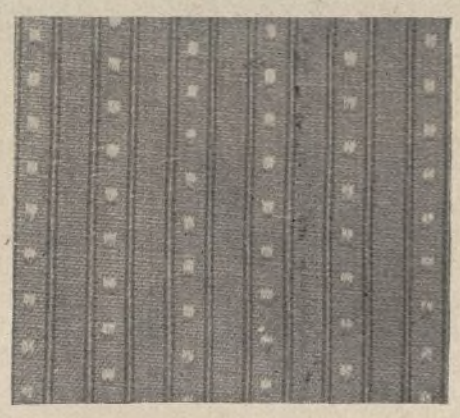
12 ends 60/2 silk for leno
11 times { 2 „ 60/2 silk. / 1 „ 2/80's cotton. / 2 „ 60/2 silk. }
45 reeds per inch.



FANCY DRESS FABRICS.—FIG. 188.

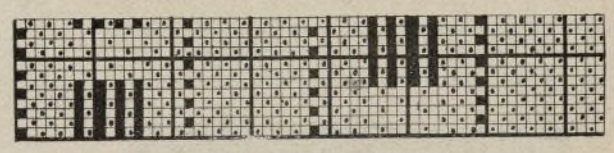
Weft.

4 picks 3/24's lustre worsted.
8 „ silk, 14,000yds. per oz.
Worsted 40 picks per inch.
Silk 80 „ „



FANCY DRESS FABRICS.—FIG. 189.

The striped pattern, Fig. 187, consists of a plain worsted fabric ornamented with an imitation of a silk weft cord, and is remarkable for the small amount of silk used in its construction, and consequent economical method of producing a silk worsted fabric. Five worsted threads form the centre of the cord, and a pair of silk threads are crossed over them and stitched by the weft alternately on one side and then



FANCY DRESS FABRICS.—FIG. 190.

the other, as shown in Fig. 188. The silk is all on the face of the cord, giving a very smooth, lustrous appearance and completely hiding the worsted warp. The silk warp is nearly four times as long as the worsted, and may be woven either with doup healds or the bead arrangement mentioned in the May issue of THE TEXTILE MANUFACTURER, page 149. The seven ends forming the cord are reeded together, and a reed is left empty

FANCY DRESS FABRICS.—FIG. 191.

on each side, the plain portion two ends in a reed :—

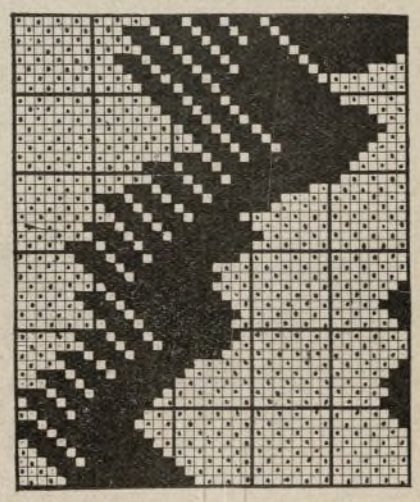
Warp.

18 ends 40's worsted, plain.
2 „ 70/2 silk } cord.
5 „ 30's worsted }
32 reeds per inch.

Weft.

40's worsted.
56 picks per inch.

In the lavender fabric illustrated by Figs. 189 and 190, the corded appearance is obtained by



FANCY DRESS FABRICS.—FIG. 192.

employing a very thick thread without any alteration in the weave. This thread occupies the space of three small ones in the reed. Every alternate stripe is ornamented with small lustrous spots of extra warp :—

Warp.

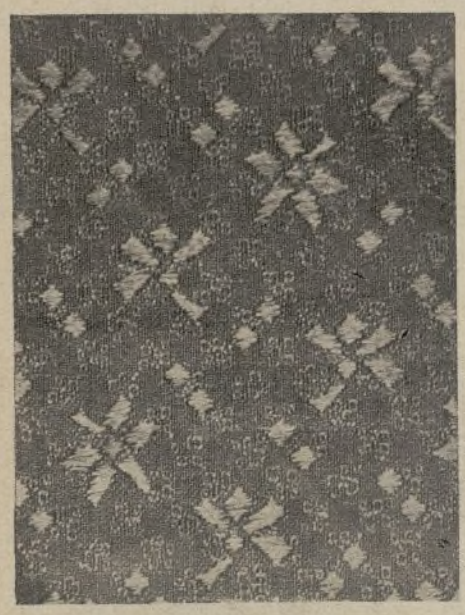
1 end 6/28's worsted.
3 times { 5 „ 40's worsted. / 1 „ 40's mercerised cotton. / 1 „ 40's worsted. / 1 „ 40's mercerised cotton. }

4 ends 40's worsted.
1 „ 6/28's worsted.
12 „ 40's worsted.
75 ends per inch.

Weft.

40's worsted.
56 picks per inch.

The alpaca fabric shown in Figs. 191 and 192 abounds in contrasts. The irregular outline of the zigzag stripes, one thick where the next is small;

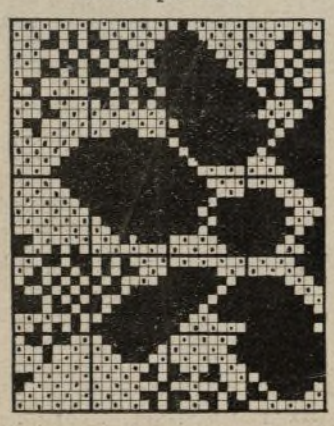


Fancy Dress Fabrics.—Fig. 193.

the direction of the twills to right and left alternately; and the detached figures interspersed between the wavy stripes, all contribute to impart variety and interest to the design :—

Warp.

2/100 black cotton.
72 ends per inch.

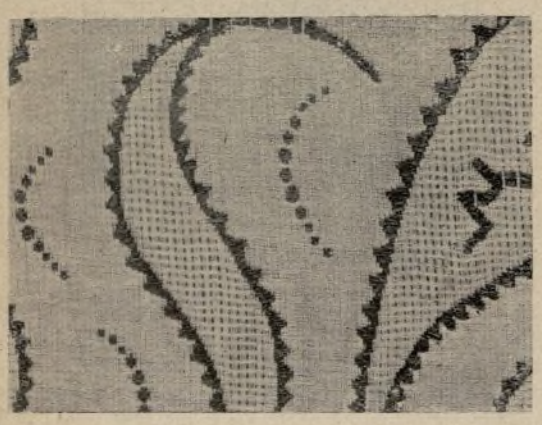


Fancy Dress Fabrics.—Fig. 194.

Weft.

24's black alpaca.
56 picks per inch.

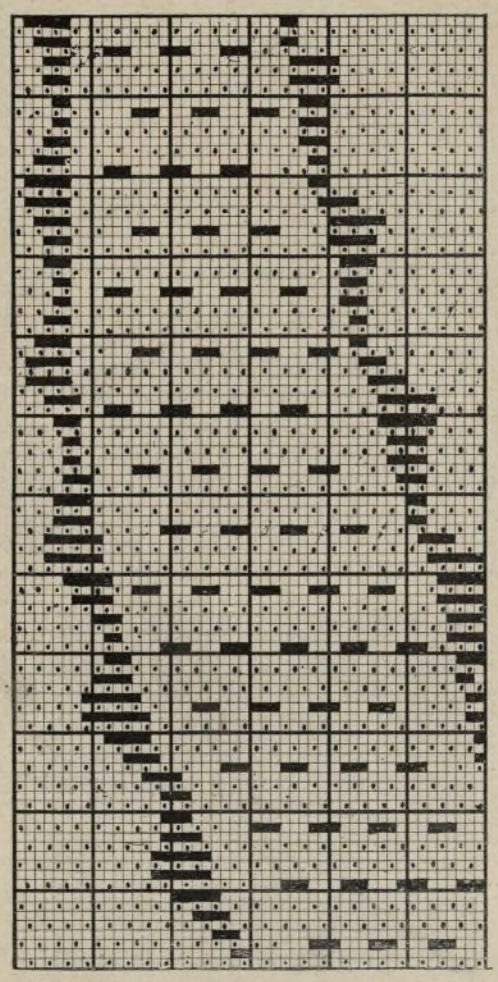
In Figs. 193 and 194 the plain ground is interspersed with irregular patches of broken weave effect, which are intermediate in lustre between the solid weft figures and the plain ground, and



Fancy Dress Fabrics.—Fig. 195.

contrast with both of them in the uneven character of the reflecting surface. This fabric is a cotton warp alpaca, the counts of yarn, etc., being like Fig. 191.

A very thin white cotton fabric, ornamented with figures outlined in solid black, is shown in Figs. 195 and 196. The white fabric weaves plain throughout, excepting in the centre of the figures, where a mock-leno effect is introduced, every third pick and thread weaving 3-and-3, thus drawing the warp and weft into groups. The black weft, after



Fancy Dress Fabrics.—Fig. 196.

coming to the surface to make the required figure, is floated on the back and cut off during finishing, being firmly held in position by the plain fabric under it :—

Warp.

120's white cotton.
64 ends per inch.

Weft.

1 pick 120's white cotton
1 „ 10's black cotton, double yarn
128 picks per inch.

(To be continued.)

REVIEWS OF BOOKS.

Researches on Cellulose, 1895—1900. By Cross and Bevan. London: Longmans, Green and Co. 6s. net.

The previous work on cellulose by the same authors is now some years old, and as the subject in hand is comparatively modern as regards the interest aroused in scientific circles, much has been discovered since its publication The present volume brings the older one up to date, acting more as a supplement or continuation. It may be more correctly described as a collection of papers and researches, some by the authors themselves, but consisting mainly of those of other scientists and experimentalists which the authors have edited. The information collected is naturally of a somewhat scattered, in fact, one might say scrappy, nature, as can only be expected from such a miscellaneous collection; but it traverses the ground in a thorough and fairly systematic manner, considering the difficulties to be contended with. The greater portion of the book is devoted to the chemical side of the subject, but the industrial adaptation or treatment of cellulose is given a prominent position. The mercerisation of cotton, the manufacture of artificial silk (lustra-cellulose), and the uses of viscose are discussed, and the chemical treatment of vegetable fibres which are composed mainly of cellulose is also thoroughly dealt with. In the preface the authors mention the scanty contribution to cellulose matters from English sources, and invite the younger generation of chemical students to consider the advantages possible from finding a career in connection with some cellulose industry. It certainly seems that the next generation will witness developments with cellulose what the present generation has seen with coal-tar products; there is not only a wide, but a very profitable field open in that direction.

Your Bankers' Position at a Glance. By Henry Warren. London: Jordan and Sons Limited. 5s.

Many manufacturers, although well versed in the financial departments of their own business, either know or care little as to the position of their bankers, feeling satisfied that because others entrust them with large sums, everything is safe. It is true that a bank crash is far from common in this country, but as such a catastrophe sometimes happens, it is as well to take the necessary precautions to prevent loss in this way. The author bases all his theories on the preparedness of the different banks throughout the British Isles to meet a run, and the liquid assets thus form an important part of his calculations. These depend largely upon the methods of banking practised by the different companies and it will be readily seen that the more cash a bank holds in hand, the less money it has earning dividends for its shareholders. All sacrifice the former to the latter, but how far this is safe forms an important portion of the matter discussed in the book. The chief banks are taken, their methods and balance-sheets dissected and criticised, and an insight is given both to their working and that of banks in general. Each bank is indexed, and the work makes a book of ready reference, all tables being arranged in an accessible and understandable form.

We have also received :—Catalogue of the New Bedford Textile School, Mass., U.S.A., a well-illustrated booklet describing the work of the school and giving a syllabus of the many and various classes which will be in session during the coming winter.—Official Catalogue and Bulletin of the Exhibits of Messrs. Mather and Platt Limited, Salford, at the Glasgow Exhibition, illustrating the bleaching, filtering, electrical, engineering, and other machinery made and exhibited by them.

QUERIES AND REPLIES.

*** Names and addresses must in all cases accompany inquiries. A stamped addressed envelope must be enclosed if a reply by post is desired.

F. O. S. (Elberfeld).—"Factory Accounts" (Garcke and Fells), 6s.

R. W. (London).—Mr. P. M. Schiersand, Kappel, near Chemnitz.

C. A. (Halifax).—Delainage Vervietois Peltzer Company, Renoupré, Verviers, Belgium.

A. R. L. (Barcelona).—We do not know the firm. Do you know the town in which they are situated?

H. J. S. (Bury).—We think the trouble is caused by your using magnesium or zinc chloride along with the soap.

S. H. and Son Limited (Rochdale).—From Mr. Carl Basurtz, 91, Alt Moabit, Berlin. The composition is put into the cloth, and held similarly to size.

P. M. B. M. Co. (Halifax).—Messrs William Pockson and Son, 30, Wine-street, Bristol; Robert Pritchard (Exors. of), New Brown-street, Manchester; E. G. Simpson, Nicholas Croft, Manchester.

Dresden (Manchester).—Sir James Farmer and Sons Limited, Adelphi Ironworks, Salford: Mr. William Bywater, Sweet-street Foundry, Holbeck, Leeds; Mr. Joseph Stubbs, Mill-street Works, Ancoats.

J. E. C. (St. Petersburg).—"Sizing of Cotton Goods" (Thomson), 10s. net; "Sizing and Mildew in Cotton Goods" (Davis, Drefus, and Holland), 10s. net. Both, especially the former, thoroughly cover the ground you ask about.

X. A. (Almelo).—Messrs. Wheatley Kirk, Price and Co., Albert-square, Manchester; Lockett, Crossland and Co., Manchester; Lang Bridge, Paradise Works, Accrington; and Sir James Farmer and Sons Limited, Adelphi Ironworks, Salford.

W. D. (Derby).—We do not know the agents nor the clothing, which, we think, is simply the imagination of some sensational evening paper, or an exaggeration based on the use of ramie fibre, underclothing of which material can be obtained through any large shirt merchant.

A. J. S. (Derby).—If you use a large quantity of warps, get a slasher, many makers of which you will see on our advertising pages, all of which are reliable. You will also require a hank-sizing plant for the weft, and if you do not make a great quantity of material, you might size the warp in hank before dressing, and do without a slasher. You will find a list of makers in our advertisement index, and we could not advise a special machine without knowing your output, etc. For instructions see the articles on "Sizing of Cotton Goods" which ran through 1899 and 1900 of The Textile Manufacturer, or "Size and Sizing Ingredients," by Monie (2s.), and write us if there is anything you do not understand. The German article has a much shorter pile than yours, which will better account for its being cheaper than by the sizing of the weft and backing warp.

THE TEXTILE MACHINIST:

Devoted to Machinery, Apparatus, Tools, Etc.

Machinery at the Glasgow Exhibition.—III.

THE textile exhibit of Messrs. Mather and Platt Ltd., Salford Ironworks, Manchester, is one of the largest and most interesting seen at Glasgow, being of additional interest owing to its novel and, one might say, revolutionary features. It consists of a new method of bleaching textile goods, being adaptable to all kinds of cloth, and treating such in an open condition at full width instead of in the crumpled rope form usual with the various bleaching operations. It is unnecessary to mention the great advantage of this change: the treatment in rope form is only too productive of creases, while in the new process such are practically an impossibility, and delicate or fancy goods may be treated with absolute safety.

The main feature, however, is that the liquors are brought to the cloth and passed through it, instead, as is usually the case, of passing the goods through the different liquors. The cloth is treated at its full breadth from the dry grey state to the fully-bottomed white bleach, and this without handling the goods mechanically (except in bulk) or passing them through any running machinery. All the operations take place in the batch form, so that the goods are perfectly protected from mechanical injury, and no pulling or distortion of the fabric is possible; the goods are in consequence wider, heavier and thicker, than when bleached in the rope state, and are of course entirely free from stripes or band marks. As practically no running machinery is required, there is very great economy effected in power for driving, the expensive renewal of washing machine bowls is entirely obviated, and the saving of water is very great, amounting to about 75 per cent, owing to the effective method of circulation adopted for washing. The labour of the bleachworks is also reduced to a minimum. A photograph of the exhibit is shown in Fig. 11, whilst a plan of the same is given in Fig 12, from which the economy effected in the space required for such a plant will be readily seen.

The process of working consists generally in saturating the cloth through the machine shown in Fig. 13 with a solution of hot alkaline liquor. It is in this machine wound on to a batch of large dimensions, with one edge of the cloth in contact with a perforated suction end plate. The roller and end plate in question, with the suction chamber in connection with them, are carried by a special wagon. This winding-on arrangement is shown to the left of Fig. 11, the solution being below the floor level. The batch when completed, as shown in Fig. 14, is about 5ft. in diameter, and contains approximately three-quarters of a ton (dry weight) of cloth. This batch of cloth, saturated with hot alkaline liquor, is then run into the kier shown in Fig. 15, which is also distinctly shown almost in the centre of Fig. 11. This apparatus, it will be seen, is of the horizontal type, with the well-known valve door, which is capable, without the screwing up of any bolts, of making a perfectly steamtight joint up to 40lb. working pressure per square inch.

After running the wagon or wagons into the kier, the door is closed, as shown by Fig. 16, and the circulating liquor is admitted and caused to circulate through the mass of cloth by means of the centrifugal pump and suitable pipe connections. The principle of action is that the liquor is drawn from the space or suction chamber behind the perforated plate at the end of the batch against which the cloth is wound tightly in contact, the whole of the batch being submerged in liquor, and the batch with its perforated faceplate being slowly rotated during the whole time of boiling. A very powerful circulation of the liquor takes place longitudinally between the convolutions of the batch from selvage to selvage with absolute evenness.

After boiling, the alkaline liquor is let off, water admitted, and the cloth thoroughly cleansed before removal from the kier. The door is then raised, and the wagon with the cloth drawn out, as shown in Fig. 17, and taken on the rails laid down for the purpose to the adjacent open-width chloring, souring, and washing apparatus, a handy jib crane transferring the batch from the wagon to the apparatus, as shown in Fig. 18, in which the whole of the subsequent operations of bleaching are performed. This open-width apparatus (Fig. 19) is provided with a perforated plate and suction chamber, as well as with the arrangement for causing the batch to rotate slowly, as described in connection with the kier. The whole of the fittings are of a special material which is not acted upon by acids or alkalies, and in this open apparatus the operations of chemicking or chloring, washing, souring, and the final washing are performed, without removal and without a moment's loss of time. A powerful centrifugal pump effects the circulation of the liquor.

When the final washing has been performed, the batch is lifted out of the cistern and placed on a

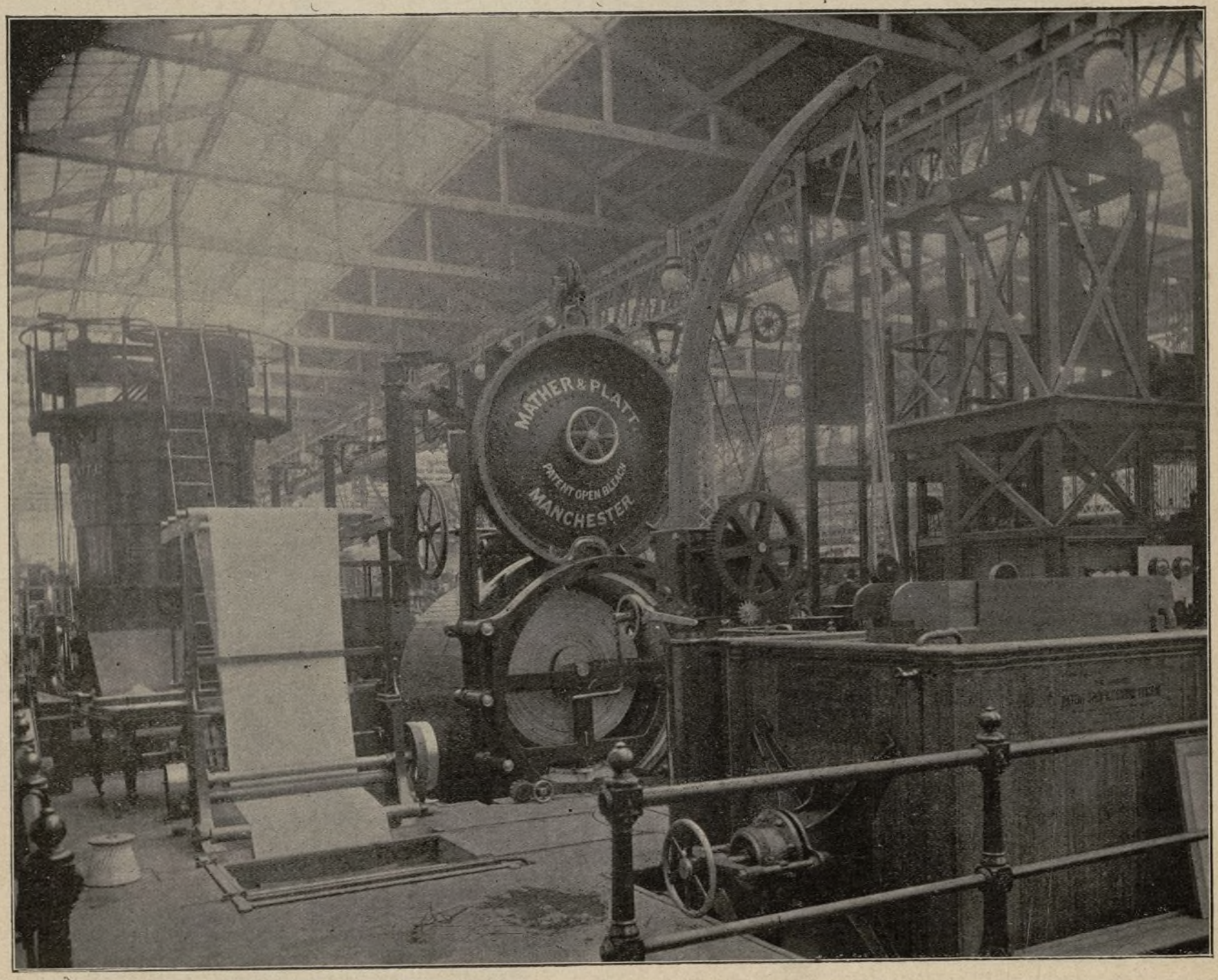


FIG. 11.

simple wagon, which takes it to an open-width squeezing machine, through which the cloth is passed for a final squeeze as it runs on to the drying cylinders, thoroughly bleached, with its surface and texture entirely uninjured, and after having been under treatment in the bleach-house for only about fourteen hours. We should mention that the apparatus is not only used for bleaching, but is applicable for dyeing many classes of colours where goods in sufficient quantities require to be treated, and at the Glasgow Exhibition a number of pieces are shown dyed with perfect evenness in the same apparatus in which they were bleached.

Fig. 20 is a special type of kier on the same principle as that described above, but of a simpler nature, and obviating the use of wagons. This type has been employed very considerably for linen bleaching, and has given results in the saving of time effected and in the quality of work produced which have surpassed the most sanguine anticipations. Only a photograph of this latter is shown at Glasgow, not the actual machine. The photograph of the interior of a bleach-house arranged on the new principle is shown in Fig. 21, and we understand that this is similar to one which Messrs. Mather and Platt are putting down in a special building at their own works in Salford, to demonstrate by continual work on a commercial scale the efficiency and economy of the new process.

(To be continued.)

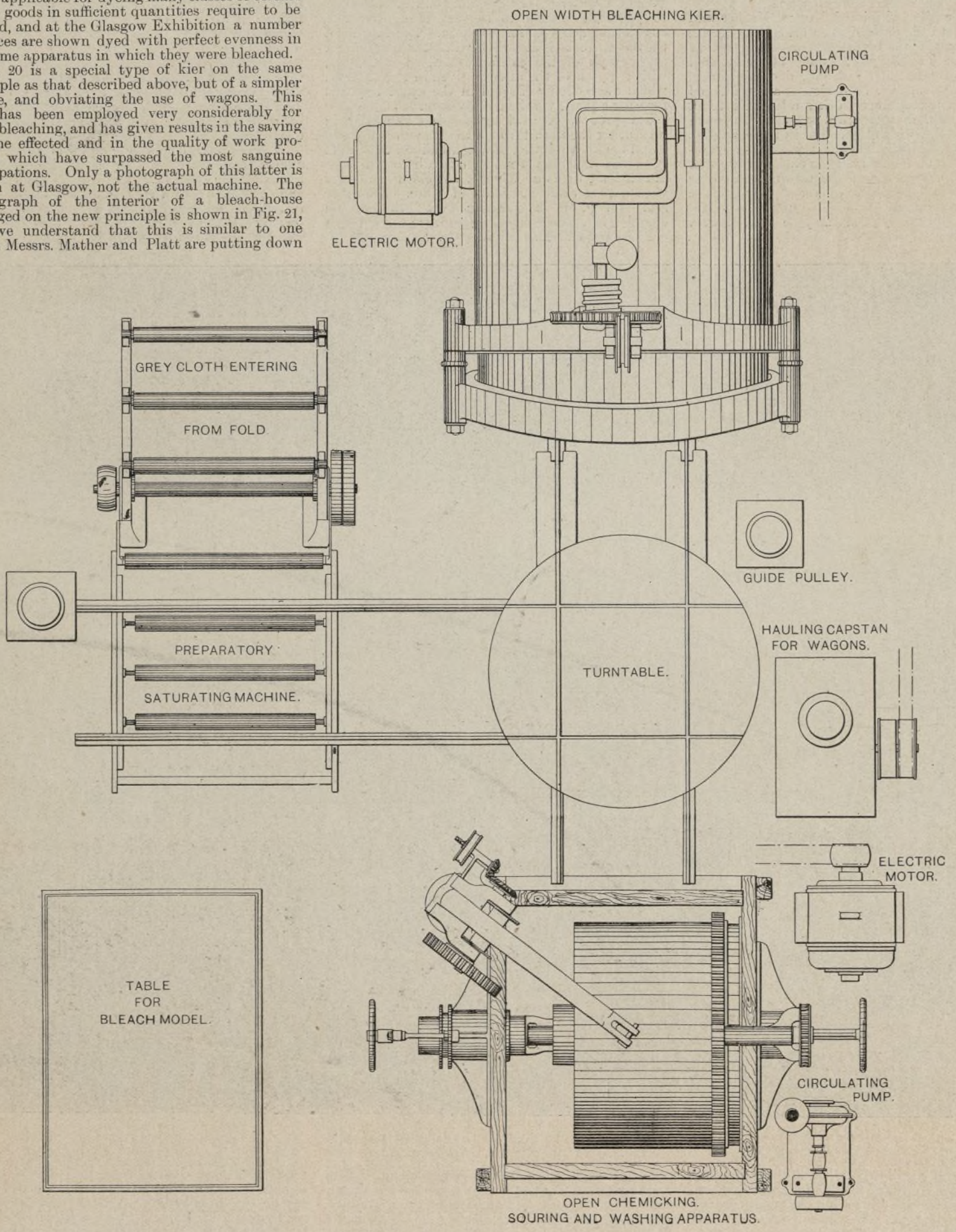
THE directors of the Portwood Spinning Company, Stockport, have decided to extend their mill in order to provide accommodation for new mules. A new engine will also be installed.

Improved Wool-scouring Apparatus.

IT is now some years since soap and water lost their position of being the premier, or at any rate the only, cleansing matters. The so-called "dry" process, which is largely used for garment cleaning, has demonstrated the advantage of using one of the various spirits of petroleum where dirt and grease are all that it is required to remove, and where it is necessary not to affect the nature of the material or the colour it has been dyed. The method is far from being confined to garment cleaning, but its adaptation has generally been looked at askance owing to the great danger attending the use of volatile and inflammable spirits, if the vapour from such is not kept under perfect control.

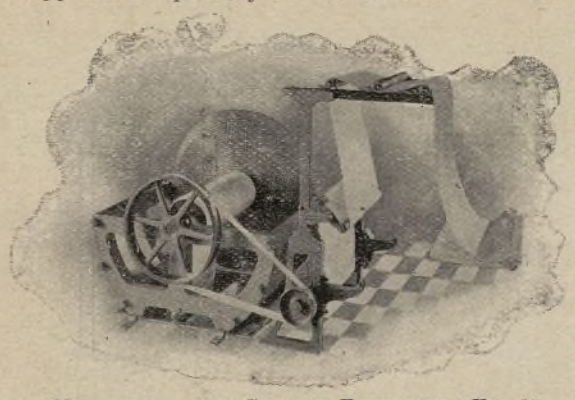
The danger from explosion or fire is, however, entirely avoided in a new machine which has been designed for scouring wool. The apparatus is the invention of Mr. Turney, of Nottingham, but the sole rights have been acquired by Mr. P. Frind, of the Bradford Wool Company, who, we believe, is forming a syndicate for working it. We had the pleasure of inspecting the new machine at work recently, and also of examining its production, both apparatus and results giving a favourable impression.

The machine is compactly built and so arranged that neither the wool nor its cleansing fluid comes into contact with the air throughout the whole of the process. From entering the machine in the greasy state to its advent scoured and dried, the wool passes step by step through the apparatus without emerging, all the tanks, bowls, and drying lattices being enclosed in a covered apparatus



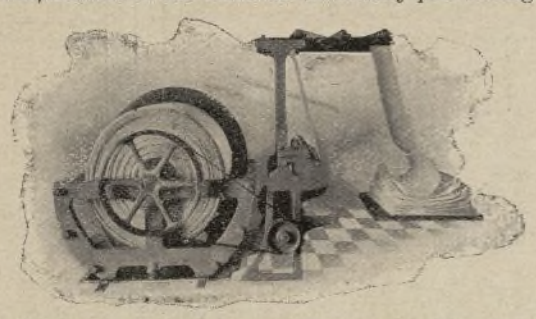
MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 12.

hermetically sealed against the admission of air. At the feed end a lattice delivers the greasy wool to rollers which, fed to their full width, allow no appreciable quantity of air to enter. At the



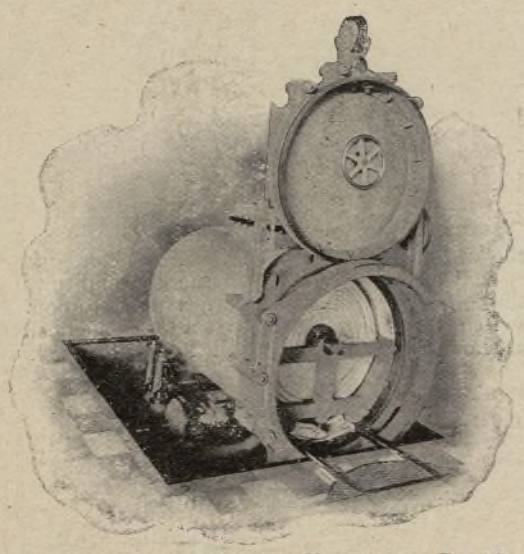
MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 13.

delivery end the clean wool is forced, under pressure of the wool behind, up a rectangular flue, the compactness of the material effectually preventing



MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 14.

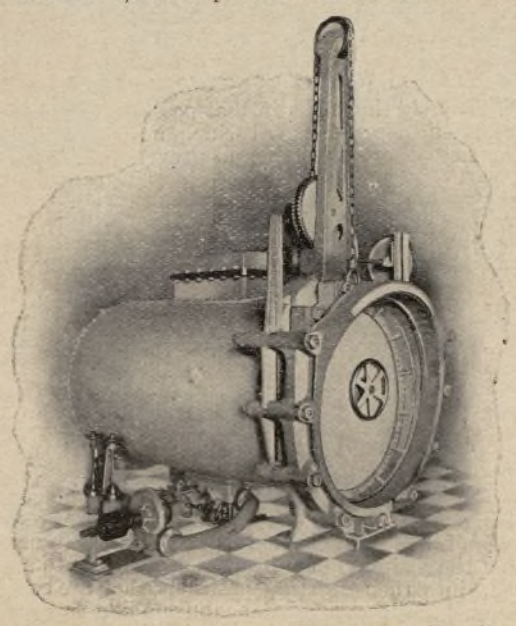
any fumes escaping into the atmosphere. By such precautions the volatile spirit is prevented mixing with the air and combining to make the



MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 15.

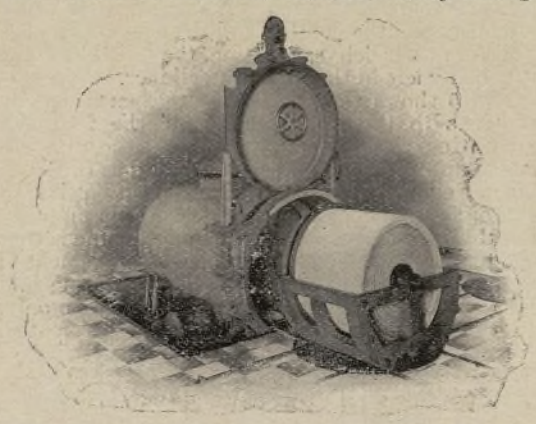
explosive mixture which is so generally feared when cleaning by the spirit process.

When the wool enters the apparatus it falls into one of the compartments of the washing bowl, and a stream of spirits of petrol enters at the same time.



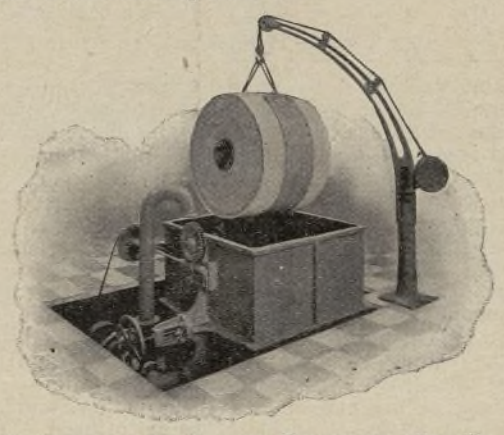
MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 16.

The liquid flows slowly through the various compartments of the bowl, the dirt and grease is separated out, and the spirit returned to the feed end of the apparatus. The wool is moved mechanically from compartment to compartment of the bowl, each stage being visible to the attendant through glass windows or port holes in the air-tight casing. The movements whereby it is moved or forked along are very similar to those in the ordinary wool washer, but are more compact, as might be expected from the limited space inside the enclosed apparatus. After the wool has travelled slowly through



MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 17.

the different compartments of the bowl, it falls into the dryer and travels to and fro, under the influence of hot air, on wire grids, until it passes out at the delivery end perfectly dry. The vapourised spirit taken from the wool during its passage through the dryer is passed on to a condenser, and returned in fluid form to do service again in the washing bowl.



MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 18.

The apparatus we inspected is the first erected under the patents being worked, and it is therefore early to give definite data as to the financial economy of the machine. However, from the two years' trial which the apparatus has already had, the experience gained leads the owners to feel that the cost of the process will just about be paid for by the by-products—that is, a wool-comber who

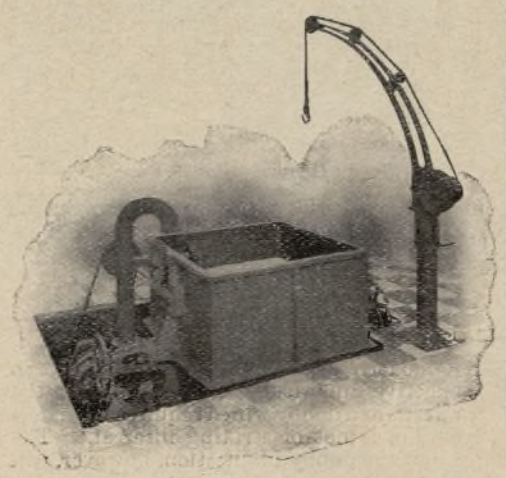


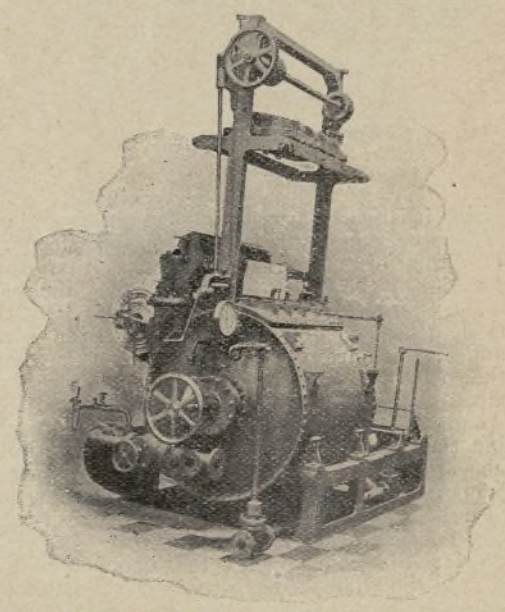
FIG. 19.

possesses such a plant will, after the latter is once paid for, practically get his wool scoured for nothing. There is, in addition, a remote possibility that wool washing by this process may eventually be a profitable manufacturing process, and that when the machine possesses the improvements which are always suggested by the working of installations on a large commercial scale, it will pay to scour wool gratis for the profits derived from the by-products. Such a possibility is, however, for the future to decide, although the early trials suggest such being probable.

These by-products are grease and dirt, the spirits of petrol being used over again, with the exception of a small leakage. It is estimated that on the average 100lb. of greasy wool will give, after scouring, 40lb. clean wool, 17lb. grease, and 43lb. dirt. The grease obtained contains none of the ingredients usual to soap-scouring machines. It is perfectly neutral, being free from either acid or alkali, and not only commands a better price than the usual waste grease, but saves much of the labour and material generally necessary for its recovery.

The large amount of dirt which is taken from the wool has generally been considered of little or no value. In this case, however, the absence of chemicals and the presence of a small amount of petrol give it a combustibility which it is hoped to eventually utilise in the manufacture of artificial fuel. It is intended to mix the dirt with coal dust or slag and a certain amount of sand or other restrainer, and make briquettes for use in the boilers.

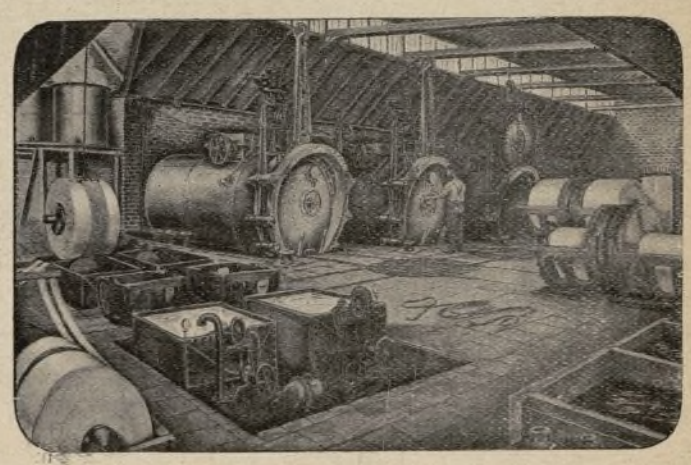
The main object in wool scouring, however, is to produce clean, white wool, and if such had not been possible by the new apparatus it would have been useless. The colour of the wool we saw treated was



MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 20.

decidedly superior to that we have seen produced by any soap-scouring process, whilst there is no comparison in the matter of handle. The presence of soap and hot water in the usual method has a slight tendency to cause felting. This, it is true, is very slight in the best modern machines, but still it is present. Spirits of petrol give no felting action to the wool, and the result is that the fibres come out perfectly free, and in an open, elastic condition. The animal dirt adhering to the wool need not be clipped off, for if not entirely removed by the new process, it is in such a loose, dry condition that it falls away in the first machine, leaving the adhering wool clean and free for the whole length of the fibre.

One feature of the process is its possible effect on sewers and rivers. No water is used, and no waste is run off—a matter which should mean a further great saving if ever a check is put upon the present pollution of streams. Then, the prolonged subjection which the wool receives, first to fluid and then to gaseous spirits, effectually exterminates any bacteria which may have previously been present.

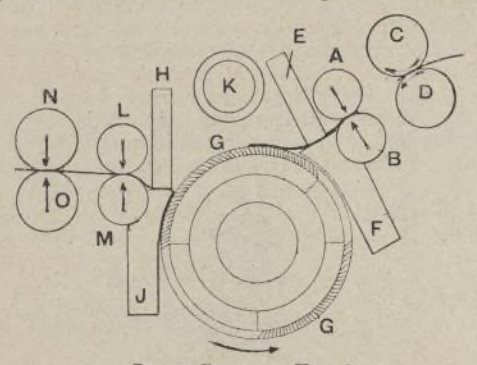


MACHINERY AT THE GLASGOW EXHIBITION.—FIG. 21.

MR. WILLIAM WHITELEY, of the firm of Messrs. William Whiteley and Sons Limited, machine makers, Lockwood, Huddersfield, died at his residence, Holly Mount, Edgerton, Huddersfield, on the 8th inst., at the age of fifty-one years. Founded by his father, the firm, of which Mr. Whiteley and his brother (Mr. J. B. Whiteley) were latterly the principal partners, has built up a world-wide reputation. It is specially noted for the production of a tentering machine of which the founder was the inventor and patentee.

The Staub Comber.*

THE Staub comb is a simplification of the Heilmann, the finisher comb being suppressed, whilst the combing cylinder treats both ends of the tuft of cotton, and a thick sliver is furnished. A machine with two heads will treat 120lb. per diem, whilst the Heilmann comb, with eight heads, only produces 75lb. The comb is also more compact, simpler, easier to adjust, cheaper to keep in repair, and is suitable for combing American cotton. In its present state the

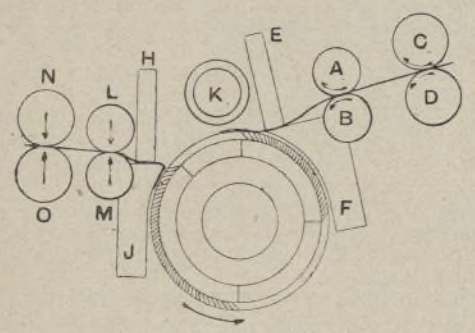


STAUB COMBER.—FIG. 1.

machine, it is true, leaves a nap here and there, but the inventor is engaged in bringing it to perfection.

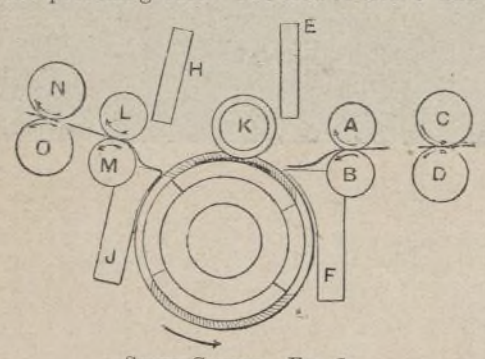
The tuft of cotton is separated from the remainder by the rollers A and B (Fig. 1), the rest of the cotton being retained by the rollers C and D. The detached portion passes between the nips E and F, which are then closed together; the comb G then acts upon the head of the tuft. The already-combed tufts have been joined together, and the tail end of the last one is held by the nips H and J, being thus acted upon by the comb at the same time as the head end of the newly-fed tuft. During this operation all the rollers are at rest except the feed rollers C and D, which deliver a fresh tuft ready for separation.

So far the comb has acted upon the tail end of the detached tuft, which latter is then laid upon the fluted segment of the comb cylinder, and the pressure roller K descends, as shown in Fig. 2. Both pairs of nips are closed, and the feed rollers C and D have delivered a fresh



STAUB COMBER.—FIG. 2.

portion of cotton, which is then taken by the rollers A and B and carried on farther. Both sets of nips are now open and liberate the tufts; the detached tuft, which has been combed at the tail end, is drawn forward by the rotation of the rollers L, M, N, and O (see Fig 3), and is slightly drawn out by the difference in speed of the rollers N and L. The detached tuft, the head of which has been combed, is compressed between the fluted segment of the combing cylinder and the pressure rollers L and M, which draw it forward in such a manner as to lay the combed tip upon the tail end of the preceding tuft. The feed rollers C and D

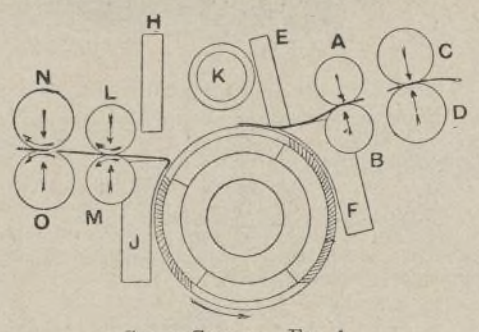


STAUB COMBER.—FIG. 3.

having been speeded up in a forward direction are now reversed (Fig. 3), whilst the separating rollers continue to revolve in a forward direction, whereby another tuft is detached, and this is grasped by the nips E and F in order to be presented to the action of the comb. In this position there are always two detached tufts, the one with the front portion already combed being brought into place ready for attachment to the combed tail of the preceding tuft, whilst the other, not yet combed at all, is ready for treatment.

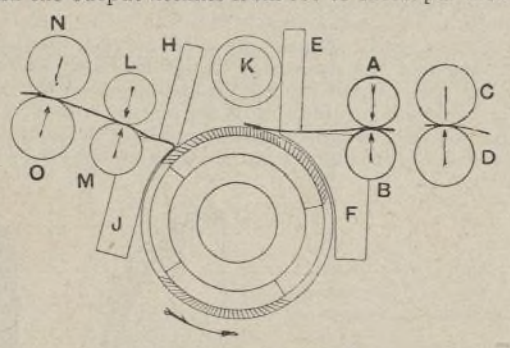
Fig. 4 shows the next movement of the cotton. The feed and separating rollers are stationary, the nips E and F are closed, and the combs are just beginning to act on the front tip of the detached tuft. The fluted segment has passed by, and the pressure roller K is lifted. The tail nips H and J are open, and the joining and drawing rollers are finishing their delivery motion, the tail end of the tuft being left in the combing cylinder.

Fig. 5 shows the position of the parts slightly previous to the first stage. All the feed and separating rollers are now at rest; the nips are closed and the pressure roller is raised as in Fig. 1, but the combs are just beginning to act on the tail end of the rejoined tuft. The feature distinguishing this comb from the Heilmann machine is that the tuft is not combed until it has been detached; there is no finisher comb, all the separating and joining rollers moving in a forward direction only. In this machine a thicker fleece can be treated.



STAUB COMBER.—FIG. 4.

The two ends of the tuft are gradually combed by the cylinder, the pins of which are set progressively closer together. The productivity of the machine is increased, and it is enabled to treat medium American cotton. The principal advantage is the absence of a finisher comb, which is so difficult to regulate and manage in the Heilmann comb. The progressive combing of the two extremities of the tuft, instead of one only as in the Heilmann comb, protects the fibre and gives a more satisfactory combing. The band is regular, and the noils contain all the portions that should be eliminated from the cotton. In the case of American cotton the waste is from 22 to 24 per cent., but as the fibre is not strained the noils retain their quality, and are almost entirely capable of being utilised. The comb is of the two-head type, the feed is 12½in. wide, and the output attains from 100 to 120lb. per diem.



STAUB COMBER.—FIG. 5.

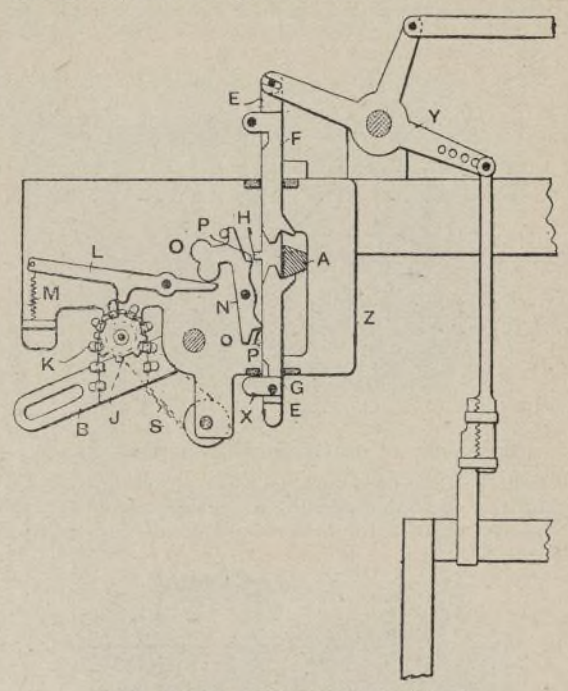
The only point on which any reservation can be made is that of quality of finish.

A Dobby Without Undermotion.

MR. F. W. HILDEBRAND, FURTH, BAVARIA.

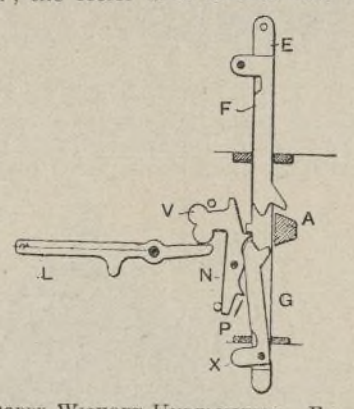
THE modern types of undermotions are so effective, and waste so little power, that the advent of a dobby which requires no undermotion is not of striking interest. The mechanism of the dobby in question, however, will repay examination, for it is of ingenious construction, although its present state will probably require some revision before it becomes a practical success, if such ever comes to pass. An elevation of the machine is given in Fig. 1, whilst the chief working parts are shown in different positions in Figs. 2 and 3.

Needless to say, the connections between the dobby and the healds, and the frames of the healds themselves, must be rigid, otherwise the pushing action by which the levers are depressed would be impossible; and it is also unnecessary to say that such an arrangement is not conducive to high speeds, the fact of the dobby being single-lift being also a disadvantage in this respect. Each hook G of the dobby carries hooked switches F and X, one at each end, and having noses which are operated on by the knife A and also by the stop levers N. These latter levers or swivels are mounted in bearings on the frame of the machine, and turn on pivots at about their middle part. They are acted upon by the feelers L with draw-springs M, and the pattern card K. The latter



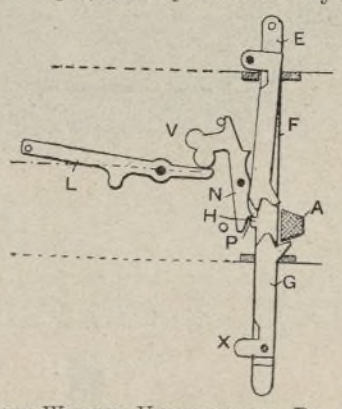
DOBBY WITHOUT UNDERMOTION.—FIG. 1.

is the usual wood lag with pegs. A peg on it causes the respective shaft to be lifted into the top shed; the feeler L is in that case raised at



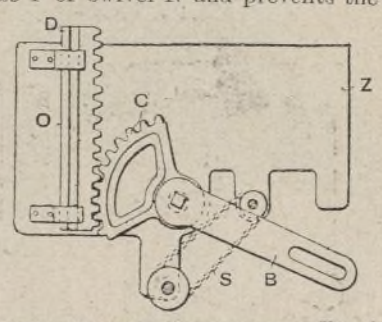
DOBBY WITHOUT UNDERMOTION.—FIG. 2.

the left and lowered at the right. The consequence is that the swivel N tilts up the top end towards the left, and with its lower nose P acts upon the switch G of the hook E, so that it takes the position as shown in Fig. 3, and is pulled down by the knife



DOBBY WITHOUT UNDERMOTION.—FIG. 3.

A. To hold the hooks in that position, each has at its middle a projection H which now slides under the nose P of swivel N and prevents the hook E



DOBBY WITHOUT UNDERMOTION.—FIG. 4.

rising until a change in the position of the levers L has been effected by the cards. In order that the switches may drop back again automatically into their starting positions, they are so fulcrumed that they overbalance on one side—a system scarcely adequate where dirt is likely to collect. Fig. 2 shows the position of the hook and switches after the lift is completed.

The connection between the dobby and the shafts must be rigid. The motion of the knife A

* Paper read by Mr. Paul Sée before the Société Industrielle du Nord.

is effected by means of the mechanism shown in Fig. 4, or a rack driven from one of the loom shafts by a crank and connecting rod, which actuates the lever B, and which by the segment O engages with the rack D to which the knife A is attached.

Boiler Economy.

THERE may be several different bases for boiler economy, according to the particular feature held in especial prominence. The output of the boiler is estimated in terms of the steam produced, and we may have the following kinds of economy :—

1. Economy in coal consumption, increasing with the output of steam per pound of coal burned.
2. Economy in weight of boiler, increasing with the output of steam per pound of boiler.
3. Economy in first cost, increasing with the output of steam per pound invested in the boilers.
4. Economy of maintenance or total life, increasing as the life of the boiler is longer and the amount necessary for repairs is smaller.

It is never possible, says a writer in a contemporary, to fulfil in the highest degree the conditions for these various kinds of economy, and a compromise must always be made among them, though usually (1) or (2) will take the first place in the order of importance.

Without special note, however, the term economy is understood to refer to (1), though the considerations relating to the others should always be kept in mind. In some cases (2) may assume first place in the order of importance, and perhaps require some sacrifice relative to the others. We will now consider more especially the economy referred to under (1).

From the standpoint of coal economy or efficiency, the boiler is charged with all the coal that is thrown through the furnace doors, and is credited with the steam which it sends to the engine. Or, to state the matter more definitely, it is charged with all the heat which could be got from this coal by perfect and complete combustion, and is credited with the heat which is transferred through and actually used in the formation of steam. If the efficiency were perfect, or if there were no loss, these two amounts of heat would be equal. Actually there are many losses, large and small, and in consequence the latter is considerably less than the former. The ratio of the two is known as the boiler efficiency. In practice its value varies from 50 to 75 or 80 per cent. Below are the more important sources of loss which occasion this drop in efficiency.

In the first place, a little of the fuel may fall unburned through the grate into the ashpit. Again, a little in the form of dust and small bits may be carried by a strong draught, either unburnt or only partially burnt, through into the tubes, uptakes, or flue. Still another small portion may escape as smoke, which consists almost entirely of very fine particles of unburnt carbon formed from the gases which are distilled away from the coal in the process of combustion. Still another portion of these gases may escape unchanged and unconsumed. Again, there may be an incomplete combustion of the carbon, forming carbon monoxide, and giving only 4450 heat units per pound, instead of 14,500 which result from complete combustion into carbon dioxide. Hence, whatever carbon escapes in the form of carbon monoxide is only partly burned, and may be considered as carrying away over two-thirds of the heat which would be liberated by complete combustion. These losses all occur in the furnace, and are due to poor firing and to imperfect combustion.

To reduce them to the lowest limit, the fireman must know his business, and be willing to attend to it with ceaseless care and diligence. In addition, there must be provided, by proper design, the necessary supply of air both above and below the grate, together with such arrangements as experience may show are needed for good combustion with the fuel in hand. At best this loss may be reduced to perhaps 2 or 3 per cent., while with carelessness or poor design, or both, it may easily reach values from 10 to 20 per cent.

The heat being thus more or less perfectly liberated in the furnace, is then passed on to the boiler heating surface, whose duty it is to transfer it through into the water on the other side. The energy is still to exist as heat, but it is to be transferred from the hot gas to the water, thus converting the latter into steam. This, however, cannot be perfectly accomplished, and thus arises a further loss. A part of the heat, instead of passing through the heating surface, goes up the flue carried by the escaping gases, and so gets away into the outside air. Another and smaller part escapes by radiation into the fire room. These losses it is impossible wholly to avoid. It would be necessary to avoid all loss of heat by radiation, and to reduce the temperature of the products of combustion in the flue to that of the outside air. The latter, especially, cannot be done, for the best of reasons. In the first place, the temperature cannot be reduced below that of the steam and water in the boiler, because heat always flows naturally from a hot body to a cooler one, and it will therefore flow from the gas to the water only so long as the latter is the cooler of the two. The actual temperature of the escaping gases must be considerably higher than that of the steam, because in the first place sufficient heating surface to reduce them to nearly the same temperature could hardly be allowed ; and, again, aside from blowers, the strength of draught is dependent on the temperature of the hot gas in the flue, and for a satisfactory rate of combustion it is necessary to discharge the products of combustion at temperatures of not less than from 500 to 600°. The loss is one, therefore, which exists in the nature of things, and cannot be reduced below some 20 or 30 per cent.

On the whole, then, the entire losses under the best conditions can hardly be reduced much below 25 per cent., while with poor conditions they may aggregate from 40 to 50 per cent. The remaining fraction, or the 50 to 75 or 80 per cent., represents, then, the efficiency of the boiler as defined above.

Since a pound of average good coal has available from 13,000 to 14,000 heat units, it follows that the heat actually utilised per pound of coal is usually found between, say, 7000 and 11,000 units.

In general the conditions favourable to high efficiency are the following :—

1. A free-burning coal of good quality, with suitable furnaces and air supply for complete combustion.
2. Moderate draught.
3. Abundant heating surface.

Or, as a combination of (2) and (3) we may put :

2. Moderate evaporation required per square foot of heating surface.

The opposite of these conditions will cause necessarily a loss in efficiency more or less pronounced according to circumstances.

Evaporation per Pound of Coal.—The efficiency of a boiler is often roughly estimated by the number of pounds of water evaporated into steam per pound of coal burned on the grates. This, according to conditions, may vary from six or seven to perhaps eleven. Remembering that it usually requires rather more than 1000 heat units per pound of steam, the general agreement between these figures and those above for the heat utilised per pound of coal is readily seen. In fact, the figures for the heat utilised are derived really from a measurement of the pounds of steam evaporated per pound of coal, together with a knowledge of the heat required per pound of steam, the latter being derived, of course, from the conditions of the evaporation.

When we remember the great difference in the amount of heat required per pound of steam, depending on the temperature of the feed, the temperature of the steam, and whether the steam is moist or dry, it is clear that for any fair measure of boiler performance in terms of steam formed per pound of coal, these differences must be allowed for, especially in comparisons between boilers working under different conditions.

To this end it is customary to reduce the number of pounds evaporated to what it would be if the steam were dry and the temperature of both feed and steam were 212°. In such cases it would require to make 1lb. of steam simply the latent heat at 212°, or 996 B.T.U. (British thermal units).

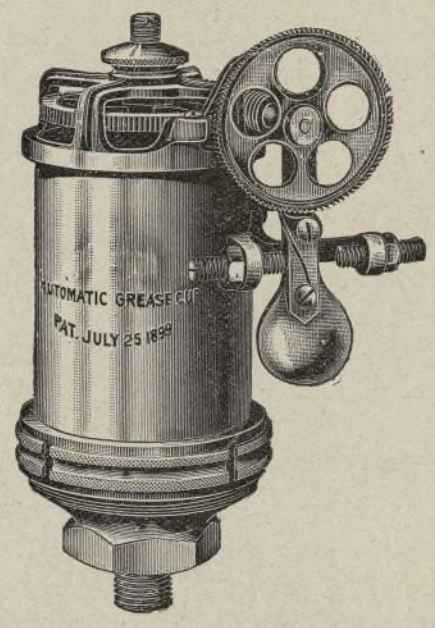
This is known as the reduced evaporation, or the equivalent evaporation from and at 212°. It is really the number of pounds of steam which would be formed if each required 966 B.T.U., and is therefore simply a measure of the B.T.U. put into the steam per pound of coal.

The ratio between the number of B.T.U. actually required and the 966 is known as the *factor of evaporation*. These factors are often arranged in tabular form, assuming dry steam in each case, but with temperature of feed water and steam varying over the usual range.

Improved Automatic Lubricator.

MESSRS. STERN BROTHERS, 57, GRACECHURCH-STREET, LONDON.

THE illustration is of a new form of automatic lubricator now being placed on the market and known as the "Tic-a-toc" lubricator. Motion from the crankpin, eccentric, strap, or other convenient source is imparted to the pendulum lever, which latter operates by ratchet action upon a worm-connected wheel, forcing the plunger at the desired rate through the grease cup. It is stated that the ordinary engine, running ten hours a day, at a speed of 150 revolutions a minute, will empty the pint cup in 11¾ days. Grease is forced into the bearing in the exact quantity required, speed of engine or size of bearing being no obstacle. It is claimed that season or temperature will not interfere with the working of the lubricator if sternoline is used therein ; the quantity of the lubricant is easily and surely regulated by increasing or diminishing the swing of the pendulum, and, if desired, the lubricator can also be operated as a hand-compression cup while the engine is running. The stem of the plunger extends through the top of the cup, and indicates the amount of grease remaining in the cup. To get the best possible results, grooves should be cut into the boxes to allow the grease to be properly distributed.



IMPROVED AUTOMATIC LUBRICATOR.

For use on eccentrics of engines which run continuously, or for a longer time than the cup will feed with one filling, a special attachment is provided. The "Tic-a-toc" lubricator is claimed to be specially suitable for crankpins, eccentrics, and other parts of machinery for which an automatic lubricator is required which will force the grease slowly and constantly into the bearing.

New Spinning Mill in Russia.

THE chief manufacturing centre of Russian Poland is the rapidly-growing town of Lodz, with its surrounding districts of Zgierz, Tomaszow, Pabianice, and Widzew. During the reign of Nicholas I., the great-grandfather of the present Czar, Lodz was granted the special privilege of developing and improving the new home industry, comprising chiefly the weaving of cloth, etc. Since that time it has made steady and rapid progress, improving and increasing its manufacturing capacity of both spinning and weaving. For a considerable time Lodz and other foreign manufacturing centres were practically isolated from the use of English machinery by the prohibition of export laws, and consequently they could not obtain the same benefit as England. However, with the removal of these obstacles, Russia and Russian Poland began to import English cotton spinning and weaving machinery, and were amongst the best of customers on the English machinery market.

Lodz, although working under unfavourable conditions as regards its water supply and other conveniences, has still made wonderful progress, especially in recent years, and may be classified now as the chief and largest manufacturing centre of Russian Poland, and even of Russia itself. The enormous growth of this town's manufacturing industry brought about the natural consequences more or less observed in this country—that is, the high wages paid for skilled labour. This and several other causes forced the manufacturer to go and look for better and more favourable seats for his mills. Some of them went far away from their original centre, either for promising advantages found in new places or through the close proximity of fuel, raw material, or of a new developing market ; others sought to improve their manufacturing capacity nearer home, thus establishing new neighbouring districts round the original centre, which they worked under better conditions.

The mill of Messrs. Rapacki and Co., Warsaw, was established owing chiefly to the above-mentioned circumstances, but as is the usual case with all pioneers, they had to work very hard and educate the work-hands Several years after this, although giving a profitable return to the owners, the mill was sold to Messrs. Ed. Heiman and Maks Kernbaum, Lodz, who had had a wide experience in cotton and woollen spinning. This latter firm, in order to make the business a complete commercial success, decided to build a new mill adjoining the old one. In the meantime, however, the old one got burned down, and they decided to erect another new mill in its place, a

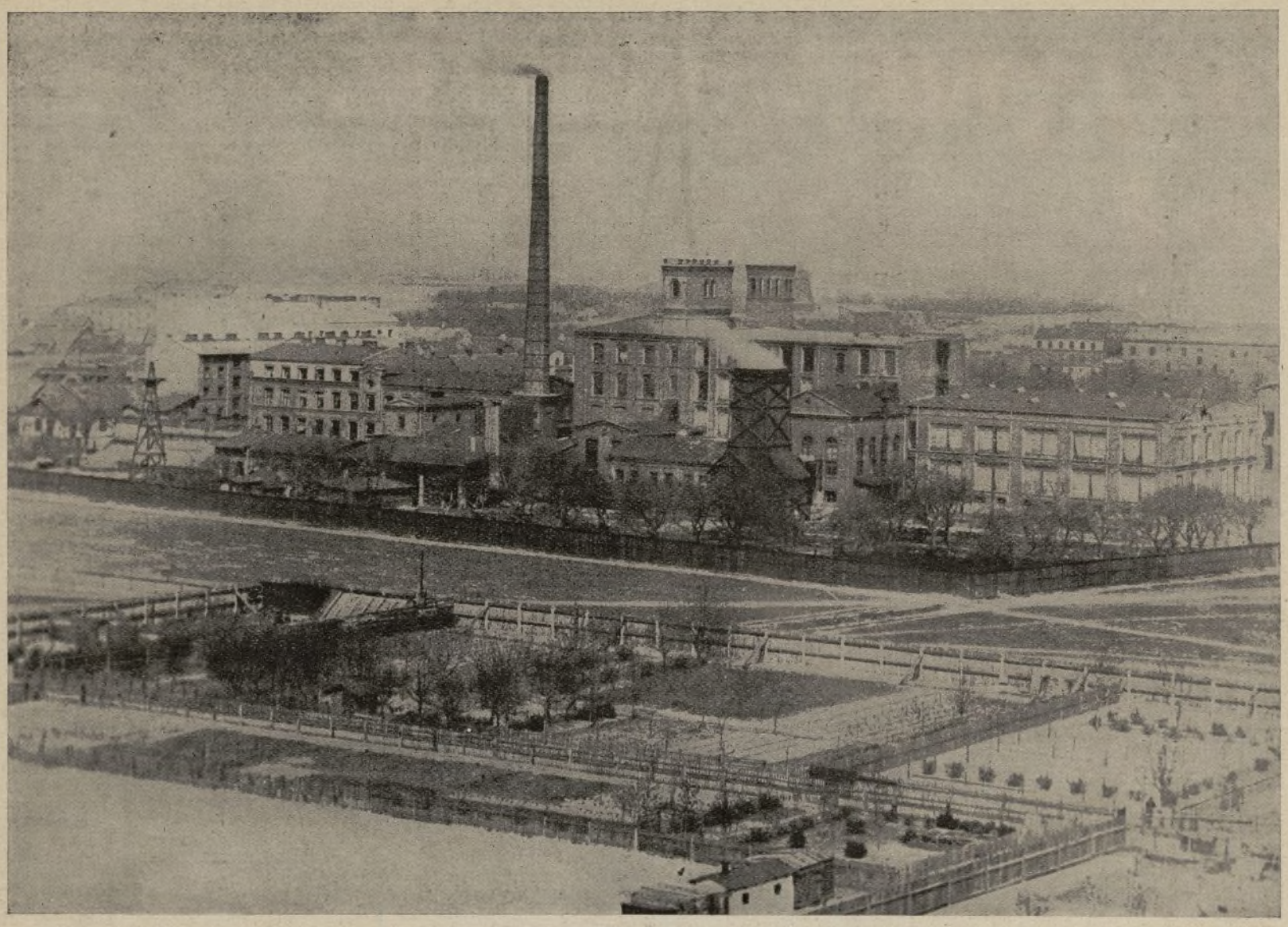
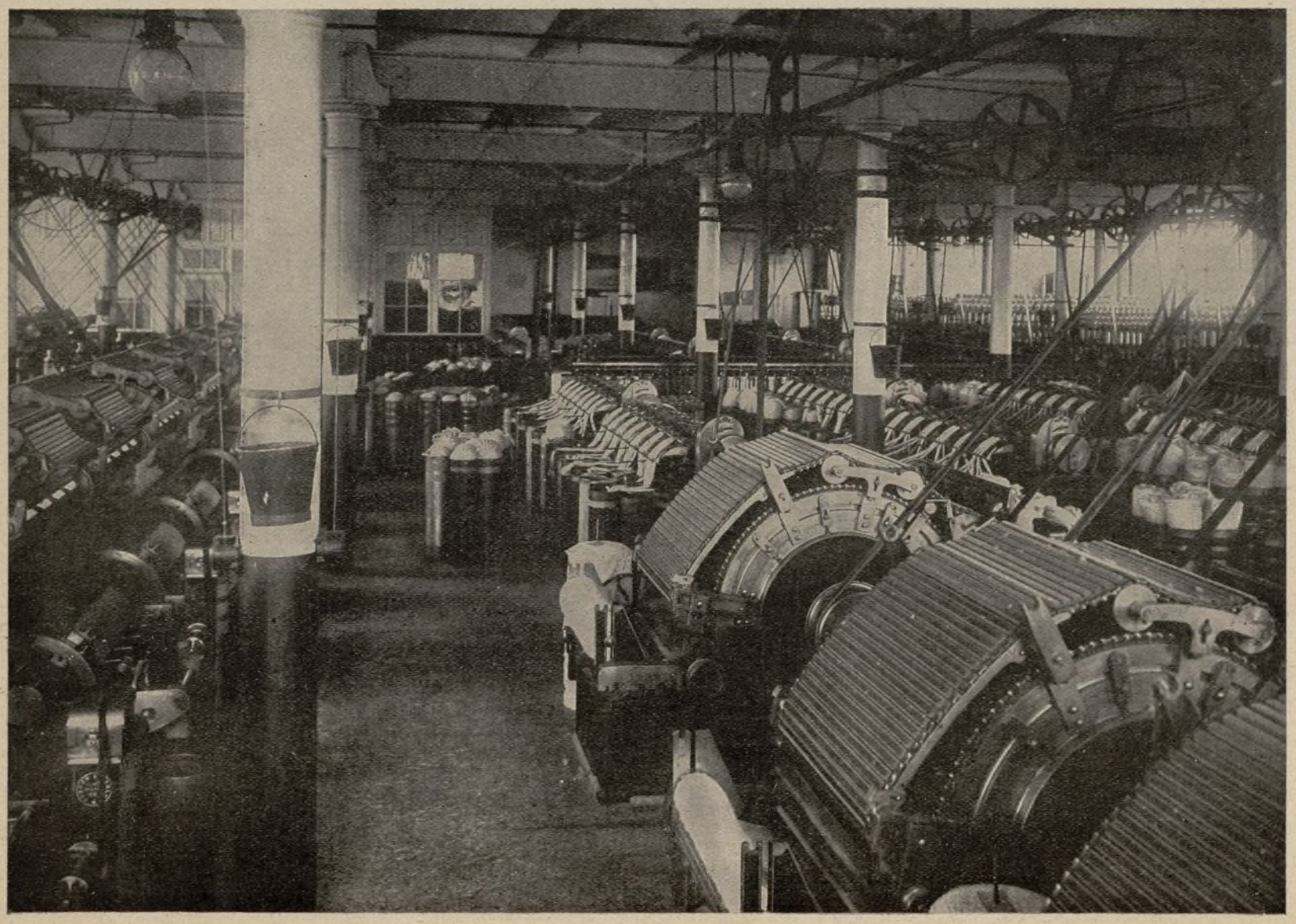


FIG. 1.



