THE TEXTILE MANUFACTURER:

WITH WHICH IS INCORPORATED

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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.

Extension of British Trade.

WHAT we are entitled to regard as one of the redeeming features of our national character is our readiness to take a leaf out of a competitor's book once it can be shown that the departure is likely to be beneficial to our interests. Close observers find in this trait the likelihood of Great Britain maintaining a leading position among industrial nations, notwithstanding all that can be said as to our inability to meet the increasingly acute competition with which we are now faced on nearly every hand. It is not pleasant to be told that our methods are obsolete and our ideas out of date; but if results prove the truth of the assertion, the sooner we face the facts the better are our chances of a speedy rehabilitation. So far as the methods adopted for pushing trade abroad are concerned, the enterprising American undoubtedly provides us with many instances of successful business tactics, some of which we appear to be at last recognising as worth consideration at our own hands. An instance which will serve to illustrate the point in question is afforded by the method adopted by the Philadelphia Commercial Museum in placing cabinet files in the world's industrial centres, containing convenient and well-arranged classified lists of American manufacturers, with concise particulars of their products and other desirable information. During the last five or six years we have repeatedly pointed out the advantages which such a system offers to manufacturers desiring to extend their trade abroad; but it is only within the last year or so that it has become possible for British traders to avail themselves of this method of coming into touch with prospective customers abroad. And even now it has been left to private enterprise to furnish us with the facilities which have long been enjoyed by our American competitors owing to the co operation of American business men. However, the London Commercial Intelligence Bureau has only to become better known to prove its value to our manufacturers and exporters, as well as to merchants and importers abroad. As we understand it, two forms of the reference cabinet files are sent out by the Bureau, the first, which is sent to merchants abroad, comprising index files of the cards of British manufacturers in any special branch of trade. The second type of cabinet is of a more general and comprehensive character, and is intended to be placed in foreign Chambers of Commerce, the Boards of Trade, the Exchanges, and British Consulates. Translated cards can be substituted if desired, and this seems to us to be very desirable for many of the principal cities in which the cabinets are to be placed. Much, of course, will depend upon the prominence given to these reference cabinets. In the Manchester Exchange, the Philadelphia Commercial Museum cabinet is placed in an out-of-the-way corner, and probably only a very small number of members are aware of its existence; while from personal observation we know that it is only very rarely consulted by business men.

Forthcoming Exhibitions.

ALTHOUGH no international exhibitions of large pretensions are to be held during the ensuing year, we are promised one or two which, although of comparatively small dimensions, may possess more than a limited amount of interest for textile manufacturers. On the Continent, the exhibition to be held at Düsseldorf is being well supported by the manufacturers of the Rhineland and Westphalia, and every effort will doubtless be made to show the very marked advance made by Germany during recent years. The international exhibition to be held at Cork will afford a good opportunity for assisting the industrial progress of Ireland, and it is satisfactory to note that the Department of Agriculture and Technical Instruction for Ireland has secured a space of 30,000 sq. ft., which will be almost exclusively devoted to the display of manufactures successfully carried on in other countries, and of a nature suitable for introduction into Ireland. To this end, invitations are extended to makers of various kinds of machinery, including that used for wool combing, spinning, and weaving; cotton spinning and weaving; silk weaving; tape and ribbon making; knitting; hemstitching and embroidering, etc. As an inducement to machine makers, the Department offers special facilities to those whose plant is accepted, including payment of carriage to the exhibition; free space; description of machinery, etc., in the official catalogue; insurance against fire and damage; free driving power; wages of skilled operator during the period of the exhibition; and the free supply of raw material when obtainable. Still another exhibition is to be held at Wolverhampton, but here the textile interest will probably be small, and confined more or less to the lacemaking, hosiery, and knitting machinery and manufactures.

The Crisis in British Industry.

WE are perpetually having crises—on paper. Whenever the average journalist runs short of a topic which will lend itself to his caustic pen, he falls back on a crisis, and the more blindly he tackles it the better the public seems to be pleased. By "blindly" is meant the manner in which such controversies are carried on, in the way the average politician looks at politics, ignoring the slightest claims on behalf of the other side. A large proportion of English voters are born of parents nominally siding with one political party; these grow up and stick to their forefathers' party through thick and thin, through wise and unwise statesmanship. If they develop active political tendencies, their minds are hermetically sealed to the possibility of the opposite party effecting the slightest good whilst in office —they are simply lop-sided human machines. In industrial economy the same takes place; in fact, it is ever-present even in science, religion, and other matters. There has recently been an outbreak of the "crisis" epidemic in the "Times," which, originating in some articles, has spread into a newspaper discussion, and been taken for a text in many speeches delivered in various parts of the country. Both sides have aired their views, some speakers and writers blaming our capitalists, but most putting the blame on the British workman. The position is this: The average master will pay no more in wages than he can possibly help, and the average workman will do no more work than he is absolutely forced to. The one side is buying labour, and naturally tries to buy it as cheaply as possible. The other side is selling labour, and, just as naturally, tries to sell it at as high a price as possible, or, what amounts to the same thing, to sell as small a quantity as possible for a fixed price. From a monetary standpoint, then, employer and employed are very much alike. If the employer is not satisfied with the price or quality of the labour, he dismisses it and gets other labour. If he cannot get new labour it shows that his dissatisfaction was unfounded and that he was only paying the market price for the kind he had. On the other hand, if the worker is not satisfied with his employment and wages, he can leave, and look for another master and better wages. If he cannot get such, it is conclusive proof that he was getting full market value for his labour. Both parties to the question are also very apt to forget that the money value of labour varies, that a rise in wages does not necessarily mean better or more work, nor a lowering of wages less work. Of course, there are times when labour is cheap; the work to be done is less than the number of hands available to do it; and it is here where most labour unions make a mistake. They consider that if, say, a piece of work will normally employ 100 men, and that 120 men of their union are available, the 100 men should do the work and keep the other twenty in paid idleness, sharing the money earned. They forget that it would amount to the same thing if the 120 all worked for a less wage—the total amount earned and the market value of the work done being the same. It is blindness on these points, along with a natural laziness common to human nature (a fault shared by employers and employed alike), that leads eventually to the childish idea that work avoided means better pay for a brother-workman who otherwise might not find enough work to keep him employed. This idea, further developed, is one which discountenances labour-saving appliances and puts up a barrier against advancement of any kind. The employed are not the only people troubled with erroneous ideas of this description, for employers mistakenly cherish one which is very similar in its own sphere; that is, the way many masters try to buy labour at less than its market value. For instance, a millowner requires an overlooker: the current wages of an overlooker in the district is thirty-five shillings, and if wise, the employer will offer that price and take his pick from amongst the applicants. Instead of this he frequently takes the man who will come for least money, and gets him at his market value, for he is generally only worth the smaller wage. The employer thus gains nothing on the transaction, and perhaps loses much in an indirect way. It must never be forgotten that there will always be a marked line between employers and employed, not socially, but just as there is a difference between any salesman and buyer. Philanthropy cannot be demanded from one, nor servile allegiance from the other, and attempts should not be made to criticise one without the other: both have their virtues and faults, and even if the latter preponderate, one side cannot be saddled with them more than the other.

A Novel Form of Competition.

THE state of affairs at Fall River, Mass., U.S.A., which was mentioned in these columns last month, has since that time come to an apparent termination. Although the aim of the chief actor in the affair is still known to none besides himself, there is every indication that the attempt which failed was neither more nor less than the cornering of weaving labour and produce in the district. Mr. Borden had twice raised his weavers' wages by 5 per cent., and the workpeople were making about forty-five shillings a week (on eight looms) under the new conditions. At the same time Mr. Borden was buying large quantities of the same kinds of cloth which he was weaving, and it is estimated that he has done this to the tune of 1,600,000 printers' pieces during the last five months. There is now every appearance that he was working to incite all other weavers but his own in the district to a strike, and at one time this seemed inevitable. It was an ingenious move, even if it could not be admired for its morality, for with huge stocks of printers' cloths and large mills making them at high pressure and big wages, things would have looked bright for the wirepuller if all the other sources of supply had been cut short by a big strike. This came very near. All the other weavers in the locality of Fall River were dissatisfied at being barred from an advance which their fellows enjoyed; but the labour unions in the district did not work well together, and whilst some unions voted for, others voted against, the strike. The weavers wanted to come out, but the overlookers, spinners, and others who would have been ultimately affected, did not want to, and after many discussions it was finally decided not to strike. Directly after this decision Mr. Borden posted notices that he would reduce wages 10 per cent., which brought his own weavers down to the general level, and at the same time his old offer for buying printers' cloths was withdrawn. Many who know Mr. Borden, and are acquainted with his speculative ability and resourceful nature, do not think that the matter is yet ended, but to all appearances it is now neither more nor less than an attempt to corner which has miserably failed.

The Past and Future of the Cotton Industry.

THE most trustworthy prophet is he who has most carefully studied the past, and those who desire some insight into the future of any industry cannot do better than make a careful study of that industry's history. Some opportunity for this was given by reading the address of Sir William H. Bailey before the Manchester Literary and Philosophical Society last Tuesday, which, under another name, described the growth of the English cotton industry in a concise and interesting manner. So few persons engaged in an active occupation trouble their heads as to past events, that an address like the above is welcome, for it puts the matter before us in a form that the average person can understand and appreciate. There are, however, features which may have a damaging effect upon the average reader — not so much from faults in the address as from misconception by the reader. Sir William gave a detailed list of noted Lancashire inventors—that is, men who have made some great mark in our industries by their genius and perseverance,—and to the average Lancastrian this list is one which may be considered with pride, for a large proportion of the most useful textile inventions can be laid to the credit of that county. Two hundred years ago England was behind the Continent in the efficiency of nearly all her industries and the machinery connected with them, and it is only a little over a hundred years ago since Liverpool began to supersede Barcelona as the chief raw cotton market of Europe, a position which this latter place had held for a thousand years. Most people know, or ought to know, of the advent of Kay's fly shuttle, and later of the earlier types of power-loom, the impetus the former of these gave to the spinning branch, and the subsequent inventions of Hargreaves, Hayes, Crompton, and others. It is also known what opposition the introduction of all these labour-saving machines brought about—blind, ignorant, fanatical opposition which showed itself in riots and incendiarism. That is now past history: the inventions were introduced when the workpeople had no means of retaliation but brute force, and this they used to the best of their ability. Then many of the greatest inventors died in poverty, some friendless, some refugees from the England which is supposed to be so free; and after asking in a dubious manner whether a certain machine would pay or not, capitalists waited until one more daring than the rest made the experiment. When success was ensured there was a rush, everybody wanting to be in at the profits: the spinners and manufacturers cut each other's prices, and pared down the wages of their workpeople to aid them. Such was Lancashire of the past, and—to a large extent—such is Lancashire to-day, but under different conditions. For instance, many years ago Americans tried automatic looms, and if only one English manufacturer had done the same with success we should have had them in scores of sheds to-day. Recently, English types of automatic looms have been introduced, one of which seems superior to anything either in this country or abroad. Some manufacturers of the more enterprising type are trying these, and the probability is that the slow-going millowners will wait the result. They will then buy looms at a time when the energetic ones are throwing theirs out for better, and so the business will continue. No wonder some firms are always busy and others always slack except under very exceptional circumstances. Then to-day there is little fear of riots: not that our towns are better guarded, but that our workpeople are better educated. This education, however, has only reached a certain point, and the bulk of the people are readily swayed one way or the other by a fluent tongue, even if that tongue is in an empty head. There may not be such pronounced and open opposition to any new machine, but as a rule the novel mechanism is put to great disadvantages—its faults are exaggerated, and it is oftener than not put to such extreme conditions of treatment that it fails in the test. In earlier days some of the greatest inventors had to put down plants for themselves, for no one else was bold enough to speculate, and to-day many of our machine makers are finding themselves almost compelled to follow suit and put down in their works sample plants working under commercial conditions when they bring out a machine which is a radical change from its predecessors. On the other side, as mentioned before, the operatives condemn a new machine, perhaps before they see it; but can it be proved that someone is earning better wages or having an easier time by its use, then they — like their monetary betters, and also like a flock of sheep—are content to follow the new conditions. Our English industries will reach their point of highest efficiency when every new invention is tried by a just tribunal of employers and operatives, when new machines are criticised with a view to improving rather than damning them, and when the mechanical advisers of every concern are not only competent to fill their positions, but progressive enough to remain competent with the many changes which time rapidly brings about.

Manchester as a Cotton Market.

THE report given at the recent meeting of the Manchester Cotton Association is pleasant reading to all interested in the progress of the Manchester Ship Canal, for the chief aim of this association is to further the direct shipment of cotton to Manchester, so avoiding certain exorbitant impositions made at Liverpool, saving time and money in transhipment, and bringing the port of delivery more closely in touch with the consumer. When every Lancashire spinner can be brought to see the advantages of buying cotton delivered direct in Manchester, then the Ship Canal will pay, and in addition some £500,000 per annum will go into the pockets of these same spinners. This sum represents the total value on a saving of about one-eighth of a penny per pound by the Canal route. The Manchester Cotton Association now consists of 251 members, and represents 18,000,000 spindles, 71,000 looms, and a number of cotton sellers. A central bureau has been opened for the sale of spot cotton, which is not used so much for trading purposes as a means of bringing sellers and buyers into touch with each other at a place where they can always depend upon finding a room with good north lights for examining samples. At the annual meeting Mr. Macara mentioned that it was estimated that the reduction of the hours of labour by the Saturday hour would mean a loss of £140,000 per annum to spinners, and that other burdens were being imposed by the railway companies in relation to storage charges. He pointed out, however, in his usual sanguine way of looking at economics, that this loss would soon be more than covered if every spinner took advantage of the cheaper delivery of cotton which the Ship Canal ensures.

ARTICLES.

Jute and Linen Weaving.—XXIV.

By Thomas Woodhouse
(*Of Dundee Technical Institute*)
and
Thomas Milne
(*Of Dunfermline Technical School*).

For practical and economical reasons, such as replacing worn or broken portions, the wyper A is built of three parts: the truck or boss L (Fig. 124), the circle or plate M, and the point or nose N. The truck L, which is keyed to the wyper shaft, is provided with radial teeth on its face to take into corresponding radial teeth on the face of the plate M, to which it is bolted through the bolt-holes O in the truck L and concentric slots P in the plate M. The point N is semi-dovetailed at Q, and is bolted to the plate M, which is grooved to receive it. The slots P permit of a certain amount of adjustment of the wyper with regard to the time of picking; but if further adjustment be necessary, it can be obtained by taking the spur pinion and spur wheel of the crank and the wyper shaft out of gear, and advancing or retarding the wyper shaft by one or two teeth, as may be desired.

In considering the construction of a picking wyper, the first point that naturally falls to be determined is the speed at which the shuttle must travel. Referring to the text in connection with Figs. 37 and 38 (page 266, vol. xxvi.), the student will readily deduce that the time in which the shuttle travels across the lay from start to stop is as nearly as may be determined half a pick, or 180° of the crank's revolution. But approximately 40° of this time are occupied in bringing the speed of the shuttle from rest to its maximum velocity, leaving 140° in which the shuttle must cover the necessary distance. This distance in a 46in. reed-space loom may be taken as follows:—

46in. (reed space) + 27in. + 27in. (2 boxes) = 100in. (total length of lay), and

100″ − [4″ + 4″ (2 pickers and box ends) + 20″ (length of shuttle) + 11″ (travel of picker)] = 61in., or $5\frac{1}{12}$ft., say 5ft.

Therefore, the shuttle travels 5ft. in 140° of the crank's revolution. If the loom be running at the rate of 150 picks per minute, then the total time occupied will be

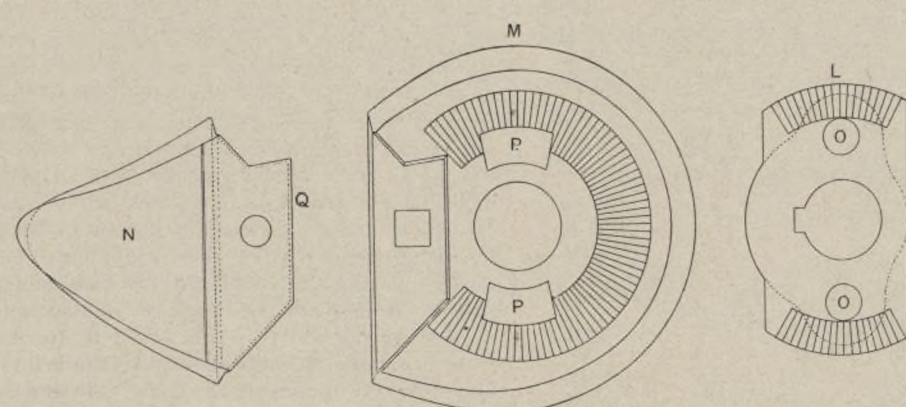
$$\frac{60 \text{ seconds}}{150 \text{ picks}} \times \frac{140°}{360°} = \frac{7}{45} \text{ of a second,}$$

or an average speed of

$$5\text{ft.} \times \frac{45}{7} = 32{\cdot}143\text{ft. per second.}$$

The problem, therefore, is to construct a picking wyper which will act upon the stud C in such a manner that the arm F will ultimately convey to the shuttle a maximum speed sufficiently greater than the average speed to enable it to overcome the resistance of friction, etc., presented to it in its passage through the shed. To determine the force which must be developed to accomplish this we shall leave to another time. Suffice it to say at the present that all parts require to have sufficient margin of strength to enable them to withstand the resistances due to the action of the swell (already referred to) upon the shuttle at rest in the shuttle box.

It is now necessary to determine what the maximum velocity of the shuttle must be in order that it may attain an average velocity of 32·143ft. per second; but to do this the frictional resistance offered to the shuttle by the warp yarn has to be considered. From a series of exhaustive tests conducted by the writers, the coefficient of friction between the shuttle and its supports, or the frictional resistance exerted upon the shuttle under ordinary working conditions, was found to vary from 0·27 to 0·43, reaching as high, however, as 0·53 in exceptionally adverse circumstances. That is to say that given a shuttle weighing 2lb. it would be necessary to exert a constant force varying



Jute and Linen Weaving.—Fig. 124.

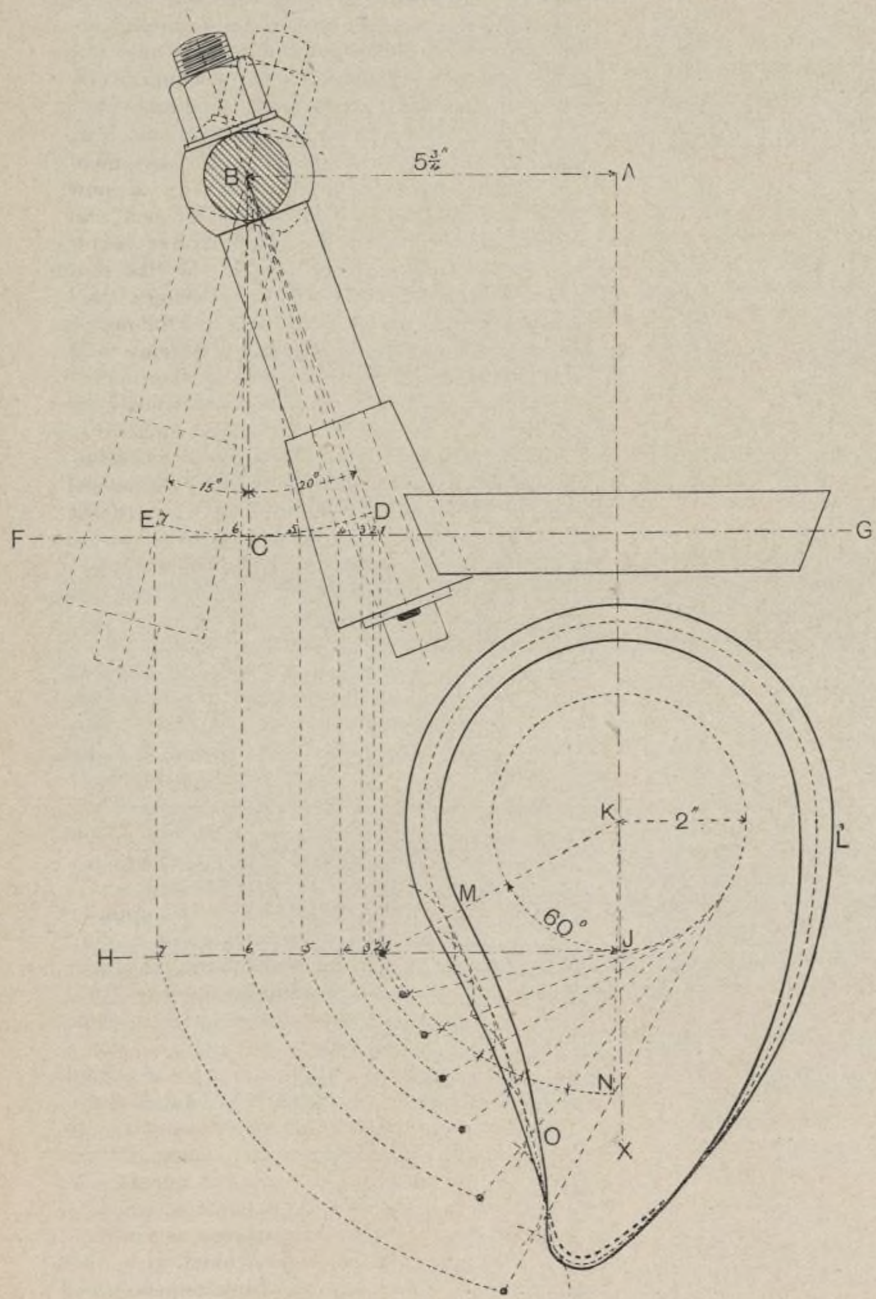


Fig. 125.

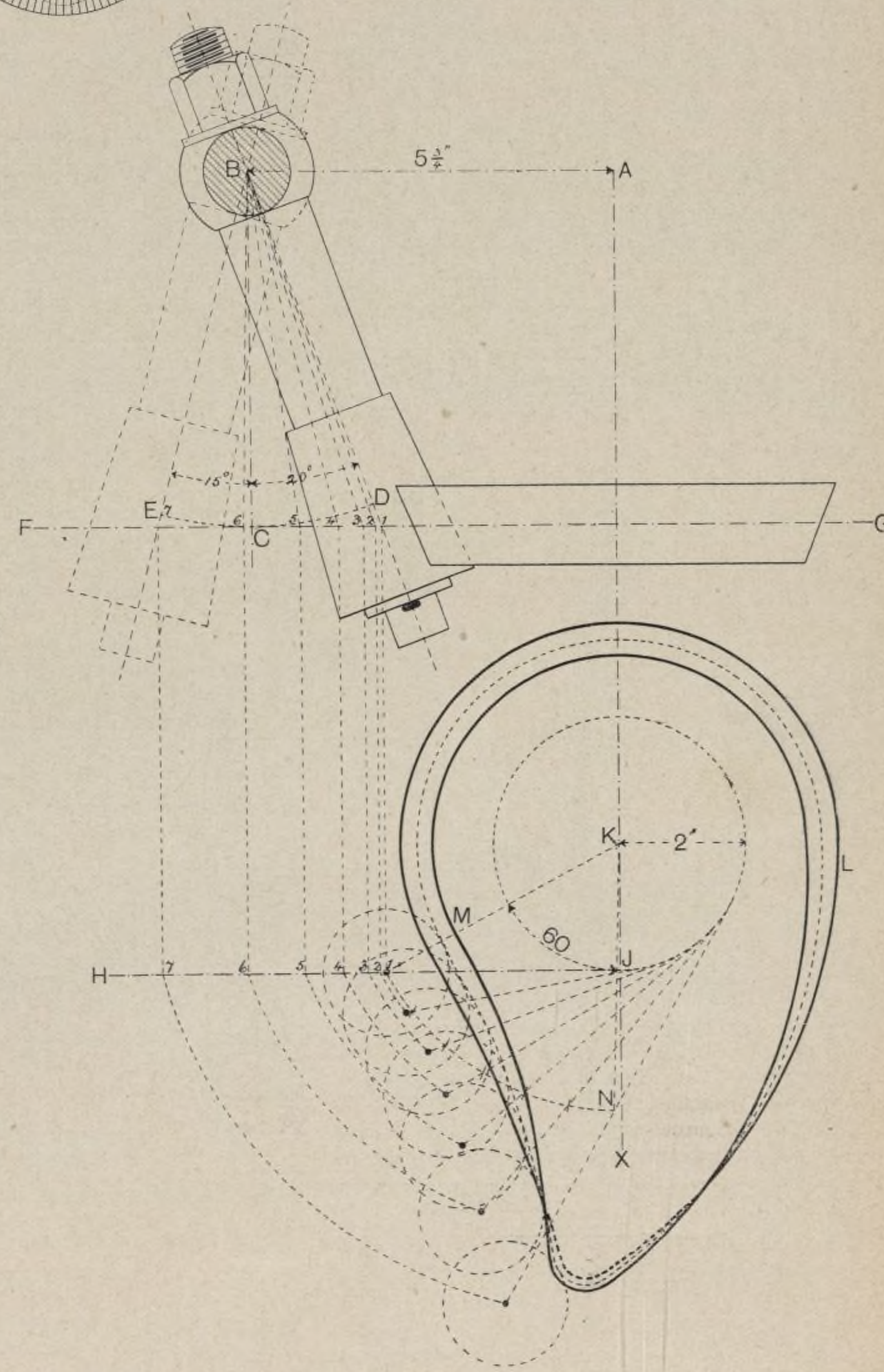


Fig. 126.

Jute and Linen Weaving.

from 2 × 16 × 0·27 = 8·64oz. to 2 × 16 × 0·43 = 13·76oz. to keep the shuttle moving through the shed; such variation depending upon the position of the lay and the quantity and weight of the warp yarn. But as all moving bodies have, in virtue of their weight and motion, a certain quantity of kinetic energy stored in them, which is represented by the formula $\frac{W V^2}{2 g}$ —where W = the weight of the body in pounds, V = the velocity of the body in feet per second, and g = gravitational attraction (32·2),—it follows that the energy stored calculated upon the average speed will be

$$\frac{W V^2}{2g} = \frac{2 \times 32{\cdot}143^2}{2 \times 32{\cdot}2} = 32{\cdot}08 \text{ foot-pounds};$$

but the initial energy will be greater than the average energy by approximately

$\frac{5\text{ft.}}{2}$ × 2lb. (weight of shuttle) × 0·4 (coefficient of friction) = $\frac{4}{2}$ = 2 foot-pounds, or 32·08 + 2 = 34·08 foot-pounds.

As the shuttle in travelling overcomes, say, a constant resistance of 2lb. × 0·4 = 0·8lb. per foot, and thus expends that amount of its energy every foot it travels (since space is proportional to the square of the velocity, it follows that the average velocity is not at the centre of the travel, but in this case the difference is so slight that it may be neglected), while the energy stored at the end of its travel will be 32·04 − 2lb. = 30·04 foot-pounds, which will be expended in overcoming the pressure of the box swell, in sending the picker home, and by straining the martingale or check strap, etc.

If, then, we take the initial energy as above—*i.e.*, 34·08 foot-pounds,—the maximum speed V which the shuttle, and therefore the picker, must reach will be

$$V = \sqrt{\frac{34{\cdot}08 \text{ foot-pounds} \times 2 \times 32{\cdot}2}{2\text{lb.}}}$$

$$= \sqrt{1097{\cdot}376} = 33{\cdot}12\text{ft. per second.}$$

Or the proposition may be taken as follows:— $S = V t - \frac{1}{2} a t^2$; where S = space (5ft.), V = velocity (unknown), t = time ($\frac{7}{45}$ of a second), and a = acceleration (unknown). Now acceleration : gravity = frictional resistance : mass.

$$a : 32{\cdot}2 = (0{\cdot}4 \times 2\text{lb.}) : 2\text{lb.}$$

$$\therefore a = \frac{32{\cdot}2 \times 0{\cdot}8}{2\text{lb.}} = 12{\cdot}88.$$

Then to find V, the maximum velocity—

$$S = V t - \tfrac{1}{2} a t^2; \text{ or}$$
$$V t = S + \tfrac{1}{2} a t^2,$$
$$\tfrac{7}{45} V = 5 + (\tfrac{1}{2} \times 12{\cdot}88 \times \tfrac{7}{45} \times \tfrac{7}{45}),$$
$$\tfrac{7}{45} V = 5 + 0{\cdot}1558,$$
$$V = \frac{5{\cdot}1558 \times 45}{7} = \frac{232{\cdot}011}{7},$$
$$V = 33{\cdot}144\text{ft. per second.}$$

While the maximum energy is

$$\frac{W V^2}{2 g} = \frac{2\text{lb.} \times 33{\cdot}144^2}{2 \times 32{\cdot}2} = 34{\cdot}116 \text{ foot-pounds.}$$

To find the velocity at the end of its journey—

$$v^2 = V^2 - 2 a s,$$
$$v^2 = (33{\cdot}144)^2 - (2 \times 12{\cdot}88 \times 5),$$
$$v^2 = 1098{\cdot}524736 - 128{\cdot}8;$$
$$v^2 = 969{\cdot}724736,$$
$$v = \sqrt{969{\cdot}724736},$$
$$v = 31{\cdot}1404\text{ft. per second.}$$

And the energy at the end of its journey is

$$\frac{W V^2}{2 g} = \frac{2 \times 31{\cdot}1404^2}{2 \times 32{\cdot}2}$$
$$= 30{\cdot}116 \text{ foot-pounds.}$$

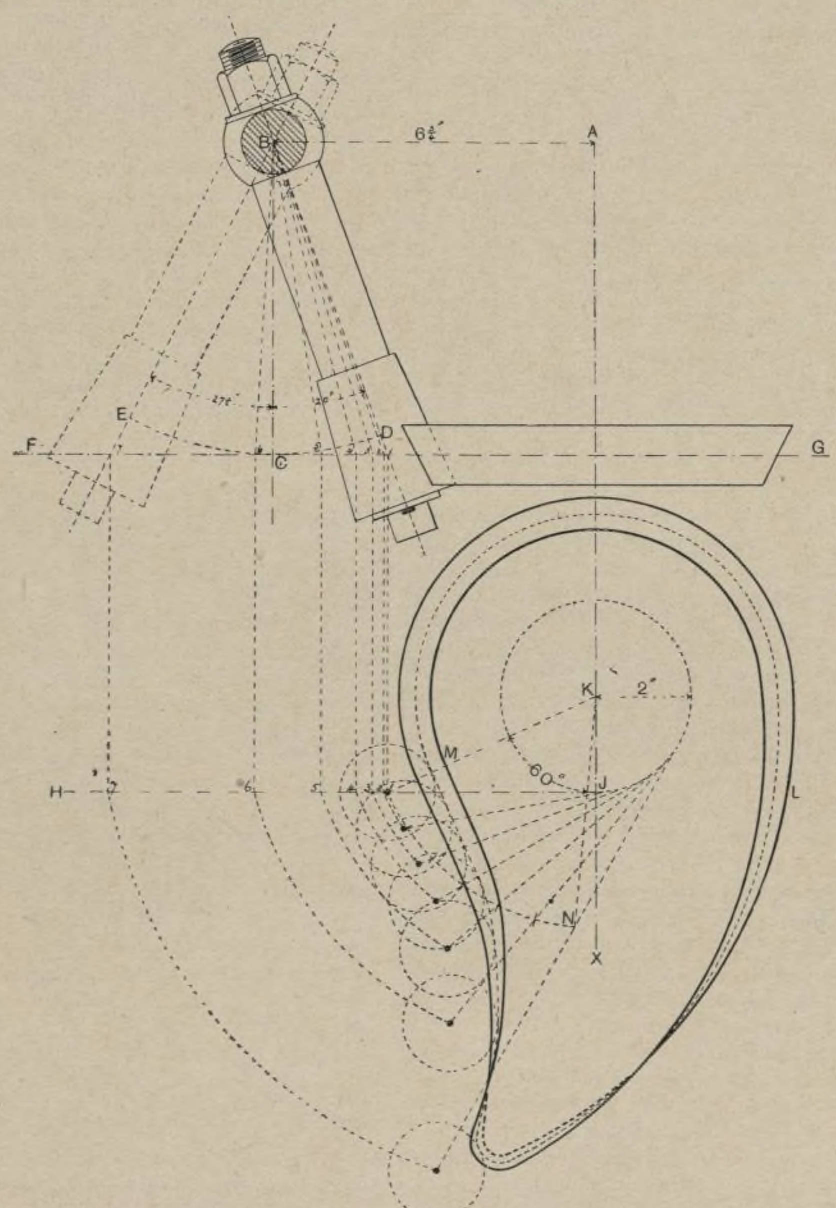
The exact space through which the shuttle has travelled when the average speed obtains can also be found by the equation $v^2 = V^2 - 2 a s$; but this is of course of no particular use.