NEW SPINNING MILL IN RUSSIA.—FIG. 2.

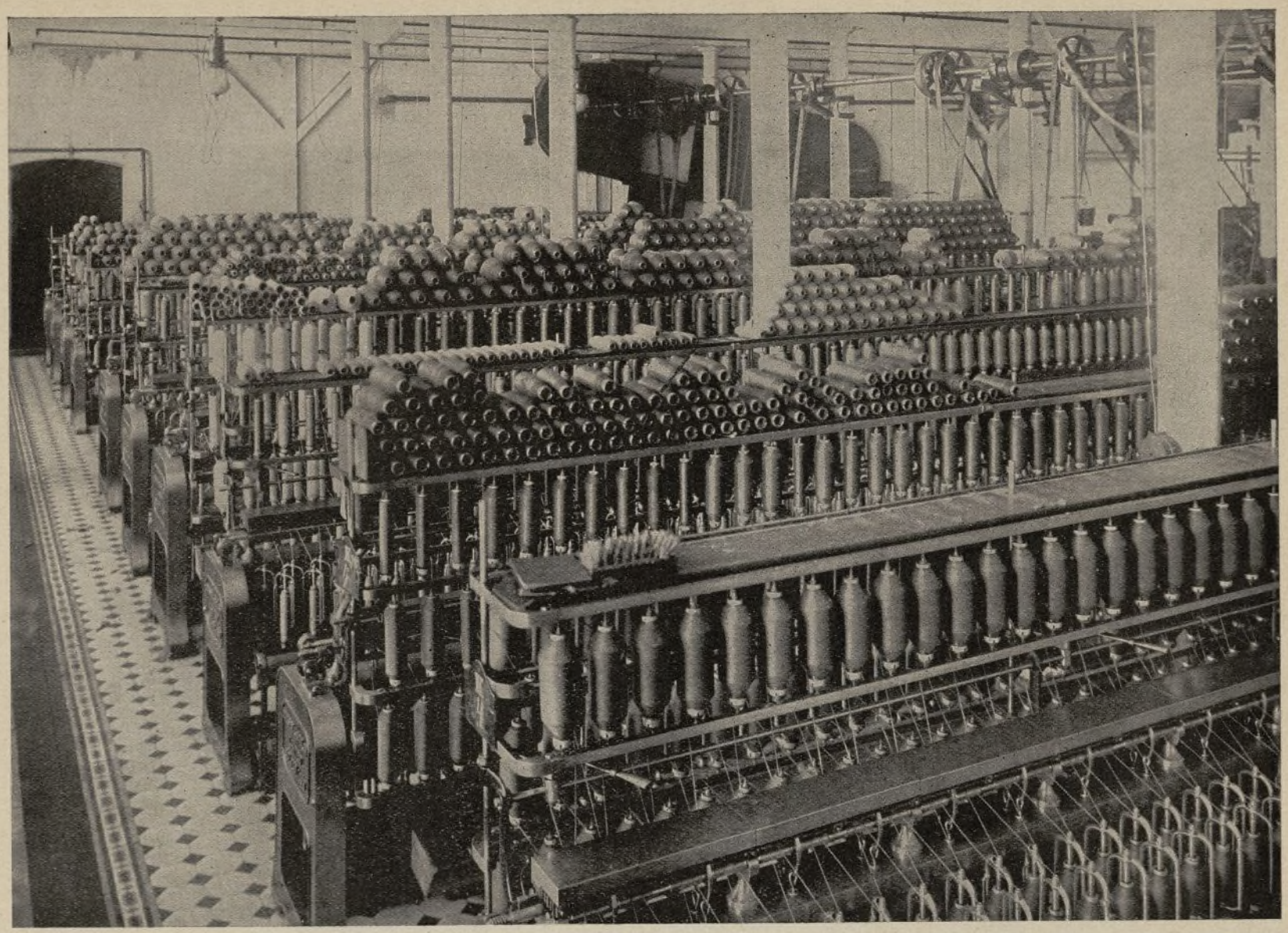
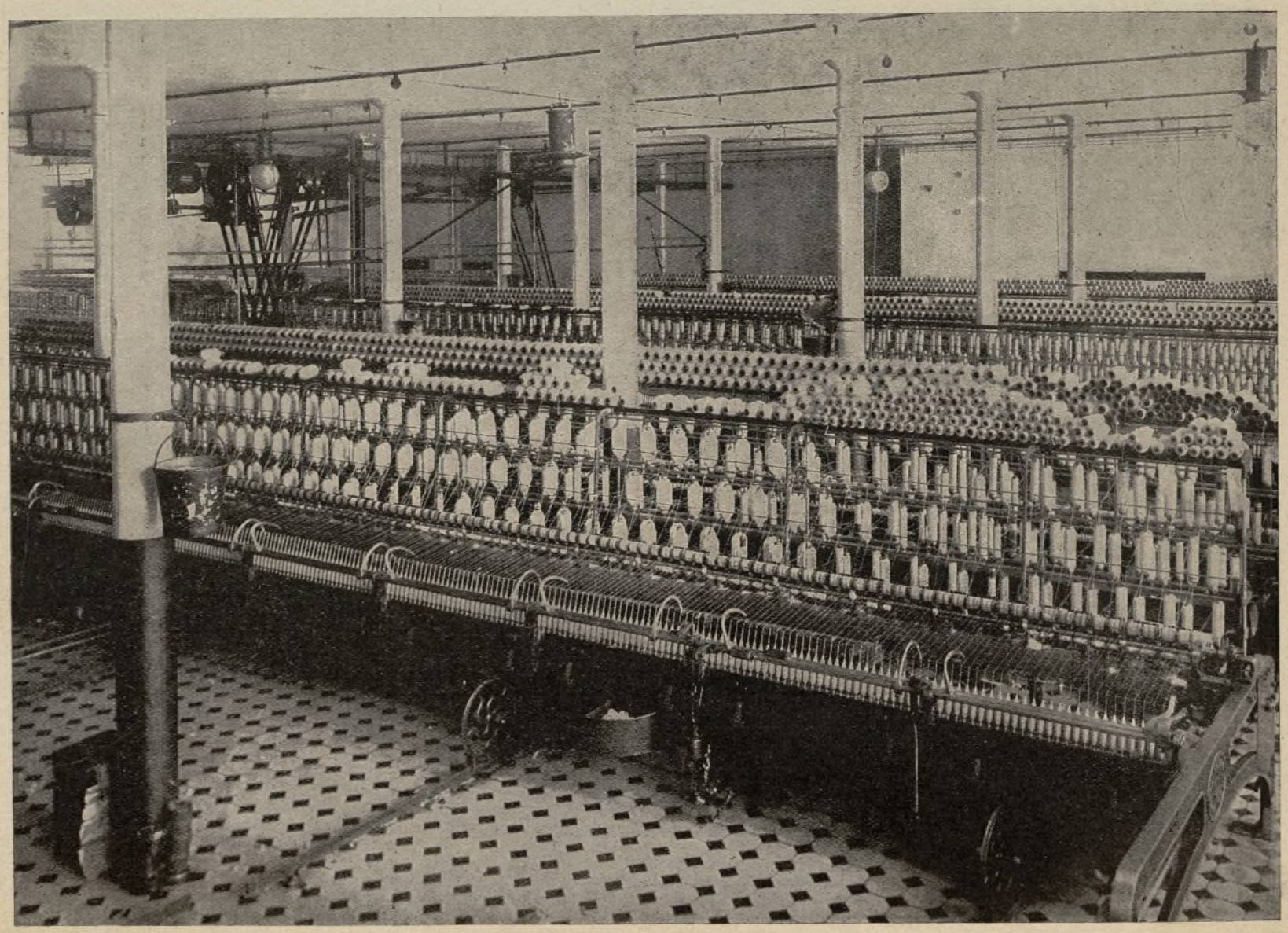


Fig. 3.



New Spinning Mill in Russia.—Fig. 4.

view of which is shown in Fig. 1. Photographs of the card, slubbing, and mule rooms are shown in Figs. 2, 3, and 4. The order for the complete preparing and spinning machinery was placed with Messrs. Dobson and Barlow Limited, Bolton, and comprised 11,000 mule spindles, 7500 ring spinning spindles,

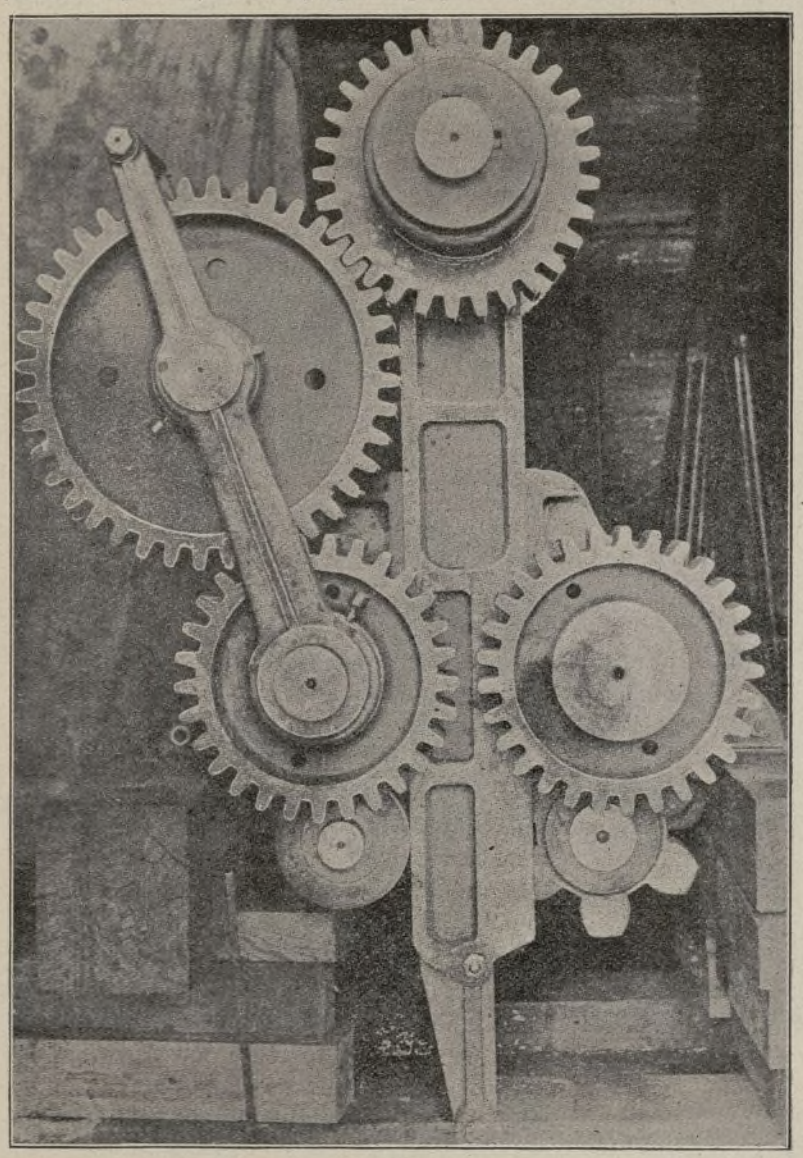


FIG. 5.

and 5000 ring doubling spindles. The auxiliary machinery for the same was as follows:—Bale breaker, lattices, improved large-size double opener, "Simplex" automatic hopper feeder, single scutcher, revolving flat carding engines, drawing frames, slubbing frames, intermediate frames, roving frames, quick-traverse drum winding frames, yarn bundling press, self-acting grid and delivery willow, and a single-cylinder soft waste opener.

Preparing and Baling Cotton in Round Bales of Uniform Lap.

(*Concluded from page* 201.)

THE beater has two wings with spikes, which pass between those on the spiked drum, and two wings with leather flaps, which wipe the cotton off the spikes of the picker roller. The speed of this beater is also constant. The light flakes of cotton fly over the grating, while the motes sift through. The bat-former compressess the loose lint and forms the thick bat. The large roller K is made of wire cloth of large mesh to allow any motes which might get over the grating above to fall out. This roller, by its varying speed, either pushes the cotton to or holds it away from the smaller compression rollers. The lower compression roller is covered with strips of rubber which aid in wiping the cotton off the roller K. The rollers L and M are geared and driven together by four small gears. This method of driving allows them to spread very far apart without choking. They are driven from the press and go about 20 per cent. slower than the press rollers. They are held together by a helical spring. Their movement, to and from one another, moves the belt shifter on the speed cones, and causes the spiked picker to run faster or slower. If the bat gets too thin and the picker runs too fast, the cones are arranged to stop driving. This is shown in Fig. 4 (page 201). The bat is stopped by lowering the lower cone out of contact with the upper one.

The press is the three-roller type. The two lower rollers are mounted in the side frames of the machine, and are fixed in relation to one another. The top roller is mounted in a yoke which permits it to slide up and down in its guides. The two vertical sides of this yoke are racks, and their teeth

BALING COTTON.

right end of the torsion shaft is a large gear. This gear, through three others, reduces the pressure 9·2 times until a friction brake is reached. This brake resists the movement of this train of wheels, and hence the raising of the top or pressure roller. The increase in diameter of the bale tends to push

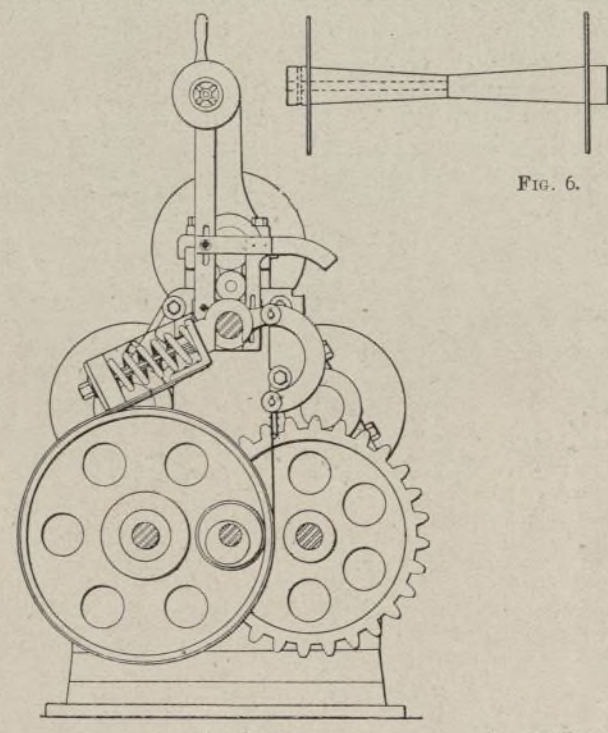


FIG. 8.

the roller up; the brake resists the upward motion. The tighter the brake is put on, the denser will be the bale.

I soon found out that the pressure must be increased as the bale increases in diameter, otherwise the core of the bales became packed to a density of 70lb. per cubic foot, and the cotton could not be unwound. A piece of cypress, which I put in for a centre, had its cross section reduced

one-half, so some idea of how great the pressure must have been can be obtained. It was about this time that the mills did not care for such bales. The cotton appeared to creep upon itself, layer upon layer, so that, even if I started with a light pressure, the inner layer became very much thickened for the first five or six yards, and the cotton was buckled or crimped. So I could not start the pressure very light and then suddenly increase it, for the bale simply refused to stay round and became oval until the inner layers had been bunched together and the whole had attained the proper density. To overcome these objections I have devised the following means:—A large double-tapered core is used which is greater in diameter at the ends than in the centre. At the ends are flanges which are loose and serve to hold the ends of the bale and also act as the fulcrum of the lever which pulls out the core. The cones divide in the centre, as is shown in Fig. 6. This core is held about an inch off the two lower press rollers by flanges at the ends of these rollers. These flanges

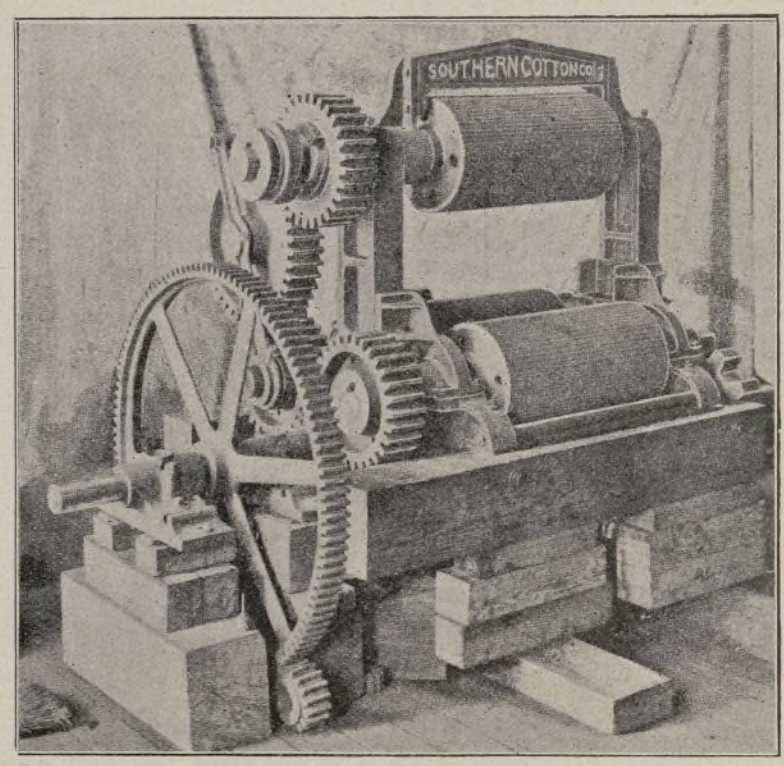


FIG. 9.

BALING COTTON.

FIG. 6.

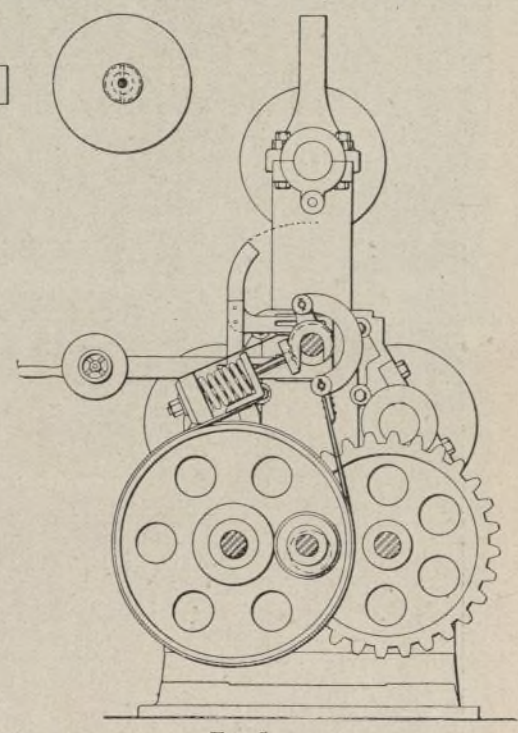


FIG. 7.

revolve with the rollers and cause the core to revolve a little faster than the rollers. The effect of this is to make the initial pressure on the cotton lap not more than the weight of the core itself, and to draw the lap around the core and thus prevent bunching at the start. This large core gives a firm centre on which to start the bale, and when it is withdrawn, the hole it leaves is so large that the cotton caves in around the centre and thus softens up. The longer a bale stands, the softer it gets towards the centre. The weight of the top roller and its yoke is too great a pressure to exert on the core at first, so I have counterbalanced them by letting the yoke come down on helical springs. These springs are shown in Fig. 2. By the time

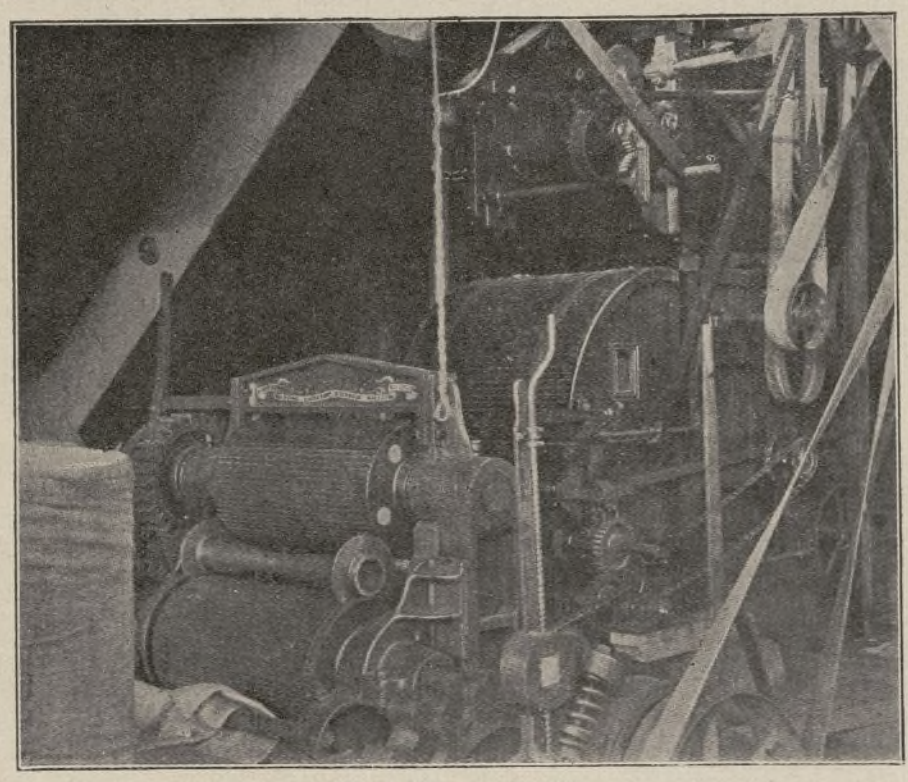
the bale has lifted the roller up about 5in., the full weight of the roller will be on the bale. After running awhile under the weight of the roller and its yoke the brake begins to act, and its pressure continually increases until the bale is finished.

Figs. 7 and 8 show the brake on and off. The brake-wheel is surrounded by a steel band lined with well-oiled leather, which allows the wheel to slip. On the pulling end of the band is a helical spring, which is gradually compressed as the strap is pulled around. This spring has a scale and pointer which indicate, just as a spring balance does, the amount of the pull. The slack end of the band is kept tight by a weighted lever. This lever stands in a perpendicular position when the brake is off, and gradually drops to a horizontal position, where it exerts its maximum pull. The point to which the slack end of the strap is fastened is at its greatest distance out from the centre when the lever is in the first position, and its least distance at the end, so that we have two varying factors—an increasing effect of the weight on the lever, and a decreasing length of lever arm through which the resistance acts. The combination of these is, of course, an infinite pull, but the spring on the pulling end lets us pass this danger point, the weight rests on the floor, and we get only the maximum value of the pulling power of the spring. It is evident that this arrangement can never stick and break the machine, and that the maximum pull is always indicated.

The lever is tipped from its vertical position and held in its intermediate positions by a cam bolted to it, which strikes against a small roller which is bolted to the journal of the upper press roller. From Figs. 7 and 8 it is seen that it is not possible to put on the brake except after the pressure roller has reached a certain height, or after the bale has reached a predetermined diameter. This point can be changed at will by adjusting the cam. It is also evident that it is not possible for the brake to come on all at once, but it must exert a gradually-increasing pressure; thus the pressure on the growing bale is as delicately balanced as it is possible for it to be made, and the additional precaution against hard centres is taken by having the large core, on the withdrawal of which the cotton at the centre softens up. The speed of the bat former is made slower at first, so that the bat will be thinner and the consequent bunching up will only bring it to standard weight.

The top roller is raised and lowered by a paper-friction wheel working in contact either with the inside of the rim of the brake wheel or with its hub. This friction wheel is journalled in an eccentric box, and moved by the inclined lever shown in Fig. 3. The arrangement of the friction wheel and brake wheel is shown in Figs. 7 and 8. The driving scheme for the rollers is shown in Fig. 8. The small pinion is mounted on the pulley shaft, and the press started and stopped by a friction clutch. The arrangement of the driving gear in the new model is shown in Fig. 4. The speed of the rollers is determined by the fact that the best result in unwinding the bales is obtained when the weight of the bat of cotton averages about 2½lb. per yard. This weight of bat requires a less number of revolutions per bale than a thin bat would, and there is consequently less drawing or tightening of the layers upon one another.

Fig. 10 shows the press and its bale. The bales weigh about 250lb., and are 35in. long and about 20 to 22in. in diameter. This gives a density of about 35lb. per cubic foot. Bales are covered with a light-weight burlap or cotton duck. As there is no tendency for the bales to expand, hoops or wires are not needed. The bagging reel is carried on the front of the press as shown in Fig. 2. From the above description it will be seen that the feeder and press are nothing but a larger and heavier form of the automatic feeder and breaker lapper of the mills. A round bale is about ten times as dense as the round lap of the mill, and it usually has to be made in one-twentieth of the time of making a round lap. In conclusion, the system from a mechanical standpoint is a success. From a commercial standpoint it is not fully established, but the prospects in that direction are very bright.



BALING COTTON.—FIG. 10.

Imagination in Mechanism.*

BY PROFESSOR C. W. MACCORD.

THE designing and construction of machinery are very generally regarded as the most practical of occupations. To the inventor it will be conceded that some play of the imaginative faculty is vouchsafed while in the struggle of projecting a new scheme or devising some new combination. But when the novel idea has crystallised into a definite form, and nothing remains but to reduce it to vulgar fractions of feet and inches, "to put it into a practical, working shape," it is commonly supposed that the work of the imagination is done, and that the completion of the task is a matter of mechanical labour, pure and simple. . . . It is hardly too much to assert that the very reverse is true—that the successful elaboration of a well-proportioned working machine in detail, from a general idea of the nature of its functions and movements, makes a greater demand upon the power of imagination than the origination of the general idea itself. . . . The inventor of mechanism, as such, is untrammelled by matters of detail, in dimensions and proportions. The object which he seeks to attain, whether it be old or new, is definite, to be sure; but when he conceives a novel arrangement of parts whose mutual relations are such as to serve his purpose, his conception of those relations is, from the very nature of the case, a general one. Vivid it may be, but all space as yet is his, and precisely how he will divide and apportion it he has yet to determine; the truth of which is attested by the fact that not one invention in a thousand is introduced in the form first suggested to the imagination of the inventor.

The designer of mechanism, however, begins where the inventor leaves off; for him not only the object, but the manner of attaining it is fixed. His field of action as compared with the inventor's is therefore limited on the one hand; but on the other it is extended, since he is required to reduce everything to definite forms and positive dimensions, such as shall not only adapt each part to the performance of its own duty, but permit the harmonious working of the whole. In either case the mental conception must precede the physical execution. . . .

Whence then the false idea that the designer i a mere calculating machine, to whom an imagination is a superfluity? It comes from too hasty generalisation; since he has only to plan details, it is taken for granted that he can do it in detail—first this piece, then that, and finally the other, and then put the whole together like a bookkeeper footing up an account. . . . The actual order of proceeding is substantially the reverse of that indicated, a general plan being first devised, subject, of course, to modification as the work progresses, which it usually does by the designing of the details as nearly as may be in accordance with this plan. Consequently, the designer is called on both to grasp fully the nature and functions of the machine before beginning his proper task, and to conceive of the details, not individually, but in relation to each other and as parts of a connected whole. . . . The inventor mentally sees a new combination; the designer mentally sees what is new in form, size, or arrangement, if not novel in mode of action. The more clearly he sees it, and the more sharply defined the mental image of the work upon which he is engaged, the greater will be the facility with which he can proceed, and the more satisfactory will his progress probably be. . . .

The designer records his plans in his graphic language—he makes sketches more or less accurate; but they are the evidence of things not seen—they represent the substance of things hoped for. And even with their assistance, be they ever so accurate, the fact remains that to form what may be and often is called a clear physical conception of what they represent—that is, a mental conception so vivid as to render unnecessary an actual physical embodiment or working model — requires an imaginative faculty of no mean order.

Like all other mental faculties, this power of imagination may be cultivated and developed. Its native intensity, like others, varies greatly in different individuals; but if it be wholly lacking in any, it is safe to assume that it is not so in one who is in other respects fitted for any pursuit in which it is necessary or useful. If such a one feels a deficiency in this respect, a suggestion or two as to the means of supplying it may not come amiss to him. First and most obvious of these are the study and the practice of mechanical drawing. Not that it is incumbent upon him to spend the time required to become a finished draughtsman, although the greater his proficiency in this accomplishment the greater will be the benefit in the direction here spoken of. . . .

It is common to hear self-styled practical men assert that the study of descriptive geometry as an abstract science is a delusion and a snare. . . . The correct construction of the simplest working drawing is purely an application of the principles of descriptive geometry—which is none the less a fact if the draughtsman does not know it. . . .

As a means of training the faculty of imagination, the study of this science, properly pursued, is of advantage merely because it is abstract to a certain degree. . . . The best method of study, not only with a view to a mastery of the science for practical purposes, but in order to develop the power of imagination, is to reason upon the problems as they come up, without making or referring to their linear representations. . . . But the connection of the geometry of planes and solids with the subjects to be dealt with in the proposed application of the mechanical imagination is clear and direct, and their utility, as a means of strengthening it, is almost as obvious by reason of their fundamental relation to the methods in which it is to be applied. The effort should constantly be made to form a clear physical conception of the magnitudes and of their relations before any representation is constructed; to imagine the successive steps of the reasoning to be conducted in space, as though the art of drawing were yet to be invented. This we repeat, not only because the greater effort is accompanied by a greater benefit, but because in this way only are the general principles to be fully mastered. A slight change in the conditions of any given case may totally alter the appearance of the representation; and no greater mistake can be made than to associate the solution of any problem with its dress on a particular occasion. He who does this may strengthen his memory, but fails in the great object of his study, whether that be to acquaint himself with the science merely for its own sake, or to derive from it the practical good that may be gained by increasing his imaginative powers.

* Extracts from an article in the Stevens' "Indicator."

THE new mill in course of erection at Lostock Junction for Messrs. William Heaton and Sons is to be supplied throughout with Threlfall special self-actor mules.

WE are requested to say that the open-shed jacquard recently described in these columns is the patent of Messrs. George Hodgson and Walter Tetley, of Frizinghall, and understand that Messrs. A. Kershaw and Son Limited. Brow Mill, Clayton, near Bradford, whose name appeared at the head of the article, have acquired the sole rights for making the machine.

RAW MATERIALS, PROCESSES, FABRICS, &c.

A New Method of Weaving Damask.

A METHOD of weaving damask patterns without having recourse to the pressure harness and its necessary healds has recently been devised in Italy. The effect obtained is very similar to that produced by a pressure harness, and its range is wider, although more intricate work is necessary for harness tieing-up. It claims many advantages in the way of cheapness, less strain on the threads, faster speed, larger shuttles, room economy, and other points, all of which must, of course, be set against the extra tieing-up required.

Diagrammatic drawings of the machine are shown in Figs. 1 and 2, in these instances being respectively adapted for weaving five-satin and eight satin effects. The warp threads are indicated by the letter X, and the weft threads by the letter Y. The plain squares represent threads corresponding to hooks which are not lifted. The dots denote those threads which are raised alone by the eighth, as shown in Fig. 1, and the corresponding thread which requires to be raised is the third. In order to raise this warp thread in the ground, there are provided in each repeat of the pattern of the weave two hooks 3, 4, and 7, 8 (of which 3 and 7 are furnished with double beaks), the two cords B3, B4 and B7, B8 of which are respectively connected together below the perforated bottom board A so as to act like a single cord, whilst permitting an independent motion of their two hooks—that is to say, the hooks can be raised or left stationary at the same time, or either hook can be raised whilst the other remains stationary. The two hooks which have beaks facing each other only operate a single common neck-twine E and K respectively, whilst the other hooks 1, 2, 5, 6 are each provided with two neck-twines in each repeat. The neck-twines are connected with the cords of the hooks as follows:—Cord B1 is connected with C and G, B2 with D and F, B3 and B4 with E, B5 with H and M, B6 with J and L, and B7 and B8 with K.