We shall now proceed to explain the construction of a picking wyper, and then endeavour to show that it will develop the necessary speed in the shuttle. Data necessary (see Figs. 122 and 123):—Distance of vertical shaft D from the wyper shaft B, say 5½in. Centre of cone stud C over or under the level of shaft B, say 2in. Stud C acted upon when in a position parallel to shaft B at a point 5½in. from the centre of the vertical shaft D. Angle described by movement of cone stud C = 35°. Acceleration to be given to stud C, and therefore to picking arm F, in the ratio of 1, 2, 4, 7, 11, 16 over six equal portions of time. Length of arm F from centre of shaft D to point of connection with picking band, say 26in. Time for development of pick = 60° of the wyper shaft (approximately 40° of this time or 80° of the crankshaft—*i.e.*, from the time the lay is full forward about 10° above front centre until it reaches the top centre—being occupied in tightening the strap), the other 20° of the wyper shaft or 40° of the crankshaft being occupied in the actual moving of the shuttle.

From any line A X (Fig. 125) which will represent the line of the wyper shaft, set off B, the centre of the vertical stud shaft at right angles to and 5¾in. from A X. At right angles to A B draw B C parallel to A X. With B as centre and a radius B C of 5½in., describe the arcs C D of 20°, and C E of 15°. Join D B and E B; these lines will then represent the centre of the cone stud at the inner and outer extremities of its effective travel. As the wyper under consideration is intended for a moderately narrow loom, and since all increase in the arc of the stud's travel (except that obtained by changing the position of the picking wyper on the wyper shaft) is obtained by increasing the length of the point N (Fig. 124), and therefore necessarily outside C B (Fig. 125), this arrangement of setting 20° of the stud's travel inside C B and only 15° outside, will allow of its making approximately equal angles on either side of C B, although acted upon by longer points. At right angles to B C and passing through C, draw F G to represent the line along which the centre of the face of the picking wyper acts. Beginning at D, divide the arc D E into six spaces in the ratio of 1, 2, 4, 7, 11, 16. From B and through the points obtained by this division draw lines (representing the centre of the cone stud at these positions) to cut F G; draw H J at any suitable distance from, but parallel to, F G, and cutting A X. Project the points 1 to 7 obtained on F G to H J. Since the latter line represents the plane through which the centre of the cone stud travels, it follows that the centre K upon which the wyper is to be constructed must be taken 2in. above H J and on the line A X. With K as centre, and radius K J, describe a circle; join K with point 1 on H J. With K as centre and K 1 as radius, describe the arc 1 N. From point 1 set off on this arc the time allowed for the development of the pick, say 60° of the wyper shaft; divide this into six equal portions of time, marking the points of division distinctly on the arc.

Through these points of division draw lines tangential to the circle described about K. With K as centre and the points 2 to 7 or line H J in succession, cut the corresponding tangential lines. The series of points thus obtained on these tangential lines indicate the primary curve of the wyper, and it now only remains to describe arcs about these points as centres, and with the proper radii to determine the centre line of the wyper's face. Little consideration is needed to show that these radii are of various lengths, and that on neither side of the central line B C can we find two of equal length. Indeed they change gradually on both sides of the central line. Thus the wyper at the commencement of the stroke will act upon the cone stud at a certain diameter, and as the stroke develops the stud will be driven outwards and the diameter of that part bearing upon the wyper will gradually diminish until when stud and wyper shaft are parallel the radius will be smallest, while beyond this point it will gradually increase again until the limit is reached. Also, seeing that F G, the line of the wyper's action, is at only one point at right angles to the centre line of the cone stud, it will be necessary—at all places except at this point—to construct ellipses of the proper dimensions, and not circles, about the points indicating the primary curve. The major diameters of the ellipses will always coincide with the tangential lines, and the major radius will be the distance from the centre of the stud to the outside of the cone measured along F G and towards line A X; while the minor radius will be the distance from the centre of the stud to the outside of the cone, measured at right angles to the centre line, both measurements being, of course, taken at the different positions of the cone.

A wyper thus constructed will have an outline similar to that represented in Fig. 125, in which



JUTE AND LINEN WEAVING.—FIG. 127.

the arcs drawn are parts of true circles of different radii, which give a result similar to that obtained by constructing the proper ellipses. To a practical man the tendency to flatness about O may seem absurd, but it is nevertheless correct, and wypers that act for a considerable time in one position ultimately wear themselves into this form. The outline of the wyper is, however, usually obtained by describing circles of a uniform diameter about the points indicating the primary curve, the result being an outline similar to that shown in Fig. 126. As to whether the present method of finding the curve of the wyper by circles of a uniform diameter should be departed from in favour of the theoretically correct method is open to question. All wypers of this type are, or should be, to a certain extent capable of being adjusted on the wyper shaft in order to actuate the cone stud through a greater or lesser arc if necessary for the important purpose of imparting a harder or a weaker pick; but as any change of position of the wyper on the shaft A will correspondingly alter the diameter of the cone on which the wyper will act, it is evident that it is impossible to construct a wyper geometrically correct for more than one position. In both these figures (125 and 126) the outer and inner lines of each wyper have been constructed in the manner indicated, although the construction of the centre line only has been shown. Rounding off at the nose, or adding thickness or weight at this point, as well as the form of the back of the wyper, are theoretically of little importance, since when the stud reaches its maximum velocity it flies entirely clear of the wyper, and in its backward stroke impinges against the wyper at or about point L. In both figures a radius of about ½in. has been used for rounding off, and a radius of about 8in. for the back portion. Those portions of the outline from L to M are portions of circles drawn tangent to the arcs obtained at M in the construction.

In so far as the construction of a picking wyper is concerned there are three distinct methods by which a harder pick for wide looms may be obtained:—(1) The arc of effective travel may be increased; (2) the ratio of acceleration may be increased; and (3) the time of development may be reduced. In general it is usual to combine the first two of the above methods in the designing of picking wypers for wide looms, and Fig. 127 shows one suitable for a loom of, say, 156in. reed space, constructed from the following data:—Distance of the vertical stud shaft from the wyper shaft = 6¾in. Centre of cone stud under level of wyper shaft = 2in. Stud acted upon when in a position parallel to wyper shaft at a point 6½in. from centre of vertical shaft, angle formed by movement of cone stud = 47½°. Acceleration in the geometrical ratio of 1, 2, 4, 8, 16, 32 in six equal spaces of time. Length of picking arm (effective) = 31in. Time for development of pick = 60° of wyper shaft.

(To be continued.)

Silk Spinning.—IX.

By Filsoie.

After the opening of the waste, the silk in English mills is generally put into bags preparatory to degumming.

Degumming.—There are two ways in which the silk waste is freed, or partially freed, of its natural gum or sericin. The English method, by which all the gum is discharged, is known as "boiling" or "discharging." The Continental process, by which only a certain percentage of gum is got rid of, is termed "schapping." The former, as the name implies, is the process adopted for removing all the gum by boiling. In the second method the gum is loosened by a process of fermentation, and only a portion removed according to requirements. The process has been carried to such perfection that as much as 15 per cent., or as little as 2 per cent. of gum, can be left on the fibre.

Water.—No matter which process is adopted, the first and most important question is the water available. This should be very soft, and free from iron and carbonates and silicates of lime. The objections to these compounds are on account of the tendency, in the case of the iron, to discolour the silk, and the limes decompose the soap which may be used, as the alkali in the soap unites with the carbonic sulphuric acids of the limes, thus leaving the fatty matter of the soap free to combine with the lime, and form an insoluble pasty, greasy substance which has no washing or cleansing properties. In fact it adheres to the fibre, and makes the gum and dirt more difficult to remove, and when the silk is taken from the water and dried the precipitate is hardened in the thread, causing it to feel gritty and to be dull in appearance. The gritty substance is even carried forward through several processes, damaging drawing rollers and leathers. The harder the water the more soap is necessary; so it is well worth the attention of the silk spinner to take the trouble to have his water carefully analysed, and if found hard to take steps to soften it.

Water Softening.—The most common method adopted is the use of carbonate of soda, about 1lb. of which is taken to every 275gals. of water, which water is boiled, and kept boiling as long as the lime which is formed continues to rise to the surface. This lime must be skimmed off, and for this purpose a shallow copper ladle is found useful (Fig. 20).

Caustic soda is also another compound which can be used, but as it has such a strong affinity for the gum on the silk, and will even dissolve silk fibre itself, it cannot be too carefully used. A half-teaspoonful of caustic soda to 1gal. of water is sufficient to soften the hardest water, but on account of its severe action on the silk fibre it is expedient to test the water in the following manner. To a gallon of the water to be tested add a small known quantity of caustic soda, and boil to help precipitation; continue adding small known quantities of caustic soda, and boil until all the lime is precipitated. In this way it can be ascertained what proportion of caustic soda is necessary to precipitate all the lime in a gallon of the water to be used, and the bulk can be treated accordingly. Water can be softened to a large extent by boiling before using, but as this would take time, a good method is to erect a large wooden tank, the bottom about 6ft. from the ground. Inside the tank must be a coil of steampiping by means of which the water is heated to boiling point. It is essential that the water should have been boiled before running it off into the tubs or cisterns in which the silk is to be discharged. Where feasible some of the waste steam can be returned to the tank, and so a use is found for what in many mills is allowed to blow to waste in the air.

Soap.—The question of soft water having been determined, the next matter which requires the spinner's attention is the soap to be used. Alkalies eat into the silk fibre and render it tender and brittle; so to minimise this effect it is necessary to soften the effect of the alkali somewhat, and this is best done by means of the fatty matters contained in a white mild curd soap.

A soft soap will degum easily and without damage to the fibre, but the potash in the soap appears to have a discolouring effect on white silks. The oily nature of the soap causes it to adhere closely to the silk, sometimes rendering it greasy and cloggy and difficult to work in after processes. On coarse, harsh silk like Tussah, such a soap can be used to advantage, as it improves the feel of the silk. A good curd soap is expensive, and in these times of cutting prices it is a great temptation to endeavour to save money by buying a cheap and consequently inferior article. This is a game of "penny wise, pound foolish." The soap may appear to degum all right, the silk may go through its next process fairly well, and the drawing overlooker only finds out something is wrong when his waste from slivers and fly increases very materially. The silk when in that department has increased in cost from its first (purchased) price by four or five times, being worth from 4s. to 8s. per pound, and sometimes more; and as soap of first-class quality is 2½d. to 3d. per pound, and poor soap costs 1½d. to 2d. per pound, the saving in first cost is soon lost, with heavy interest, if silk is lost in waste after it has been through one or two processes. A good white curd soap should show at least

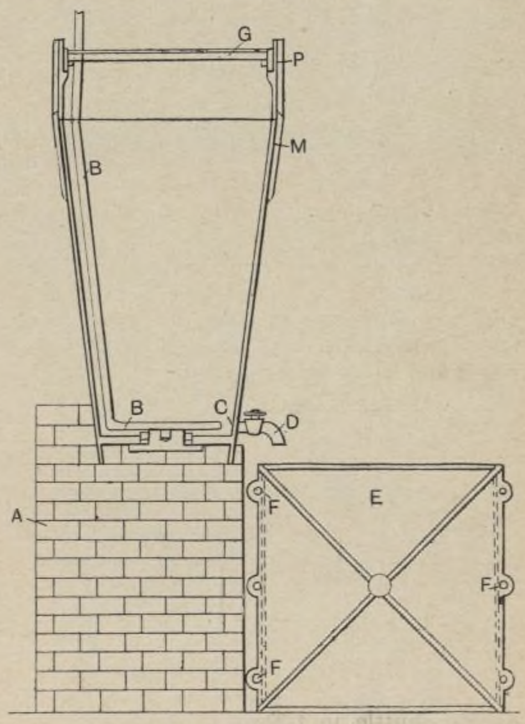
64	per cent.	of fatty matters, with about
25	,,	water, and
11	,,	alkalies, etc.

The greater the percentage of fatty matter, the less soap will be required for any quality of silk; and as it is the fatty matter which is the costliest ingredient in soap, it is obvious that adulteration would mean a less percentage of fat, which means more soap will be needed for a specific quantity of silk. Then, again, the nature of most adulterations is particularly injurious to silk, and very few more so than silicate of soda, which, whilst assisting materially in bleaching silk, will at the same time dull it, make it feel harsh, and cause it to work short in dressing frames. The sand or powdered quartz in silicate of soda appears to stick to the silk fibre in spite of all attempts to wash it off, and although the particles are most minute they can and do cut the silk very much. The presence of this injurious mixture can often be detected by taking a portion of boiled silk, drying it thoroughly, and then shaking it well, when a white powder will fall from it, which on examination shows hard particles

Silk Spinning.—Fig. 20.

and is quite gritty to the touch. Much of it will not shake off, and is carried forward through the various following processes, and acts exactly in the same manner as lime soap. A cheap soap of course always contains a large percentage of water, which commodity the spinner is quite well able to put in for himself without paying so much for it as when sold as soap.

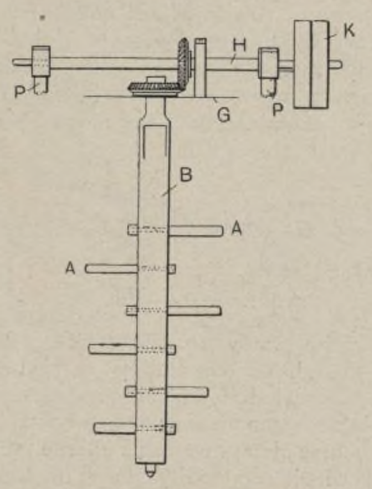
For the sake of economy many experiments have been made with a view to degumming by means of caustic soda or caustic potash alone, used in small quantities in cold or lukewarm water, which mixture softens the gum, which is then washed off with clean water or soap and water. These experiments have not, however, been found satisfactory, because the caustics are so strong that when they have loosened the gum so that it will easily wash off, they have also attacked the fibre



Silk Spinning.—Fig. 21.

itself and burned it considerably. Various means of counteracting the action of the caustic on the fibre have been tested, and some perfected, in the chemist's laboratory, but none have been put to a practical use in England.

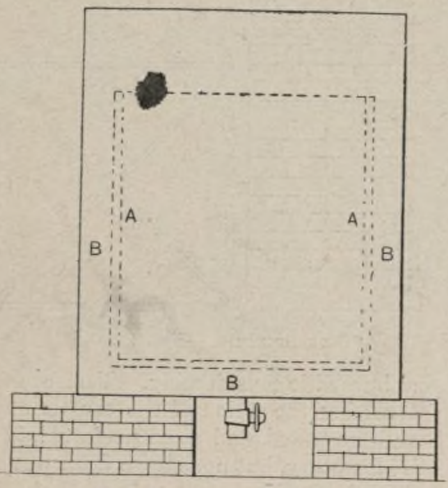
Some spinners make their own soap, which is now greatly facilitated by being able to purchase pure rendered tallow and pure caustic soda, the latter in small tins. The process is known as the "cold" processs. A tub is erected (Fig. 21) and supported on brick stands A. Inside the tub is placed a steampipe B coiled round the bottom. At the point C is fixed a tap D, of large diameter, to serve as an outlet. To 120lb. of tallow (which must be free from salt), placed in the tub, apply gentle heat by means of the steampipes until the tallow is thoroughly melted. Allow it then to cool to a temperature of 120° F., and add very gradually 85lb. of ley (the composition of which is given below) and stir well until a complete union of the alkali and fatty matter is effected. This can be discerned by the smooth appearance of the mixture. The composition of the ley is 17lb. of caustic soda with 68lb. of cold water, which are mixed well in an earthen vessel until the soda is all dissolved. The temperature at which it is ready for use is 80° F. When the ley and the tallow are thoroughly mixed, the tap D is opened and the liquid run into the box E. This box may be made of wood or iron, and it is so made that by loosening the bolts at F the sides fall away to allow proper cutting of the soap.



Silk Spinning.—Fig. 22.

Before running in the molten mass the box should be lined with wet calico. The top is then well covered over with woollen cloths or sheepskins, and left alone for three days, during which time the mixture slowly turns to soap. The quantities of material here given make about 200lb. of good white curd soap. This class of soap is apt to contain more alkali than those made by the hot boiling process, but it is a real good article, and when carefully made is good enough for any silk spinner, and he knows then that it does not contain such adulterations as silicate of soda, alum, acetate of lead, lime, chalk, bone ash, pipeclay, sand, sugar, starch, glue, etc., which are used to cheapen some so-called white curd soaps.

The stirring or mixing of the liquid in the tub can be done by means of the apparatus shown in Fig. 22. A series of arms (not shown in the drawing) project from the side of the tub inside; a vertical shaft B, also furnished with projecting arms A, is fixed by footstep to the bottom, and by a journal fixed to the crosspiece G (see Fig. 21) which is placed over the tub. The bevel wheels affixed on vertical and horizontal shafts respectively B and H are set in motion by driving pulleys



Silk Spinning.—Fig. 23.

K, and the stirring given to the mixture is so complete that in a short time the fatty matter is brought into contact with the alkaline ley, and so saponification takes place. About three hours' stirring is necessary. The stirrer is put in and out of position as required, and is easily fixed by means of bolts at M, M through the tub and brackets P, P.

At the expiration of three days the soap is ready for cutting. This is done by means of a wire drawn across the block of soap which is laid ready for cutting operation by dropping the box ends and sides flat. The bars of soap must then be stored for about a month before using.

Schapping.—If gum silk, or so-called silk waste, is piled in a heap in a damp, warm place, and kept constantly moist, the gum will begin to ferment and loosen. By continually turning over the pile all portions of the heap are properly softened, but the process takes several days, much depending on the quality of the silk being treated. The method is too long and the stench from the fermenting matter too great to allow of such being much practised in England, and on the Continent where schapping is in vogue a much quicker method is adopted now. A cistern of wood (Fig. 23), measuring about 6ft. in depth and 5ft. diameter, is fitted inside with a wooden cage (shown by dotted lines A), allowing 4in. space B between the outside measurements of the one and inside of the other. The top of the inner cage is about 15in. below the height of the outer cistern. The former is perforated bottom and sides with 1in. holes about 4in. apart to allow water to circulate freely from outer to inner cage. A steampipe is fixed to enable the water to be kept at the required temperature. The water for use must be well softened, and it is well that it should have been boiled. When the cistern is empty, about 30lb. of silk is laid in the inside cage; some water is then run in, and the silk well beaten down until it is thoroughly saturated. Another 30lb. of silk is then placed in, well trodden down, saturated with water, and the process repeated until the inner cage is full. Some boards are then placed on the silk and heavy weights placed on them to hold down the silk, which is disposed to swell and to rise out of the water. When wel weighted down the cistern is filled up with water to 8 or 10in. above the boards, and the temperature kept at about 140° F. until the operation is complete. This will take from two to six days, according to the quality of silk under treatment. At the expiration of two days a string of silk is taken out and rubbed well between finger and thumb nail and then broken, and if the silk shows fine fibres at the broken ends it is soft enough or degummed sufficiently for the next process. If, on the contrary, hard ends show, the silk is kept in the cistern longer, and the test made every day until it is softened enough. The silk is then taken out and washed well with clean hot water or hot water and soap. Before washing it is sometimes advisable to put it into a hydro-extractor for the purpose of getting out as much dirty and gummy liquor as possible. Afterwards the silk is placed into shallow wooden tanks with water heated to about 180° F., and kept at this temperature for some time; it is knocked about well in the water so that the loose gum is washed off. Some silks, such as cocoons, will swell exceedingly in the first degumming liquor, and have to be continually beaten and trodden by the attendants' bare feet to ensure their being saturated thoroughly. When soft enough they are sometimes placed on a perforated and movable table, which is moved slowly underneath a jet of water which is arranged above the table so that by its great force and fine spray the cocoons or silk are exceedingly well washed to free them from dirt and loose gum. After the silk has been under the spray for some time the table is withdrawn and the silk turned over, so that what was underneath comes directly under the tap for the washing, which is repeated. Much experience and skill are necessary to be proficient in all these processes, and every operation needs most careful supervision—water testing for heat and softness, repeated testing of the silk to ascertain if it is softening satisfactorily, etc. Any slackness or inattention to any of these details may result in the whole process having to be repeated, which is not only a waste of labour and expense, but does the silk harm; or, if the silk is allowed to pass, although not satisfactory, much trouble may be caused in the after processes and the yarn spoiled. After the washing the silk must be dried, beaten, and conditioned.

The silks most in favour for schapping are Japan wastes, China curlies, knubs of all sorts, and cocoons of all descriptions. Gum wastes are avoided, because by the nature of their production they are subject to hard ends—*i.e.*, twisted threads,—which do not lend themselves to any softening process. Steam wastes are not used very much, because, although they do not contain hard ends, they are so matted in hard lumps that they soften in a very irregular manner, and whilst some portions might be exceedingly well schapped, the next portion would most probably be hard and gummy. If this is softened properly, then the portion which was previously right is apt to become too much treated and to be soft and tender. Such faults lead also to a variable percentage of gum being left in the finished yarn, which must be avoided, as buyers calculate the worth of the yarn in some measure by the amount of gum left in. It is fairly safe to assume that the cheaper the yarn the more gum the buyer is purchasing. A first-class white schappe will contain 2½ to 5 per cent. of gum, and it is obvious that a great deal of skill and attention has been necessary to enable the producer to loosen and wash away some 20 to 25 per cent. of gum, leaving only the small percentage above mentioned.

(*To be continued.*)

Fig. 1.

Fig. 2.

Cotton Designs.

Designs for Cotton Fabrics.

Specially Contributed.

PATTERN No. 207* is an example of one type of the many plaid designs which are being made in cheap materials. The thick soft-twisted cotton weft and the loose crêpe ground combine to give a woolly appearance to the fabric, which at a slight distance seems to contain a certain proportion of wool. The fabric would,

* See facing page 426.

however, have a dull, lifeless appearance if not brightened up by the over-checking of red mercerised cotton.

Pattern No. 208* is a very simple cloth consisting of a plain leno weave, loosely set and picked. The yarn throughout is mercerised cotton, and it is very essential that it be very evenly spun, for the slightest unevenness or imperfection shows up in a most prominent manner. These cloths are made for wearing over a coloured lining; but to get the best effect the leno should be doubled, when a

Fig. 3. Cotton Designs.

pleasing and effective watered appearance is visible, to which is added a shot appearance from the coloured lining.

Fig. 1 is a design suitable for a fine brocade cloth for dyeing or mercerising. The warp should be in a 96 reed, shot with about 120 picks to the inch. The figuring should be worked up from the warp with plenty of fancy bindings, and in some places 2-pick may be used to give more effect. The ground should be 4-and-1 weft satin.

Fig. 2 is a sketch for an all-over cloth made in a 66 reed, and shot 72 picks to the inch. The black figuring should be weft, with the grey ground 3-and-1 warp twill, and the white leaf tabby.

Fig. 3 is a stripe pattern suitable for a cloth made with a 76-reed warp, and shot 80 picks to the inch. The black figures should be made from the weft with the grey warp. The ground on the ivy leaf

Fig. 4. Cotton Designs.

stripe should be 3-and-1 warp twill, and on the other stripe tabby with the grey spots warp.

Fig. 4 is an all-over design for a 76-reed warp, and 70 picks to the inch. The figuring should all be made from the weft and firmly bound down, lying on a tabby ground. This is a good type of design for heavy cloths for printing on.

Fig. 5 is a pretty design for zephyr cloth made with an 80-reed warp, and shot 86 picks to the inch. The black figuring should be made with the weft, the grey edgings and oatmeal from the warp

Fig. 5.

on a tabby ground. To show this design up properly it should be made with coloured warp and weft, say a white warp and shot sky weft, which will throw up the warp oatmeal and edgings.

Fig. 6 is a sketch for cotton dress cloth made with a 96-reed warp, and shot 80 picks to the inch. The

Fig. 6.

black figuring should be made from the weft, with the grey in figure warp, but the grey ground figure should be 2-pick and the ground 4-and-1 warp satin. Inside the leaves should be floating warp broken up with cuttings as shown.

*See facing page 426.

Designs for Silk Fabrics.

SPECIALLY CONTRIBUTED.

FIG. 1 is a design for a lady's scarf made with a 2000/2 net silk warp and shot 100 picks of tram to the inch. The black figuring should be made from the weft with the grey warp,

Silk Designs.—Fig. 1.

and on a 3-and-1 warp twill ground. The network on the ground should be made with weft run by threads, to give a sharp appearance.

Silk Designs.—Fig. 2.

The grey inside the figure may be 7-and-1 warp satin. There is a present demand for this class of scarf, some being made with the woven figures and others having the figuring embroidered on a plain scarf.

Fig. 2 is a sketch for a rich blouse cloth made with a 2000/4 net silk warp and shot 96 picks to the inch of tram. The black figuring should be worked up with weft floated as much as possible, the light grey 7-and-1 warp satin and the dark grey 3-and-1 weft twill, all on a tabby ground. A fine warp and weft oatmeal can be used in places which will take away the bareness of the tabby without loosening the cloth.

Silk Designs.—Fig. 3.

Fig. 3 is a handkerchief design made with a 2000/2 double net silk warp and shot 100 picks of tram to the inch. The figuring should be worked up with warp and weft, taking care that where there is white on the front of the large flower a good large warp satin is used, so that it will stand up well. The darker portions of the flower should be fast weft. The ground of the pattern is 3-and 1 warp twill. A nice effective border is made with 5 and-1 warp and weft twill.

Silk Designs.—Fig. 7.

Fig. 4 is a small tie cloth design made either with gum warp and weft or with coloured warp and weft in about a 2200/2 warp and shot 110 picks to the inch. The diagonal lines and the black figuring should be weft, with the grey warp, on a tabby ground. The oatmeal should be a fine weft one lying on tabby.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 5 is a gentleman's tie-cloth pattern for a 2000/4 net silk warp, shot with ground and tissue shuttles 90 picks each. The black figures should be made with the tissue shuttle and arranged to float as much as possible; the grey figuring should be made with the ground shuttle, and bound down with 9-and-1 satin. The ground should be 4 warp and 2 weft twill, so that the tissue shuttle can be bound at the back.

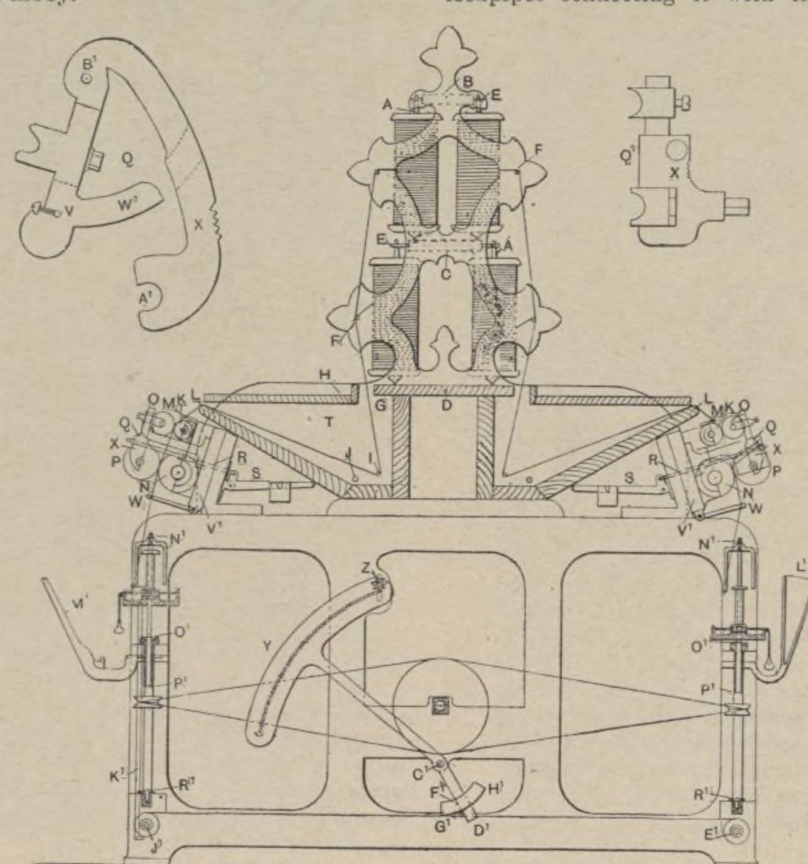
Fig. 6 is also for a tie cloth, but for only one shuttle, with a 2000/4 net silk warp and shot 100 picks of tram to the inch. The black figures should be weft with the grey edgings tabby and the grey oatmeal of weft lying on tabby. The ground should be 7 and-1 warp satin.

Fig. 7 is a sketch suitable for a gent's net silk handkerchief. The warp should be a 2400/2 shot 100 picks of tram to the inch. The figuring should be made with warp and weft, the black should be weft floating fairly well, and the darker shades of grey fast weft with the white floating warp and the light-grey bound warp. The ground of the design should be 3-and-1 twill.

The Mechanism of Spinning.—XIX.

By H. R. Carter.

Wet Spinning Frames for Vegetable Fibres.—Fig. 52 shows a wet spinning frame such as is in common use for spinning flax, hemp, and tow yarns. The bobbins full of rove are brought from the roving frame and placed upon wooden or wire skewers A in the creel B C D. Brass or porcelain footsteps are inserted in the planks C and D, which support the skewers and bobbins, in which steps the points of the skewers turn freely while they are supported in a vertical position by the staples E The creel must be made wider if the frame is to be used for spinning "double rove," for in that case double the number of bobbins must be put in the creel at one time in order that there may be two ends per spindle instead of one. The rove passes from the bobbin as shown, over the brass guide rods F, which should direct it in such a manner that it passes between the back of the trough G and lid H (without rubbing against either), and round another rod I which is placed near the bottom of the trough T, containing water at a temperature of from 100 to 170° F. The rod I is placed low in the trough, in order that the rove may be kept as long as possible under the action of the hot water and be sufficiently macerated. The trough is supplied with water and steam by feedpipes connecting it with the main supply pipes which pass above the frames. The proper position of the steampipe in the trough is shown at J. As heated water rises, it must be placed low and far enough from the line of rove that the



The Mechanism of Spinning.—Fig. 52.

latter may not be scorched. From the rod I the rove is drawn by the feed rollers K over the lip L of the trough and rove guide M. The object of the latter, which is given a slow and short reciprocating horizontal motion by an eccentric moved by a worm wheel and worm upon the end of the feed roller K, is to cause the rove to traverse backward and forward over the face of the roller, so as to distribute the wear pretty equally over its surface, and in this way increases its life. Were the rove to remain in one place upon the roller, a track would soon be created which would prevent the roller drawing as it should. N is the boss or drawing roller, moving at from four to sixteen times the surface speed of the feed roller K, and effecting, by the aid of the pressing rollers O and P, an equivalent amount of drawing out or drafting. The rollers O, K, and N are all brass-covered, but the drawing pressing roller P is of wood, gutta-percha, or indiarubber. All these rollers are fluted to a pitch varying with the coarseness of the frame, and lying between 20 and 40 flutes per inch diameter. The quality of the brass with which these rollers are covered, and the method of casting, are of great importance, especially for fine spinning. The metal must be close-grained, and of equal density throughout, for blowholes and other flaws cause the flutes to be imperfect, and prevent them from drawing properly. Most of the makers have special mixes and methods of casting, while in some cases the bosses are compressed under great pressure while on the roller. The rollers K and P are in pairs upon either end of short axles. The means by which they are pressed against the feed and drawing rollers, which are in one long length, are clearly shown. Q is a piece of brass, called the "saddle," having two bearings, which embrace the journals between each pair of pressing rollers. A pull is brought to bear upon it through the wire R, one end of which is attached to the short arm of the lever S, while the other passes through the saddle, which is tightened up by a nut upon the screwed end of the spring wire R, a washer or collar, called the "humbug," being interposed between the nut and the saddle. A weight is placed upon the long arm of the lever, as shown, in a position necessary to give the required pressure, which varies from 60 to 180lb. The drawing shows the frame fitted with rollers of an ideal size, under which conditions the lever is exerting its force most efficiently, the spring wire R being at right angles to the saddle and pressing the feed and drawing rollers directly into their bearings. Under these conditions the force exerted is distributed between the top and bottom rollers in quantities inversely proportionate to the length of the perpendiculars let fall from their centres upon the spring wire. Since the feed roller with its bearing may be, and is, frequently screwed up or down in order to lengthen or shorten the length of reach or distance from the nip of the top rollers to that of the bottom ones, it follows that while the perpendicular distance of the centre of the drawing roller from the spring wire remains constant for the same size of bottom pressing roller, the length of a similar perpendicular from the centre of the feed roller varies with the "reach." For this reason the effective pressure upon the feed roller diminishes with the lengthening of the reach, or *vice versâ*, while that upon the drawing rollers is increased, or the reverse, in a like degree.