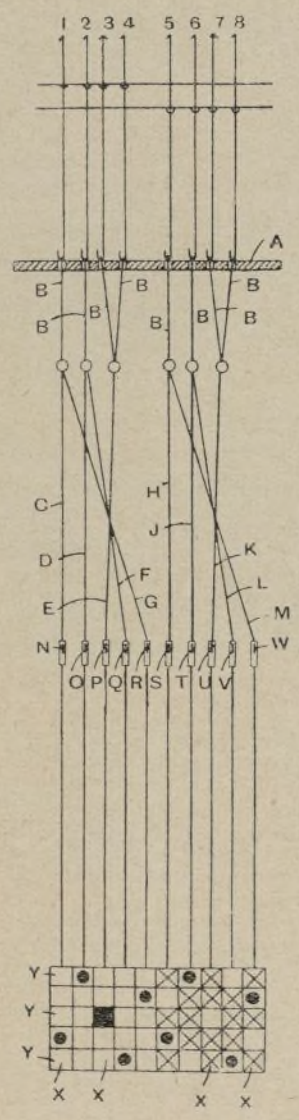


FIG. 1.

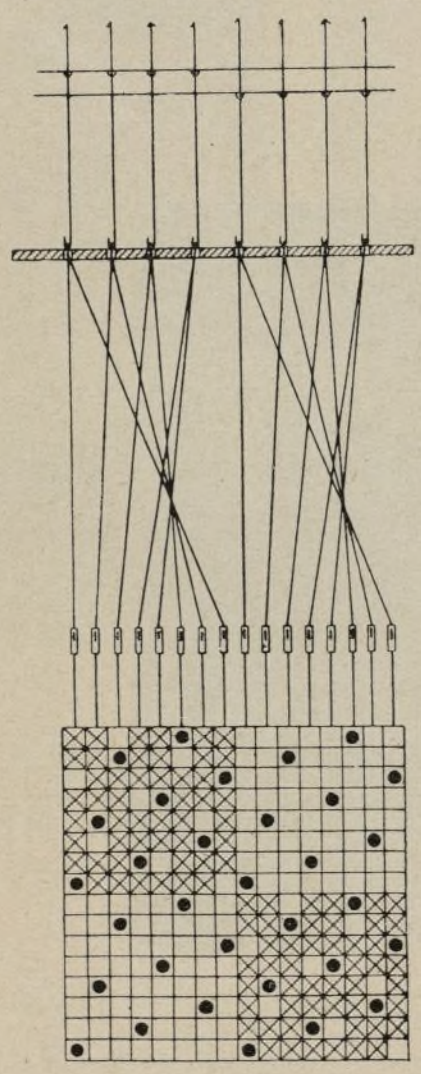


FIG. 2.

DAMASK WEAVING.

shafts or bars indicated by letters N to W. These bars pass through loops in the harness as represented diagrammatically, so that when required the ends can be lifted by the hooks while the bars remain stationary. The full square in Fig. 1 indicates the threads which are raised by the hooks which are turned to the right. The crosses denote the threads raised by means of hooks which are turned to the left, and the corresponding needle of which has entered a hole in the card, the hook being raised by the corresponding blade of the griffe.

The pattern given by way of example shows a five leaf satin twill for the figure and for the ground, the mounting, however, being arranged in such a manner that the twill or satin in the ground is reversed—that is to say, it is symmetrical with the twill or satin in the figure. As the raisings of the shafts in the ground take place in the same order as in the figure, it is necessary to so arrange the mounting that the raisings of the ground shafts correspond with the stationary hooks of the figure. In the manufacture of a five-leaf satin twill, and also in all odd-leaved weaves, there is always one thread which requires to remain stationary in the figure, while the corresponding thread in the ground is raised.

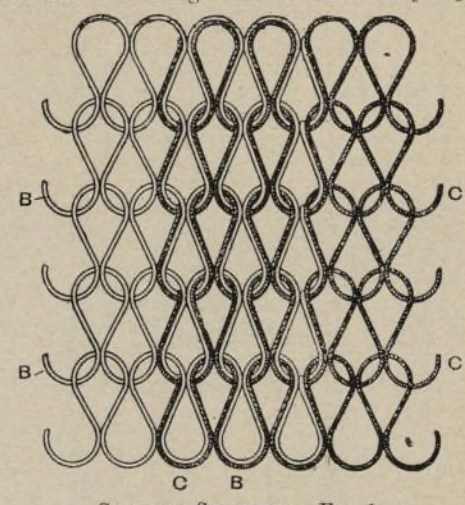
The stationary thread in a five-leaf satin twill is

Seeing that the hooks 1, 2, 4, and 5, 6, 8 are turned to the left as usual, they are raised by the lifting blades of the griffe which are turned to the right, whilst the hooks 3 and 7, being turned to the right, are consequently only raised by the lifting blades of the griffe which are turned to the left. The lifting blades are turned by means of any device which permits the independent turning to the right or to the left in accordance with the requirements of the pattern. For raising those warp threads to which two hooks are connected, the shafts or bars P and U are entirely dispensed with or left inoperative.

It will thus be seen that in five-leaf satin, in the first, second, fourth, and fifth picks one hook in the figure is left down, but one of the two threads or ends governed by this hook is raised, as also is the corresponding end of the ground, by the lifting bars. On the other hand, in the central pick the odd thread in the ground and figure are controlled solely by hooks, and that in the ground is raised, while that in the figure remains stationary. In the case of an eight-leaf or other even-numbered satin or weave, the hook turned to the right is not required, as there is no odd thread requiring special treatment, and the cords are connected as shown in Fig. 2.

The Manufacture of Seamless Stockings.

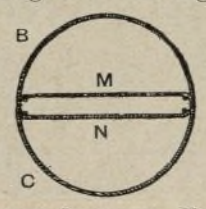
A METHOD of making seamless stockings is that in which the front and rear parts of the foot of the stockings are composed of independent threads, which are interlooped at the sides of the foot, each course of stitches around the foot consisting of two short threads having their ends terminating on the inside of the stocking. In order to clearly explain



SEAMLESS STOCKINGS.—FIG. 1.

the construction of the stocking, the accompanying two illustrations are given, of which Fig. 1 is an enlarged view of five courses at the point of the interlocking of the threads at one side, and Fig. 2 a diagram indicating the manner in which the two threads are laid in a single course around the foot.

The stockings are knit on circular machines by a continuous rotary movement, the threads being each introduced into the knitted web as a continuous thread, after the manner shown in Fig. 2. The thread B, which forms the rear part of the foot, is fed to the needles in the usual manner a little more than half-way around the needle cylinder, when it is drawn inward and is no longer knitted into the fabric. At a predetermined point in advance of the point at which the thread or yarn B is withdrawn, the thread C, which has to form the front of the foot, is brought into position to be taken by the needles, and the two threads for a short space are both engaged and knitted into the web. At the opposite side of the cylinder the thread C is again carried slightly more than



SEAMLESS STOCKINGS.—FIG. 2.

half-way around the cylinder, and the thread B is brought into knitting an equal number of needles in advance of the withdrawal of the thread C, so that the two threads are knitted together into the web at that side, after which the thread C is withdrawn inward. After the foot of the stocking is completed, the threads will be found floated across the interior of the foot, as indicated at M and N in Fig. 2. These float threads are then severed on the dotted lines, and the stocking finished for the market in the usual manner. The foot will then be found to be composed of short threads, each extending a little more than halfway around the foot and knitted together at each side of the stocking, thus securely fastening the threads, the web for this reason being as strong and durable as when the foot is composed of two continuous threads interlooped at each side.

The two threads may be interknit by one, two, three, or more needles, if found most desirable. In Fig. 2 the threads are shown as passing together and being jointly acted upon by two needles, while in Fig. 1 the two threads are shown as they would appear when interknit or interlocked by three needles. In this figure, B designates the thread for the rear part of the foot, and C the thread for the front of the same, and this figure, taken with the diagrams shown in Fig. 2, clearly shows the interlocking of the threads and the mode by which it is accomplished. One of the advantages of this mode of making stockings, says the "Textile Record," is the greater speed at which the machine can be run while knitting the foot over the mode of making feet of different colours by reciprocating the movable parts and interlooping the threads.

Sericulture in Eastern Roumelia.

THE successful liquidation of the cocoon stocks of 1899 encouraged cultivators in Eastern Roumelia to make large ventures in the raising of silkworms in 1900, and the progress made by this industry may be gathered from the fact that whereas in 1890 only 2000oz. of seed were distributed, the figure for 1900 was 27,922oz., being an increase of 8234oz. on the amount distributed in 1899. The season was, however, disastrous both for cultivators and dealers, because there was not a sufficient supply of mulberry leaves to feed the quantity of seed set for incubation, the young trees not being yet able to produce the amount of fresh foliage required. The official statistics published at the beginning of the season anticipated a yield of 2,464,000lb. of fresh cocoons, but in reality the amount was less than half, and the quality of the cocoons was very inferior. Of the distributed seed, 19,706oz. were of the yellow variety and only 8215oz. of the white, and prices ranged from 2s. 2¾d. to 2s. 4¾d. per kilogramme.

In spite of these high prices, competition was so keen that the greater portion of the entire stock was soon in the hands of exporters, who shipped chiefly to Milan and Marseilles, about one-fifth of the total produce having been spun into silk by the Sfila Company Limited, chiefly for exportation to the United Kingdom, while of the remainder two-thirds went to Milan and one-third to Marseilles. The mulberry cultivators may be said to have been the chief gainers last season, and the impetus given to planting throughout the province was such that the whole stock of about 7000 saplings in the Government nursery gardens was taken up, and 50,000 more were imported from Turkey. Unfortunately, owing to careless methods of culture, a large proportion of the saplings are in all probability doomed to destruction; but the attractions of silkworm raising appear to be so great that it is not unreasonable to hope that in a few years a great part of this province will again be covered with mulberry groves, as was the case thirty years ago, when the industry here was at its height. The production of native seed, which is found to be better adapted to the local conditions than foreign seed, is steadily increasing, and the distribution of seed for 1901 is as follows :—

	Quantity. Oz.
Bulgarian	6,951
Italian	10,150
French	530½
Turkish (Brussa)	1,330

A New Class of Fancy Yarn.

FANCY YARNS are generally developed by the twisting frame, but there seems to be no reason why effects of a less durable nature should not be employed for beautifying the many kinds of fabrics which are never expected to come in contact with water. For many years fancy braids of yarn have been used in making the more fancy varieties of straw hats and bonnets, the yarns being run through some stiffening material which binds them together in ribbon form, in which condition they are plaited alone or in combination with natural or dyed straws. Then the natural silks woven in the gum are composed of two or more strands fastened together by silk gum, although there is no element of decoration brought to bear in this case, the strands being of the same material and shade.

Following on these lines, however, a Swiss firm of manufacturers have conceived the idea of forming fancy threads for weaving purposes by uniting yarns of different texture or colour by a transparent agglutinant, which, whilst so binding them, allows their properties and shades to be distinctly visible. Gum, gelatine, glue collodion, a dextrine solution such as British gum, or a cellulose solution such as the cuprammonia solution may be used, and according to the nature of the agglutinant employed the product is more or less stiff or supple.

If, for example, collodion is employed to unite a cotton thread with a natural or artificial silk, of ramie or mercerised cotton, coloured the same or differently from each other, a compound thread is obtained which has a peculiar lustre like the fluorescence of certain solutions or like reflections of metal. Like effects are obtained by uniting by a transparent agglutinant a thread of natural with a thread of artificial silk, or a thread of natural silk with one of mercerised cotton, or a ramie thread with one of natural or artificial silk or mercerised cotton. More than two threads of different materials may be united by a transparent agglutinant into a single compound thread presenting characters of the kind mentioned above, or such threads could be united side by side so as to constitute a strip having peculiar lustre, suitable for trimmings and bindings. Compound threads and strips of peculiar colouring may also be manufactured by uniting by a transparent agglutinant differently coloured threads of one material, such as cotton. A thread produced in this way resembles one having two differently-coloured threads twisted together. The threads are united by passing them side by side through the agglutinant, and then between rollers to remove excess, after which they are dried.

Fibre Plants.

FROM time to time attention is drawn to the value of the so-called indigenous agaves —the common American aloe (*Agave Americana*) and Bombay hemp (*Agave Vipipara*). Everything would point to neither of these plants being indigenous to India, but both are so widely distributed throughout the country that they may now be looked upon as being thoroughly naturalised. *Agave Americana* is mentioned by Roxburg under the name of agave Cantula, and as the Sanscrit name of the plant is Kantula, he was led to think it indigenous. But on the other hand, the Hindoo name, bilatee-ananas, would seem to imply that the plant is not a native of India. Be that as it may, it is now common enough everywhere, and the plants blossom in May and June when from ten to fifteen years old. In November, 1891, the keeper of the herbarium and library at Kew paid a visit to the gardens of the Riviera for the purpose of studying the plants of agave and allied generæ, and the plants of such arborescent liliaceæ as had been successfully introduced into cultivation in that part of the world. Few botanists had previously attended much to these plants, and it had often been very difficult for cultivators to obtain names for their specimens. In his paper on the agaveæ of the Jardin d'Acclimatation at Hyères he places *agave Americana* in a separate group to that of *agave rigida*, still *A. Americana* is always considered the type of the *A. rigida*.

Nearly related as they no doubt are, it cannot be too strongly put forward for the consideration of intending cultivators of this class of plant that the fibre of the common American aloe (*Agave Americana*) ranks nowhere in comparison with that produced by the sisal plant. There is a very great deal in the cleaning and preparation of all fibres, and this applies to the fibre of this specie of agave equally with others, but at its best it is described as having little strength and as giving way under moderate strain, poor in colour, with a "tousled" appearance. On the latter account it is sometimes dyed black and used as a substitute for horse hair. This fibre is almost identical with that extracted from the Keratto of Jamaica and the West Indies (*Agave Morrisii*) which is "towy" and not even, of very little strength, and undesirable. Another objection to this species, in comparison with sisal, or even with the Mauritius hemp plant, is its very completely armed state. Besides the strong, sharp, terminal spine, the leaves are thoroughly armed with strong, sharp teeth down the whole length of their edges, which makes it imperative that they be planted widely apart, and even then they are most difficult to handle when harvesting.

The Bombay aloe fibre (*Agave Vivipara*) is a native of tropical America, but is to be found all over India, and is extensively used as a hedge plant in Bombay and in the North-West Provinces. It is identical with the Manila aloe fibre, but it is important to distinguish between this and Manila hemp, yielded by musa textiles, the wild indigenous plantain of the Philippine Islands, which is an entirely different plant. The leaves of this species are also armed like the above with a terminal spine and brown side teeth, but the latter are not set so close together. Bulbils are produced on the flower spikes as in both *agave Americana* and *agave rigida var.* sisalana. When white rope fibres were in high demand, this fibre was prepared by hand and shipped from Bombay. It appears to have been practically unsaleable, but it was pointed out that well-cleaned fibre of this species would really have realised at the time from £25 to £30 per ton, as the better class of fibre, such as sisal, could not be had in any great quantity. The fibre of this plant has always realised better prices when prepared in Manila, as it has always been presented in a cleaner state, and it was only possible to produce the Bombay aloe product when the price of white rope fibres was exceptionally high. Manila hemp is suitable for cultivation in South Assam. What was stated to be Manila hemp plants (*Musa textiles*) were sent up some years ago to Damacherra, in South Sylhet. They were planted in a strong bhil soil, and grew as luxuriantly as the Indian wild plantain would have done under similar circumstances. The trunks could not be less than 20ft. long and with a girth in proportion. But the fibre produced had not the slightest appearance of the real Manila, and was poor in colour, possessing little strength, and appeared to be no better in any way than the fibre produced by any other plantain or banana. The real Manila plant would succeed in South Assam quite as well as other species of musas. At the same time, says the Calcutta "Capital," it ought always to be borne in mind that this plant requires a *rich, deep* soil as well as an abundant rainfall, well distributed throughout the year. That would point to North Assam being better suited for the Manila plant than South Assam, and Borneo, the Straits, or Ceylon better than either.

Cotton Comber Noil and Its Regulation.

THE amount of noil necessary to be removed depends upon the quantity in the lap, and as this is influenced by the condition and production of the cards, when deciding upon the percentage to be maintained these things must be considered, and the comber adjusted to remove the least amount of noil, consistent with the quality of work desired. Different grades of cotton contain different quantities of noil, varying from 13 to 28 per cent. This percentage must be determined upon, and the machine adjusted to remove the required amount. If the comber is not regulated to suit the kind of stock being run, a large percentage of valuable fibre will be lost in the noil, or a large percentage of noil will be allowed to pass into the sliver.

A comber may be adjusted to remove any amount of noil ; in fact, it may be so set and timed that the cotton can be run through the machine without its removing any noil whatever ; but the purpose of this machine is to take out this undesirable material. Where cotton is run through the machine and a very small amount of noil removed, the machine has been so adjusted that the needles have not been allowed full play upon the fibres, and in consequence a part only of the noil is removed, and a part only of the cotton is combed. A practical man never believes those who say that they succeed in combing with from 7 to 10 per cent. of noil. To remove this small amount is a very simple matter, but to determine the exact amount to be removed to give the required strength and appearance to the yarn, to take out that same amount from each individual head of the machine, and to maintain it under the varying conditions of the work, is an art that requires brains, practice, and a close attention to the innumerable details which the above-named people sometimes know nothing about.

Any American cotton above the combing length (1⅛in.) is nippy. In order to remove the large number of nips, and all other material that does not go to make up a perfect yarn, close settings must be made. This results in a large percentage of fibres which are below the combing length being taken out along with the nips and foreign matter, and lost in the noil ; while if such close setting were not adopted a large number of these slightly short fibres would escape being removed. One of the ends for which the comber works is to save as much of this good fibre as is possible ; but his first work is to produce a perfect sliver, and if cotton is given him that is nippy and dirty, he must sacrifice more or less of the good stock. Peeler cotton is of this class, being difficult to card and comb, and from 18 to 25 per cent. of noil must be expected. To remove the large number of nips which this cotton invariably contains, close settings must be made, and the machine timed to give it every advantage to thoroughly comb the fibre.

Egyptian cotton, while clean and easy to comb, generally contains a large percentage of short fibre. Close setting is not necessary with this cotton, but its unevenness results in the production of from 14 to 20 per cent. of noil.

Sea Island is difficult to comb, and a careful and accurate adjustment of the comber is absolutely necessary. From 18 to 22 per cent. of noil will be made on cotton perfectly combed. The following methods are given for regulating the amount of noil :—

1. The earlier the comb is dropped the greater the amount of noil.
2. The later the nipper is closed the greater the noil.
3. The greater the angle of the comb the greater the noil.
4. The later the feed the greater the noil.
5. The closer the setting the greater the noil.

In practice the first and second methods are rarely used. These timings should not be meddled with, as such more often results in injury to the work than otherwise. The third plan might be used by a skilful operator, but 28° angle is the rule, and can seldom be improved upon. The fourth method can be taken advantage of with safety and the noil varied to the extent of 4 per cent. By the setting of the nipper knife to the cylinder needles, and the top comb to the segment, the noil is easily regulated ; it being quite evident that the deeper the fibre is pushed into the cylinder needles as they pass, the greater amount of noil will be removed ; while, if the cotton is not pressed into the needles to so great a degree, the needles will pass underneath rather than through the fibre, and a great many short but valuable fibres will be saved. This, however, will

be at the expense of the quality of the work, if this practice is carried beyond the proper limit.

The nearer the comb is set to the segment, the greater amount of noil will be removed, for the reason that more of the short fibres will be held through the comb, and consequently more of the short fibres will be held back to be removed by the cylinder needles on the next cycle of operation; while, if the comb is set at a greater distance from the segment, the fibres will draw underneath rather than through the comb, and a great many fibres escape that would otherwise be removed. A very important point in the regulation of the noil is the careful adjustment of the nipper. The cushions should be as straight as it is possible to get them, the nipper knives parallel, and nipping the entire length of the cushion, so that the cotton will be held firmly instead of being pulled away to be lost in the noil.

The detaching rolls affect the percentage of noil to a considerable degree; those that are uneven, or which have been made rough by the use of a poor varnish that has come off in patches, make an unnecessarily large amount. Where a very heavy lap is used, and the combers are being driven to their utmost capacity, every advantage possible must be given the needles to do their work well upon the fibres. This will result in a large production of noil, and in order to reduce the percentage without altering the time and set, weight is added to the detaching rolls; 3 or 4lb. weights hung on each hook answer the purpose well. This is not a common practice, but in mills where heavy production is demanded it is found necessary.

While the above plan will do much toward reducing the noil, it means ruin to the detaching rolls, and should only be practised where a wound roll is used, as a cotted roll, not being so substantial, would be quickly destroyed. When we consider that a great many rolls are run many months after having outlived their usefulness, we can see that the above plan will answer an admirable purpose in putting out of business those bad rolls that are run in some mills as long as they hold together sufficiently to take a coat of varnish, and which are the cause of money being thrown into the noil box every day they are run, as the fibres that escape the detaching roll are generally the best of the cotton. In mills where different grades of cotton are run, the resourceful carder will increase the production of his machines, which are running good stock, and reduce on those running the poorer kind. A little less noil out of the Egyptian and a little more out of the Peeler improves things, says the "Textile World," and no one but the comber need be the wiser for it, a point which is of some importance to many overseers.

Sisal Growing.

A GOOD deal of attention has been given lately to the subject of growing fibres in the Surma Valley delta, but there is very little reliable information on the subject. It has been proved that sisal will grow, and that the fibre, if well dressed, brings £30 and upwards per ton. Beyond this there is nothing trustworthy forthcoming. Mr. Joseph Chamberlain put a large area (some 6000 acres) under plant some ten years ago in the Bahamas, but nothing further has been heard regarding this, and there lurks a suspicion that the returns have not been what they were expected to be, or, says the Calcutta "Capital," we should have heard more on the subject. The period of ten years is too long for any gold mine not to have been found out: the secret would have leaked out long ago. Dr. Prain, of the Royal Botanical Gardens, is of opinion that as an industry by itself it would not pay, but that it might do so as an auxiliary to indigo, where there would be enough steam power on the spot which could be utilised for the extraction of the fibre without incurring original cost for expensive plant, which could not be employed profitably throughout the year unless the plantation was on a very vast scale. Some light is thrown on the subject of what return may be expected, always provided the climate is equally suitable to the growth of sisal as that of the Bahamas or Windward Islands, and there is no reason to suppose that much difference exists, for both places are more or less tropical. Then the outturn would indicate a crop of dressed fibre of 900lb. per acre, or considerably less than half-a-ton. We have no statistics to say how much can be got from the plant in Assam; but we do not imagine that it would be safe to calculate on any larger output, nor would it be safe to calculate upon £36 sterling as a price per ton. Before the Spanish War the same fibre was selling at from £18 to £20 per ton, and now that peace has been proclaimed the natural inference to be drawn is that the fibre will revert to a normal and not an inflated price, in which case, if our forecast is correct, it would be unwise to calculate on more than £25 for the dressed material, so that the net result financially upon the above-mentioned calculations would read just over £10 sterling per acre. Dr. Prain estimates 4 per cent. a good return of fibre to the raw material that has to be handled, so that the cartage from a large area would be a most costly item of expenditure, as only 4lb. of fibre would result from the handling of 100lb. of raw stuff. If fibre is to be grown at all as an industry by itself, a plantation of less than from 600 to 1000 acres would not be worth entering upon, so that taking 640 acres to the mile, if the factory were situate even centrally, the cartage from the field to the factory would be a costly item, as, for every ton of fibre, about 24 tons of leaves would have to be handled, which is an enormous weight, and for cartage alone would mean a serious item in expenditure; nor, it would seem, can any product be evolved from the crushed pulp. No doubt in time some profitable use might be found for the enormous mass of pulp left at the decortication. The amount of gummy substance exuding might be utilised chemically, but so far no such discovery has been made, and we cannot therefore include this as an item of income. In fact, the only one item that we can safely count upon is the £25 sterling we get for the fibre per ton. True, the cultivation of the sisal requires no expenditure after the original cost of planting is met, but there must be a gang kept on any plantation for the purpose of filling in, for this must be kept up steadily, else the supply of leaves would soon cease. Suppose a plant lasts, say, three years after maturity, then this means filling in the whole area in three years; but it would be out of the question to keep a continuous supply of leaves to be acted on, and it would be necessary to have three rows or lines of plants coming on—*i.e.*, if the sisal plant takes five years to mature before cutting begins, the planter would require to run in one row between the others a little to one side of the original one, so as not to interfere with the growth of the sucker or bulbs put in, nor with the cutting of the leaves of the mature plant, two years after the original planting had been done, and again another in the fourth and fifth years, or the source of supply would soon get exhausted. Thus, although the actual cultivation would not require many attendants, a considerable staff would still be necessary for supplying or filling in cartage and decortication. To meet this we have an income of £10, and in addition have to pay for freight, pressing, insurance, brokerage, etc., so that if one considers all the different items of expenditure calmly, it makes one think Dr. Prain is right, and that there is not much in the fibre growing after all the fuss that has been made over it. It may be contended that the price quoted is a pessimistic one Let those who argue this way remember that we have taken an average between an inflated and a depressed market, and we think most reasonable people will agree it is a fair way to calculate.

The Piece Goods Trade of Egypt.

A NOTEWORTHY feature in the import trade of Egypt last year was the decrease in imports of coloured cotton yarns, and in connection with this it may be stated that a good deal of dyeing of yarns is now done by the Egyptian natives This is a new industry which has been introduced by Armenian refugees during the last two years, and which is now beginning to be taken up by the natives. The progress of the Egyptian Cotton Mills Limited, of Cairo, and the Anglo-Egyptian Spinning and Weaving Company Limited, of Alexandria, will be watched with keen interest by all connected with the spinning and weaving trades, and by importers of cotton goods especially, as also by the general public in Egypt; the further development of such industries in Egypt must necessarily greatly depend upon the results which will attend the first few years' working of these mills.

In reviewing the year's trade in Manchester goods, attention should be directed in the first place to the complete success with which the Irrigation Department met the danger which seemed at one time to threaten all branches of business alike. It was greatly feared that the diminished quantity of water coming down the river would not suffice for the agricultural needs of the country, and that drought, with general failure of crops, would be the consequence. The available supply, however, though inadequate, was managed with such care and skill that the cotton crop was saved and disaster averted. The year opened with small stocks in importers' hands, and with arrivals rather below the average, the high level of prices in Manchester having prevented buying on the usual scale. But, stimulated by favourable demand in Egypt, confidence in home quotations began to revive, and arrivals to increase, the total imports for the year reaching 940 bales more than those for 1899. Excepting for a short period, prices have been well maintained throughout, and on the whole it may be regarded as a satisfactory year for importers. The following table shows the imports of Manchester goods in each of the last five years:—

Year.	Bales, Cases and Packages. Number.
1896	20,275
1897	24,628
1898	21,284
1899	22,753
1900	23,692

The average for five years 1886-1890 is 16,399 bales, etc.
" " " 1891-1895 " 18,033 "
" " " 1896-1900 " 22,526 "

These figures, which refer to goods of British origin, indicate the progress that has been made during the last fifteen years. The attention of those interested should be directed, however, to the increased importation of Italian cotton yarns. It will be seen from the following figures that these are competing successfully against cotton yarns from Great Britain:—

Imports in	Italian Cotton Yarn.	British Cotton Yarn.
	Bales.	Bales.
1899	1180	2028
1900	1671	1733

With respect to fancy goods, such as brocades, flannelettes, etc., the Customs authorities are to be congratulated on the introduction of a new rule bringing within the tariff all goods of this sort, irrespective of their place of origin. The adoption of this rule removes altogether the objection that, under certain conditions of price, goods not within the tariff have an advantage over those that are valued at tariff rate. An amendment of the bankruptcy laws was effected during the year under review, placing on a more satisfactory basis the relation between credit-giving firms and their clients. With regard to textiles in Cairo, the report states that the prosperity remarked in last year's report continued during 1900, and it is only to be regretted that the year has ended with distinct signs of less prosperous times in the near future. When it is borne in mind that the textile trade of Cairo, as well as many other Oriental markets, is especially a stock trade, the native having a distinct aversion to providing for his wants more than for a very short time ahead, it can be easily understood that in a falling market the importing merchant is liable to have a bad time, and in a rising market he should be particularly prosperous. Generally speaking, the rise in prices of most textile goods was checked in the autumn, and this meant also the stopping of any but an ordinary merchant's profit to the importer.

There is nothing of special importance to notify in regard to Continental competition; it has been as active as ever, but British products seem to have held their own as in the past. Several orders which were given in Italy for prints, flannelettes, etc., will not be repeated, as the goods did not come up to expectations. Yorkshire-made cloths, mostly mixed cotton and wool for men's "abayahs" (the long native cloak), have again been in excellent demand, though Meltons have sold very badly except in the wider widths—60in. and upwards. Bankruptcies have been decidedly fewer, and now that the Mixed Courts have penal jurisdiction in the case of fraudulent bankruptcy, there is no doubt that, provided this power is properly used, there will be a marked diminution in such cases in the future. Among a certain class of merchants the committing of fraudulent bankruptcy has become quite a speculation, and if severe punishment be meted out in a few instances of this nature it is probable that such speculation will be effectually quashed.

Oiling Wool.

THE operation of applying oil to wool which is to be carded and spun is a disagreeable operation to the operative if done by hand, and is attended with more or less waste of oil and a difficulty in securing a uniform distribution of it throughout the batch. It is not possible to dispense with oil, as dry wool spins badly, if indeed it can be spun at all. Manufacturers often seek to economise by either reducing the quantity or quality of the wool oil used, but generally such experiments are attended with failure. Any reduction of oil below what is necessary to properly lubricate the wool results in increased flyings and waste in the cardroom, and in causing the fibre to work badly in both rooms, causing imperfect yarn, decreased production, and inferior cloth, and any experiment in the way of reducing the quality of the oil is frequently attended with far more serious consequences.

The oil is applied to the wool for a temporary purpose only—namely, to facilitate the operation of carding and spinning. After these processes are completed and the yarn has been converted into cloth ready for finishing, all the oil in the wool must, in nearly every textile fabric, be first removed before the goods are ready for the

market. A few fabrics, such as certain woollen hosiery, it is customary to finish without scouring, and, consequently, with the oil in the goods. A cheaper and inferior oil generally means an oil difficult to saponify and remove from the fabric. Many of the difficulties which mills experience in getting their goods clean are the results of using inferior wool oils; but a good oil, when used on the wool, instead of making the cleansing of the goods difficult, facilitates that operation by combining with the alkali in the goods and forming soap, which, being thoroughly incorporated in the fabric, is a very efficient agent in the cleansing process. So it may be laid down as an axiom in woollen manufacturing that nothing but the best oil should be used for oiling wool.

The application of the oil is, as stated, a disagreeable process, and improved methods of doing this work have been invented from time to time. The different methods which have been employed exhibit, perhaps, as clearly as any other process in the mill, the advance which has been made in the art of woollen manufacture. The old hand process is carried out as follows:—Thin layers of the wool are spread on the floor, and a man sprinkles each layer with what he considers the proper amount of oil. Then, taking a pole 8 or 10ft. long in his hands, he proceeds to pound the wool, and, by a twist which he gives the pole as it strikes the batch, turns the top of the layer which had received the oil down into the batch, which serves to more thoroughly spread the oil throughout the stock. There is quite a knack in giving this twist to the pole, and a painstaking man can contribute much to the success of the carding and spinning operations by paying attention to this point; but as it requires considerable effort and strong arms, it is very liable, especially in the case of careless and indifferent workmen, to be slighted. After one layer has been oiled and shaken up, another is applied, and the same operation is repeated until the whole batch is oiled. The total amount of oil for the whole batch is measured out carefully, but the amount applied to each layer must of necessity be left to the judgment of the operative; consequently one portion of the batch may receive more or less than its proper share of oil. This variation is to a great extent remedied in the subsequent operation of picking, but frequently the carder notices that one part of the batch has more oil than the rest.

While wool oil facilitates carding and spinning, it is also true that the addition of water to some kinds of wool aids in these processes, and so it has been the practice to mix the oil with a small proportion of water, sometimes as much as three parts of water being used to one part of oil. The objection to this is that the water evaporates rapidly, and as this operation does not proceed in a uniform manner throughout the batch, it causes a great deal of trouble in the cardroom. When starting a new batch which has been recently oiled, the wool will contain much more moisture and will card better than it will in a few days, when a part of the water has evaporated; and sometimes, especially if the batch is large, the last part of it to be carded will contain no moisture. This variation, says the "Boston Journal of Commerce," is a very serious matter, and causes uneven yarn and bad spinning.

To obviate these difficulties a device has been invented for applying the oil as it is fed into the card. It consists of an oil tank placed above the first breaker feed apron and extending across the width of the apron. A revolving shaft is placed above this tank, and this shaft has three or four jointed arms, at the end of which a rod is passed. This arrangement is so made that when the shaft revolves it immerses this rod in the oil and then brings it up slowly out of the liquid, and more or less of the liquid will adhere to it. As the rod revolves and passes the centre of gravity, it is so arranged that its weight will cause it to fall, and a stop is provided, so that when the rod strikes the stop the particles of oil adhering to it will be shaken down on the wool. When the shaft passes round it again causes this operation to be repeated, and the amount of oil can be partially regulated by the speed at which the shaft is run.

Gleanings from Consular Reports.

BADEN (GERMANY).—The textile industry, after a brief revival at the close of 1899, suffered very heavily in 1900. The whole branch was almost prostrated, and the losses were considerable. Eight companies at Mulhausen lost nearly 16,000,000 marks, one at Leipzig two-thirds of its capital, and another large firm at Bremen, which in 1899 had paid 30 per cent. dividend, so far from distributing any profits, lost the whole of its reserve, nearly 5,000,000 marks, in 1900. The losses in wool in the past year reached at the most modest estimate upwards of 80,000,000 marks, and in cotton they were also considerable.

A large cotton factory in particular reports that notwithstanding advantageous purchases of raw material, they had a very bad year, and would have suspended yarn making altogether if circumstances had permitted. Anxious reserve on the part of the trade caused spinners to vie with one another in price cutting, but without avail. The only result was that even willing buyers grew frightened and withdrew. The collapse in the wool market confirmed pessimist impressions, business became from month to month duller and more difficult, and in the last quarter of the year ceased almost altogether. Only at the close of the year were spinners able to come to an agreement that arrested the ruinous competition. The same company manufactures also cotton velvets, Genoa cords, and other specialities, and reports an unsatisfactory trade also in these departments. Although prices were quite out of proportion to cost of production, buyers nevertheless remained very reluctant, and little business could be done. In velvets, trade was dull throughout the year. In heavy furniture kinds, only middling and inferior sorts were asked for and commanded a fair sale, while for superior qualities the inquiry left much to be desired. There was a better market for Genoa cords, and consumption was lively until checked by higher prices at the close of the year. Rugs were influenced by the higher quotations for Vigogne yarn, and customers were hardly to be induced to give fresh orders.