The size of the bottom pressing roller likewise materially affects the distribution of the pressure of the lever and weight between top and bottom rollers, for if the triangle of forces be studied it will be seen that, the saddle being no longer perpendicular to the spring wire, the bottom roller receives a larger percentage of the pressure applied, part of which, however, is generally lost in pressure of the saddle against its stand. It may be said that, although the saddle and stand have been the subject of innumerable patents, they are a practical detail in spinning machinery which is still open to improvement. We show a few of the leading types in detail. They may be broadly classified into armless and armed saddles, the former being supported and kept in place by a single central stand, while the latter require a double stand such as is shown on the right-hand side of Fig. 52. The advantage of an open or single stand is the additional room and freedom secured for cleaning, etc. Many prefer a closed or double stand, because, if the stands are well spaced and the pressing roller axis of an exact length, the wooden or guttapercha rollers cover the brass bosses properly, enabling the boss roller to be run much longer without refluting. The bad practice of side piecing, which is quite easy with an open stand, is moreover rendered difficult and often impossible with a closed stand. The saddle Q^1, shown in detail and detached at the right of the figure, is an armed saddle which is superior to that designed in the right-hand side of the frame itself, for the reason that the bearing for the bottom pressing roller may be screwed in and out with the object of keeping the saddle perpendicular to the spring wire with every size of pressing roller, for the reason already given. In both of these saddles the top pressing roller seat may be shifted up or down to keep the point of contact of the rollers constant, whatever may be the length of reach. Another advantage which the armed saddle has over the armless one is that the groove, cast in the stands at either side to receive the ends of the saddle arms, may be made at such an angle or curve that the point of contact of the bottom rollers may also be kept constant, whatever the size of the pressing roller. In all classes of saddles the angle of the spring wire and the saddle itself may be further adjusted to a small extent by shifting the point of the humbug in the nicks made to receive it, and shown in the enlarged saddles to the right and left. The small saddle shown in the frame to the left is an armless saddle similarly constructed in other respects to those already described. It has the practical disadvantage of occasionally permitting the rollers to wear to one side or the other. The enlarged saddle to the left is perhaps the best of two-piece saddles. We will describe it rather minutely, as the theory of its leverage is rather interesting. It is supported in a single stand, in which its short arm is pivoted at V. The short arm carries the top roller bearing, and the long arm is pivoted to the upper extremity of the first, and carries the bottom pressing roller bearing. The spur W^1 on the short arm passes through the long arm and makes the combination more rigid. The spring wire passes through the saddle at X, and is screwed up with a nut and humbug in the usual way. If the combination be studied it will be seen that in the first instance the long arm acts as a lever of the first kind, the pressure applied at X being distributed between the points A and B^1 in inverse proportion to their perpendicular distance from the spring wire. The short arm of the saddle will now be seen to be a lever of the second kind with its fulcrum in the pin V, while the force is applied at the point B^1 against the resistance offered by the top pressing roller at a variable distance from the fulcrum V. This saddle has several structural defects which prevent the point of contact of the bottom pressing and boss rollers from being kept constant. Difficulty is also sometimes experienced in working with small pressing rollers, while with a long reach the pressure upon the retaining rollers is frequently insufficient.

Leaving the drawing rollers P and N, the thread passes to the action of the flyer and spindle, being steadied in its passage through the eye of the thread-plate W. This thread-plate eye is differently constructed from those in frames already described for spinning fibres of another nature. It is a round disc of brass riveted in a corresponding hole in the cast-iron thread-plate, which is pivoted as shown to enable the bobbins to be readily doffed from the spindles. A small round hole is bored in the brass disc, into which the thread is inserted through a slanting or tangential slot communicating with the outer edge of the plate. This slot is cut in such a direction that the end does not tend to fly out while being twisted. The arrangement of the spindle and flyer is very similar to that of the cotton-flyer frame. The flyer is screwed upon the spindle top in such a direction that resistance to rotation tends to tighten it. The flyer eye, being quickly cut by the hard and well-dragged thread, is of brass wire soldered into the hollow end of the flyer leg and turned into a curl. The bobbin is placed upon the spindle and rests upon the builder, being dragged by a cord which extends across the latter from back to front and carries a leaden weight at its extremity, as shown. Either the top or side of the front edge of the builder is nicked to hold the cord in the desired position, the drag being tempered or regulated by hand, as the bobbin fills, in causing the drag band to embrace a larger section of the grooved base of the bobbin. The weight of the drags varies from 1oz. for the finest yarns to 16oz. or more for heavy numbers. Various mechanical and automatic dragging devices have from time to time made their appearance and failed in their practical application. Their object was a good one—namely, to advance the drag bands slowly with each fresh layer of yarn upon the bobbin; and they would no doubt have met with success if the yarn could have been spun without breakages, and had the comparative drag of one bobbin with another remained constant.

An up-and-down traverse is given to the builders by means of the quadrant Y, turned by the small pinion Z on the end of a long shaft extending from the other end of the frame. The circular segment of the quadrant, which is only a quadrant in name, is set with one row of round brass pins, which serve as teeth upon either side of which the teeth of the small driving pinion act. A semi-circular guide at either end of the row of teeth causes the pinion to move round to the other side, which it is free to do, its shaft not being rigidly held, but moving in a slot as shown. The quadrant turns upon a stud at C^1, and has a tail-piece C^1 D^1, which, if the driving pinion cannot be placed in the centre of the frame, must make a suitable angle with the long arm of the quadrant, so that while in motion it makes similar angles on either side of a vertical line drawn through its rocking centre. The reason of this condition is that the builder shafts J^1 and E^1 are given a reciprocating rotary motion by means of adjustable chains attached to bosses upon their ends, and to a circular segment F^1 upon the tailpiece of the quadrant. The simplest way to obtain an absolutely uniform motion for the builder is to have the chains E^1 G^1 and J^1 H^1 always horizontal. This, however, is not always practicable, if the traverse of the builder has sometimes to be lengthened or shortened by moving the segment F^1 up or down upon the tailpiece C^1 D^1 of the quadrant. Inconveniences of this sort may be avoided, or bobbins of special shape built, by the use of cam-shaped pieces or "irons," instead of the round bosses upon the end of the builder shafts. Thus, for instance, a bobbin with a large base and a small head may be used, and a large quantity of yarn placed upon it by building the said yarn in a large measure towards the base of the bobbin by increasing the speed of the builder as it approaches its lower position, and *vice versâ*. In explanation we may say that if the head of the bobbin be too large, the end will rub against it and cause breakages or fraying of the yarn. Or the capacity of the bobbin may be increased by giving the full bobbin a swell in the middle by giving the builder a slow motion near its central position and quickening that motion towards either extremity. The ordinary rate of traverse is very slow indeed, but we may say that a very much quicker motion has been unsuccessfully tried with the object of crossing the threads upon the bobbin at a greater angle in order that the end when broken might be more easily found. The reciprocating circular motion of the builder shafts is changed into a vertical up-and-down traverse, and communicated to the builder itself through rods K^1, known as "poker rods," one end of each being tapered and inserted in the taper hole in the builder, while the other end is attached to a short chain wrapped round other small bosses upon the builder shaft. The circular reciprocating motion of this latter shaft thus wraps on and lets off the short chains, and raises or lets fall the builder, that on one side of the frame rising while the other descends. Flyer frames are at present at work building cops or pirns with a quick and short up-and-down traverse, as in the cotton ring frames described in Article VIII. Ring frames have also been tried for wet spinning, but without success, since stalk-fibres usually retain much of the woody matter of the stem, which they throw off in all the processes, and which (in the spinning especially) combined with water has been found to choke the traveller on the ring, impede its free rotation, and render its proper lubrication difficult.

Two forms of splashboard are shown at L¹ and M¹. The object of this accessory to the wet spinning frame, the use of which is rendered compulsory by law in some countries, is to protect the spinners from the spray thrown off by the revolving flyers, which in a coarse frame is of considerable density. It consists of strips of sheet iron, etc, supported in brackets of various forms, the chief qualifications of a good splashboard being ease in lifting out for cleaning, and freedom to move forward to enable the spinner to reach her creel with facility. The spindles are driven in the ordinary way by bands from a single tin cylinder as shown. The most suitable banding for wet work is coated with a red composition to protect it from the damp, and is composed of three strands of 3 to 6 threads of about 2½'s cotton made from long-stapled fibre. Tapes are also sometimes used for heavy work. They necessitate the use of a tension pulley and a wharve of different construction to that shown. The proportion of the tin cylinder to the wharve as regards diameter is usually about 10 to 1. To keep the spindle from jumping, the wharve should be shrunk upon the butt in a horizontal line with the centre of the tin cylinder. A well-proportioned spindle should have the length of its blade N¹ O¹ 2½ times the pitch of the frame or the traverse of its bobbin, or about one-third the total length of the spindle. The length of the neck O¹ P¹ should be about half that of the blade N¹ O¹. The butt P¹ R¹ is an inch or two longer than the blade. The diameter of the blade varies from ⅕ to ½in., the nick being about ⅛in. larger in diameter and the butt ¼in. more than the blade. The wharve, besides being horizontal with the centre of the tin cylinder, should be upon the balance point of the spindle in order to secure steady running.

The angle of the rollers, and the position of the latter in relation to the spindle and thread-plate, are important in consequence of the effect they have upon the strain put upon the yarn while spinning. The distance which the face of the delivery roller N stands back from the line of the spindle is termed the projection, and varies from ½ to 1¼in., according to the strength and number of the yarn and the pitch of frame. When the line of the spindle projects much beyond the face of the roller, a considerable strain is put upon the end, and *vice versâ*. The thread-plate eye must be absolutely vertically above the spindle top, and the plate itself, which should be high enough above the spindle to permit the spinner to insert her hand between the plate and flyer in order to stop the latter, should also be at right angles to the line of the thread between the thread-plate eye and the point of delivery from the roller. The rollers may be advanced or retired with their seats and the beam V¹, which extends the whole length of the frame. The following table gives suitable settings for frames of various pitches :—

Pitch of Frame.	Bottom of Spindle Screw to Nip.	Distance Back from Line of Spindle.	Angle of Beam.	Angle of Roller.	From Spindle Screw to Thread-plate.
4in.	9¾in.	1¼in.	17°	19°	3¾in.
3½in.	8¾in.	1⅛in.	17°	19°	3¼in.
3in.	7¾in.	1in	16°	18°	2⅞in.
2¾in.	7¼in.	⅞in.	16°	18°	2⅝in.
2½in.	6¾in.	13/16in.	15°	17°	2¾in.
2¼in.	6¼in.	¾in.	15°	17°	2⅜in.
2in.	5¾in	10/16in.	15°	17°	2in.
1¾in	5¼in.	⅝in.	15°	17°	2in.

(*To be continued.*)

Bobbin Drying.

By George R. Smith.

THE great advance made in the drying of material in one or other of its states during the manufacturing process has made the drying of these materials in the best possible and economical manner a matter of some importance. Such factors as output, labour required, condition and colour of the material, as well as cost of drying, have to be considered. However, the following remarks only refer to experiments performed to ascertain the possibility of drying on certain lines. In the first set of experiments performed, the object was to determine the possibility of drying dyed cotton slubbing on bobbins 14in. long by 4in. diameter by means of air. The apparatus used for these experiments is shown in Fig. 1, which represents a small gasholder such as is used for testing the quantity of gas registered by gas meters, consequently it is well adapted for measuring the pressure and the quantity of air passed through the bobbin. It consists of a gasholder, balanced by the balance weights passing over friction wheels. The weights A were added one at a time to give the desired pressure, which was registered by the gauge B in the following manner: When there was the same pressure inside the holder that there was outside, the water in the two limbs of the U-shaped tube stood at the same level, but when weights were added at A the pressure of the gas in the vessel was increased, and forced the water to stand higher in the right-hand leg of the three vertical tubes than in the central tube. The difference between the levels of the water in these tubes is the column of water this air supports, and represents the air pressure used. A column of water 1in. high gives a pressure of about 0·036lb. per square inch. The bobbin C was soldered on to the outlet pipe to prevent any possible leakage, and the experiments given in the following table were performed :—

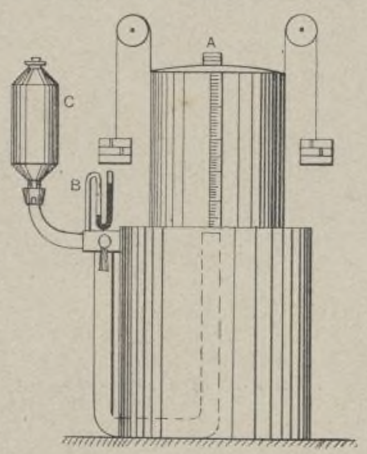
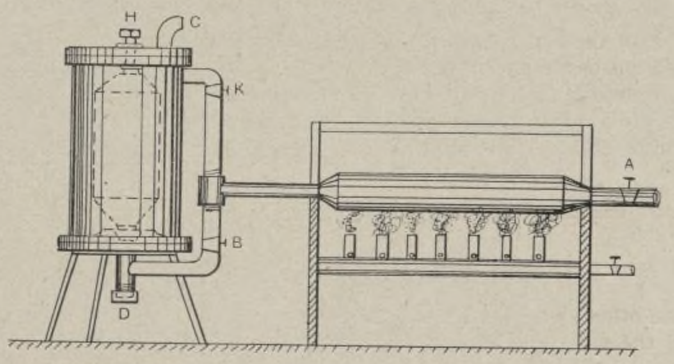


Fig. 1.



Bobbin Drying. Fig. 2.

No.	Pressure of the Air Used, and Measured by the Column of Water it will Support in *Inches*.	The Time Required to Pass the Air given in Column 4 in Minutes and Seconds.		The Quantity, in Cubic Feet Passed in the Time Stated.	
		Mins.	Secs.		
1	0·5	12	12	1	Bobbin dry.
2	1·0	4	20	1	
3	2·0	2	10	1	
4	3·0	1	26	1	
5	4·0	1	6	1	
6	5·0	0	53	1	
7	6·0	0	39	1	
8	7·00	0	33	1	
9	7·55	0	32	1	
10	0·5	Infinite.		1	Bobbin wet.
11	1·0	350	0	1	
12	2·0	133	0	1	
13	3·0	112	30	1	
14	4·0	58	0	1	
15	5·0	46	0	1	
16	6 0	39	0	1	
17	7·0	30	0	1	

When dry 2lb. 5½oz
When wet .... 5lb. 2oz.
Water .... 2lb. 8½oz. = 108 per cent.

As shown by column 2 of this table, the pressure of air used in the first experiment was equal to a column of water half-an-inch high, and under this pressure it took 12mins. 12secs. to drive 1 cub. ft. of air through the dry bobbin. Under a pressure of 3in of water the time required to send a cubic foot of air through the bobbin was 1min. 26secs. Under an air pressure equal to 7in. of water, the time required to drive 1 cub. ft. of air through the bobbin was only 33secs. The bobbin was then saturated with water by steeping in hot water for a day, and squeezing out the excess of water by hand pressure, but this left 108 per cent. of its dry weight of water in the bobbin. The lower half of the table shows that when the bobbin is wet it is difficult to drive the air through it. The time required to drive a cubic foot of air through the bobbin under a pressure equal to half-an-inch of water was almost infinite, as no flow could be measured after hours of waiting. When the pressure of the air reached 3in. of water, it took 58mins. to get a cubic foot of air through, and 30mins. when the pressure was equal to a column of water 7in. high.

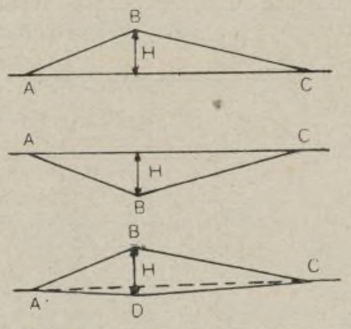
These results show that an air pressure of not less than 7in. of water would be required to dry a bobbin by passing air through it from the inside to the outside, or from the outside to the inside. However, it would not require much air by this method if the temperature of the air was, say, 180° F., because the air comes in close contact with the water in the bobbin. Each cubic foot of air at this temperature is capable of carrying off 140 grains of moisture on leaving the outer surface of the bobbin, and it is only during the later stages of drying that the air would not be completely saturated. The resistance to the flow of air in the wet bobbin as compared with the dry one is very marked, and much higher than we should expect on reasoning from the results obtained from a dry bobbin. This great resistance in the wet bobbin seems to be due to the small globules of water clinging to the fibres by cohesion, and the necessary displacement of these globules to permit the air to pass in the new channels it must be constantly making. This change of path is due to the relaxation of stress in the layers of slubbing on the bobbin as it becomes dry.

The results obtained from the wet bobbin show that a high air pressure must be employed to dry quickly in any drying system based on this system. The need of high pressure and temperature made it necessary to find some easy means of obtaining both. Superheated steam seemed to meet both requirements, consequently the apparatus shown in Fig. 2 was rigged up and the experiment performed. Steam comes from a boiler at 60lb. pressure, and is reduced at the valve A to about 1lb. pressure. It then enters an enclosed 2in. iron pipe, where it is superheated by the bunsen flames, as shown. The degree of superheat in the steam is about 20° when it has passed the valve B. This superheated steam now passes through the holes in the bottom and through the material into the brass cylinder and out at C. After a time C and B are closed, and the superheated steam reaches the outside of the bobbin by the valve K and finds its way out at D when the cap there is unscrewed. It should be observed that the top end of the bobbin is closed by the set-screw H pressing on a brass plug. In one trial a bobbin was dried with this superheated steam within 3oz. in about twenty minutes. On unwinding it was found that the water was in the outer layers. High pressures have a tendency to force the cop bottom down, and so provide an easy path for the air to escape by. Where it is possible to dye material in the bulk, this can be done if suitable means are adopted.

The Shedding of the Warp.

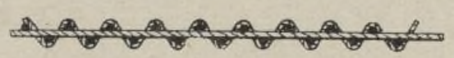
IN weaving, the warp shed may be defined as the angle formed by the separation of the warp threads to permit the passage of the shuttle. The mechanical methods of forming the shed may be divided into two classes—single and double. The single shed is formed by raising or lowering a portion of the warp, while the remaining portion is at rest. Fig. 1 represents a single shed formed by raising, and Fig. 2 one formed by lowering the warp. In each case a portion of the warp is held in the line A C, while the other portion is deflected in the form of a broken line A B C ; the dotted line H represents the height of the shed.

The single shed is not much used except in certain kinds of jacquard weaving, where the shed is formed from 2 to 2½in. high, and Fig. 3 represents the shed so produced. The less the warp is raised



Warp Shedding.—Figs. 1, 2, and 3.

above the level A C, the less will be the tension on the yarn. The primitive method of weaving consisted in the use of a single harness or shaft carrying each alternate thread or one half of the warp. This shaft formed the shed by alternately rising above or dropping below the level of the other threads, which remained at rest, as shown in Figs. 1 and 2. Fig. 4 represents a longitudinal section of a cloth woven with one heald ; the lines represent the warp, and the points the weft. This illustration shows irregularity of the fabric caused by operating only one-half of the warp threads. Owing to the unequal tension, two warp beams are needed for this method of weaving. The double shed is formed by a combination of the two methods of producing the single shed. One part of the warp rises, and

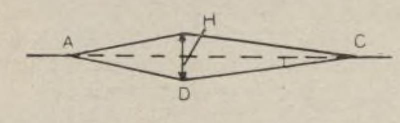


Warp Shedding.—Fig. 4.

the other descends ; it is evident that for a shed of the same height it will be necessary to deflect the warp threads only one-half as much as with the single shed. Fig. 5 shows the position of the warp threads in a double shed.

In the operation of weaving there are three different kinds of sheds : —(1) Closed shed ; (2) mixed shed ; (3) open shed.

These expressions, in common with many others, are used in a double sense. This is due to the fact that in the transformation of the weaving industry from hand to machine work, many expressions which originated in the hand industry were retained in machine work. The original terms, open shed and closed shed, related originally to the shed when the reed pressed the weft in position ; this meaning has not only been retained, but also applied to the action of the healds. We will first consider the action of the reed and then that of the healds. The terms open and closed shed used in connection with the action of the reed are of general signification—that is, they are used

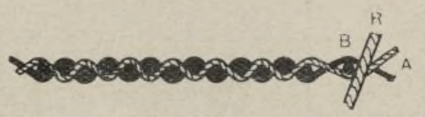


Warp Shedding.—Fig. 5.

in both hand and power weaving,—while the same terms applied to the action of the harness are employed only in power weaving.

Cloth is made with a closed shed when the following shed has already been formed when the reed is driving the weft thread into position. Fig. 6 shows the action of the reed R and weft pick B ; the shed A for the succeeding pick is already formed. The weft pick, having reached its proper position, is pressed both by the warp thread and the reed at the same time ; it is thus subjected to a torsion which contributes much to the solidity of the fabric. Fig. 7 is a transverse section along the line of the last pick in a fabric woven with the closed shed at the moment when the reed is pressing this pick into position. The warp threads are represented by A and B. As the healds have already changed position in order to form the next shed, the weft thread will be deflected up and down, as shown at Fig. 7. The closed shed thus has a tendency to stretch the weft thread in the interior of the fabric. This tendency is not regular, and consequently at the intersection of the warp and weft threads minute irregularities are formed which give the fabric a dull, irregular appearance when woven.

The shed is termed mixed when the healds are all on the same level when the reed presses the weft thread into position. In this shed the weft thread assumes a straighter position than with the closed shed. This method is suitable for most fabrics, although it does not form as firm a texture as the closed shed.



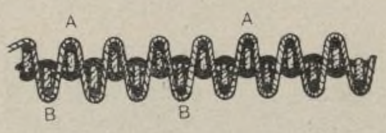


Fig. 6. Warp Shedding. Fig 7.

In the open-shed method of weaving the weft pick is placed in position by the reed before any change has taken place in the shed (see Fig. 8). The various weft threads are thus kept in a straight line, and consequently are nearer parallel than is the case with the other sheds. Fig. 9 is a section of the fabric woven with an open shed, showing the position of the warp threads and weft pick, as the latter is brought into position by the reed. C D is the weft pick, and A B represents the warp threads. Practically the same results are arrived at by both the open and mixed sheds. In the open shed the weft thread is not subjected to that torsion which it undergoes in the other sheds, consequently the weft pick occupies the straighter position, and the intersections are less rounded. From what has already been said it will be readily understood

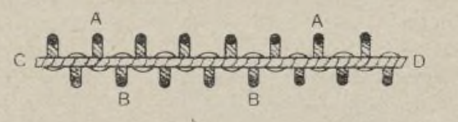


Fig. 8. Warp Shedding. Fig. 9.

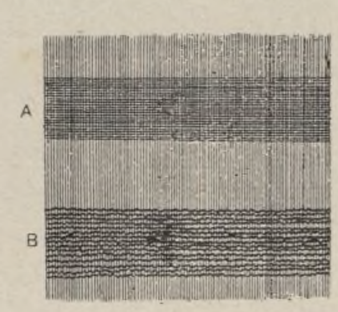
that each form of shed has its advantages for particular fabrics. Fig. 10 represents a fabric in which the portion A has been woven with either an open or a mixed shed, and the portion B with a closed shed. These exaggerated drawings will give an idea of the effects produced by these different methods of weaving. We may sum up the matter by saying that with the open shed the warp deflects the weft, and with the closed shed the weft deflects the warp.

Most silk fabrics are woven with either an open or mixed shed, while in other fabrics a closed shed is used to a greater extent. The open shed has a tendency to make the warp prominent, while the closed shed tends to make the weft more apparent. The closed shed has also a tendency to cause the goods to shrink in width after weaving, while the fabric woven with the open shed retains the woven width better. The take-up of the weft is naturally greater with the closed shed than with the open shed. The closed shed should not be used indiscriminately for all fabrics ; it is necessary to modify the shed according to the nature of the fabric ; thus a fabric with a cotton weave and wool weft should be woven with a closed shed in order to give the cloth more the appearance of all wool. Fabrics made with silk organzine warp and wool weft should be woven with an open shed in order to make them resemble pure silk goods.

A partially-closed shed is still used for manufactured goods where it is desired to have the weft and warp show alike, as in pure linen goods.

From the point of view of the action of the healds, looms are called either open or closed shed. Fast-running looms are operated with an open shed, while slow-running looms generally have closed sheds. For a closed shed all of the healds are brought to the same level after each insertion of the weft. The succeeding shed thus begins to form at the level of a line drawn from the back beam to the breast beam—that is to say, if a heald lowered at one pick is to be raised at the next one, it is first brought to the centre level and then elevated, the movement being in reality a double one. In other words, the action of the healds in power-looms with a closed shed is similar to that in hand-looms : the healds are brought to a common level after the passage of the shuttle. This action takes place whether the succeeding shed is the same or not ; thus, if one heald is raised for several consecutive picks, it is nevertheless thrown to the centre level at each pick. The warp threads thus assume the three different positions shown at Figs. 11, 12, and 13 ; the complete shed is shown at Fig. 14. At the moment the reed drives the weft into the fabric, the threads occupy a position shown at Fig. 12, and consequently to lower or raise a heald it is only necessary to move it a distance equal to one-half of the height of the shed.

In weaving with an open shed the action of the healds is entirely different. Any heald that may have been raised can be lowered with one movement, while a heald that has been lowered also requires but one movement in rising. This method saves time in the formation of the shed, as the healds remain stationary when they are up or down during several consecutive picks. Weaving with an open shed thus has the advantage of lessening the friction of the warp threads on each other ; consequently it is well suited for weaving tender yarn.—"L'Industrie Textile."



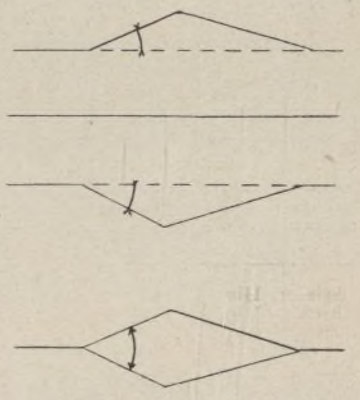


Fig. 10. Warp Shedding. Figs. 11, 12, 13, and 14.

Fancy Dress Fabrics.—XXIII.

By G. Washington.

A VERY neat figured effect is illustrated by Figs. 230 and 231, where small weft spots are contrasted with five-end warp sateen. An intermediate effect is obtained by combining equal quantities of warp and weft in the plain portions of the design. The pattern is only visible when the fabric is viewed from certain angles, and in some positions the weft effect shows darker than the warp.

Warp.

2/80's worsted.
116 ends per inch.

Weft.

22's lustre worsted.
52 picks per inch.

Figs. 232 and 233 show the appearance and structure of a white silk fabric. The design is very effective; it is about 3½in. wide, and consists of a number of circular spots developed in hopsack and weft-cord weaves, irregularly

Fig. 230.

distributed over an 8-shaft sateen ground. The great disparity in the number of threads and picks gives the hopsack portions a fine warp-cord structure. The weft cords are formed by alternate picks floating over 24 threads, and then weaving 2-and-2 with the next 24.

Warp.

Organzine silk, 10,000yds. per ounce.
384 ends per inch.

Weft.

Tram silk, 7000yds. per ounce.
160 double picks per inch.

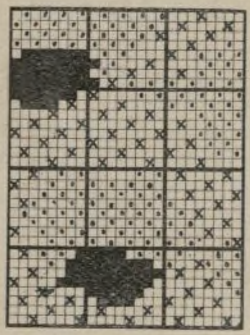


Fig. 231.

The silk fabric illustrated in Figs. 234 and 235 has a stripe of sateen edged with warp cord, contrasted with the small detached warp spots and open texture of the plain ground. The design has been reduced by omitting 20 threads of the sateen stripe, and 16 plain threads. Further variety is imparted by placing the bulk of the spots near one edge of the stripe, and leaving the other without.

Warp.

Silk, 11,000yds. per ounce.
Cord and satin stripe, 224 ends per inch.
Plain stripe, 112 ends per inch.

Weft.

2/80's worsted.
64 picks per inch.

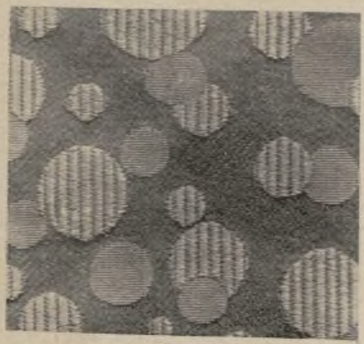


Fig. 232.

A fancy "crêpe-de-chine" is shown in Figs. 236 and 237. The ground weave is nearly plain, but broken up in a very irregular manner, excepting round the warp figures, where the fabric is made as firm as possible in order to give a good outline.

Warp.

White silk, 22,000yds. per ounce.
120 double ends per inch.

Weft.

2/48's worsted.
56 picks per inch.

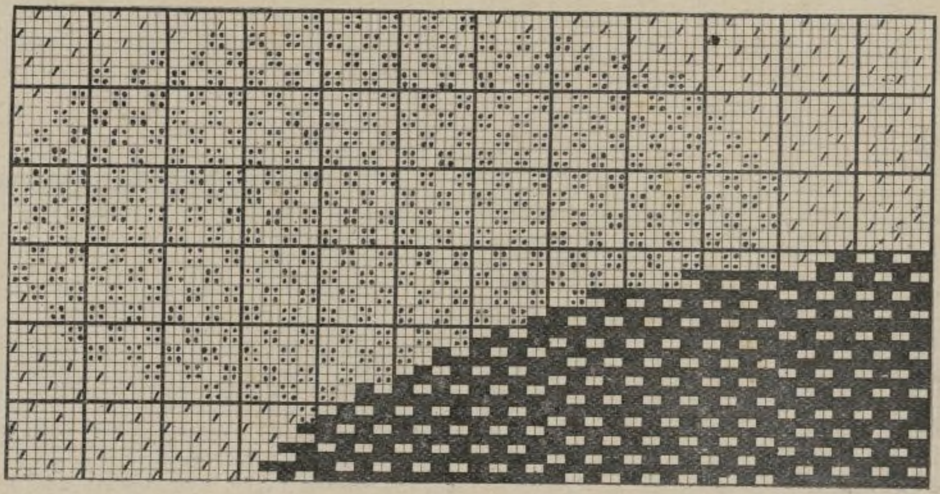


Fig. 233.

Fig. 238 is a fine example of swivel weaving, and has been considerably reduced in size The ground fabric is black and perfectly plain in structure. Fig. 239 is the design for the swivel picks forming the flowers shown near the centre in Fig. 238. This fabric is especially interesting technically because of the large number of swivels required to weave it, their nearness together, and also the manner in which the figures inserted by separate swivels join up to each other. Five swivels are required to weave the figures shown in Fig. 238, and the design is not complete. Commencing at the left hand, the first forms the two detached figures; the second, the upright spray, leaving off where it joins the flowers, as shown by strokes in Fig. 239. The next weaves the flowers shown in full squares, then passes on to the nearest ball and forms seven of them to the top. The fourth first weaves the small flowers, and then passes to the two centre balls; after a few picks it also forms an extra ball on the left and half a ball on the right, thus weaving the full extent of its traverse; as the fabric is so thin that the picks would show through if floated behind, these are woven in a fine twill between the balls. The fifth commences with the flower at the right-hand bottom corner, then forms the other half of the ball and the remainder of the festoon. The swivels are only ⅞in. apart, and can overlap each other a few threads if required; they are probably circles arranged in two rows and working alternately, the loom first opening the shed for the odd swivels, and afterwards a second shed for the even swivels, between each ground pick. The sketch in Fig. 239 shows the plain fabric in solid black lines, and also the interweaving of the swivel picks Nos. 33 to 40. The swivel weft is always down when the ground pick is inserted, so that any slackness when turning back is thrown behind and often forms a small loop. The sketch also shows that the two swivels have passed round the same thread. In the ball formed in two halves by separate swivels they overlap each other two threads.