Bushire.—The imports improved in cotton piece goods by £134,463 over the previous year, and though the importers did not realise profits to any appreciable extent, they succeeded in disposing of the accumulated stocks of the previous years. The high prices ruling in Manchester for a portion of the year gave a welcome relief to the merchants in Bushire, who, on the whole, are said to have realised invoice prices. Brisk business was done at paying rates in Turkey-red twills and black twills, which for some time past were neglected. Grey Mexicans, too, were in much demand, and handsome profits were netted, especially by such merchants as had contracted for them in advance at comparatively lower rates.

Woollen goods show an increase of £6169, which is chiefly contributed by broadcloth. Germany heads the list, and the United Kingdom comes next, then Austria Hungary and France. The returns show a falling off in Cashmere shawls, but this is due to the fact that the merchants in India have taken to sending through the post large parcels for which no statistics are available. As an average 100 parcels of shawls are received in a year.

Large quantities of the previous year's exports of raw silk having remained unsold, deterred shipments being made on any large scale. It is also reported that the production from Khorassan and other silk-growing districts is finding its way to Russia, where good prices are said to be obtainable.

Baku (Russia).—The great strides made in the cultivation of cotton in Trans-Caucasia, and more especially in Trans-Caspia, has been an inducement to local capitalists to build a cotton mill here, and one of 18,000 spindles has recently been started. It is estimated that as freights on the raw material to Northern Russia and on the manufactured article back again will be gained, this saving will enable the manufacturer to secure the whole of the trade in cotton goods for this part and also for Northern Persia.

Should the venture turn out successful, which can hardly be doubted, owing to the exceptional advantages accruing from the situation of the mill, we may expect to see a great development in this industry in the near future.

Ningpo (China).—The total number of pieces imported in 1900 was (excluding handkerchiefs, towels, and blankets) 768,052 pieces, as against 918,063 pieces in 1899, and an average of 806,473 pieces for the years 1892-99.

The only cotton goods of importance in which there has been an advance are white shirtings, mainly British (72,020 pieces against 69,169 pieces in 1899); lastings, one-half of them British (17,425 pieces against 15,569 pieces); and Italians, two-thirds from the United Kingdom (23,377 pieces against 18,502 pieces). Of the minor imports, plain dyed shirtings (2082 pieces against 859 pieces) and Turkey-red shirtings (5275 pieces against 4809 pieces) have also increased; otherwise the tale is consistently against 1900.

The staple article under this heading of cotton goods is plain grey shirtings. Of these (one-half from the British dominions), 399,965 pieces were imported in 1900, against 478,415 pieces in 1899, and 510,325 pieces in 1897, the record year. T-cloths, an article three-fourths of which comes from British looms, show a serious fall from 178,516 pieces in 1879 to 108,851 pieces in 1897, 82,350 pieces in 1899, and 62,668 pieces in 1900. Drills are chiefly of American manufacture, and in this class are practically stationary (23,632 pieces in 1900, against 24,300 pieces in 1899). Their British rivals, however, have fallen in the same year from 5025 to 2380 pieces. Jeans, as a whole, remain the same, but here, too, the American article is gaining on the British. The change, indeed, since 1897 is most striking, though it should be borne in mind that the article is of comparatively small importance in the Ningpo trade. Nevertheless, here are the figures:—

	Quantity.	
	British.	American.
	Pieces.	Pieces.
1897	9780	1840
1900	4080	3515

In 1897 the United Kingdom had 84 per cent. of the import of jeans; in 1900 she had but 43 per cent. If we go further back in the history of the port, the change is still more remarkable. The figures for 1879, for example, are: British, 29,130 pieces; American, 1640 pieces; and the respective percentages (Holland supplied 4320 pieces in that year, as against 560 pieces in 1900), British 83 per cent., and American 5 per cent.

Sheetings are a more distinctly American article, the United States having all along supplied Ningpo with about five times the quantity sent out from the United Kingdom. The apparent growth in favour of this article, irrespective of origin, is very marked in the returns. Thus in 1900 52,158 pieces were imported, as against only 4501 pieces in 1879. The respective shares of the trade were: In 1900—British, 7008 pieces; American, 45,070 pieces; in 1879—British, 796 pieces; American, 3705 pieces.

Handkerchiefs show a very considerable decline as compared with last year, and still greater when compared with 1897 (6487 dozen, against 18,194 dozen).

The gross import of towels was above that of 1899 and 1890, but below that of 1897.

Japanese cotton cloth, the demand for which was insignificant up to 1897, is now increasing in favour, the import having sprung from 76 pieces in 1895 to 8108 pieces in 1899, and 9309 pieces in 1900. No Japanese firm has as yet established itself at Ningpo, though it is believed that one will be opened in the near future. When that is done, the products of the Japanese factories—cotton cloth, crêpe, yarn, matches, and the rest—will be vigorously pushed, and in the absence of any corresponding British firm will gain ground at the expense of their rivals.

Even now this is the case, as the imports of raw cotton yarn show. Japanese yarn appears in the returns for the first time in 1893, when the figures were:—

	Quantity. Cwt.
English	114
Indian	9100
Japanese	25

The figures for 1900 are:—

	Quantity. Cwt.
English	235
Indian	2261
Japanese	3901

Meanwhile, however, a new rival is rapidly advancing—the output of the Chinese steam mills. Ningpo at first imported this article from Shanghai, commencing in 1894 with 785cwt., and in 1898 with 5912cwt. The local mill then made its influence felt, till the import dropped to 18cwt. last year, while the export rose from 513cwt. in 1896 (the first year) to 3820cwt. in 1899. In 1900 there was a falling off in the export, the amount recorded being only 2739cwt., and a revival of the import (2504cwt.), but for this the greatly enhanced export of raw cotton amply accounts.

It would not be right to dismiss the subject of foreign cotton imports without some mention of their rivals, the other products of the Chinese cotton mills—Shanghai drills and sheetings. These first appeared in 1891 with 640 pieces. They rose, with considerable fluctuations, to 11,890 pieces in 1897, and then fell suddenly until in 1900 only 773 pieces were brought in. The great steadiness of sterling exchange during the past three years may be one explanation of this curious phenomenon, enabling, as it has done, home manufacturers to adjust their prices to a fallen dollar.

The import of woollens has been very steady for many years past. Since 1883 it has never touched 14,000 pieces, nor fallen below 10,000 pieces, the average for the sixteen years, 1883-1899, being, in fact, exactly 12,000 pieces. Before 1883 the trade was much more flourishing; in 1876, for example, 27,154 pieces were imported

Rostov-on-Don (Russia).—Russian manufacturers having considerably increased their purchases on the spot direct from wool growers, supplies to this market were about 682 tons less than in 1899, the total being 2762 tons plus 397 tons remaining unsold from 1899, which was chiefly bought up by exporters, their purchases amounting to 2174 tons, Russian manufacturers securing 921 tons, and

64 tons remaining in stock unsold. The stocks of washed wool left over from 1899 consisted of 135 tons in the hands of exporters, and 49 tons unsold; adding to this the yield of the new clip washed at Rostov—viz., 1325 tons,—and 741 tons brought here already washed, the quantity available amounted to 2250 tons, the bulk of which—2025 tons—was shipped to the United States, the balance going to Germany and for home consumption—71 and 154 tons respectively. The demand both for greasy and washed wools was very fair during all the season, prices ruling from 2½d. to 3d. per pound for the former, and 5½d. to 5¾d. per pound for the latter, Russian buyers paying, however, 4 to 5 per cent. higher.

Stocks of brook-washed autumn wool left over from 1899 amounted to only 47 tons in the hands of exporters and 16 tons unsold, to which must be added 151 tons of the 1899 clip brought here in the spring, and 452 tons of the new clip. Shipments were as follows:—286 tons to Germany, 198 tons to the United States, and 95 tons bought for home consumption, while 87 tons have remained unsold owing to the exorbitant demands of sellers. Business in the spring was very slack, purchases being mostly made for America at prices not exceeding 4½d. to 5¼d. per lb.; in the autumn, however, a brisk demand sprang up for Germany and for home consumption, prices going up to 6½d. per lb., which prevented a considerable quantity of wool coming to this market, Russian manufacturers having effected purchases on the spot from farmers direct.

Italy.—Raw hemp and flax of British origin had the usual limited market, showing, however, a slight increase.

Italian factories ordered large quantities of raw cotton, which were imported from:—

Country.	Quantity.	
	1899.	1900.
	Cwt.	Cwt.
United States of America	1,756,359	1,841,037
British possessions in Asia	564,109	283,658
Egypt	119,322	136,506
Austria-Hungary	59,995	21,442
United Kingdom	48,629	38,310
France	7,983	21,363
Other countries	21,365	74,665
Total	2,577,762	2,416,981

Although the quantity imported in 1900 was slightly less than that of the previous year, the value is returned at a higher figure. That fact is due to the increased price, the cost per quintal (220lb.) having risen from £3 6s. in 1899 to £4 18s. 6d. in 1900.

The United States head the list, and they are evidently getting a firmer hold of the market, to the great detriment of the British, Austro-Hungarian, and Indian exporters.

The quantity imported from the United Kingdom in 1897 amounted to 91,908cwt., and in 1900 it fell, as we have seen, to only 38,310cwt. British possessions in Asia sent 584,536cwt. in 1897, and the quantity returned in 1900 was less than one-half.

Indian exporters should examine the causes of this falling off and try to recover lost ground.

The decline of flax and hemp yarns affected Belgium, Austria-Hungary, and in a minor degree the United Kingdom. Woollen yarns decreased generally, but the quantity sent by us showed a slight advance.

With regard to silk, the thrown raw quality actually decreased owing to increased local production, but not so with the quantity of the dyed raw article, which is included in the above return, only because of the fall in value. The only kind of silk which was exported by us to Italy was a small quantity of silk cloth, classified as silk tissues in the official customs list.

The United Kingdom continues to supply in limited quantity sundry kinds of cotton, including the raw material. It is found, however, that the quantity of the raw material exported to Italy by us in 1896 was 32,672cwt., and is returned at 38,310cwt. in 1900; but the United States have raised their figure during the same period from 1,407,539 to 1,841,036cwt. The importation from India has decreased by almost one-half during the last few years to the advantage of the United States and Egyptian exporters, who have doubled their exportation to Italy within the above period. During a long series of years the United States have monopolised the local cotton markets, and it is not likely that with our limited stock for export and extensive home requirements we shall ever be able to make any appreciable advance, but Indian growers might.

The increase in hemp, cotton, and silk manufactures is very marked. Not only does Italy seem to be gradually freeing herself from foreign markets in connection with these articles, but she is now exporting them. Several reasons have acted as a stimulus. The comparatively high price of the foreign article and frontier duty could not but prove an incentive to Italian manufacturers, especially if the low scale of wages allowed to Italian operatives is taken into account.

Philadelphia.—Ever since the production of manufactures on the American continent, Philadelphia has held a high place in the manufacture of textiles.

According to the latest available figures, there are within the city 645 textile mills, 295 of which are cotton and woollen mills, 63 upholstering goods, curtains, etc., 151 hosiery and knitted goods, and 98 carpet factories. The principal districts in which these mills are situated are Manayunk, Germantown, and Kensington; 57 more mills are situated in the immediate vicinity of Philadelphia, at Camden, Chester, Gloucester, etc., thus making Philadelphia the first of American cities in textile industries, and one of the largest producers of carpets in the world. The chief centre of the carpet industry is Kensington.

Ninety per cent., it is stated, of the carpets made in the world are manufactured in the United States, and nearly 50 per cent. of them are turned out in the mills of Kensington. In 1896 there were 144 carpet mills in Pennsylvania, and the aggregate value of their product exceeded 25,000,000dols. (£5,000,000). Nearly 14 000 hands were employed, and wages amounting to over 6,000,000dols. (£1,200,000) were paid. Materials amounting to nearly 15,000,000dols. (£3,000,000) were consumed. Of these amounts, Kensington turned out 21,000,000 dols. (£4,200,000) of product, employed nearly 12,000 persons, and paid in wages over 4,500,000dols. (£900,000), and consumed material amounting to nearly 12,500,000dols. (£2,500,000).

Sixty per cent. of all the carpets made in Kensington are ingrain, and are made in three qualities, designated by the manufacturers as cotton chain, all wool, and extra super., of which the first is the lowest grade. The total number of ingrain power looms is nearly 4800, of which over 300 are in Kensington.

In addition to these ingrain looms in Kensington, there are probably 1500 other looms which turn out Brussels, tapestry Brussels, tapestry velvet, damask, Venetian, and rag carpets, also Smyrna, Wilton, and Oriental rugs. Kensington practically controls the markets of the world in Smyrna rugs. The Brussels and Wilton carpets made in Kensington are the finest grades of carpet manufactured in America. There are no Axminster carpets made in Philadelphia.

NEW COMPANIES.

British "Chicago Rawhide" Manufacturing Company Limited.

Registered June 27, with a capital of £30,000, in £1 shares, to adopt an agreement with S. Schreiber, and to carry on the business of manufacturers of and dealers in rawhide, woven leather, and other belting for machinery and other purposes, engineers, machinists, tanners, etc. No initial public issue. The number of directors is not to be less than three nor more than seven; the subscribers are to appoint the first; qualification, £100; remuneration, 2 guineas each per meeting attended. Registered office, 8, Victoria-avenue, Bishopsgate-street, London, E.C.

Charles Whowell Limited.

Registered June 20, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of Charles Whowell, of Two Brooks Bleachworks, Tottington, to adopt two agreements with the Bleachers' Association Limited, and to carry on the business of bleachers, dyers, finishers, printers, and manufacturers of cotton, linen, silk, worsted, woollen, and other goods, etc. The general manager or general managers 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.

Commercial Enterprise Limited.

Registered June 28, with a capital of £50,000, in £1 shares, to acquire the undertaking of the Chardonnet Silk Company Limited, to adopt an agreement between the said Chardonnet Silk Company Limited of the one part, and H. E. S. Juster (trustee for this company) of the other part, and to carry on the business of artificial silk manufacturers and spinners, silk and cotton spinners and doublers, flax, hemp, and jute spinners, silk and braid manufacturers, merchants, wool combers, worsted and woollen spinners, yarn merchants, bleachers, dyers, makers of vitriol and other acids, etc. No initial public issue. The first directors (to be not less than two nor more than five) are H. Edwards and E. de Rodakowski; qualification, £250; remuneration, according to profits. Registered by Timbrell and Deighton, 44, King William-street, London, E C.

Fibre Spinning and Weaving Company Limited.

Registered June 24, with a capital of £20,000, in £1 shares, to adopt an agreement between the Fibre Purchase Syndicate Limited of the one part, and H. P. Mills (for the company) of the other part, and to carry on the business of combers, spinners and dyers of and dealers in ramie grass, flax, hemp, jute, wool, cotton and silk; dyers, bleachers, etc. No initial public issue. The number of directors is not to be less than three nor more than seven: the first are J. Hayes, W. W. L. Lishman, and W. H Chamberlain; qualification, £100; remuneration, £50 each per annum, with a share in the profits, divisible. Registered office, 13-14, Abchurch-lane, London, E.C.

Doris Mill Company Limited.

Registered June 27, with a capital of £3000, in £5 shares, to acquire the Doris Mill, Heady Hill, Heywood, Lancashire, and the business of Arthur Mathew and Co, Limited, and to carry on the business of spinners, waste dealers, weavers, bleachers, dyers and manufacturers of cotton, wool, silk, and other substances. No initial public issue. The first directors are J. Hacking and W. Hacking. Registered office, Doris Mill, Bury New-road, Heady Hill, Heywood, Lancashire.

Frank Smith and Co. Limited.

Registered June 25, with a capital of £2000, in £1 shares, to acquire the business of cotton doublers lately carried on by Henry Slack, at Oldham, Lancashire, and generally to carry on the business of spinners and manufacturers, cotton merchants, weavers, agents, bleachers, dyers and finishers, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are C. Hardman (chairman) and F. Smith; qualification, £100; remuneration, as fixed by the company. Registered by C. Clegg, 27, Queen-street, London, E.C.

F. Wilkinson and Co. Limited.

Registered June 27, with a capital of £20.000, in £10 shares, to acquire the business of Fergus Wilkinson, of Nelson, Lancashire, and his interest as tenant of a portion of Pendle-street Shed, Nelson, and to carry on the business of cloth manufacturers, spinners, weavers, bleachers and dyers of fibrous substances, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are W. Hartley, F. Hartley, A. E. Wilkinson, and W. Wilkinson. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Pendle-street Mill, Nelson, Lancashire.

Gandy Belt Manufacturing Company (1901) Limited.

Registered June 28, with a capital of £150,000, in £1 shares, to adopt an agreement with the Gandy Belt Manufacturing Company Limited and D. D. Macpherson, and a second agreement with the Velvril Company Limited, W. F. Reid, and E. J. V. Earle, for the acquisition of the undertaking of the Gandy Belt Manufacturing Company Limited (incorporated in 1886), to develop and extend the same and to carry on the business of manufacturers of and dealers in belting, mill furnishers and importers, exporters and dealers of and in all substances, apparatus and things capable of being used in any such business. Minimum cash subscription, 100 shares. The first directors (to number not less than three nor more than seven) are D. D. Macpherson, J. M. Wade, A. H. Thomas, and H Le Marchant; qualification, 100 shares; remuneration, £100 each per annum. Registered by T. T. Hull, 22, Chancery-lane, London, W.C.

Eden and Thwaites Limited.

Registered June 17, with a capital of £100, in £1 shares, to adopt two agreements made by this company with the Bleachers' Association Limited, for the acquisition of the business of Eden and Thwaites Limited (in liquidation), and generally to carry on the business of bleachers, dyers, printers, and manufacturers of and dealers in cotton, silk, worsted, woollen, and other goods, etc. No initial public issue. The names of directors are not given Registered by Patersons and Co., 25, Lincoln's Inn Fields, London, W.C.

Joseph Smith Limited.

Registered June 15, with a capital of £40,000, in £1 shares, to adopt an agreement with J. Smith for the acquisition as a going concern of the business of a cotton spinner now carried on by him at the Ribbleton Mill, Preston, and to carry on the business of cotton spinners and doublers, flax, hemp and jute spinners, linen manufacturers, flax, hemp, jute and wool merchants, wool combers, worsted spinners, woollen spinners, yarn merchants, worsted stuff manufacturers, bleachers, dyers, and textile manufacturers generally. No initial public issue. The number of directors is not to be less than two nor more than five; the first are T. M. Smith, R. Smith, and J. L. Smith; qualification of first directors, £2000; ordinary directors, £200; remuneration, as fixed by the company. Registered by Rowcliffes and Co., 1, Bedford-row, London, W.C.

Midlands Ramie Spinning Company Limited.

Registered June 13, with a capital of £10,000, in £1 shares, to adopt an agreement with E. A. Wallis and W. Watson, to acquire any patents, inventions and the like, and to carry on the business of ramie manufacturers, growers, and merchants, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the subscribers are to appoint the first; qualification £100; remuneration, as fixed by the company. Registered by Fullilove and Co., 120, Cannon-street, London, E.C.

Whittakers of Mount Sion Limited.

Registered June 15, with a capital of £100, in £1 shares, to adopt an agreement with the Bleachers' Association Limited, for the acquisition of the business carried on by John Whittaker and Co., of Mount Sion, at the Bleachworks, Radcliffe, and to carry on the business of dyers, bleachers, finishers, dressers, printers, and manufacturers of and dealers in cotton, linen, silk, woollen, worsted, and other goods, etc. No initial public issue. The first directors are not named. Registered by Paterson and Co., 25, Lincoln's Inn Fields, London, W.C.

Wolstenholme and Wild Limited.

Registered June 15, with a capital of £10,000, in £1 shares, to acquire and carry on the business of cotton spinners now carried on by W. Wild (trading as Wolstenholme and Wild), at Miller's Brook Mill, Heywood, to acquire land at Heywood, and to erect a cotton mill or mills, weaving shed or sheds, and other buildings, works and conveniences. No initial public issue. The first directors are W. Wild, H. Wild, and H. Crabtree; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Brook Mill, Miller-street, Heywood, Lancashire.

Kirkwood, Baird and Co. Limited.

Registered at Edinburgh, June 13, with a capital of £24,000, in £1 shares, to acquire and carry on the business of tapestry manufacturers carried on by Kirkwood, Baird and Co., at Blackhall Works, Blackhall-street,

Paisley. The number of directors is not to be less than three nor more than seven; the first are J. Kirkwood, William Baird, and Wilson Baird; qualification, 500 shares; remuneration, as fixed by the company. Registered office, Blackhall Works, Blackhall-street, Paisley.

Charles E. Phelps and Co. Limited.

Registered June 3, with a capital of £2000, in £1 shares (1000 preference), to carry on the business of factors and manufacturers of veils, veilings, veil nets, lace, scarves, made-up lace goods, neckware, embroideries, etc. No initial public issue. Table A mainly applies. Registered by F. I. Richards, 28, Bedford-row, London, W.C.

Castleton Moor Spinning Company Limited.

Registered June 6, with a capital of £100,000, in £5 shares, to acquire certain land in Castleton, Rochdale, to erect thereon a first-class fireproof cotton mill, which will contain when complete 60,000 weft and 30,000 twist spindles, suitable for spinning fine counts of American yarn, not now produced in Rochdale, to adopt an agreement between H. Sidebottom of the one part, and C. E. Brierley and J. Clegg of the other part, and to carry on in all or any of their branches the businesses of cotton spinners, manufacturers, dyers, finishers, bleachers, merchants, doublers, cotton-waste dealers, workers of cotton, wool, silk, flax, hemp, jute and other fibrous materials, etc. Minimum cash subscription, 25 per cent. of the shares offered to the public. The number of directors is not to be less than three nor more than seven; the first are C. E. Brierley, J. Clegg, J. M. Thomas, T. Leach, W. Kershaw, and S. L. Chadwick; qualification, 10 shares; remuneration, £300 per annum, divisible. Registered by C. Doubble, 14, Serjeants' Inn, London, E.C.

C. E. Robinson Limited.

Registered June 10, with a capital of £1000, in £1 shares to acquire such part of the job goods merchanting business of the Bradford Dyers' Association Limited as is carried on at 24, Brook-street, Bradford, with or without any of the assets appertaining thereto, and to carry on the same as a branch and for the benefit and under the control of the Bradford Dyers' Association Limited. No initial public issue. The Bradford Dyers' Association Limited are the controllers of the company. Registered office, 39, Well-street, Bradford.

J. B. Elliott and Co. Limited.

Registered in Dublin, June 25, with a capital of £20,000, in £1 shares, to acquire the business now carried on by J. B. Elliott and Co., Belfast, and to carry on the business of bleachers, printers, dyers, finishers, cleaners, sewers and embroiderers of linen, etc. The first directors are J. B. Elliott, J. W. Elliott and J. H. Elliott; qualification, 100 shares; remuneration, as fixed by the company. Registered office, 2, Linen Hall-street, Belfast.

Silver Springs Bleaching and Dyeing Company Limited.

Registered June 10, with a capital of £15,000, in £1 shares (5000 preference), to adopt an agreement between Thomas Royle, jun., of the one part, and F. J. Mason of the other part, also a second agreement between the said Thomas Royle of the first part, F. J. Mason of the second part, and R. Heath of the third part, for the acquisition of the business carried on by the said T. Royle, jun, trading as the Silver Springs Bleaching and Raising Company, and to carry on the business of bleachers, dyers, raisers, printers, finishers, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are T. Royle, jun., and F. J. Mason; qualification, £250; remuneration, as fixed by the company. Thomas Royle, jun., is managing director; special qualification, £500; remuneration, £260 per annum, with residence, fuel, and light. Registered by Waterlow Brothers and Layton Limited, Birchin-lane, London, E.C.

Thomas Rowley Limited.

Registered at Edinburgh, June 8, with a capital of £15,000, in £1 shares, to acquire the business of Thomas Rowley, silk finisher and dyer, of Campbell-street, Govan, and to carry on the business of finishers, dyers and singers of silk and other goods. The number of directors is not to be less than two nor more than five; the first are T. Rowley and M. Davidson; qualification, 10 shares; remuneration of T. Rowley, £1000 per annum, others as fixed by the company. Registered office, Campbell-street, Govan.

Clonard Printworks Company Limited.

Registered in Dublin, May 25, with a capital of £5000, in £1 shares, to carry on the business of bleachers, printers, dyers, finishers, cleaners, hem stitchers, sewers and embroiderers of linen union and cotton goods and textile fabrics of all descriptions. The first directors are J. Johnston and T. Paul; qualification, one share; remuneration, as fixed by the company. Registered office, Falls-road, Belfast.

Herdman's Limited.

Registered in Dublin, May 23, with a capital of £250,000, in £10 shares (10,000 preference), to acquire the business, premises, lands, hereditaments, mills, waters, water rights, buildings, machinery, stock-in-trade, goodwill and effects of Herdman and Co., carrying on business at Sion Mill, County Tyrone, and to carry on the business of flax, hemp, jute and thread spinners, cotton spinners and doublers, wool merchants, etc. The first directors are J. Herdman, E. T. Herdman, E. C. Herdman, and J. C. Herdman; qualification, £5000; remuneration of J. Herdman and E. Herdman, £600 each per annum; of E. C. Herdman and J. C. Herdman, £400 each per annum. Registered office, Railway-place, Coleraine.

Birkacre Bleaching Company Limited.

Registered June 22, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of the Birkacre Company Limited (in liquidation), to adopt two agreements with the Bleachers' Association Limited, and to carry on the business of bleachers, dyers, finishers, dressers, textile manufacturers, etc. No initial public issue. The general manager or general managers (not named) shall be the director or directors of the company. Registered by Patersons and Co., 25, Lincoln's Inn Fields, London, W.C.

Montgomeryshire Mills Limited.

Registered June 22, with a capital of £40,000, in £1 shares, to acquire the businesses of the Severn Tweed Company Limited (in liquidation) and the Severn Valley and Powysland Mills Limited (in liquidation), and to carry on the business of manufacturers of and dealers in tweed, wool, woollen, worsted, cotton, linen, flax, hemp, jute and mixed and other fabrics and goods; bleachers, dyers, cotton spinners and doublers, and textile manufacturers generally. No initial public issue. The number of directors is not to be less than three nor more than six; the first are E. Pryce-Jones, H. E. Preen, A. W. Pryce-Jones, and T. J. Garlick; remuneration, £300 per annum, divisible. Registered by Godden, Son and Holme, 34, Old Jewry, London, E.C.

Robert K. Roberts Limited.

Registered June 22, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of Robert K. Roberts, of Stormer Hill Bleachworks, Tottington, near Bury, to adopt two agreements with the Bleachers' Association Limited, and to carry on the business of bleachers, dyers, finishers, dressers, textile manufacturers, etc. No initial public issue. The general managers (not named) shall be the director or directors of the company. Registered by Patersons and Co., 25, Lincoln's Inn Fields, London, W.C.

John Frew and Sons Limited.

Registered at Edinburgh, June 17, with a capital of £30,000, in £1 shares, to acquire the manufacturing business now carried on at Thomson-street, Strathaven, 22, Little Hamilton-street, Glasgow, and elsewhere by John Frew, and to carry on in Great Britain or elsewhere the business of silk manufacturers and merchants. The number of directors is not to be less than three nor more than five; the first are J. Frew, jun., W. Frew, T. Frew, and J. Hamilton; qualification, 400 shares; remuneration as fixed by the company. Registered office, Thomson-street, Strathaven.

THE GAZETTE.

ENGLAND.

Partnerships Dissolved.

JEREMIAH GARNETT and FRANK GARNETT, grey cloth agents, Royal Exchange, Manchester, as J. Garnett and Co.

George Taylor Porritt, Thomas Richard Porritt, and Arthur Wood Riley, wool merchants, Huddersfield, as R. Porritt and Co.; as regards T. R. Porritt.

Alfred Leach and Herbert Percy Schofield, wool merchants and top makers, Market-street, Bradford.

Henry Ridehalgh and James Ridehalgh, cotton manufacturers, Bradley Shed and Throstle Nest Mill, Nelson.

Ellis Turner the elder, William James Turner, Oscar Turner, and Benjamin Turner, Field-lane, Batley, rag merchants.

George Fox and Sons, cotton spinners, Staincliffe, Batley, and at Sowerby Bridge; as regards Charles Edward Fox and Louis J. Fox.

Nathan Whiteley and Sons, cotton spinners, Ripponden, Halifax; as regards Nathan Whiteley.

Joseph Sunderland, Sons and Co., cloth manufacturers, at Nelson and at Bradford; as regards Joseph Sunderland.

George Poyzer and Arthur Smith, lace manufacturers, Commerce-square, Nottingham.

Diran Mouradian and William Arthur Pearson, grey cloth merchants, 59, George-street, Manchester.

John Petrie Jowett and Samuel Jowett, wool noil and waste merchants, Bradford, as Jowett Brothers.

Milner Gibson and Harry Alister Costobadie, calico printers, Portland-street, Manchester.

Jim Taylor and John Oldroyd, rag merchants, Chickenley Heath, Ossett.

The Bankruptcy Acts, 1883 and 1890.

Receiving Orders.

Joe Smith, spinner, Wyke Mills, Wyke, Bradford.

Nathan Rosenfeld (as Nathan Rosenfeld and Co.), grey cloth and general merchant, 54, Sackville-street, Manchester.

Adjudication.

Frank Pickles and David Illingworth Longbottom (as F. Pickles and Co.), worsted spinners, Clarence Mills, Cleckheaton.

SCOTLAND.

Sequestration.

Walter Scott and Sons, woollen and worsted cloths manufacturers, Traqueer Mills and Nithsdale Mills, Dumfries, and 25, Golden-square, London.

JOTTINGS.

THE directors of Messrs. Howard and Bullough Limited, Globe Works, Accrington, have declared a final dividend of 15s. 4d. per share (making 11 per cent. for the year).

THE directors of Messrs. A. and S. Henry and Co. Limited have decided to pay on the 1st prox. an interim dividend on the ordinary shares at the rate of 6 per cent. per annum for the half-year ended May 31.

THE directors of Messrs. John Crossley and Sons have declared an interim dividend for the half-year ended June 3 of 2s. 6d. per share on the 5 per cent. cumulative preference shares, and 2s. per share (being at the rate of 5 per cent. per annum) upon the ordinary shares.

IT is intended this year to essay the cultivation of the cotton plant in Hungary. It is said that it will ripen in the southern part of that kingdom; the efforts to grow cotton in the lower provinces of Asiatic Russia, in the same latitude as Hungary, have been successful. It is probable that bounties will be paid the cotton planters, in keeping with Hungary's liberal treatment of the founders of factories.

ACCORDING to the figures published by the Chamber of Commerce of Lyons, the number of looms devoted to the production of silk fabrics, broad and narrow, in France, is 30,838 power looms and 47,408 hand looms. The department that has the largest number of power looms is that of Isère, with 15,315, while the department of the Rhone, in which the city of Lyons is located, has 4312. The department of the Loire, in which is St. Etienne, has 4891 power looms, but it heads the list for hand looms with 16,315, the Isère being second with 12,029, and the Rhone third with 9488 hand looms.

ON the 19th ult., Mr. J. D. Barbour, head of the firm of Messrs. William Barbour and Sons Limited, flax spinners and thread manufacturers, died at the age of 78 years. For more than fifty years Mr. John Dougherty Barbour, J.P., D.L., has been actively engaged in business affairs. The firm with which he was connected have large manufacturing concerns at Hilden, near Lisburn, Ireland, and at Patterson, New Jersey, U.S.A. They have branch establishments in Manchester and London. Mr. Barbour was chairman of the Linen Thread Mills in Ulster, and director of several local concerns connected with the linen trade.

THE Board of Trade returns show that the imports for the month ended June 30 amounted to £41,711,038, against £42,016,307 in the corresponding month of last year, a decrease of £305,269. The exports for the month totalled £22,444,424, against £24,895,335 in June last year, being a decrease of £2,450,911. The imports for the first six months of this year amounted to £262,506,790, against £255,656.999 in the first six months of 1900, an increase of £6,849,791. The exports for the first six months are returned at £138,796,398, against £144,376,764 in the corresponding period of last year, a decrease of £5,580,366.

THE returns of the United States Consul for the Bradford district show that during the month of June the total value of the exports from Bradford to the States was £89,226, as compared with £135,791 in the corresponding month of last year, or a decrease of £46,564. Dress goods and linings have fallen from £54,814 to £38,098, a decrease of £16,716; and wool has declined from £26,447 to £8913, a decrease of £17,533. The other chief decreases are £13,513 in cotton cloths, £5375 in silk yarns, £2560 in cotton yarns, £3947 in machinery. On the other hand, alpaca has gone up from £705 to £6328, worsted coatings have increased from £1852 to £6226, and iron and steel from £1364 to £3401.

THE stagnation in the various branches of the textile industry which has existed in Austria and Germany for the greater part of a year, still prevails, and instead of the improvement setting in which was hoped for in the spring, the situation is becoming even more grave. The cotton-goods industry is perhaps the most seriously affected. The union of manufacturers of these wares in Austria, whose factories contain nearly 100,000 looms, decided to reduce the output 20 per cent. after July 1, 1901. Though unfavourable markets and the unstable price of cotton are charged with the general responsibility for the present situation, there is in Austria another contributing cause. For several years just prior to 1900, the cotton-goods business was so active that the erection of new factories was stimulated. This caused the operation of about 10,000 additional looms in Austria. Then came a depression in prices, which was aggravated by competition until the selling price hardly covered the cost of production.

THE following is a German estimate of the world's cotton spindles and consumption:—

Country.	Spindles Employed. Number.	Cotton Consumed. Bales.
United States	19,300,000	3,600,000
Canada	500,000	100,000
Mexico	500,000	18,000
East Indies	4,800,000	2,000,000
Japan	1,200,000	2,000,000
China	560,000	2,000,000
Great Britain	45,000,000	3,300,000
Germany	8,000,000	1,400,000
Russia	7,500,000	1,200,000
France	5 500,000	550,000
Austria	3,500,000	750,000
Spain	2,800,000	450,000
Switzerland	1,550,000	150,000
Belgium	1,000,000	180,000
Sweden	400,000	100,000
Holland	300,000	75,000
Italy	200,000	450,000
Portugal and Greece	300,000	75,000

The world's consumption of cotton is estimated at about 14,000,000 bales.

MR. B. F. STONE, the American Consul at Huddersfield, has issued his half-yearly returns of trade done between Huddersfield and the United States. The total value of the exports for the past year was £235,755, a decrease of £105,060 on the previous year. Woollen goods were valued at £75,716, or £22,020 below the figures for the preceding year. Worsted cloths were represented at £75,794, or £46,830 less than the total for the previous year. For the quarter ending June 30 the total was £56,561, a decrease of £21,037 on the corresponding quarter of last year and a fall of £3512 from the March quarter this year. Woollens were represented as £17,916, a decline of £3138 compared with the corresponding period last year and £3594 compared with March this year. Worsteds were £18,613, or £3553 less than last year and £1137 compared with March this year. In the month of June the total was £30,040, a decrease of £10,295 on June, 1900, and £6338 on June, 1899. Woollens totalled £12,502, or £4749 less than in June, 1900, and worsteds £10,451, as compared with £12,734 last year. There were decreases last month of £1705 in card clothing, £973 in sewing cotton, and £940 in machinery on the figures for June, 1900. The only material increase was £1089 in chemicals and dyes.

THE TEXTILE COLOURIST:

DEVOTED TO

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

The Analysis of Samples of Indigo.

By W. M. Gardner and J. Denton.

An increasing amount of indigo is now put on the market which contains a considerable proportion of indigo red, this constituent being formed in notable amount whenever an excess of alkali is used in the extraction tanks or beating vats employed in the process of manufacture. When present in greater amount than between 1 and 2 per cent., indirubin interferes greatly with the ordinary method of assaying samples of indigo —*i.e.*, by titration with permanganate of potash. When indigo containing from 5 to 10 per cent. indirubin is dissolved in sulphuric acid, the resulting sulphonic acids, when purified, dissolve in water with a navy-blue colour, which is redder in proportion to the amount of indirubin present. On titrating this acid solution with permanganate, the indigotin sulphonic acid is first attacked, and the colour of the solution turns at first darker, becoming reddish-blue and then violet, owing to the admixture of the *yellow* oxidation product with unchanged *blue* indigotin sulphonic acid and *red* indirubin sulphonic acid. As the oxidation of the indigotin proceeds, the colour of the solution becomes paler and redder, and at the completion of that stage of the titration it is a bluish-red. On continuing the titration, the indirubin is attacked, and the solution finally acquires a yellow colour, but the permanganate must be added slowly, as the indirubin is not quickly attacked.

It is possible, with great practice, to obtain fairly satisfactory results by taking the moment of fullest development of the red colour in the solution to represent the complete oxidation of indigotin, and the moment of its final destruction as a measure of the indirubin; but the end reactions are very indefinite, and it is evident that the method is not suitable—at any rate, for general use. Of the other methods for the analysis of indigo the gravimetric hyposulphite process is available, but it is unsuitable for general works purposes, and if used, the separation of the indigotin and indirubin should be carried out by means of acetone as described later.

Indirubin is more easily soluble than indigotin in alcohol, and it is also soluble in ether and glacial acetic acid. Koppeschaar extracts the indigo with glacial acetic acid, which dissolves indirubin and indigo brown. The latter is then removed by treatment with caustic soda, which precipitates the indirubin, and this, after washing, is again dissolved in glacial acetic acid, and estimated colorimetrically against a standard glacial acetic acid solution of pure indirubin. After removing the indirubin, the indigotin may, of course, be estimated in the usual way. In our experience, Koppeschaar's process is inconvenient, on account of the comparative insolubility of indirubin in glacial acetic acid, and the impossibility of completely extracting it.

Rawson boils from 0·1 to 0·25grm. of the sample of indigo with 150cc. of ether for half-an-hour with an inverted condenser; when cold, the solution is made up to 200cc. with ether, 10cc. of water added, and the flask shaken. A clear solution of indirubin is thus obtained, which may be compared colorimetrically with a standard solution. The indigotin is estimated in another sample, after previously extracting it several times with alcohol to remove the indirubin. In working according to this process, we found that the amount of indirubin estimated depends greatly on the length of time the extraction proceeds, and even after three hours' boiling with ether, the indirubin is not completely extracted. The colour of the ethereal solution obtained from the sample is also different from that of a pure solution of indirubin, and though this cause of error can be eliminated, the other objections to the process still remain.

As a result of these difficulties, which occurred in analysing some indigos, we were led to try various other solvents for indirubin, and made comparative tests with ether, glacial acetic acid, alcohol, aldehyde, glycol, acetone, amyl alcohol, glycerol, chloroform, carbon disulphide, carbon tetrachloride, nitrobenzene, benzene, phenol, aniline, and paraffin oil. Of these bodies *acetone* was found the most satisfactory solvent, dissolving indirubin with facility, and indigotin in traces only. It also dissolves indigo brown and the yellow constituent of indigo (particularly Java indigo), described by Rawson. All these bodies are, however, readily precipitated by adding a 10 per cent. salt solution, which does not throw down the indirubin. Eventually the following process was worked out, and has been proved to be accurate, quick, and easily carried out:—

Modified Process of Assaying Indigo Rich in Indirubin. — 0·2grm. of the finely-powdered and dried sample is placed in a flask and boiled for half-an-hour with 100cc. acetone, with reflux condenser. After cooling, the solution is made up to 100cc. with acetone, and then to 200cc. with 10 per cent. salt solution, which precipitates the small amount of indigotin in solution, and also the impurities. After shaking, the solution is allowed to stand for five minutes, filtered through an asbestos filter, and the indirubin estimated colorimetrically by comparison with a standard solution of indirubin. This standard solution must be made up with acetone and salt solution in similar proportion to that employed above, as the colour is redder in pure acetone. The asbestos filter is conveniently made by carefully spreading a layer of asbestos fibre on a small Buchner filter.

Estimation of Indigotin.—Wash the precipitate on the asbestos filter with hot water until free from salt. Dry, and transfer the asbestos and precipitate to a cylindrical crucible by means of a camel's hair brush. Treat with concentrated sulphuric acid (pure), purify with sulphindigotic acid, and titrate with permanganate in the usual way. The end reaction is then quite sharp, there being an entire absence of indirubin. The quality of acetone used is of importance.—"Journal Soc. Dyers and Colourists."

Mordant Dyes for Printing Cottons.

While the basic dyes came into great favour on account of their brightness, they were by no means fast to light and washing. The mordant dyes, on the contrary, are not so bright, but are, on the average, superior as regards fastness to light and washing. This is true particularly of most of the alizarin dyes. Alumina, chrome, iron, nickel, zinc, lime, magnesia, and tin salts are employed as mordants for these mordant dyes. It has been found that in many cases a dyestuff produces better results with some particular mordant. For instance, acetate of chrome produces good green with Alizarin Viridin F F. The same mordant answers well for the production of grey and black with Alizarin Blue Black 3 B, and also for colours made with Diamond Orange, Brilliant Alizarin Blue S D, and Brilliant Chrome Red. For other dyestuffs, such as Alizarin Blue S, zinc vitriol or acetate of nickel can be used as mordants. The shades produced by the last-named mordants are brighter, but not so fast to washing as those obtained by the use of the acetate of chrome. Sometimes the chrome and nickel mordants are mixed. Acetate of chrome as a mordant for Anthracene Brown R produces a dark brown, while the same dyestuff with acetate of alumina produces a red brown, which is faster to washing and light. Celestin Blue B gives, with the acetate of chrome, a beautiful blue violet, while it produces a blue very fast to washing with a tannate of alumina as a mordant. Other dyestuffs produce various shades with different mordants. Alizarin Bordeaux B D produces a Bordeaux red fast to washing and light, by the use of an alumina and lime mordant; with iron mordant a purple; while this dye gives a violet fast to light and washing if the chromates are used. Alizarin Orange gives a bright orange with alumina and lime as mordants, while it gives a yellowish brown on a chrome mordant. Alizarin Red gives a red or rose shade with aluminia, lime, and zinc, while it produces a dark red with the acetate of chrome, and a violet with the acetate of iron.

The mordants are used mostly in the form of acetates — as acetate of chrome, lime, nickel, alumina, magnesia, etc. Sometimes, however, they are used in the form of sulphocyanide, tartrate, oxalate, nitrate, and bisulphite. It is necessary for the dyer to find out by actual experiment what mordant produces the best results with any particular dye. Sometimes the various mordants are combined—as, for instance, acetate of chrome may be used in combination with nitrate of lime. Many of the mordant dyes give better results if printed on goods that have been prepared with the Turkey-red oil. Some dyestuffs, and particularly the bisulphite combinations of Alizarin Blue S or cœruleins, can be advantageously treated with a short steaming in the Mather and Platt kier. Other dyes, such as Alizarin Bordeaux B D, require prolonged steaming.

The mordant dyes can all be printed by having the necessary mordants mixed with the dyes. For instance, Viridin F F, Anthracene Brown, Chrome Red, Alizarin Blue S, Chrome Orange, Alizarin Red S X extra, and Alizarin Blue Black B and 3 B, all work well with acetate of chrome. The following dyes can be used with the alumina mordants:—Alizarin Cyanine R, Alizarin Bordeaux B D and G D, Alizarin Heliotrope R and B B, and Alizarin Red X D. Beautiful effects can be produced by discharging the colours produced by the above dyes by a process of oxidation. Another method is the following:—The cotton goods are saturated with an alkaline solution of acetate of chrome. The pattern is then printed on the goods with citrate discharge, and the goods are then dyed with mordant dyes. The part of the goods treated with the citrate does not take the dye, and so white effects are produced on a coloured ground. The following dyes can be used for this method:—Alizarin Yellow, Alizarin Cyanine, Diamond Orange, Brilliant Alizarin Blue S D, Chrome Bordeaux 6B, Anthracene Brown, Brilliant Alizarin Blue G, and Alizarin Blue Black B.

Many of the mordant dyes are used on goods that have been treated with alumina mordants, and which have had the white pattern discharged with the citrates. Among such dyes may be mentioned Alizarin Red, which gives good results. Other mordant dyes work well with the alumina mordants, and the pattern is afterwards produced by oxidising agents. By this process Alizarin Cyanine R, Celestin Blue B, Anthracene Brown, and Alizarin Bordeaux give good results. The basic dyestuffs can be used in combination with the mordant dyes on chrome, alumina, and iron mordants in order to increase the brightness of the shade. Thus, Alizarin Red can be used with Rhodamine on alum in a mordant; Alizarin Viridin with Brilliant Green on a chrome mordant, and Alizarin with Methyl Violet on an iron mordant for light lilacs. In former years, says the "Leipziger Färber Zeitung," the mordant dyes were employed much more extensively by first printing the pattern on the goods with alumina or iron mordants, or a mixture of the two, and then developing the design by dyeing with the mordant dyes At the present time the simple steaming process is employed, whereby the goods are more thoroughly impregnated, even though thousands of pieces be under treatment at one time. The employment of the mordant dyes for printing cotton goods shows a rapid growth, as well as for the printing of half-wools, silk, half-silk, linen, and half-linen.

Printing with Sulphide Colours.

The application of colouring matters of the sulphide class is generally known and practised in cotton dyeing, but their introduction for calico printing has not been attended with much success. Recently, however, a process by means of which very fast and deep black, brown, and other colour prints can be readily produced with certain of these colouring matters has been discovered. It is especially applicable to the class of dyestuffs in which the sulphur is introduced by means of thiosulphuric acid, which dyestuffs are put upon the market in a pure state free from sulphides or uncombined sulphur. The colouring matter (Clayton Fast Black) is dissolved in a strong boiling solution of sodium sulphite. The solution obtained is thickened by means of starch, or other suitable thickening agent, and, when cold, is mixed with glucose and a caustic alkali. The paste so formed is printed on the goods, and these are steamed and washed and the colour fixed (if necessary), which may be done by a short passage through a bath containing a copper salt, or a chromate, or a mixture of both. As no sulphide or free sulphur is present, there is no attack upon the copper rolls, nor is there any liability to tender, or render rotten, the goods in the subsequent steaming. When an alkali-soluble colouring matter is used, the employment of sodium sulphite may be omitted. Instead of adding glucose to the printing paste, the paste may be employed without glucose, and glucose be applied to the material by a preliminary padding and drying. The last method is especially suitable when indigo is required to be printed simultaneously with black according to the Schlieper and Baum process, and is also advantageous in other cases when the duration of the steaming is very short.

The prints obtained by the new process possess remarkable resistance to injury by washing, soaping, and light; the blacks, when fixed with copper salts, having a fastness equal and in some respects superior to aniline black, over which they have the advantage of not tendering the fibre and of being ungreenable. The method can further be used when the employment of aniline black is excluded—as, for instance, in printing together with indigo, or paranitraniline red. The process is further illustrated by the following two examples:—

2lb. of Clayton Fast Black B P, 2lb. of sodium sulphite, and 6lb. of water are heated together until a clear solution is obtained. 10lb. of starch paste (8 per cent.) and 1lb. of glucose dissolved in 1½lb. of water are then added, and to the mixture obtained there is added, whilst rapidly stirring, 2½lb. of caustic soda lye (70° Tw.) The paste thus prepared is printed on cotton goods, which after drying are steamed for twenty minutes, washed, fixed by passing them through a hot bath containing ½ per cent. of copper sulphate and ½ per cent. of acetic acid, and then are washed, soaped, and dried.

4lb. of Clayton Fast Black B P, 4lb. of sodium sulphite, and 12lb. of water are heated together until a clear solution is obtained. When cold the solution is mixed with 1lb. of solid starch suspended in 7lb. of cold water, and whilst the mixture is rapidly stirred, 22lb. of caustic soda lye (70° Tw.) are run in. The printing paste thus prepared is applied to cotton goods which have been previously prepared by padding in a solution containing from 5 to 20 per cent. of glucose and dried. After printing, the goods are dried, steamed for from three to five minutes in a continuous steamer or Mather and Platt ager, and then soaped, washed, and dried.

Stripping Colours on Cotton.

IT is frequently desirable, for one reason or another, to remove a colour that it may be replaced by another, or re-dyed with better effect, although this should be avoided wherever possible, because the fibre is always more or less injured. A few colours, such as Primuline, Thioflavine S, etc., cutch brown, the sulphide colours, and aniline black, cannot be entirely discharged; prolonged boiling in a large volume of water is perhaps best for the direct colours, and even dark shades of cutch brown can be reduced to a fair extent by boiling with oxalic and hydrochloric acids. Treatment with bleaching powder solution is not to be recommended, since it yields uneven results. The sulphide colours, when properly fixed, are very fast, but they can be reduced a little by bleaching. If treated before fixing, however, bleaching will remove most of the colour.

Indigo blue has sometimes to be made lighter, or stripped altogether. There are three ways of doing this—bleaching, oxidising with chromic acid, or reducing with bisulphite of soda. Bleaching is very unsatisfactory. When chromic acid is used, the goods should be passed quickly through a boiling bath containing 9 per cent. bichromate of potash and 3 per cent. sulphuric acid (D.O.V.), and well washed. Repeat until the colour is pale enough. This is very effective. Discharging by reduction, which has undoubtedly a much less injurious action on the fibre, is effected at the boil with zinc dust and bisulphite of soda (32° Tw.). A gill measure of zinc powder is carefully and gradually mixed with three gallons of bisulphite, and then added to the boiling bath. The goods must afterwards be washed and treated with warm dilute acid, and then well washed again.

This reduction method will also discharge to the original grey nearly all the direct colours in use at the present time, including those known as developed or ingrain colours. It has a great advantage over bleaching, in that the goods are scarcely injured. They are left grey instead of white. Iron buffs are readily stripped by means of a moderately strong boiling solution of oxalic acid, to which a little hydrochloric acid may be advantageously added. This will also strip khaki drab if dyed with cromium and iron salts; if they are bottomed with Cachou de Laval the iron can be removed as above, and the cachou reduced very much by subsequent bleaching.

The best method for discharging basic colours, however well mordanted (says the "Textile Colourist"), is by boiling in moderately strong caustic soda, with or without soap. Though some are readily removed by the bisulphite method, such as Victoria blue, violet, etc., others, as methylene blue, are rendered temporarily colourless through reduction, but persist in coming back again on exposure to the air. Boiling caustic soda through its solvent properties will also decolourise chrome orange, etc., with little injury to the fibre. Chrome green, a fairly fast colour, can be discharged very effectively by first removing the lead chromate with caustic lye, and then the indigo by one of the methods already described. Slates and drabs produced by tannin and iron salts are readily destroyed by warm mineral acids or oxalic acid. The same treatment will bring logwood black down to a light brown. In discharging aniline black, bleaching is generally resorted to with not very good results. Defects in aniline black can easily be remedied without such a drastic action as stripping.

Mordanting Wool.

COLOURS fast to milling may be produced on wool by the formation of lakes, and by this process the woollen goods are mordanted with chromium compounds and subsequently boiled in a solution of the dyestuff. The chief feature of the mordanting process consists in impregnating the material to be mordanted with a boiling solution of potassium or sodium bichromate with certain assistants, which serve to decompose the bichromate and simultaneously to reduce the chromic acid thus formed. Suitable assistants are tartar, oxalic acid, lactic acid, or lignorosin in combination with sulphuric acid. Sulphuric acid alone, or boro-sulphuric acid, or certain other additions sometimes employed, set free the chromic acid without reducing it; hence the reduction can only take place by affecting the wool fibre. It has, however, been recently found by the Actien Gesellschaft für Anilin Fabrikation of Berlin that by substituting for the above-mentioned assistants neutral ammonium salts—for instance, ammonium sulphate,—a mordanting bath of most valuable properties is obtained.

The new mordanting bath, prepared from potassium bichromate and ammonium sulphate, is neutral at first but becomes slowly acid when boiled, a part of the ammonium sulphate decomposing and ammonia being given off. The latter escapes or reduces the small quantities of chromic acid which at the same time have been set free; further, nitrogen, water, and lower oxides of chromium are formed, which latter immediately become fixed upon the wool fibre. It is evident that the mordant is slowly and evenly deposited on the fibre, and if a sufficient quantity of ammonium sulphate is added the bath may be almost completely exhausted.

This new method permits the addition of a number of mordant colouring matters directly to the mordanting bath, without the formation of a lake occurring immediately in the bath. As the bath is neutral at first, the colouring matter is first absorbed by the wool. On boiling, the trace of chromic acid liberated is immediately taken up by the fibre, which possesses a very great affinity for it, and combines with the colouring matter upon the fibre. The reaction continues in the same manner, and is assisted by the dyebath becoming more and more acid, until both the colouring matter and the chromic acid are withdrawn from the bath and united upon the wool.

The following advantages are claimed for the new method:—The dyeing process is carried out in one single operation, the goods being brought into the boiling bath, no subsequent addition of any ingredients being required. The bath is completely exhausted, so that several consecutive dyeing operations may be carried out in the same bath. Mere traces of chromium that may have been retained can be removed, if necessary, by the addition of a small quantity of lactic acid. The bath directly dyes those shades which in the older dyeing processes have only been obtained by a subsequent treatment with potassium bichromate. Consequently the dyer has it in his power to match directly. Since dyestuffs, as a rule, dye very evenly in a neutral bath, the dyeings obtained with the help of this mordanting process are more even in shade compared with those produced upon a chromium mordant. Whilst in the latter case the colour lake is immediately formed upon the surface of the woollen fibre, thereby tending to yield uneven dyeings, by the new method the material is first thoroughly penetrated by the dyestuff, which is then gradually fixed during the boiling of the bath. By this means even very thick and closely-woven fabrics can be dyed through. Many colouring matters, when subjected to the new process, yield shades which are essentially richer and much faster to milling than those produced by the older ones. The preparation of the dyebath may be greatly facilitated by keeping standard solutions containing the dyestuff and all the necessary ingredients in the proportions required. Such standard solutions could be prepared by the colour manufacturers and brought upon the market.

The following are three examples of the method of conducting the new process:—(1.) Dissolve in boiling water 1lb. of potassium bichromate, 1lb. of ammonium sulphate, and 1lb. of anthracene red in a vat of 200gals. Introduce 100lb. of slubbing, and connect with a pump. Work for two hours until the bath is exhausted. Rinse and dry. (2.) Dissolve in boiling water 1lb. of Chrome Fast Yellow R, 1lb. of potassium bichromate, and 1lb. of ammonium sulphate in a vat of 300gals. Introduce 50lb. of worsted yarn at a moderate temperature, lift six times, raise the temperature slowly to boiling, and dye, gently boiling until the bath is exhausted. (3.) Dissolve in boiling water 7·5lb. of the azo-dyestuff paste obtained from diazotised picramic acid and meta-tolylenediamine, 1·5lb. of potassium bichromate, and 1·5lb. of ammonium sulphate in a piece vat of 200gals. Introduce 75lb. of worsted goods at a moderate temperature and work for fifteen minutes. Raise the temperature slowly to boiling, and dye while boiling until the bath is exhausted.

New Indigo-vat Dyeing Process.

A GREAT disadvantage in dyeing goods in the indigo vat is the necessity for more than one immersion, otherwise it is impossible to obtain shades of any depth. This fact results from the indigo white having in the ordinary vats only a limited affinity for the animal or vegetable fibre, so that when merely one immersion is given only a small portion of the indigo contained in the vat fixes on the fibre as indigo white, and consequently only a certain intensity of colour is obtained. In a very concentrated vat, however, it is possible to obtain deeper colours, but then they are not fast to washing, and rub off easily, being, so to speak, fixed superficially. The only way to obtain deep colours on the animal or vegetable fibre fast to washing and not liable to rubbing off consists in repeated dyeing operations, in order to sufficiently fix the indigo on the fibre by several immersions. This method, however, requires much time and labour, and consequently is very expensive.

It is very improbable, however, that this old system will long continue, for by a new process which has recently been tried by the large firm of dyestuff makers at Hoechst-on-Main, colours of deep intensity may be produced on the fibre by one immersion, colours which are fast to washing, and which do not come off when rubbed. The affinity of free indigo white for animal and vegetable fibre is much greater than that of the indigo sodium or lime salt usually employed in the vats, and under the present system it is impossible to obtain dyes in a vat containing free indigo white—that is to say, in a neutral, or even acid, vat,—for free indigo white behaves like an acid which requires an excess of alkali to dissolve it, and from its solution feeble acids (even carbonic acid) precipitate it; in this separated form it has no affinity for the fibre.

The separation of indigo white in a neutral, or even acid, bath can be avoided by an addition of certain substances, such as gum, glue, gelatine, dextrin, or starch albumen, and it is possible to obtain by a single immersion in vats thus prepared, dyes which do not rub off and are of an intensity of colour such as is generally only to be obtained by several immersions. The new process, therefore, consists in adding to the vat prepared in the usual manner a substance having the property of keeping the indigo white dissolved in a neutral or acid liquid, it thus being no longer necessary throughout the process to keep the vat alkaline, a neutral or even acid reaction being produced during the immersion of the goods by a gradual addition of acids or acid salts. The alkali may also be neutralised immediately before introducing the goods, instead of during the dyeing process. A dilute solution of sodium bisulphite or an aqueous solution of sulphurous acid is best suited for acidifying the vat, but other acid salts or acids, such as lactic, hydrochloric, or acetic acid, may also be used, which, together with the salts in the vat, do not produce any insoluble precipitates.

The best results in practice are obtained with the hydrosulphite vat, whilst those having a sediment—such, for instance, as the zinc dust lime and sulphate of iron-lime vat—are less suited for this dyeing process, as the sediment appears to combine mechanically with the greater portion of the substance added for dissolving the indigo white; but if the clear vat liquid is drawn off from the sediment, then the last-named vats yield also good results. While the bath is almost completely exhausted by one immersion, indigo-vat dyes are obtained of an intensity of colour such as could only be obtained hitherto by several immersions. The dyeing is thorough and the fastness to milling and rubbing far superior as compared with the equally deep dyes obtained in the ordinary manner. Besides, the solidity of the fibre, its brilliancy, its fitness for being spun, especially when the material is wool, are much increased by the reduction of work in a vat which is not alkaline, and are much greater than in the case of fibre dyed in ordinary indigo vats.

The quantity of glue added to dissolve the indigo white may be varied within wide limits according to the nature of thickening agent and whether the dyeing is to occur in a freshly prepared or an old bath. The quantity of acid to be added depends on the quantity of alkali contained in the vat, and an essential part of the process consists in the neutralisation of the alkali or actual acidification

of the bath. The following is an example of dyeing indigo blue on 50kilos. of slubbing, dyed with the Obermayer machine :—

Preparation of the Hydrosulphite (200 litres).—24 litres of sodium bisulphite (38 to 40° Bé. specific gravity) are diluted with 150 litres of water at a temperature of from 20 to 25° C., to which are slowly added, while stirring, 4kilos. of zinc dust made into paste with water. The whole is then further stirred for another half-hour. From 3 to 4kilos. of burnt lime (according to its strength) are slaked with water and stirred with 20 litres of water to form milk of lime, this mixture being added half-an-hour later to the hydrosulphite solution. The whole is allowed to stand for one hour after the last addition, and the clear solution is then drawn off.

Preparation of the Original Vat.—5kilos. of pure ground indigo (100 per cent. strength) and 6 litres of soda lye of 40° Bé. specific gravity (that is to say, the smallest quantity of alkali requisite to convert the indigo employed into indigo-white sodium salt) are diluted with 10 litres of water, to which are added 180 litres of the above-described hydrosulphite solution ; the whole is heated to 60° C. till all the indigo is dissolved and reduced.

Dyeing.—The apparatus is prepared with 50kilos. of well-wetted slubbing to which is added the requisite quantity of water (according to the size of apparatus), and the whole is heated to 50° C. Then 40 litres of the original vat (containing 1kilo. of indigo) are introduced and the apparatus started. Then 5 litres of 10 per cent. glue solution are added, and, by means of a dripping apparatus, 6½ litres of sodium bisulphite of 40° Bé. specific gravity diluted with water till the vat assumes an acid character. At the expiration of a quarter of an hour the vat is nearly exhausted, and the slubbing taken out and oxidised in the usual manner.

Improved Black Dyeing Process.

COTTON GOODS dyed by means of sulphide blacks have in some cases become rotten or tendered after being stored for some time, or when subsequently submitted to steaming or hot pressing. Investigation has led to the conclusion that this destructive effect is due to the deposition of finely-divided sulphur upon the cotton fibre during the process of dyeing, which sulphur subsequently becomes oxidised to sulphuric or sulphurous acid, which tenders or rots the cotton. The sulphur thus deposited must either arise from free sulphur or polysulphides contained in the dyestuff, or be produced during the dyeing operation by oxidation of the sulphide of sodium present. It should therefore be possible to prevent this tendering or rotting action either by adding a substance capable of combining with the free sulphur, or preferably by entirely avoiding the presence of sulphur, or sulphides, in the bath. The first of these conditions can be secured by adding to the dyebath just sufficient neutral sodium sulphite to combine with the whole of the sulphur present (either in the free state, or liable to be formed during the dyeing by oxidation of sodium sulphide), and to produce an innocuous sodium thio sulphate according to the equation $Na_2SO_3 + S = Na_2S_2O_3$. It is also possible to entirely avoid the presence of free sulphur, or sulphides, by making use of another reducing agent in place of sodium sulphide. In the ordinary process of dyeing with this class of dyestuffs the sodium sulphide (either present already in the dyestuff or added to the dyebath) fulfils the double function of acting as a dissolving agent for the colouring matter (insoluble in the free state) and of reducing it to its leuco compound. The former function, however, can be performed as well by neutral sodium sulphide, whilst the latter function can be effected by glucose and caustic alkali. For this purpose the pure dyestuff is dissolved in a solution of neutral sodium sulphite, with which it forms a soluble sulphite compound, or thiosulphonate. Glucose and a caustic alkali are then added, and the dyeing is then performed from a boiling bath with the addition of sufficient common salt, or Glauber's salt, to obtain the requisite depth of colour. It is inadmissible when using glucose as the reducing agent to employ a dyestuff which contains an admixture of sulphides, as is usually the case with the commercial sulphur colours prepared by the melt process ; on the contrary, the colouring matter should be employed in the free state as obtained by purification of the crude colour melts. For the same reason the glucose process is especially applicable to the class of sulphur colours which are prepared by means of thiosulphate without the employment of sulphur, or sulphides, and which are consequently pure products. The following examples serve to illustrate the method of adapting the improved method, in each case dyes of the Clayton Aniline Company Limited being used, that company having introduced the process.

To dye 50lb. of cotton piece goods, dissolve 6lb. of Clayton Fast Black B conc. together with 9lb. of sodium sulphide in 3 or 4gals. of hot water. When dissolved make up with water to 40gals. and add 6lb. of neutral sodium sulphite and 20lb. of common salt. The material is dyed on the jigger at the boil for about an hour and a half. It is then washed and fixed with 13 per cent. of copper sulphate and 1 per cent. of sodium bichromate.

To dye 50lb. of cotton piece goods, dissolve 6lb. of Clayton Fast Black B M together with 3lb. of neutral sodium sulphite in 3 or 4gals. of boiling water, and add 10lb. of caustic soda lye of 70° Tw. Add this solution to the dyebath, together with 15lb. of desiccated Glauber salt, and make up with water to 40gals. Dye for an hour and a half at the boiling point, adding by degrees a solution of 2lb. of glucose in a gallon of hot water. When the dyeing is complete, wash and fix with 3 per cent. of copper sulphate.

Alkali in the Indigo Vat.

AN excess of alkali over and above that required to combine with the indigo white is necessary in the indigo vat, but no quantitative experiments have previously been made to determine the relationship between the amount of indigo fixed and the alkalinity of the vat. It was known, however, that a large excess of alkali, especially in the case of caustic soda, acts detrimentally. The unfavourable influence of caustic soda as compared with lime depends mainly on the fact that the sodium compound of indigo white allows of a much more rapid penetration from the surface of atmospheric oxygen into the vat liquor than is the case with the lime compound. This is one of the reasons why lime is preferred. In the zinc vat and in the copperas vat lime is almost invariably used, but in the hydrosulphite vat caustic soda has to be used for practical reasons.

Recent researches have been made to ascertain by means of quantitative experiments exactly what effect a known excess of alkali has on the amount of indigo fixed, and at the same time to ascertain in what form the indigo is taken up from the vat. For this purpose cotton was dyed in a specially-constructed apparatus with the pure lime compound of indigo white, without and with the addition of lime and of caustic soda. The indigo taken up by the fibre was determined in each case quantitatively, as also was the alkali removed from the vat.

The results show that the intensity of shade obtainable with a lime vat decreases by substituting the lime in the vat by caustic soda. A slight difference is noticed on the addition of only 0·02grm. NaOH to 100cc. of vat liquor, while addition of from 0·05 to 0·14grm. NaOH to 100cc. of vat liquor reduces the amount of indigo fixed in the proportion of 16 to 13. If the alkalinity is increased to between 0·4 and 0·7grm. NaOH, only half as much indigo is fixed as with the pure indigo white lime compound. These figures are not to be regarded as constants, as they would vary with the concentration of the indigo white, the nature of the fibre, and the duration of the washing.

The process appears to be independent of the duration of the dyeing process and of the subsequent oxidation. In one experiment an excess of lime was used, but it apparently had no influence on the amount of colour fixed. Besides indigo white, the fibre also abstracts alkali from the vat. The amount of lime determined quantitatively, says the "Zeitsch. f. Angew. Chem.," was found to correspond very closely with the amount required theoretically by indigo deposited upon the fibre.

Immedial Colours Dyed Cold.

IMMEDIAL BLACK and Immedial Blue (Cassella) may be dyed cold, and owing to this property are very useful to dyers who have no steam boiler and cannot work according to the ordinary methods of dyeing, or for those whose boiler supply is inadequate. The dissolving of the dyestuffs is carried out in wooden or earthen vessels. The dyestuff is mixed with the quantities of sodium sulphide (the ordinary crystallised sodium sulphide of commerce) stated in the recipes mentioned later, and boiling hot water poured over the mixture, which is then well stirred until it is completely dissolved.

Immedial Black.—The dyeing of piece goods may be carried out in any earthen, wooden, or iron vessel, etc., which must, however, contain no parts made of copper or brass. It is essential that the goods, immediately after being dyed—*i.e.*, directly when coming from the dyevat—are well squeezed off at full width by means of a pair of squeezing rollers, and then at once very well rinsed. In dyeing the brands F F extra, V extra, and G extra, prepare the bath with about twenty times as much water as the goods weigh, and 20 to 25 per cent. Immedial Black calculated on the weight of the goods, in addition to 9½oz. sodium sulphide, 1lb. 3oz. dextrine (yellow), 1lb. 8oz. common salt, and 8oz. Turkey-red oil per 10gals. liquor.

When dyeing in the standing bath add for each subsequent lot 9 to 11 per cent. Immedial Black, 3 to 4 per cent. sodium sulphide, 1 to 2 per cent. dextrine, 1 to 2 per cent. common salt, and 1 to 2 per cent. Turkey-red oil, calculated on the weight of the dry goods.

When using the brands N B and N G, prepare the dyebath with about 20 times as much water as the goods weigh and 20 to 25 per cent. Immedial Black, calculated on the weight of the goods, as well as 14½oz. sodium sulphide, 1lb. 3oz. dextrine (yellow), 1lb. 8oz. common salt, and 8oz. Turkey-red oil, per 10gals. liquor.

When dyeing in the standing bath add for each subsequent lot 9 to 11 per cent. Immedial Black, 6 to 8 per cent. sodium sulphide, 1 to 2 per cent. dextrine, 1 to 2 per cent. common salt, and 1 to 2 per cent. Turkey-red oil, calculated on the weight of the dry goods.

The dyestuff is dissolved as stated before, and added to the bath. The other ingredients which have been previously dissolved are then added, and after the whole has been well stirred, the well-wetted goods are entered. These are left for about 1½ to 2 hours in the dyebath at the ordinary temperature, and turned during this time only three to four times. Care should be taken that during the dyeing operation the goods remain covered by the liquor as much as possible and are only brought into contact with the air during the turning. The dyed goods are squeezed off at full width by means of squeezing rollers fixed on the vat, immediately thoroughly washed in a second vat containing fresh water, and then after-treated.