Fig. 234.

Fig. 236.

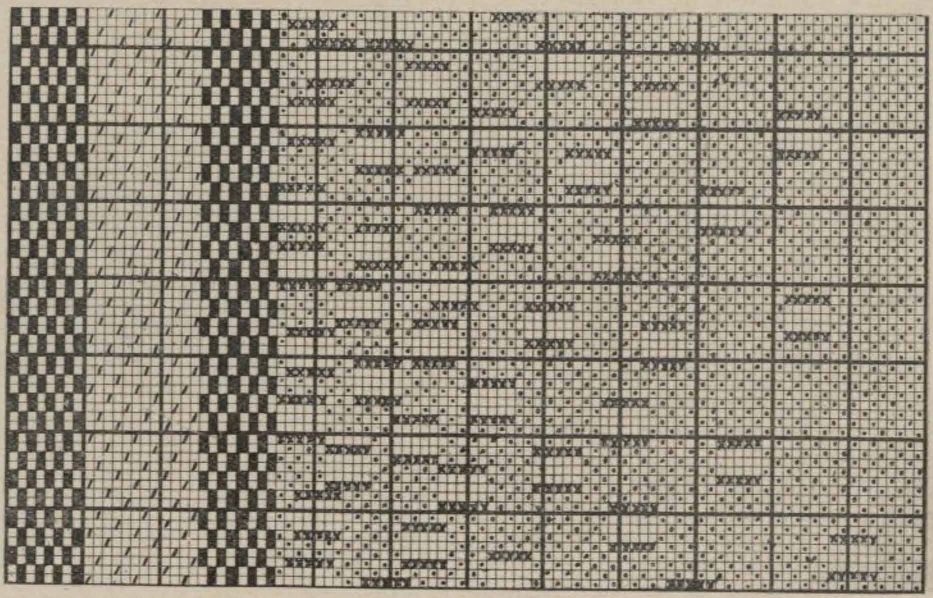


Fig. 235.

Warp.

Black, 16,000yds. per ounce.
84 ends per inch.

Weft.

Black 16,000yds. per ounce.
80 picks per inch.

Swivel Weft Extra.

White, 1500yds. per ounce.

The serge canvas or hopsack shown in Figs. 240 and 241 is remarkable for the introduction of a fine thread, marked in crosses in Fig. 241, and weaving plain between each hopsack. The yarns are a mixture of brown with a small quantity of a contrasting colour of a greenish hue.

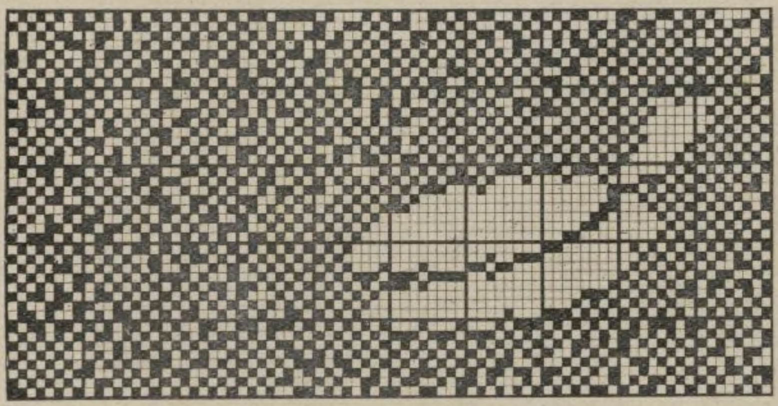
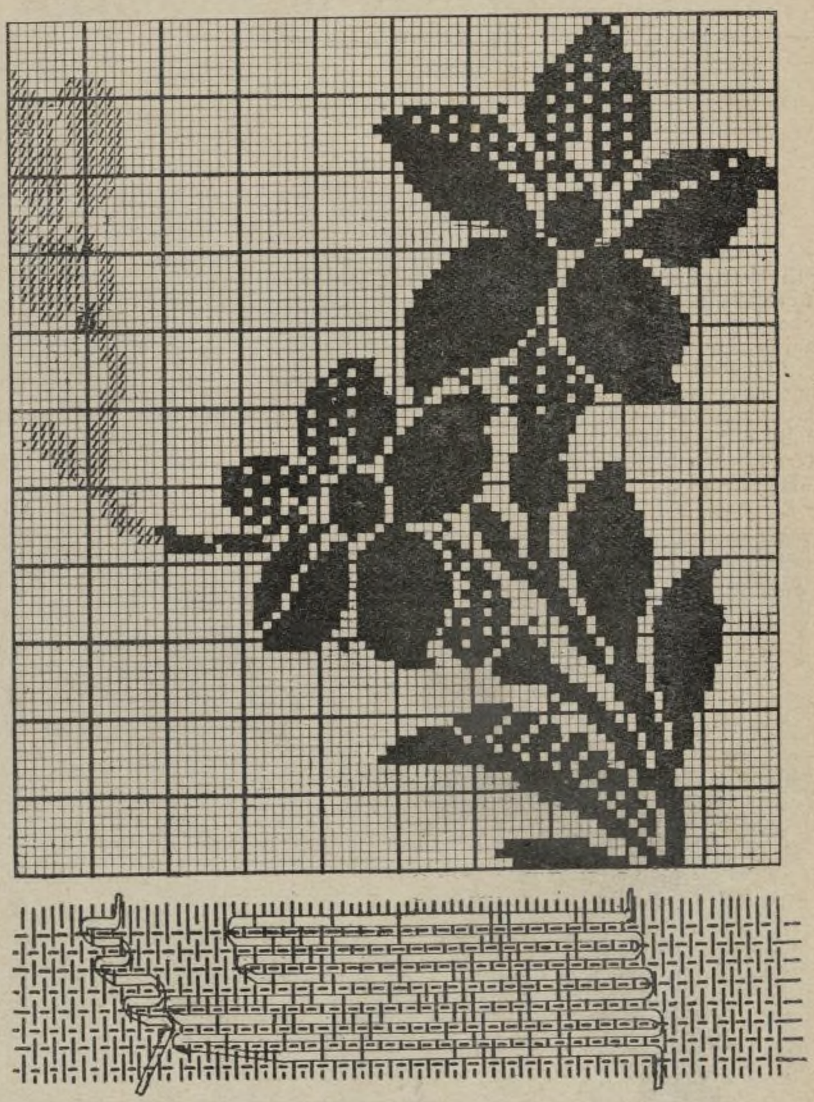


Fig. 237.

Fig 238.



Fancy Dress Fabrics.

Fig. 239.

Warp.

2 ends 2/16's worsted.
1 „ 2/36's „
42 ends per inch.

Weft.

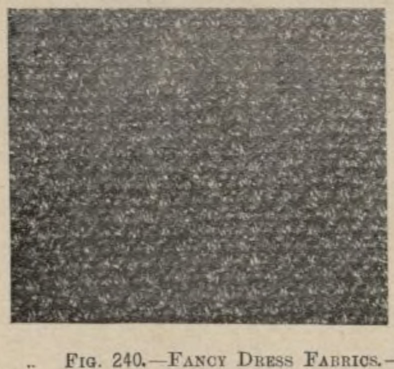
8's worsted.
26 picks per inch.

(To be continued.)

REVIEWS OF BOOKS.

Textile Raw Materials and Their Conversion into Yarns. By J. Zipser. Translated from the German by C. Salter. London: Scott, Greenwood and Co. 10s. 6d. net.

This is a voluminous work which treats on every known fibre, mineral, vegetable, and animal, and follows it through the preparing and spinning processes. The first portion—namely, that devoted to



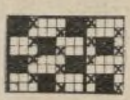


Fig. 240.—Fancy Dress Fabrics.—Fig. 241.

the enumeration and classification of the various fibres—is very complete, and contains references to many textile fibres which are usually overlooked in such works. In different portions of the book, sometimes in the most unexpected places, are also to be found the different chemical tests used to distinguish the various fibres or to ascertain their qualities, and also the methods of testing materials for condition, twist, strength, etc. These are competently treated, and it is rather a pity that the arrangement of the book does not bring the results of these tests together in one section. It is, in fact, in discussing the chemical side of any textile question that Continental writers are seen at their best, in contrast with which, in the present work, the mechanical side of the spinning branch is treated in rather a scrappy manner. There is much excuse for this, for when it is remembered that the book follows the different fibres all through their processes from raw material to finished yarn, it will be seen that space must necessarily be curtailed to bring the volume within reasonable limits. There appears, however, to be no excuse for the drawings, which might have retained their present reduced size and still have had reference letters attached to the various parts which could have been read by persons with average eyesight. There is one point of great interest which may be noticed throughout the book, and that is the explanation of methods of working and of machinery peculiar to Continental factories. The book does, in fact, treat on Continental practice, but of course this follows lines similar to our own in many respects. There are, however, many machines and methods explained which materially differ from our own, the section on worsted spinning being very marked in this respect, whilst that on wool also shows this characteristic in a less degree. The portion treating on waste silk spinning will prove of interest, for we have little English literature on this subject, whilst in a less marked manner the same applies to other secondary processes, such as waste cotton, shoddy, etc. The book will prove an excellent work of reference as regards the different raw materials, and in the spinning section a few suggestions may be got which will show how our Continental neighbours produce some of the cheap yarns which we find difficult to imitate at the price.

Book-keeping for Traders, Manufacturers, and Companies. By W. R. Elworthy and C. C. Campling. London: Jordan and Sons Limited. 2s. 6d. net.

Book-keeping is explained in this work in a simple manner, which appeals alike to the cashier or manager of a small private business concern and the secretary of a large limited liability company. The first portion of the book is devoted to book-keeping pure and simple, and in a very lucid and easily-understood manner explains the various books necessary for a reliable system of double entry. Each book is considered separately, sample folios and accounts are given, and the whole is intermixed with advice of a sound and practical nature. It is safe to say that any person of ordinary intelligence should be able to thoroughly grasp the principles and practice of book-keeping from the explanations given, which are such as can be readily adapted to the textile industries for both wholesale and retail accounts. Passing to higher spheres, the work next explains the books of a limited liability company, with full instructions to secretaries, and a short enumeration of the latter's duties and responsibilities. The various forms of accounts, bills, etc., are explained, as are also the methods of drawing up statements and balance-sheets. Much other information, too detailed to mention, is given, and altogether it might be said that the book presents its subject in a manner both simple and comprehensive, omitting all lengthy descriptions, but nothing which is likely to be of use, even indirectly.

Die Organischen Farbstoffe. By Albert Berghof. Vienna: A. Hartleben. 6 marks 80 pf.

Most books on dyeing matters commence their subject with the prepared dyestuff, or at most give but a brief outline of its earlier conditions. The present work, however, devotes most of its pages to a detailed description of the preparation of the various natural dyestuffs—*i.e.*, those of animal or vegetable origin,—their preparation for the drysalter or dyer, and their modern application to the various kinds of fibres.

We have also received:—"Reports of the Heads of Departments of the Bradford Municipal Technical College."

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.

J. B. (Accrington).—You have not complied with our rule regarding name and address.

Inquisitor.—(1.) Write the Secretary of the Cotton Operatives' Association at either Blackburn, Burnley, or Preston. (2.) Frederick Ripley and Co., Spring-mill-street, Bradford; and James Tankard, Bowling, Bradford. (3.) We did not see the article you mention, so do not know what you mean. (4.) There is no good modern book published in England on silk weaving, but there are articles on the subject in back numbers of The Textile Manufacturer. (5.) About 30, but it depends upon the condition and speed of the looms, the quality of the material, and the class of weavers employed. (6.) Italians are woven in tappet looms, 5 satin weft face. The warp is usually a low-sett cotton, and the weft well-picked single Botany.

THE TEXTILE MACHINIST:

Devoted to Machinery, Apparatus, Tools, Etc.

The New Needle Loom.

BRITISH AUTOMATIC LOOM COMPANY, GREAT ST. HELENS, LONDON, E.C.

IN face of the great advances made in the power loom during the last few years, there are still many mechanisms which practice shows to be defective, and which are only used because they are the best means known for obtaining the desired end. The most glaring defects are to be found in the ordinary picking motion—not in its mechanism so much as in its principle,—which still remains almost as crude as in the hand-loom days. Many methods have been devised with the aim of doing away with a loose shuttle, but as yet no reliable means has been advanced which will be equally applicable to looms of all widths.

The new needle loom, as also looms of a similar if less perfect type, manage to lay the weft without losing control of the weft-laying medium, as is the case in the ordinary broad loom, where the shuttle passes from box to box, controlled by no mechanism between the two, it only being possible to operate it from the extreme end of either of its journeys. Swivels and needles have an advantage in this respect, although both are restricted as to the width of fabric they will economically weave. Theoretically speaking, there should be no limit in this respect; but when it is remembered that either a swivel or a needle requires at least twice as much space as the cloth itself, in the same longitudinal direction, the limits imposed by space and convenience are overstepped. In addition, the production of a broad loom would be considerably curtailed even if other things were practicable.

The use of a needle for laying the weft seems to be the ideal method for narrow fabrics, especially those which are woven in multiple in one loom. Needles can be worked much more rapidly than swivels, less wear and tear accompanies their movements, whilst they are simpler to operate and keep in repair. Not only these, but a needle can be fed from a large stationary bobbin, and so save much in attendance as against the swivel, whose small bobbin is constantly in need of replenishing. A slight disadvantage accompanying the use of the needle loom—one considered slight in ribbon weaving, but which is a great drawback with wider goods—is the fact that it is always necessary to lay a double pick, also that only one colour of weft can be used. The use of needles for weft insertion is not exactly a new idea, but it has been made practicable, in the loom about to be described, by the introduction of a selvage motion which can be relied upon to turn out perfect selvages.

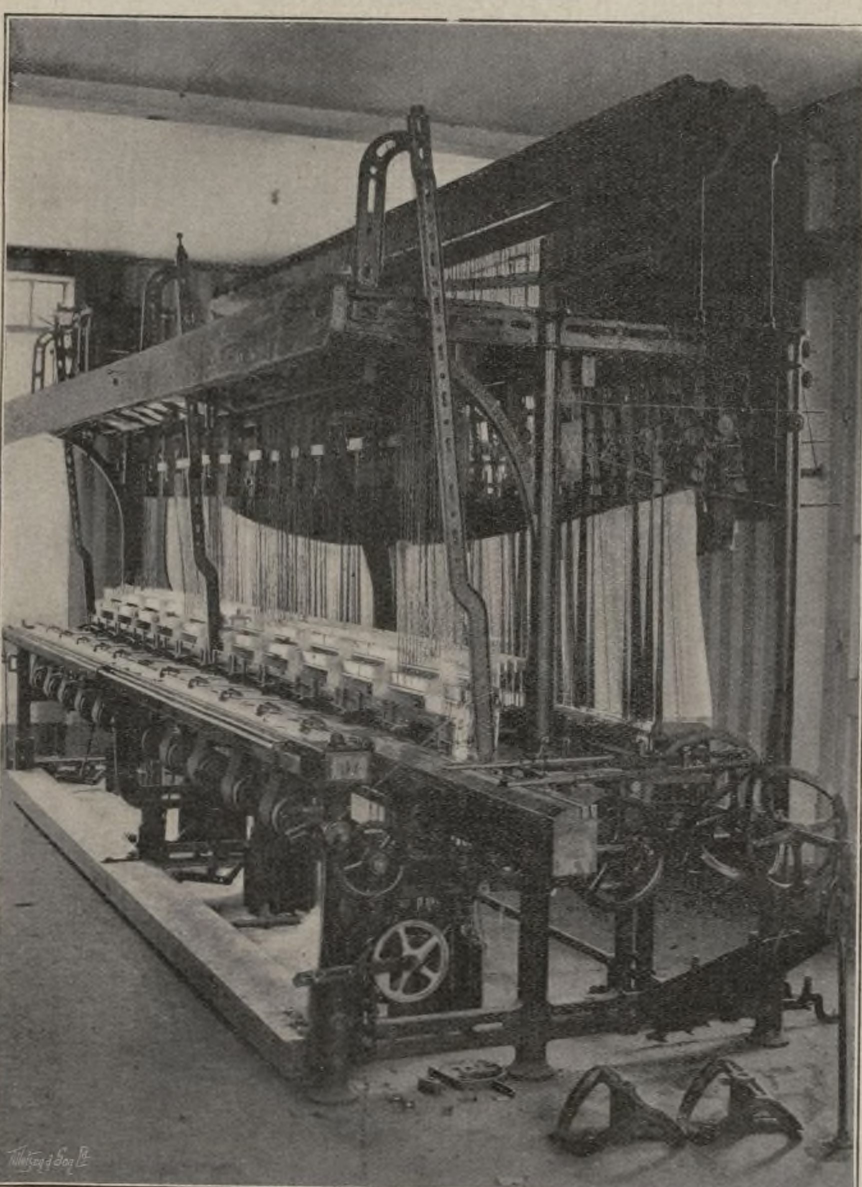


FIG. 1.