The after-treatment may be done at ordinary temperature same as the dyeing. For bluish blacks use 3 per cent. bichrome and 3 per cent. acetic acid, calculated on the weight of the dry goods. For deep shades use 2 per cent. chrome alum, 2 per cent. bichrome, and 3 per cent. acetic acid, calculated on the weight of the dry goods. It is not necessary to after-treat dyeings done with the brands N B and N G, but it improves their shade somewhat.

The goods are left for about three-quarters to one hour at the ordinary temperature in the baths prepared as described in the foregoing, turned twice or three times during this time, and then washed. To the last rinsing bath 3 to 5oz. acetate of soda per 10gals. of liquor are added, and the goods dried without being rinsed again.

Cotton yarn may be dyed in a manner exactly analogous to that employed for the dyeing of piece goods, in any vat or other vessel free from brass or copper, and the quantities of dyestuff, as well as all other additions for the first bath and for subsequent lots, remain the same as indicated for the dyeing of piece goods. Previous to dyeing the yarn is well wetted, suspended as usual on sticks, and then entered at the ordinary temperature into the dyebath prepared as stated before. The duration of the dyeing operation is the same for piece goods—viz., about 1½ to 2 hours, during which time the yarn is turned five or six times. The dyeing is either conducted on bent sticks or iron pipes, the yarn remaining in this manner always covered by the liquor, or on straight sticks placed slantwise into the liquor, the yarn thus being also below the surface of the same. The dyed yarn is either quickly and evenly wrung off over the vat, to avoid any loss of dyestuff, or it is squeezed off by means of squeezing rollers fixed on the vat. In both cases this operation must be followed immediately by a thorough rinsing in fresh water in a vat kept at hand for this purpose. After rinsing the yarn is after-treated exactly as explained for piece goods.

Immedial Blue.—The dyeing of cotton piece goods is carried out in exactly the same manner as stated for Immedial Black, with the only difference that the goods after being dyed are simply squeezed, but not rinsed. The starting bath is prepared with about twenty times as much water as the goods weigh, 12 to 20 per cent. Immedial Blue C calculated on the weight of the dry goods, and 9½oz. sodium sulphide, 1lb. common salt, 8oz. caustic soda lye, 75° Tw. and 8oz. Turkey-red oil per 10gals. liquor.

When dyeing in the standing bath the same is replenished for each lot with 6 to 15 per cent. Immedial Blue C, 3 to 4 per cent. sodium sulphide, 1 to 2 per cent. common salt, 1 to 2 per cent. caustic soda lye 75° Tw., and 2 per cent. Turkey-red oil, calculated on the weight of the dry goods. The goods are dyed for about one and a half to two hours at the ordinary temperature, squeezed off, but not rinsed, and then the bluish-black shade is developed to blue.

In addition to the usual developing methods, the following may also be employed :—The pieces, after having been dyed and evenly squeezed off, but not rinsed, are laid in folds and simply placed into a room heated to from 140 to 160° F. (60 to 70° C.) for from 5 to 6 hours, after which time the blue will be developed. In order to prevent the goods from drying during this time they are wrapped into a cloth steeped into the dye liquor and slightly wrung off. After the developing a very thorough

washing is essential, or even soaping if necessary, in order to remove any particles of dyestuff that may still adhere to the fibre.

Cotton yarn is dyed with Immedial Blue C in the same manner as described for Immedial Black, with the exception that the yarn is not rinsed, but very well wrung off or squeezed off by being passed through the squeezing rollers and then well wrung off again. The yarn is then developed in the same manner as stated for piece goods. The preparing of the starting bath and the dyeing in the standing bath is carried out exactly as described for piece goods.

Dots and Stripes on Dark Grounds.

CLOTHS showing white dots and stripes on a dark ground are always favourites, and when calico has been mercerised, as is now often the case, a very effective result is produced. One of the best methods of producing this style depends on the use of the basic dyes, such as Methyl Violet, New Methylene Blue, Brilliant Green, Auramine, etc., as advantage can be taken of the circumstance that the tannin used for mordanting can be discharged with caustic soda. The following is a series of operations :—

The stuff is washed and freed from grease. It is then padded with a 2 per cent. solution of tannin at a temperature of 60 to 65° C. This must be done with absolute uniformity, or subsequent levelling will be impossible. After padding, the goods pass through wringing rolls to the drying rooms. The pieces are passed through a bath containing 10lb. of tartar emetic and 1lb. of sal ammoniac to 100gals. of water, to fix the tannin, and wrung and dried. The goods are printed with a mixture consisting of 2lb. starch, 6lb. British gum, and 50lb. of caustic soda lye of 38° B. If the style of engraving on the bowls demands it, this mixture can be diluted with a paste of 5lb. British gum and a gallon and a half of water. The printed goods are dried and put through the Mather-Platt for from one to two minutes, then through sulphuric acid of 1·4° B. Then after washing they are ready for dyeing.

The dyeing can be done with basic dyes by the usual processes, although many dyers, says the "Leipziger Färber Zeitung," add a little tartar emetic, sulphate of alumina, and glue to the dyebath, with the object of preserving the purity of the white. The following receipts are each for 100lb. of goods :—

Brilliant Reddish Violet : 5lb. Tannin Heliotrope, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Brilliant Violet : 2lb. Methyl Violet 7 B, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Dark Green : 3lb. Methylene Green, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Yellow : 2lb. Thioflavine T, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Blue : 3lb. New Methylene Blue N, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Dark Blue : 3lb. Naphtindone B B, 5lb. Thioflavine T, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Dark Green : 2lb. Naphtindone B B, 1lb. Thioflavine T, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Scarlet : 2lb. Safranine, 1lb. Thioflavine T, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Orange : 5lb. tannin orange R, 5lb. sulphate of alumina, and 2lb. tartar emetic.

Gold : 2lb. New Phosphine G, 5lb. sulphate of alumina, and 2lb. tartar emetic.

The goods are entered cold, and the bath slowly brought to the boil. When the bath is exhausted, the goods are lifted, rinsed, soaped (to liven the colours), again rinsed, and dried.

Points for Dyers.

VENTILATION IN THE DYEHOUSE.—Keep the dyehouse well ventilated and free from steam ; it pays. The writer has often been in dyehouses where it was quite impossible to see from one end to the other for the steam which was present. How can the men work comfortably under such conditions? How can they see when their work is properly done? Then, again, steam condenses and forms drops of water, which, if they get on to the goods, are liable to stain them. It is easy, in these days of fans and other ventilating appliances, to keep the atmosphere of a dyehouse free from steam, and although these may cost something in the first instance, yet, as the men can work better and quicker, their cost is saved in the increased output of work which is done, and by freedom from losses caused by stains from drops of condensed and often dirty water dropping from the roofs of the dye shops on to the goods.

Drying Wet Yarn.—The drying of dyed fabrics of all kinds is a matter of importance, and yet how little attention is given to the construction of the necessary appliances for carrying it out, and how few people have really a correct idea of the principles upon which drying is based. This is, perhaps, more particularly the case in connection with the drying of yarns, either in hanks or other forms. Piece goods are generally dried over drying cylinders or stentering machines, which work fairly satisfactory, although here there are one or two points that require attention, of which we will speak later on. We shall, however, first give some notice to the drying of yarns. Usually the dyehouse is provided with a drying stove, about the proper construction of which really very little care is often taken. We inspected one the other day, a description of which will show the lines on which these are usually built. The stove was about 8ft. in height by 12ft. long and 10ft. broad, and on the floor was arranged a coil of steampipes. Near one end was the entrance door of iron, made to slide. The roof was nearly flat, but there was a slight rise to the centre, and here three little apertures, about 16in. area each, were allowed. This stove was not found effective ; the drying was slow, and no matter how high the temperature was, it did not affect the drying. Where lay the fault? Let us look at the question of drying, and we will suppose that we put a quantity of wet yarn into a closed room. The water it contains must leave it, and it can only do so by going into the air. Air has a fairly good absorptive capacity for water vapour ; the normal air always contains some, and the hotter it is the more water it will take up. There is, however, a point when it becomes saturated and will not take up more. Now the air in our drying room will soon become charged with water vapour, and then no further drying can take place, and however long the yarns be left in that room they will never become properly dry. What has to be done then? Simply change the air. This is the whole secret of a successful drying stove—provide it with means for changing the air ; and this is done in the best and simplest way by making provision for a current of air right through, cold fresh air passing in at the bottom, over the steampipes, through the yarn to be dried, and then out at the top of the stove. The natural tendency of heated air to rise will often be sufficient to provide this current of air, and a good current has wonderful drying properties. Never mind if the temperature inside the stove be 20 or 30° lower ; the yarn will dry quicker in a current of air at 110° F. than it will in a closed room at 150° F. Hang a wet and dry bulb thermometer in the stove, and the greater difference there is in the reading of these two thermometers, the quicker will really be the drying power of the stove, because it shows that the air in the stove is far from saturated with water vapour. There is one defect of a closed-up drying stove that must be noted. If the water-saturated air cannot get away there is a tendency for some of this water to condense and form in drops about the roof, and these may fall on the yarns, causing spots and stains. There is not much risk of this in a stove through which a constant current of air is passing. We have not referred to the use of fans for mechanically creating a draught or current of air. We should say that anyone putting down a fan should have a drying stove built on lines which will work more economically and scientifically than the simple room we have in our mind in penning the above lines. In connection with drying cylinders we would only remark that here again the object should be to carry away by a current of air all the water vapour which comes from the pieces which are being dried.

Preserving Wooden Dyevats.—Wooden dyevats and liquor cisterns, when used, sooner or later become saturated with the various liquors and chemicals, some of which will tend to rot the wood in time. Besides, such saturated vats are somewhat difficult to keep clean. In order to preserve wooden dyevats or tanks they might be covered over with a composition made by dissolving 2½lb. shellac, 4½oz. rosin, and 4oz. Venice turpentine in 1gal. of methylated spirit. The ingredients are mixed together in a bottle or other convenient vessel and then shaken at intervals until they are thoroughly incorporated. This is applied by a brush, but care should be taken that the wood is quite dry. This composition will not affect, nor be changed by, any chemicals or dye liquors with the exception of caustic lyes.

It is foolish economy for a dyehouse to be restricted in its equipments ; the work is never so well done, nor is it so quickly done. Let us take as an example indigo vat dyeing. In order to produce certain shades, says the "Dyer and Calico Printer," it is necessary to dip the cotton two or three times. In all the best dyehouses these dippings are done in separate vats, and the result is an excellent colour. But for the sake of saving room and the time and trouble of setting several vats, some dyers will only have one vat, and the consequence is that the work turned out is not up to the mark. It is dull, and rubs badly, while the vat itself gets deficient in dyeing power very quickly, and becomes charged with deposited indigo. There is really in the end no saving, and there is no satisfaction to the dyer in turning out his work.

NOTES ON DYEING, BLEACHING, FINISHING, &c.

Specially compiled for THE TEXTILE MANUFACTURER.

ACID CYANINE B AND R.—These two new colours (Bayer) are dyed, in the same manner as other acid wool colours, with the addition of Glauber's salt and sulphuric acid (or bisulphate of soda). The B brand, when dyed a dark shade, closely approaches Sulphon Cyanine G R extra ; the R brand, however, is of a somewhat more reddish tone down and overhand, possessing at the same time more brightness of shade. Both the products are easily soluble. Their chief features are said to be their considerable resistance to light and steaming, their fastness to rubbing and perspiration being also good ; their fastness to milling, however, is not so good as that of the Sulphon Cyanines. They are both adapted for the dyeing of piece goods, particularly for the production of very fast navy blues. Dyed on woollen hanks they also yield useful shades, but on account of their being but slightly fast to milling they are not to be recommended for the dyeing of loose wool, etc.

GREY TO BLACK SHADES ON COTTON.—An interesting shade card, illustrating the large variety of shades from grey to black obtainable by the use of Diamine colours (Cassella), has recently been issued. The dyestuffs used may be briefly summed up as follows :—Diamine Black B H, for direct or developed dyeings in dark-blue, blue-black, and deep-black shades ; Diamine Black B O and R O, for direct dyeings, and for indigo and aniline-black bottoms ; Diamine Black H W, for greenish-black and dark-green shades ; Diamine Grey G, for grey shades ; Diamine Dark Blue, for shading and saddening ; the Diamine Jet Blacks, for special fastness to light ; the Oxydiamine Blacks, for cheap single-bath dyeings and substitutes for logwood ; the Diamineral Blacks, for blue blacks on mercerised goods ; the Diamine Beta Blacks, for deep blacks of bright appearance ; and the Diamogene colours, for diazotising.

TOLUYLENE ORANGE R.—This is a new substantive orange dyestuff (Bayer), which may be considered as a benzo nitrol developing dyestuff. It is dyed in the usual manner with Glauber's salt and soda, but dyed direct it is of little use in cotton dyeing, owing to its being but slightly fast to storing ; however, developed with benzo nitrol or paranitraniline it produces very bright chestnut shades of considerable fastness to washing. It is well adapted for combining with or shading brown developing colours such as Benzo Nitrol Brown, Pluto Brown, etc. Developed with benzo nitrol, it is claimed to be the best method for the dyeing of cotton yarn and fancy woven goods. Dyed direct it also produces very useful shades on half silk. When dyed direct the colour can be discharged a very good white with tin crystals or zinc powder, and sulphocyanide of zinc discharges it a cream colour ; shades which have been afterwards treated with benzo nitrol can only be discharged a white with zinc powder.

SULPHURISED COLOURING MATTERS.—The use of sulphurised colouring matters directly dyeing cotton has essentially increased during late years, but the presence of sodium sulphide employed as a solvent offers great inconveniences, as it is most injurious to the hands of the workmen, prevents the use of metallic vessels, yields waste waters containing sulphur, and affects the fibre to a considerable extent. It has recently been found that the drawbacks may be nullified by dissolving the sulphurised colouring matters in caustic soda lye with the addition of glucose, lactic acid, milk sugar, or dextrin, instead of in sodium sulphide. For example, one part by weight of immedial black is ground with one part of caustic soda lye (40° Bé. specific gravity) and one part of boiling water ; one part of glucose (or lactic acid, milk sugar or dextrin) is added thereto and the mixture is gently heated until a greenish-black liquor is formed. The standard solution thus obtained is ready for dyeing processes. A sufficient quantity of it is added to the dyebath and dyeing is effected, boiling, if necessary, with addition of common salt or normal sodium sulphite. In most cases the addition of the sulphite is of great advantage. The goods are rinsed and dried. The new process may be applied with an analogous result for other sulphurised dyestuffs—for instance, for Immedial Blue, Immedial Bronze, Vidal Black, Thiocatechine, Thiogen Black, Sulphaniline Black, Sulphon Black, Sulphogen Black, Katigen Black, Katigen Brown, Katigen Olive, Verde Italiano, Cross-dye Black, Eclipse Black, Sulphur Black, and the like. The method offers another great technical advantage, as it allows sulphurised dyestuffs to be employed in printing processes, from which, on account of sodium sulphide corroding the metallic parts of the printing apparatus, they have hitherto been excluded. For printing purposes the standard solution is to be thickened by means of British gum, or other suitable additions.

C

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.

10th June.

11,805 G. E. and J. F. STEAD, Leeds. Looms.
11,818 E. TAYLOR, Manchester. Sectional warp winding.
11,839 H. E. NEWTON, London. New azo dyestuffs. (*The Farbenfabriken vormals F. Bayer and Co., Germany.*)
11,852 N. WAHL, London. Felting machines.
11,853 C. WOLF, London. Apparatus for the dyeing, bleaching, and other similar treatment of fibrous materials.
11,858 A. J. BOULT, London. The treatment of ramie, china-grass, and other fibrous material.* (*C. Mosse and La Société Française de Ramie, France.*)

11th June.

11,868 W. BEDNELL, Coventry. The weighting of warps in textile machinery.
11,886 H. HOYLE and E. SCARBOROUGH, Keighley. Machinery for combing and dressing silk and other fibrous substances.

12th June.

11,957 W. M ATTEWELL, Nottingham. Hosiery machines.
11,975 T. E. PERKINS, Manchester. Machine for combined cording and braiding with or without a foundation.
12,025 S. SUWALSKI, London. Weft fork.*

13th June.

12,046 J. L. RUSHTON, Manchester. Machines for combing cotton, wool, and other textile fibres.
12,052 A. H. ILLINGWORTH and R. A. FRASER, Bradford. Pressing wool and the like into bags.
12,062 T. S. LAYCOCK and B. SPENCER, Keighley. Rollers for use in machinery for preparing or treating fibrous substances.
12,100 H. REPENNING, London. Weaving machines.*
12,102 P. P. CRAVEN, London. Ring spinning machines

14th June.

12,155 E. BATTEN, London. Machinery for use in the manufacture of mosaic or inlaid floorcloth.*
12,174 G. F. NEWMAN, London Compositions for rendering garments and other articles waterproof.*
12,185 J. Y. JOHNSON, London. Colouring matters of the anthracene series. (*The Badische Anilin and Soda Fabrik, Germany.*)
12,193 W. P. THOMPSON, Liverpool. Tubes for use in spinning mills, weaving sheds, and the like. (*The Marquis Giovanni Mazzacorati, Italy.*)

15th June.

12,246 B. HIND, Sheffield. Machines for clipping wool or hair.

17th June.

12,319 I. BRONN, London. Treatment of textile and other fibrous materials of animal origin, and of animalised fibrous materials of vegetable origin.
12,327 J. Y. JOHNSON, London. Dyeing blue shades. (*The Badische Anilin and Soda Fabrik, Germany.*)
12,334 H. PANITSCHETE and J. AHORN, London. Carpets.

18th June.

12,358 C. A. APPERLY and T. TANNER, Stroud. Twisting and doubling apparatus.
12,360 T. TAYLOR and OTHERS, Keighley. The manufacture of woven fabrics.
12,362 W. A. HEYES and J. LAWRENSON, Wigan. Process for enamelling wood bobbins used for spinning and manufacturing cotton, wool, silk, and like materials.
12,369 S. WRIGLEY, Oldham. Tramway lines or rails used in connection with the carriages of mules.
12,380 J. and J. WARD, JUN., Halifax. Dobbies of looms.
12,388 J. KEITH and W. W. WARDLE, Glasgow. Dyeing and conditioning yarns, fabrics, and other goods.
12,389 J. KEITH and W. W WARDLE, Glasgow. Drying chambers and apparatus for use in drying and conditioning yarns and other goods.
12,394 C. MARTER and J. F. BUTTERWORTH, Manchester. Material for use in the manufacture of loom shuttles.
12,405 T. W. ABBOTT, London. Apparatus for separating dust from fibrous material.

19th June.

12,476 T. PICKLES, Manchester. Method of finishing fabrics woven with coloured cotton or linen yarns.
12,487 J. J. SOUTHAM, Manchester. Woven hose pipes, tubes, or other articles.
12,491 ASA LEES AND CO. LIMITED and R. TAYLOR, JUN., Manchester. Spindles employed in slubbing, intermediate, and roving frames.*
12,519 J. A. A. IMBS, London. Spinning and twisting frames known as ring throstles.*
12,523 W. P. THOMPSON, London. Wool-washing machinery.* (*La Société A. Motte et Cie., France.*)
12,540 R. B. RANSFORD, London. Reserve printing on fabrics to be dyed with sulphur colours. (*L. Cassella and Co., Germany.*)
12,545 T. F. MACKIE and G. SHAW, Belfast. Machinery for breaking or scutching flax or other fibrous materials.

20th June.

12,578 T. R. SHILLITO, London New sulpho acids and sulphur dyestuffs. (*The Aniline Colour and Extract Works, formerly J. R. Geigy, Switzerland.*)
12,583 D. M. BREDIN, Kingston-on-Thames. Means for drawing off predetermined quantities of fluids from vats and other receptacles.
12,591 C. D. ABEL, London. Mordant dyeing colouring matter. (*Actien-Gesellschaft für Anilin-Fabrikation, Germany.*)
12,612 H. WILDT, London. Knitted fabrics.

21st June.

12,663 J. BANCROFT and HOWARD AND BULLOUGH LIMITED, Accrington. Appliances for spinning, twisting, and winding frame building motions.
12,674 S. MUSGRAVE and G. WILSON, London. Selvage motions of looms.
12,691 R. E. LEVE, London. Electric cloth-cutting machines.*

22nd June.

12,728 J. S. AINLEY and A. L. STRINGER, Huddersfield. Shuttle relief and checking motions of looms.
12,772 P. P. CRAVEN, London. Ring-spinning, doubling, and twisting machines.

24th June.

12,794 G. S. HAMILTON, Glasgow. Self-accommodating bearing for rapidly-revolving spindles.
12,795 E. HAIGH and W. W. STOTT, Huddersfield. Apparatus for sizing and damping yarns or fabrics.
12,844 H. FERGUSON, London. Combing machines for long fibres.

25th June.

12,872 W. E. HEYS, Manchester. Multiple shuttle-box power-looms. (*A. Nuyts et Cie., France.*)
12,951 V. BELANGER, London. Spindles for spinning and twisting machines.*
12,960 W. L. WISE, London. Jacquard apparatus. (*J. Szczepanik, Austria.*)
12,967 W. P. THOMPSON, Liverpool. Devices for plumbing spinning spindles.* (*H. Kelly, United States.*)
12,968 W. P. THOMPSON, Liverpool. Spindle plumbs or devices by which the perpendicularity of spinning machine spindles may be determined.* (*H. Kelly, United States.*)
12,980 H. R. RICHES and THE WOOL, HIDE, AND SKIN SYNDICATE LIMITED, London. Process for cleaning and scouring wools, furs, hair, skins, and textile fabrics.
12,983 J. Y. JOHNSON, London. Knitting machines. (*R. W. Scott and L. N. D. Williams, United States.*)
12,984 J. Y. JOHNSON, London. Needles for knitting machines. (*R. W. Scott and L. N. D. Williams, United States.*)

26th June.

12,998 R. HARROP, Manchester. Reeling and doubling yarns

27th June.

13,102 W. GONTERMANN, London. Iron finishing rollers.
13,104 T. JONES and OTHERS, London Straight-bar knitting frames of the "Cotton" type.
13,112 A. SCHLUPERS, London. Double-pile fabrics of mohair or worsted.
13,130 W. R. PIHL and A. OLSEN, London. Machines for making nets.*
13,132 W. P. THOMPSON, London Automatic cloth-guiding devices for machines for handling piece goods. (*W. I. Lewis, United States.*)
13,140 C. R WOODWARD and OTHERS, London. Stop motions for circular knitting machines.

28th June.

13,168 J. LISTER, Keighley. Mechanism for winding warps on beams in dressing, beaming, sizing, and like machines.
13,177 G. S. HICKLING Manchester. Roller weights used in frames, for preparing and spinning fibrous materials.
13,181 T. A. BOYD and J. T. BOYD LIMITED, Shettleston, near Glasgow. Cap spindles, caps, and lifting rails for cap spinning and twisting frames.
13,183 H. H. HACKING, Bury. Looms.
13,198 L. BOWEN, London Washing machines.
13,201 W. DEERING, London. Twine.*

29th June.

13,251 T. THOMPSON and J. HEYWOOD, Manchester. Preparing machinery for textile materials.
13,257 J. VERT and F. T LAING, Glasgow. Portable steam damping apparatus.
13,269 G BURGESS and OTHERS, London. Devices for easing shuttles employed in looms.
13,295 J. HORNER and W. HEAP, London. Hackling machines.
13,297 W. MARTIN, London. Processes of treating fibrous material.

1st July

13,313 THE CALICO PRINTERS' ASSOCIATION LIMITED and G. HIGGINBOTHAM, Manchester. Machines for printing calico and other fabrics.
13,325 W. F. REYNOLDS, Belfast. Machines for beetling or finishing cloth.
13,348 C. F. KOBES, London. Looms for the production of patterns similar to embroidery.*
13,375 O. IMRAY, London. Apparatus for bleaching, dyeing, washing, and otherwise treating fibres by means of circulating liquids. (*C. Roesch et Cie, Germany.*)
13,377 C. D. ABEL, London. Colouring matters directly dyeing cotton. (*Actien-Gesellschaft für Anilin-Fabrikation, Germany.*)
13,378 O. IMRAY, London. Reduced indigo. (*Farbwerke vormals Meister, Lucius and Bruning, Germany.*)
13,395 G. DE KEUKELAERE, London The treatment of textile materials on cops, bobbins, spindles, etc.
13,399 H. LYE and YATES AND CO LIMITED, London. Hand implement for assisting in looping and for cutting the pile of hand-woven pile fabrics.

2nd July.

13,414 W. B. WHITE, Burnley Weft forks and shuttle pegs of looms.
13,419 A. MIDDLETON and P. BARRETT, Nottingham. Circular knitting machines.
13,427 J. L. NAPIER, Glasgow. Machinery for spinning cotton and other fibres.
13,433 H. W. WYMAN, London. Mechanism for replenishing filling or yarn in the shuttles of looms.*
13,505 T. I. BIRKIN and OTHERS, London. Twist lace.

3rd July.

13,554 J. COOPER, London. Twist lace machines.
13,560 E. L THORP, London. Plaiting or braiding machines.
13,562 P. GRENET and A. BACHELARD, London Waterproofing fabrics, felts, feathers, furs, and other materials.
13,564 W. F. FAIR and C. WOOD, London. Cloth-cutting machines.
13,585 H. FERGUSON, London. Apparatus for washing textile materials.

4th July.

13,615 F. WAITE and WAITE AND SAVILLE LIMITED, Bradford. Machines for embossed printing.
13,619 I. LEVINSTEIN and OTHERS, Manchester. New azo colouring matters.
13,641 P. aed E. LEROUX, London. Face-to-face pile fabrics.

5th July.

13,673 J. CUNNEFF, Manchester. Apparatus for threading shuttles.
13,679 R. H. PLACE, Halifax. Dobbies of looms.
13,735 THE FIRM OF A. ET P. POLLET, London. Mechanism of the brushes of combing machines.

6th July.

13,755 THE CALICO PRINTERS' ASSOCIATION LIMITED and W. W. WILSON, Manchester. Calico printing machines.
13,758 J. W. NASMITH, Manchester. Combing machines.
13,799 A. BRAUN and J. WENTZLER, London. Self-acting mule.
13,805 G. A. F. MULLER, London. Draw-off or stretching rollers for textile machinery.

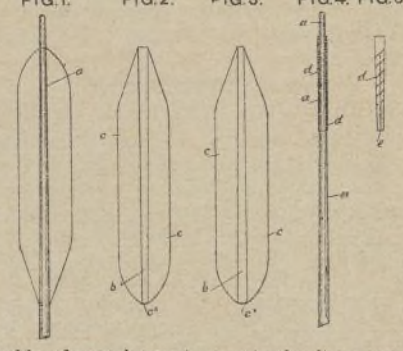
Recent Textile Patents.

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.

7393. Spindles. April 21. T. Ashworth, Lynwood, Urmston, and J. S. Gaunt. This invention relates to that class of spinning frames wherein the cops are wound either upon a bare spindle or upon a tube in an inverted position—that is to say, with the base of the cop upwards. An objection to the above method of winding the cops (that is, base upwards) has been that in consequence of the spindle being always slightly tapered towards the top (as shown at *a* in Fig. 1 of the drawings), the hole *b* through the cop *c* when doffed from the spindle and reversed (see Fig. 2) has always been tapered in the wrong direction—that is, it has always been smaller at the base of the cop and larger towards the point or nose, which has interfered with the facility for placing them on the skewers for winding in the case of warp, and also, in the case of weft, with the threading of the cops on to the tongue of the shuttle. The object is to remedy this defect by making the hole in the cop to taper in the right direction—that is, from the base towards the point, as shown in Fig. 3. The tapering point of each spindle *a* has an inverted conical shell *d* (as shown in section at Fig. 4 and elevation at Fig. 5) made of paper or other suitable light substance or material, the lower end being tapered to a fine edge, and gradually thickened upwards so that its exterior forms an inverted cone (see Fig. 5) This paper or other shell *d* is split longitudinally for some distance from its

FIG. 1. FIG. 2. FIG. 3. FIG. 4. FIG. 5.



lower or thin edge as shown at *e* so as to give it a certain amount of elasticity to enable it to grip the spindle *a* with which it revolves, and the cop *c* of yarn being wound upon this inverted conical shell *d* with its base upwards will consequently, when doffed and reversed, have the hole *b* through its centre tapered in the required direction—that is, from the base towards the point, as shown at Fig. 3. The inverted conical shells *d* are doffed from the spindles with the cops *c*, and as the split or splits *e* allow the thin end to collapse, they can readily be removed from the ends of the cops *c* after doffing.—May 21, 1901.

8256. Printing oilcloths. May 4. W. Melville, Alexander Works, Varley-street, Manchester. Relates chiefly to rollers for use in the printing of oilcloths, and consists in the use of a roller composed of a paper pulp and covered with a substance known as "rubberine," or any like composition, and the surface of which is cut or moulded with the intended pattern in relief.—May 4, 1901.

9505. Mercerising yarns. May 24. J. M. Ross, Greenhead Works, Glasgow, and J. Schneider. The improved apparatus comprises a vat or vessel A, which is divided by a partition A^1 into two or more compartments, one B to hold the mercerising liquor, and the other C or others for washing water. Over each compartment is mounted in bearings a shaft D carrying a grooved roller D^1, and thereunder, within each compartment, is mounted a like shaft E, having on it a series of grooved pulleys, which are preferably loose and free to turn independently, or a single smooth roller E^1 may take the place of the grooved rollers. Either the top grooved rollers D^1 or the bottom pulleys or rollers E^1 may be angled in order to keep the feed straight, and this bottom roller may be positively driven if desired. The yarn to be treated is carried through the mercerising liquor and washing water by these grooved rollers and pulleys, being passed over the end groove of the upper roller D^1 surmounting the liquor tank B, down and under the grooved pulley or smooth roller E^1 beneath, thence upwards and over the second groove of the upper roller D^1, and so on back and forth over and under the upper and lower roller or pulleys D^1, E^1, to form a series of bights or endless hanks extending across the mercerising liquor compartment B, and a like series extending

FIG. 1.

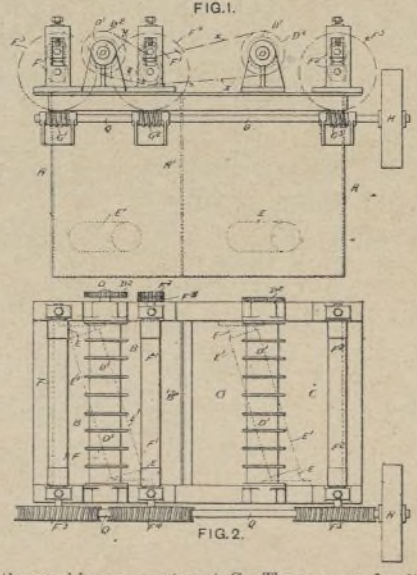


FIG. 2.

across the washing compartment C. These grooved rollers and pulleys D^1, E^1 feed the yarn through the liquor and serve to maintain it in tension within it, whilst the yarn is further fed and drawn through the tank at a uniform speed and tension by means of several pairs of gripping rolls F, F^1, F^2. One pair of these gripping rolls is mounted over the feeding-in end of the tank A, a second pair F^1 over the partition A^1 separating the compartments B and C, and a third pair F^2 over the further or delivery end of the tank A. The shaft carrying one of each pair F, F^1, F^2 of such rolls has on its end a worm-wheel F^3, F^4, F^5 respectively, and the roll shafts of these three pairs are driven in unison by a worm-shaft Q or other gearing extending along the side of the tank and having worms G^1, G^2, G^3 on it in gear with the worm-wheels F^2, F^3, F^4, the worm-shaft G being driven by a belt and pulley H or other means, and the grooved rollers or pulleys D^1, E^1 being driven by sprocket wheels D^2, D^3 on their spindles, and chains *x*, *y* passing round these wheels, and similar wheels F^6, F^7 on the gripping rolls F^1.—May 18, 1901.

9530. Warps. May 24. J. Law, F. A. Holt, and Thomas Holt Limited, Atlas Ironworks, Rochdale. Relates to a method of and machinery for producing certain warps used particularly for hand-loom weaving, and hitherto produced only by hand labour, chiefly in India and other Eastern countries.—May 23, 1901.

10,157 Warp threads. June 1. H. Hardwick, 3152, North Broad-street, Philadelphia, U.S.A. Relates to textile machinery, such as warping machines for winding, or looms for weaving fabrics, in which are employed parti-coloured warp threads having the colours so disposed upon the different threads that when the threads are woven into a fabric a predetermined pattern will be produced, the ordinary tapestry carpet being a common example of a fabric woven in this way. The object is to provide for the control of the warp threads during the winding or weaving operation, so that the colours of the different threads can be kept in closer "register" than usual.—May 25, 1901.

10,316 Colouring matters. June 5. J. Y. Johnson, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). In Patent No. 15,080, of 1899, there is described the production of mono-alphylido-anthraquinone-monosulpho acids by the condensation of mono-nitro-anthraquinone-sulpho acids with aromatic amines. It is now discovered that

these mono-alphylido-anthraquinone-mono-sulpho acids, upon treatment with chlorine or bromine, yield new halogen derivatives which are themselves colouring matters, and are also valuable as materials for the production of other new colouring matters.—May 25, 1901.

10,512. Circular knitting machines. June 8. J. Y. Johnson, London (communicated by R. W. Scott and L. N. D. Williams, 2079, East Cumberland-street, Philadelphia, U.S.A.). Relates to improvements upon Patent No. 14,157, 1899. The ring 14 which is employed for raising the needles so that their tops will be in the same plane for the application of a knitted web thereto is provided with projecting pins or stems 50 which enter the lower portions of the needle grooves in the cylinder 3, and by contact with the lower ends of the needle stems support the said needles when the cylinder is raised. The cam for acting upon the bits of the needles to depress the same is shown at 51, this cam being mounted so as to slide vertically in a guide 52 secured to a ring 53 which is mounted upon the upper end of the needle cylinder so as to be free to turn thereon to a limited extent. A pin 54 on the cam projects through a slot in the guide 52, and is acted upon by a coiled spring 55, passing around a sheave 56 on the guide and connected to a fixed pin 57 thereon, so that the cam 51 has a constant tendency to rise in its guide, but can be forced down to the position

FIG. 1.

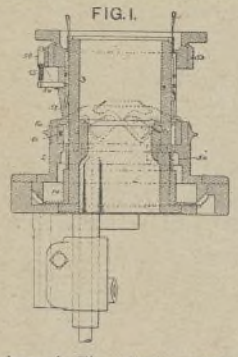
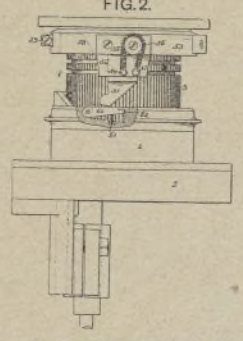


FIG. 2.



shown in Fig. 2 by the action of a cam at the upper end of the needle cylinder, as shown by the dotted lines at 58 in Fig. 2, this cam being caused to act by projecting any suitable form of stop into the path of a projecting pin 59 on the ring 53. The yielding cam in the needle supporting ring of the cambox is shown at 60, the said cam being pivoted to the box at one end, and acted upon by a spring 61 tending to raise its other end, this upward movement being limited by contact of a toe 62 on the cam with a shoulder on the cam ring so that the upper edge of the swinging cam 60 normally forms a continuation of the horizontal upper surface of the cam ring.—May 11, 1901.

10,578. Carding. June 9. R. W. James, London (communicated by F. Mérelle, 19, Rue Cambon, Paris). Relates to means for mechanically teasling wool before entering the carding machine, which effects its object by initially and strongly stretching the sheet of wool and subsequently drawing it back or heaping it up on its entry to the carding machine by a series of cylinders. Fig. 1 shows the teasling device diagrammatically, and Fig. 2 a detail view of the rollers C, C¹, illustrating the rollers on the periphery. The device is placed at the entry to the carding machine, so that the wool is passed therethrough before entering the carding

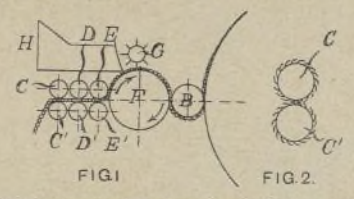
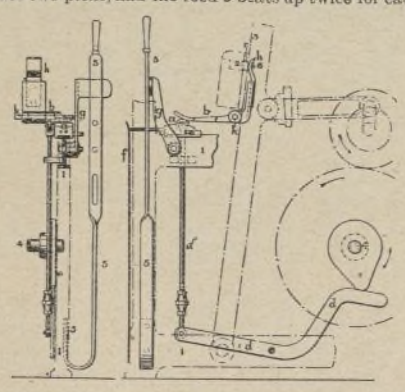


FIG. 1. FIG. 2.

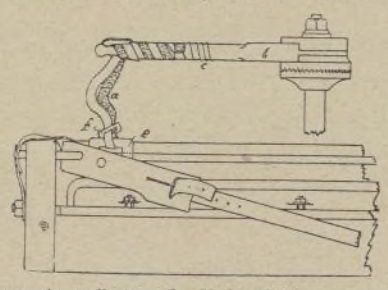
machine. This device consists of a pair of cylinders C, C¹ furnished with needles and mounted close together. They receive the wool to be treated. Following this pair is another pair of rollers D, D¹ furnished with longitudinal grooves. These two pairs of cylinders are so operated that a considerable tension is set up in the wool as it passes, the tension being regulated according to the nature of the material treated. A further pair of rollers E, E¹ is provided, furnished with points, which may be round, saw-toothed, or other shape. Between these two latter pairs of rollers the wool is drawn up, accumulated, or heaped up by giving these said pairs a differential velocity—*i e*, the rollers E, E¹ are less in diameter than the rollers D, D¹.—June 1, 1901.

10,933. Stop-motions of looms. June 15. H. R. Ross, Durham-street Mills, Belfast. To the loom side or frame 1 (at the side opposite to the change box) is fixed a "frog" *a* (similar to that used in a fast reed loom), and to the shuttle-box 2, at the same side of the loom, is pivoted a finger *b* which is lifted or operated by the swell *c* in the back of the shuttle-box 2. The swell *c* is pushed back by the shuttle as it enters the shuttle-box 2, and the finger *b* is lifted at the same time. When the finger *b* is raised by the swell *c* it is lifted above and clear of the frog *a*. The swell *c* engages against the upper part *h* of the pivoted finger or lever *b* to move it in one direction, and it and the swell are moved back again by the spring 6. The finger or lever *b* is pivoted upon the bar or rod *k*, and is carried backwards and forwards with the reed 3. The loom makes two picks, and the reed 3 beats up twice for each entry



of the shuttle into the shuttle-box 2. At one pick the shuttle enters the shuttle-box 2, and the next pick the shuttle enters the change-box, leaving the shuttle-box 2 empty. To prevent the stopping of the loom when the shuttle-box 2 is empty and the shuttle is in the change-box, a reciprocating rod d^1 and lever *d* lift the stop lever *b*. The reciprocating rod d^1 and rocking lever *d* are operated from the bottom shaft 4, or other rotating part of the loom by a cam *e*, and the rod d^1 raises the finger *b* clear of the frog *a* at each alternate pick or shot, and thus out of action when the shuttle is in the change-box or shuttle-box at the opposite end of the loom. The frog *a* slides to and fro on the frame 1, and it is moved in the direction to stop the loom by the lever *b*, and is pushed in the reverse direction back into its normal position by the spring *f*. The frog *a* may come into direct contact with the setting-on lever 5 to stop the loom, but it is preferred to employ the second or intermediate lever *g* pivoted to the frame side 1, with which the frog *a* comes into contact, and which in turn acts upon the setting-on lever 5 to throw it off.—June 1, 1901.

10,938. Picking straps. June 15. O. Hoffmann, Neugersdorf, Saxony. The strap joining the picking arm with the picker is made double, and formed as an endless strap. When the strap runs the risk of getting worn out at the spot where it is particularly exposed to wear, it is displaced in its position and turned until a fresh part takes the wear. The endless strap *a* is wound several times round the picking arm *b*, and is fastened by means of a cord *e* to the arm *b* in such a way that when slackening the strap



the latter may be easily turned. If the picking strap is formed as an endless strap by sewing or clamping the two ends together before its application to the loom, the strap *a* is first attached to the picker *e*, and thereafter wound upon and fastened to the picking arm *b* in the manner described above.—May 11, 1901.

11,054. Cloth-cutting machines. June 18. N. Garland, 76, Bay-street, Toronto. Relates to improvements in electrically-operated cloth-cutting machines. The improvements relate particularly to the guard for the knife rod, to the means for connecting the knife to the knife rod, to an adjustable edge for the baseplate whereby the operation of the machine over the cloth is facilitated, to means in front of the standard whereby the wear of the knife in the knife slot in reciprocating is minimised, to the means whereby the cloth is held up from the slot in the bedplate so that the cloth is prevented from becoming stuck or wedged in the slot, to an improved means for providing for the easy running of the bedplate over the cloth, to an improved means for connecting the standard to the bedplate, and to provide an improved bushing for connecting the arm attached to the knife rod to the crankpin of the crank on the end of the motor shaft.—May 25, 1901.

11,387. Pile fabrics. June 22. H. Rösgen, Erkrath, Düsseldorf, Germany. Relates to the manufacture of pile fabrics, such as plush and more particularly to double-pile fabrics, where the pile warp passes from one cloth to the other placed face to face, and the two cloths are afterwards severed with a knife. The improvement has for its object to avoid the interruption of the shuttle motion during the time the flat wires are being introduced. In the accompanying drawings, Fig. 1 shows the arrangement of the threads during the introduction of a wire *r* into the

FIG. 1.

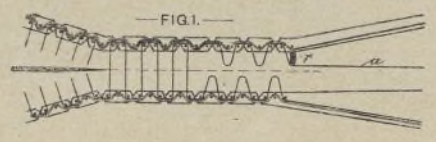


FIG. 2.

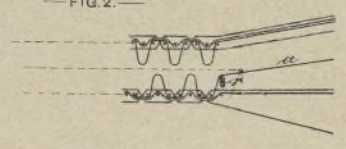
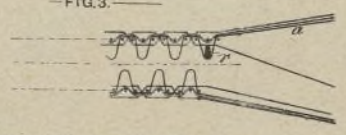


FIG. 3.



upper fabric. During this operation the pile warp *a* of the upper fabric is lowered, so that the wire lies above the same. Fig. 2 shows the arrangement of the threads at the moment when a wire *r* is introduced into the lower fabric simultaneously with the shuttle. The pile threads of the lower fabric are lifted, so that the wire *r* will enter below the same Fig. 3 shows the arrangement of threads when a weft enters the upper fabric, without the simultaneous introduction of a wire.—May 25, 1901.

11,962. Lifting motion for spinning frames. July 3. Asa Lees and Co. Limited, Soho Ironworks, Oldham, R. Taylor, jun., and J. W. Clegg. Relates to an improved lifting motion for spinning and doubling frames, and the object is to give a straight lift to the pokers and to avoid the disadvantages of the ordinary lifting motion. Horizontal transverse bars are used, which pass from one side of the frame to the other, and upon each bar rests a pair of pokers, one poker near each end. The transverse bars are all raised together vertically by chains and rods actuated from a pulley or bowl which has an oscillating movement given to it by the copping motion, and a chain from this pulley is connected to a quadrant arm secured upon a shaft which is moved in one direction by the aforesaid connections from the copping motion, and in the other by the weight of the pokers and the rails upon which they rest Upon this shaft, near each end, is secured a vertical arm, and to the upper ends of these arms are connected chains which pass over guide pulleys, and then are carried back towards the copping motion, where they pass over other guide pulleys mounted upon studs, and are connected by chains to the horizontal bar under one pair of pokers. The pokers on the other side of the quadrant are actuated from the vertical arms by two chains connected at their other ends to two rods which extend about to the other end of the machine, and to these rods, near each pair of pokers, is connected a bracket, and a chain from each bracket passes over a guide pulley and is connected to the horizontal bar below. By this arrangement the oscillating motion is conveyed from the copping motion by chains and connections to all the transverse bars, which, with the pokers, are lifted vertically parallel to the axes of the pokers without any twisting or bending strain.—May 11, 1901.

12,063. Dyeing apparatus. July 4. T. G. Charlesworth, Castle Mill Dyeworks, Leicester. Has reference to machinery or apparatus employed in dyeing, and has for its particular object the provision of means for automatically removing the goods or articles from the dyevat and conveying them to and under a sprinkler for washing purposes, after which they are allowed to drop into a trolley, by which they may be conveyed to another part of the works to undergo further treatment.—May 4, 1901.

12,454. Stretching fabrics. July 10. C. Laval, Rue des Romains, Rheims, France. Relates to an apparatus for the continuous stretching or expanding of fabrics whereby their widening or their treatment generally in the direction of their width may be effected, consisting in the combination of two endless chains working in directly opposite directions at right angles to the movement of the fabric, and composed of slightly-curved links having sharp flutings on their outward surface, arranged parallel to such links and at right angles to the direction of travel.—May 4, 1901.

12,517. Dyestuff containing sulphur. July 11. J. Y. Johnson, London (communicated by the Badische Anilin and Soda Fabric, Ludwigshafen-on-Rhine). It is found that when 1·4-dichlor-2·6-dinitro-benzene (the preparation and some of the properties of which are described by Jungfleisch, "Jahresberichte über die Fortschritte der Chemie," 1868, page 348; Körner, *Ibid*, 1875, page 324) is condensed with para-amido-phenol, or para-amido-phenol-ortho-sulpho acid sodium salt, under suitable conditions—for example, in the presence of a body capable of binding hydrochloric acid, such as sodium carbonate, sodium acetate, and the like,—a new dinitro-chlor-para-hydroxy-diphenyl-amine, or the sodium salt of its sulpho acid respectively, is formed, either of which, on heating with sulphur and an alkaline sulphide, yields dyestuff containing sulphur, which dyestuff dyes unmordanted cotton brown shades of excellent fastness.—June 8, 1901.

12,804. Black azo dyestuffs. July 16. O. Imray, London (communicated by the Farbwerke vormals Meister, Lucius and Brüning, Hoechst a/Main). Relates to the manufacture of black azo dyestuffs for cotton by first diazotising a para-amido-benzene-alpha-naphthylamine sulphonic acid, obtained from diazotised para-nitraniline or diazotised para-amidoacetanilide on the one hand, and an alpha naphthylamine sulphonic acid capable of combining in the fourth position on the other hand, and subsequent reduction of hydrolysis, with one molecular proportion of nitrous acid, and then combining the amidodiazo-azo compound thus obtained in alkaline solution with one molecular proportion of amido-naphthol-sulphonic acid G.—June 8, 1901.

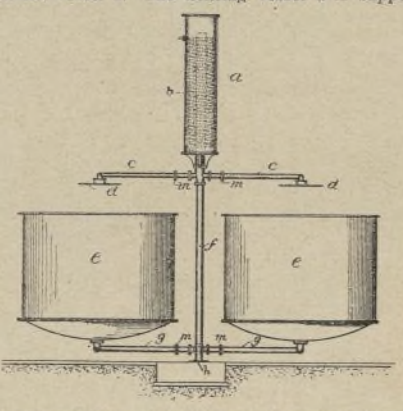
12,819. Azo colouring matters. July 16. J. Y. Johnson, London (communicated by the Badische Aniline and Soda Fabrik, Ludwigshafen-on-Rhine) It is found that azo colouring matters possessing a much greater degree of stability can be obtained when the 1·1¹-naphthylene-diamine sulpho acids are first treated with acetone in weakly acid solution or suspension, and then combined with one molecular proportion or two molecular proportions of a diazo compound, according as a mono or disazo colouring matter is desired.—June 8, 1901.

13,032. Bobbins. July 19. J. B Sutton, 19, Bristol-street, Hulme. Relates to an improved construction of composite bobbin for use for warping, winding, and similar processes, having a wooden barrel and a metal head such as described in Patent No. 28,138 of 1897.—May 25, 1901.

13,351. Condensing carding engines. July 24. L. A. Porritt and E. S. H. Barnes, Vulcan Works, Rochdale. Consists in driving the endless belts by rollers at their opposite ends to the ends at which they have hitherto been driven, by which means the tight sides of the belts will be those working in contact, which are thus kept tight and straight, or nearly so. The length of the endless belts may be shorter, and thus less extensive and of less weight; they will require less oil, with which they have to be coated to keep them in order, and less power will be required to give them the lateral rubbing action against each other, the slivers acted upon being between them, and consequently there will be less wear and tear.—June 8, 1901.

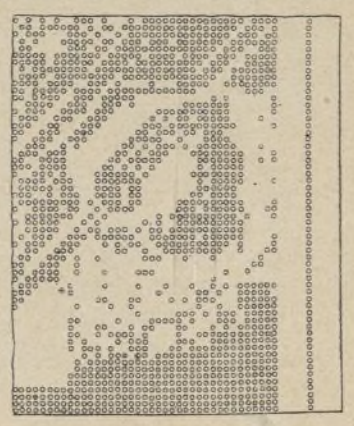
13,738 Folding and measuring. Feb. 22. H. Raynal, 81, Rue Gambetta, Lille. Relates to an improved machine adapted for automatically folding fabrics and other similar materials. It consists chiefly of a carriage for carrying along the fabric, provided with two distributing boxes, each containing a store of folding blades with a table having a progressive falling motion, and upon which the carriage is caused to reciprocate through the intervention of any appropriate mechanism, and two pairs of receiving boxes the position of which is adjustable in such a manner as to limit the length of fold by stopping the blades which come from the distributing boxes.—May 25, 1901.

14,174. Kiers for bleaching. Aug. 8 C. L. Jackson, Wharf Foundry, Bolton. Relates to improvements in kiers for bleaching or otherwise treating textile and other materials, and the chief object is to regulate and control the circulation of the bleaching liquor with greater efficiency and economy. A cylindrical or other suitably shaped vessel *a* is used and divided vertically into two compartments, the outer of which is fitted with a coil or coils of steampipes *b*, while the inner compartment, preferably at or near the bottom, has connected to it two pipes *c* and distributors *d* arranged to discharge liquor from the compartment of the vessel *a* over goods in two open or low-pressure kiers *e* placed at a lower level than the vessel *a*. The heating vessel *a* is supported on



a pillar *f*, and each kier *e* at the bottom is connected by a pipe *g* or a passage to the receiver of a centrifugal pump *h* connected on the discharge side by a pipe to the outer compartment of the vessel *a*. When the pump *h* is set in motion the bleaching liquor is forced up into the outer compartment of the vessel *a*, where it is highly heated by the steam coil *b* until it overflows into the inner compartment and is conducted thence by the pipes *c* to the kiers *e*, being distributed evenly and uniformly by the distributors *d* upon the goods in the kiers, finally returning through the pipes *g* to the receiving side of the pump *h*, whence it is again raised into the heater *a*.—June 8, 1901.

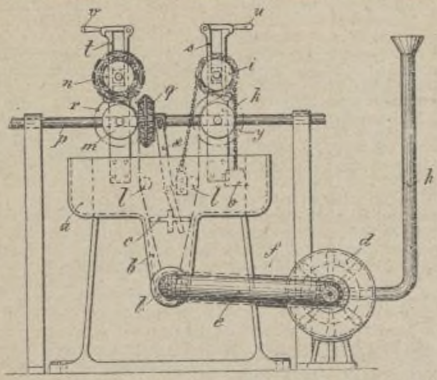
14,298. Cards for weaving Aug. 10. J. Szczepanik, III Ungargasse 12, Vienna. Relates to the substitution for the hitherto usual jacquard cards of a card made as an endless strip which can be produced by photo-mechanical means. To produce such an endless card—the use of which requires only that the lifting wires or needles of the jacquard be arranged in a single row, as is the case, for example, in a dobby—a diagram is required in which each weft thread and each warp thread are separately represented, as they are to be by the holes to be produced in the card by a horizontal



row and a vertical row of fields or portions of the diagram respectively, and the thread crossings are advantageously shown by round dots. Such a diagram is shown in the accompanying drawing; each horizontal row of dots represents the thread crossing for the corresponding weft thread (or pick), and each vertical row the thread crossing for the corresponding warp thread. It will be noted that there are no squares as there are in ordinary diagrams. At each of the two sides of the diagram there is an uninterrupted row of dots or two such rows corresponding to those holes (corresponding to the registering holes in jacquard cards) that are to be produced in the endless card to serve as guides for the same

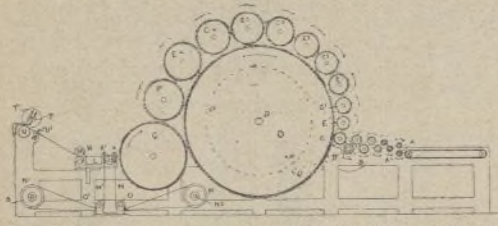
on the card cylinder. A diagram is copied in a copying frame or projected in a photographic apparatus upon a plate of any desired or suitable metal, prepared, for example with chromated fish glue. The plate—for example, a zinc plate—is then developed, whereby free and covered places are produced thereupon, of which the former correspond to the dots on the diagram. The plate is thereupon coated on the other side with an insulating or protecting layer of asphalt, leather, paper, or the like, and is etched until round openings occur in it. Finally, the insulating layer which ensures that the etching takes place only from one side, and that the plate is attacked only at this side, is stripped off in water.—May 25, 1901

14,518. Dyeing fabrics. Aug. 14. L. Schreiner, 54, Beyenburgerstrasse, Barmen-Rittershausen, Germany. The bottom of the vat *a* is provided with the trough *b*, which can be closed by the cover *c*, so that only two slots between trough and cover remain for the passage of the fabric. The dyebath is forced by means of the motor *d* through the short pipe *e* into the trough *b*, and returns through the long pipe *f* to the motor *d*. A perforated steampipe *g*



is introduced in the angled pipe *f*. The pipe *h* through which the concentrated dye solution is added to the dyebath enters the pipe *f* between the motor *d* and the steampipe *g*. The goods run from the roller *i* over the support roller *k*, and are conveyed by means of guide rolls *l*, *l*, *l* through the bath in the trough *b*, thereafter passing the second support roller *m* and being wound up on the second goods roller *n*.—June 1, 1901.

16,219. Carding. Sept. 12. A. Speak, Oxenhope, Keighley, and J. H. Sedgwick. A series of card feed rollers—the diameter of the respective rollers increasing from the first pair of rollers A to the roller B—feed the fibres, and secured on the main shaft S the roller B delivers the fibre to the first worker roller C. The rollers A^1 to E are rotated by a train of spur gearing A^2, connected to the main driving shaft S, and by forming a clear space between each bottom feed roller the dust and other foreign matter as it is liberated from the fibre passing between the feed rollers to the machine will fall to the floor or into a receptacle. The swift cylinder D is covered with card clothing in which the "set" of the card teeth point in the direction as shown—that is, the card teeth do not point in the direction of rotation of the cylinder, which according to this invention is made to rotate considerably slower than is the case with machines of the ordinary construction. Rotary motion may be transmitted from the grooved pulley P secured on the main shaft S by belt Q to a large grooved pulley P^1 secured on shaft D^1 of swift cylinder D. The circumferential or surface speed of the swift cylinder D is less than the surface speed of the worker roller C, and around the upper



portion of the swift cylinder D are mounted in the usual manner a number of worker rollers C to C^4 and clearer rollers E to E^4. These rollers may be driven in the ordinary manner by belts, bands, or chains, such as are now used for the purpose on machines as hitherto constructed. The surface speed of each worker and clearer roller C to E^4 increases, and this is readily obtained by giving to the rollers the same number of revolutions in a given time, so that by gradually increasing the diameter of the rollers an increased surface speed is obtained. The stripper roller F deposits the fibre upon a doffing cylinder G, driven from the shaft D^1 by a belt, and rotated in the direction shown at a less circumferential surface speed than the stripper roller F and the swift cylinder D. Any fibre that may be left on the swift cylinder D is collected by the doffer cylinder G, which has a less surface speed than the swift cylinder D, so that the card teeth on cylinder G strip the fibre from the cylinder D. The doffer cylinder G is covered with card clothing on which the "set" of the card teeth project in the direction opposite to the rotation of the cylinder, from which the fibre may be finally removed in one sheet or sliver by an ordinary reciprocating stripper applied and operated in the usual manner. A condenser arrangement is also provided as shown.—May 25, 1901.

18,848. Coiler apparatus. Oct. 22. Brooks and Doxey Limited, Union Ironworks, West Gorton, Manchester, and J. S. Brooks. Relates to the coiler heads and press plates of the mechanism for delivering the sliver to the coiler cans in carding engines, drawing frames, and other machines. The invention is

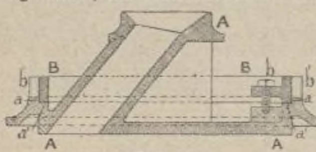


FIG. I.

FIG. 2.

designed to provide the coiler plate with cut teeth, and it consists essentially in casting the plate without teeth and forming thereon a grooved or flanged face to receive a separate ring of teeth, which, after being cut, are secured thereto by screws or bolts. The coiler plate or press plate is cast or constructed in two parts A and B, which are secured together by set screws *b* or by other suitable means. In the upper part of the press plate A is turned a groove *a* with a ledge a^1. The second part B comprises a toothed ring (the teeth b^1 of which are cut), and which is accurately turned or milled to fit into the groove *a* turned in the press plate A.—May 11, 1901.

20,417. Flyers. Nov. 13. W. Berry, 76, Church-road, Farnworth, and J. Scrimgeour. Relates to an improvement in flyers such as are employed in a bobbin and fly frame for giving twist to the yarn. The objects are to reduce friction in the presser and obtain more perfect action. The flyer tube *a* is perfectly plain, and at the lower end of the said tube two small projections *b* and b^x are forged with a space between them of sufficient width to

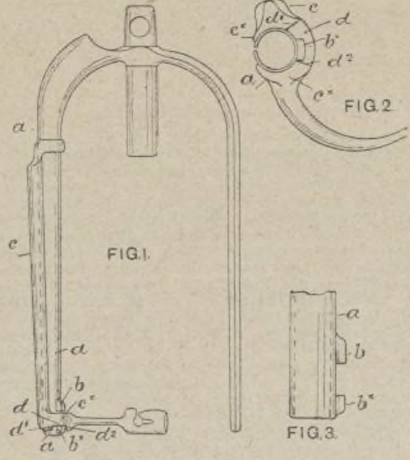


FIG. 2. FIG. 1. FIG. 3.

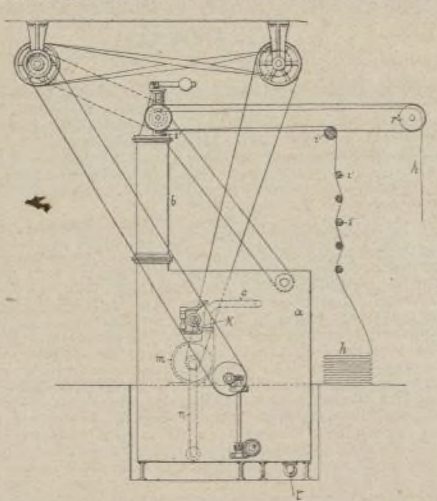
introduce the lower end c^x of the presser socket *c*, which is secured by bending said lower end round the flyer tube *a*. The presser is forged in one piece, the presser socket fitting on flyer tube at the bottom being rimered or drilled to fit on same. A short length of this bent portion is reduced in width as shown at *d* so that the parts d^1 and d^2 that are not reduced in width may engage with the aforesaid projection b^x, or if preferred with the projection *b* also.—May 25, 1901.

20,895. Drying of yarns. Nov. 19. J. Tattersall, Enschede, Holland. Relates to a method of and apparatus for drying yarn in dressing and similar machines. The method consists in forcing dry air through a heating apparatus, and then feeding such air along the yarn, which is guided in sinuous paths in a drying chamber divided by partitions.—June 1, 1901.

1901.

1. Winding thread. Jan. 1. D. G. Baker, Willimantic, Connecticut, U.S.A. Relates to winding machinery, and is primarily a tension device whereby the tension of the thread being wound may be automatically varied to a nicety. During the process of winding, as the diameter of the spool or cop being wound increases, the tension of the thread is gradually lessened.—June 1, 1901.

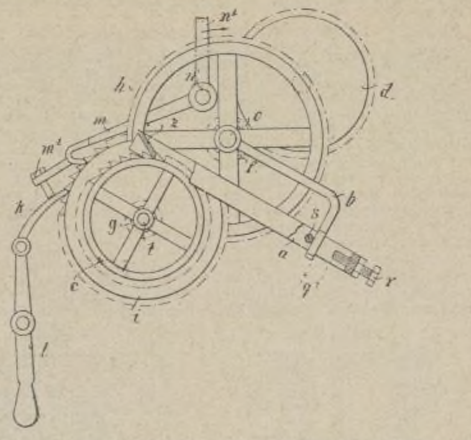
228. Kiers for bleaching fabrics. Jan. 3. C. Rigamonti, 21, Via Correggio, Milan, Italy, and G. Tagliani. The improved kier is constructed of a rectangular casing *a* of boiler plate, which is made air and water tight, and which is connected at one side with an upwardly-extending trunk *b*, of considerably greater height than the casing. The trunk is open at its upper end, so that the fabrics can be introduced through the same to the interior of the casing *a* and returned to the outside after having been subjected to the cleansing action within the casing. The fabric *h* is guided in all its full width over rollers *i*, which are arranged vertically one above the other, and then conducted over upper rolls i^1 to the opening in the upper end of the trunk *b*, first in a downward direction through the same, and then over a roll at the lower



end of the trunk and over a roll in the upper corner of the casing *a* adjacent to the trunk, to the upper part of the casing, and then between tension rollers. The liquor is introduced by means of a steam injector (which simultaneously heats the liquor) and by spray pipes into the casing *a* in such a manner that it is sprayed over the layers of the fabric. The steam that is introduced with the liquor into the casing *a* assumes gradually such a pressure that a liquid column is formed by the liquor in the trunk *b*. The liquor has to be kept continuously in motion, which is accomplished by a circulating pump *m*, which is connected by a pipe *n* with an opening near the bottom of the casing, so as to suck up the liquor and force it through a supply pipe *o*.—May 4, 1901.

1464. Card-setting machines. Jan. 22. W. P. Thompson, Liverpool (communicated by O. Arnold, Leicester, Mass., U.S.A.). Relates to that portion of a card-setting machine whereby the sections of wire, as they are cut off at the required length, are gripped, bent into proper shape to form card-teeth, and inserted through the previously-punctured backing fabric, and consists in a novel construction and combination of tooth-forming and inserting appliances.—June 8, 1901.

2908. Weft fork and take-up mechanism. Feb. 11. G. Schmidt, 12, Turkheimerstrasse, Colmar, Alsace. The shaft *n* has an arm n^1 extending upwardly into the path of movement of any suitable lever or part of the weft-fork mechanism, so that it is turned to a certain extent when the weft fork comes into operation to stop the loom. This shaft carries a pawl *m* which engages in a ratchet wheel *i* mounted on a stub shaft *t*, said pawl being connected by means of a pin-and-slot connection m^1 or other suitable means to the pawl *k* attached to the hand lever *l*. Rigidly connected to the ratchet wheel *i* is a second ratchet wheel *c*, on which rests by gravity the tooth *z* mounted in the forward end of a frame *a*, supported in an arm *b*, in which it may slide longitudinally, always resting with its tooth or pawl *z* on the said ratchet wheel *c*. The arm *b* is supported on the stub shaft *o*, to which other gears are fixed. The frame *a* has a crosspin *s* riveted therein in front of the arm *b*, and at the rear thereof is provided with a set screw *r*, which may be screwed in and out of the crosspiece at the end of the frame, and thus vary the length of the stroke which the said frame is capable of performing in the guide hole at the end of the arm *b*. The stroke, which may be varied according to circumstances, is indicated by *q*. A gear or pinion *g* is rigidly connected to the ratchet wheels *i* and *c* on the stub shaft *t*,



the said pinion meshing with a gear *h* of the stub shaft *o*. A pinion *f* is rigidly connected to the gear *h*, and meshes with the gear *d* mounted on the shaft on which the feed or cloth beam is mounted.—May 25, 1901.

3518. Bleaching. Feb. 19. F. Taylor, A. Cooke, B. W. D. Montgomery, and The Lishman Process Bleaching Company Limited, Glen Dyeworks, Cornholme, Todmorden. Relates to an improvement in bleaching vats applicable for use when bleaching loose fibres and yarns, piece goods, and the like, such vats being particularly applicable when bleaching by the chlorine process, or other process where reagents can be re-used in bleaching piece goods or cotton or linen yarns or the like in the form of hanks of vegetable or animal fibres. The apparatus comprises a series of becks or vats for containing the bleaching liquors, and the necessary reagents having rods, rollers, or the like, on which the yarns are loosely carried (or in the case of piece goods suitable winches or rollers), together with means for circulating the liquids and changing and refreshing and agitating the same.—May 11, 1901.

3568. Mercerising yarn. Feb. 10. F. Shuman, 3400, Disston-street, Tacony, Philadelphia, U.S.A. Fig. 1 is a side elevation of a mercerising machine embodying the improvements; Fig. 2 is an enlarged transverse sectional elevation of same. There are two independent series of travelling carriers, between which the yarn is stretched when combined with means to automatically move the carriers apart during a portion of their travel, to subject the yarn carried by them to tension during the process of mercerisation; means for controlling the position of the independent

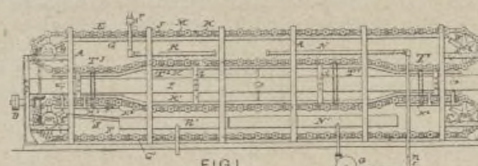


FIG. I.

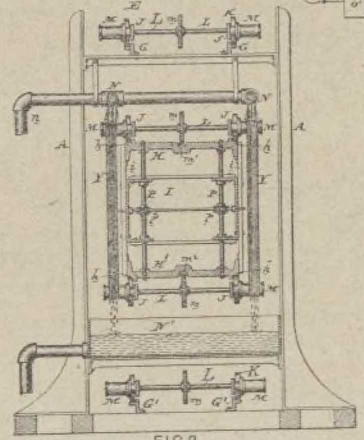


FIG. 2.

series of carriers during their travel when constructed and operating to automatically subject the yarn to tension during the mercerising process, and to relieve the tension before and after mercerisation to enable the skeins to be applied and removed; means for applying the mercerising solution to the stretched yarn, consisting of the spraying pipes N; a tank N^1 to receive the sprayed mercerising solution from the pipes N combined with the circulating pump O, by which the solution from the tank is returned to the spraying pipes; and means for adjusting the cam guides H, H^1 to vary the tension put upon the yarn.—May 4, 1901.

4286. Towelling. Feb. 28. H. W. Smith, North Grafton, Massachusetts, U.S.A. Relates to woven fabrics in which the warp and weft shall be securely tied together, and in which both faces shall present moisture-absorbing surfaces. To this end a fabric is formed of cross woven warp threads and a filling tied in by the crossings of the warp and consisting of a loose, bunchy, or knotty yarn.—April 6, 1901.

6247. Harness for looms. March 25. E. Schindeler, 2, Rue d'Armentieres, Comines, France. Relates to an improved weaving harness, and comprises the coupling of the hook wires by means of a cord on which a pulley runs. It is double-lifting and with open shed. Each card has two rows of holes, and operates for two weft threads. Each knife blade effects a course double the lift. The leaf M N supported by a pulley P running on a cord attached

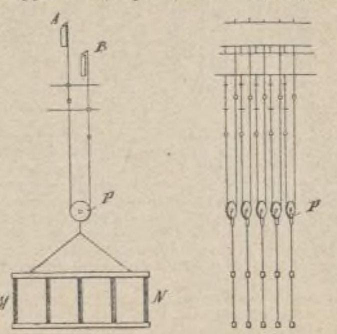


FIG. I. FIG. 2

at the same time to two sets of hook wires only effects half the course of the knives, and therefore undergoes the normal lift. If the leaf is to remain raised, the hook wires A and B take at the same time the two knives, and as one of the hook wires sinks as much as the other rises, the pulley P (and consequently the leaf M N) remains stationary.—May 11, 1901.