The new loom is shown in Fig. 1, from which it will be seen that in general structure it differs little from those ribbon looms in ordinary use. In fact it is not an expensive matter adapting any smallware loom of the existing type to the new process. A partial side elevation showing some of the new parts is given in Fig. 2, which parts are also shown in plan in Fig. 3. The reed is fixed on the lay in the usual manner, being either in one piece or in sections corresponding to the number of ribbons being woven. Mounted on the lay, so as to be capable of sliding in grooves, are two needle carrier slides C. The needles, attached to short pillars for support, are carried in these slides, the number of pairs corresponding, like the reed sections, to the number of ribbons. The carrier slides are operated by cams D, best seen in Figs. 1 and 3, the former figure also showing two detached cams lying on the floor. By the levers shown in Fig. 3 these cams transmit a rapid reciprocating motion to the slides and their needles at the time that the pick has to be inserted and, as will be seen, they are timed to operate alternately with each other. If necessary—say, for laying four picks in a shed—the cams can be timed to work simultaneously, or, if required, one can be put out of action.

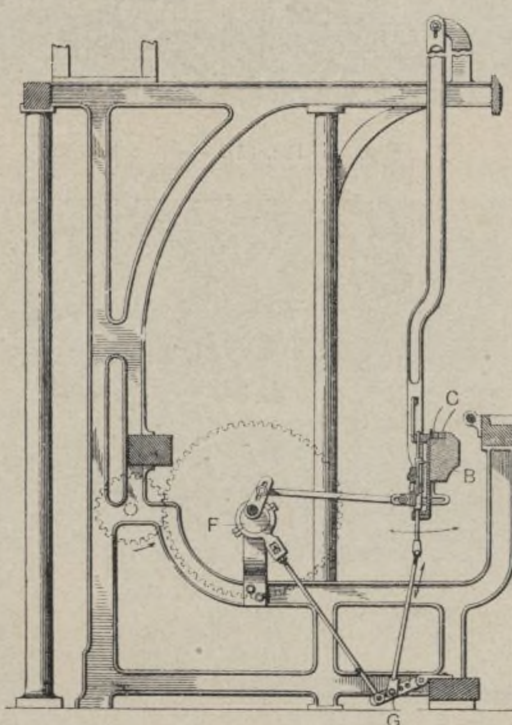


FIG. 2.

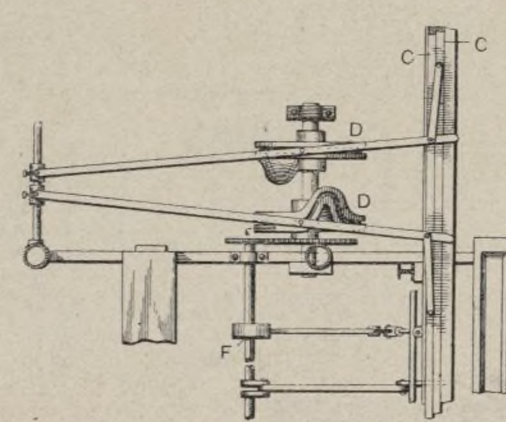
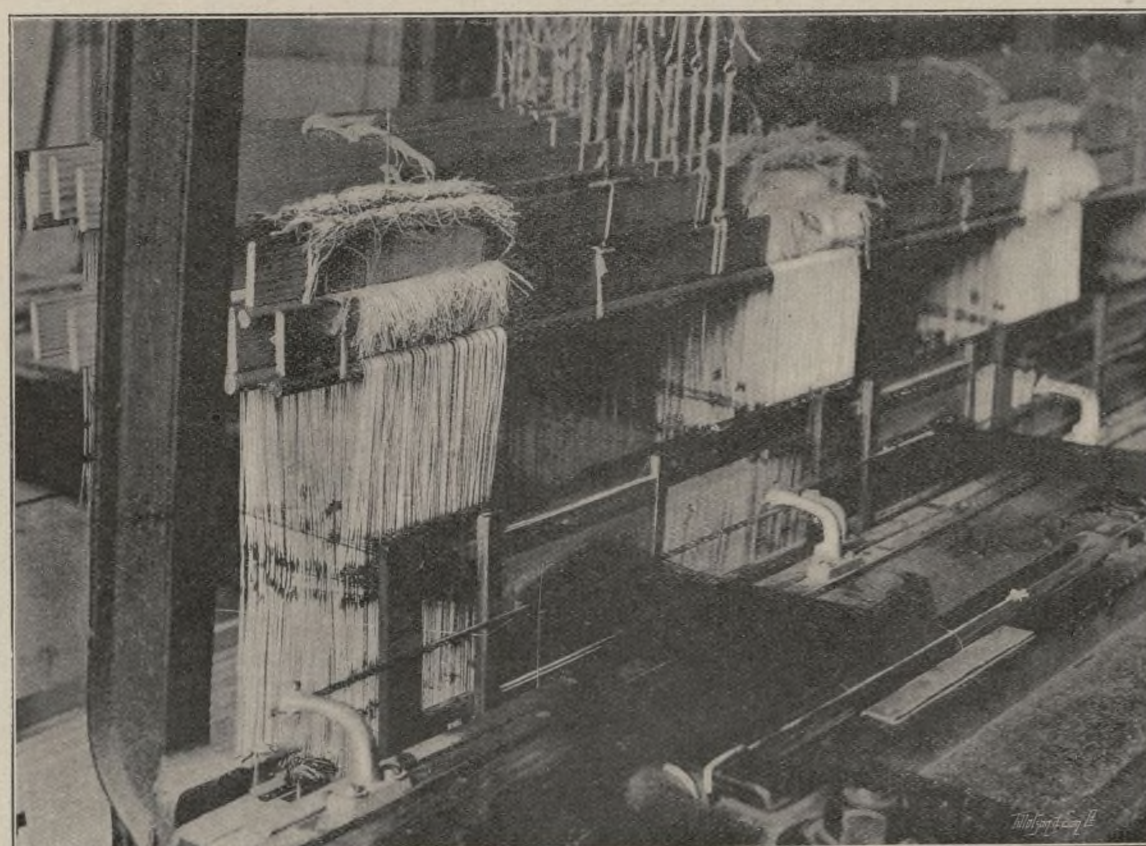


FIG. 3.

The chief feature of the new loom, as mentioned previously, is its selvage motion. This is partially visible in Fig. 4, as are also the weft-laying needles just described; it is better seen in Fig. 5, which shows one of the selvage needles and its support. The needle E is raised so as to engage each double pick as it is inserted by the weft-laying needle, and prevent its being drawn back into the warp shed as the needle recedes, and so make faulty edges, if not a useless fabric. The needles are given an up and-down motion, rising to catch the loops, and falling when each loop is beaten up, this movement being derived from the eccentric F shown in Fig. 2. This eccentric, through the lever G and the rods shown, only contributes part of the motion, the movement of the lay multiplying it as it reciprocates backwards and forwards. The needle E passes down through a short lever H, which is free to swing on its fulcrum. The upper part of the needle lies in a long slot, so that it has sufficient play in a direction parallel to the warp threads in the loom. A spring J helps to keep the needle in an upright position, although the force of gravity is often quite sufficient for this. In addition to this flexible support, the needle is made of some flexible metal, and it is in this respect that it differs from other selvage motions of the same type. The rigid needles injured either the reed or the cloth, and usually had to be set so far from the latter that a distinctly looped border was formed.

The motions may be perhaps better understood if they are followed out during the different phases relating to the laying of one pick. This is done in Figs. 6 to 10, each of which shows the different positions in elevation and plan. In Fig. 6 the lay is on its backward movement from the fell of the cloth, the shed is being formed, the selvage needle E is in its lowest position, and the weft-inserting needle K is about to move into the shed. At this period, also, the arms L of the specially-arranged weft tension motion are apart, and there is no slack in the weft yarn. As the lay gets nearer the backward part of its stroke, the weft-inserting needle passes through the shed, drawing the take-up arms L together, and also more weft from the supply bobbin M, as shown in Fig. 7. The selvage needle E is here raised into the angle formed by the inserted weft thread, as seen best in the elevation of Fig. 7.

The lay B next commences its forward movement and the weft-inserting needle K retreats from the shed, leaving its loop of weft held by the



THE NEW NEEDLE LOOM.—FIG. 4.

selvage needle E and producing some slack yarn in tne weft supply, which is taken up by the tension device, the spring arms L separating as shown in Fig. 8. As the lay then continues its forward movement, the weft-inserting needle K is drawn entirely clear of the shed, and the increased tension put upon the weft is sufficient to draw the selvage needle E against that side of the warp

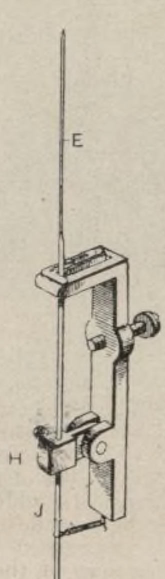


FIG. 5.

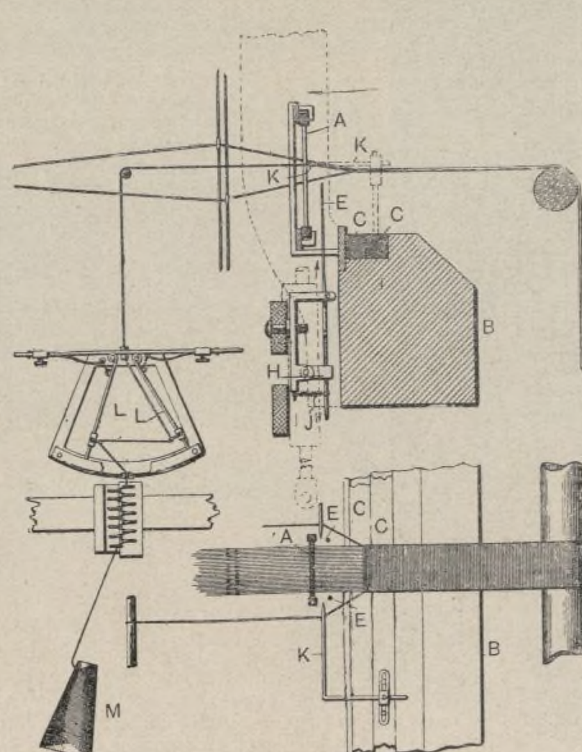


FIG. 6.—THE NEW NEEDLE LOOM.

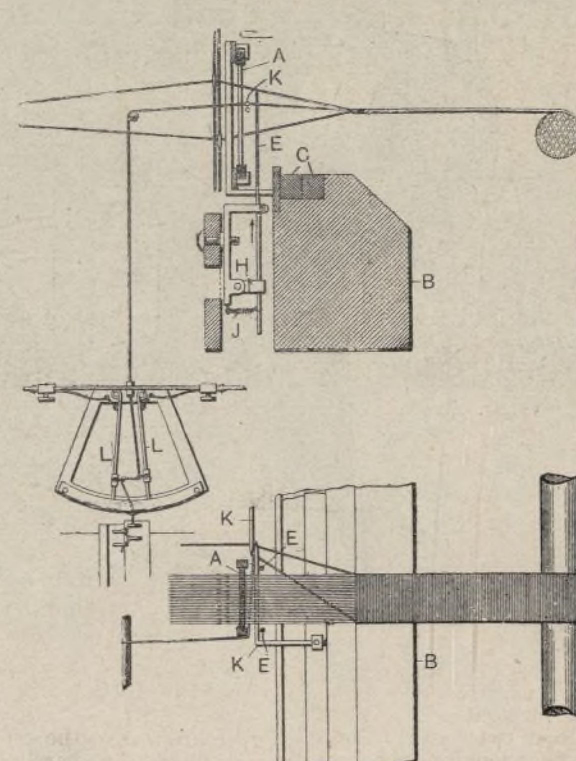


FIG. 7.

threads where it is held as the lay approaches the fell of the cloth, as shown in Fig. 9. It is at this point that the tension arrangement shown is most in evidence, for it prevents a further supply of yarn being drawn off the bobbin, and yet gives sufficient pull to hold the selvage needle firmly against the warp.

The selvage needle E is not only placed far enough away from the warp to prevent any risk of injury during its rising and falling movements, but it is also some distance from the reed A—sufficiently so to allow the weft-inserting needle K to pass between it and the reed and so properly deliver its loop of weft. Then, as the selvage needle holds the weft right up to the moment of beating up, the flexibility previously mentioned allows the needle to bend towards the reed. The bending is shown in Fig. 10, which, in addition to the side elevation and plan of the parts concerned, also gives a partial front elevation to better illustrate the movement. This takes place as the shed is changed, which change firmly binds the weft into the cloth and so prevents the tension device from drawing the weft backwards. The frame carrying the selvage needles is then lowered, and the parts again assume the position shown in Fig. 6.

Unfortunately, just at present the English ribbon industry is in a very stagnant condition, and no conclusive tests can be made in this country. Trials in other countries, however, show that the new method effects various savings, ranging from $7\frac{1}{2}$ to 15 per cent. on the ultimate cost of the woven ribbon. This, of course, represents economy in the production covered by increased turn-out and lessened attendance.

Improved Combing Machinery.

MESSRS. ASA LEES AND CO. LIMITED, OLDHAM.

A VERY large proportion of the new cotton-spinning machinery being put down at the present time in this country is for fine or combed yarns. The Southern States of America, India, Japan, and China, not to mention the nearer countries on the Continent, are all developing the cotton industry at a rapid rate; but as many of them chiefly work up home-grown cotton, which means coarse counts, English spinners find it necessary to develop in the direction of better-class yarns and fine counts. The change has been in evidence for some time, and machine makers have been busy overhauling and revising the necessary machinery, with the result that it is now possible to obtain a large production from machines which may be relied upon to turn out perfect material, and yet require a minimum of skilled attention and little cost in repairs.

The sliver lap machine shown in Fig. 1 has been designed with the view of obtaining a machine of durable build. It is now more and more recognised that many machines have their working existence curtailed by the vibration of their own parts when working, which causes a rapid wear and tear, loosens joints and stays, and in time shakes the machine itself to pieces unless upheld by frequent and continuous repairs. To avoid this, the framing

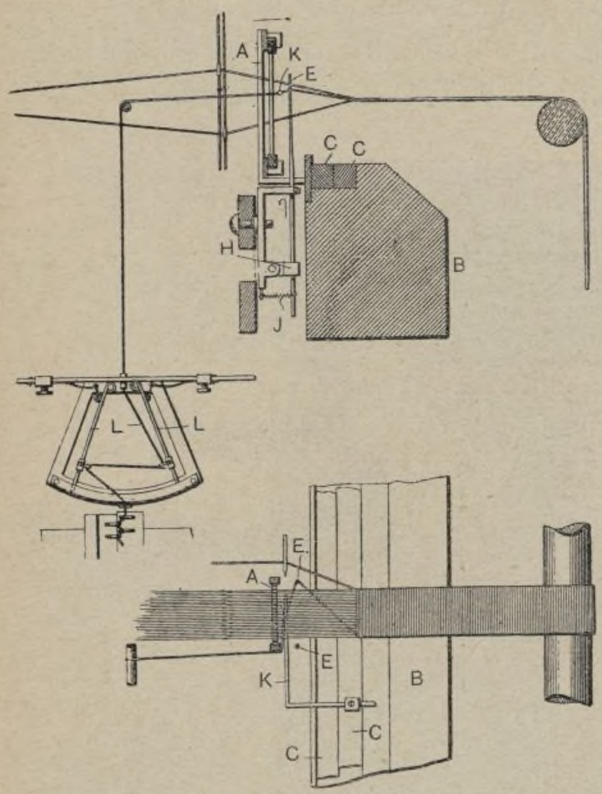
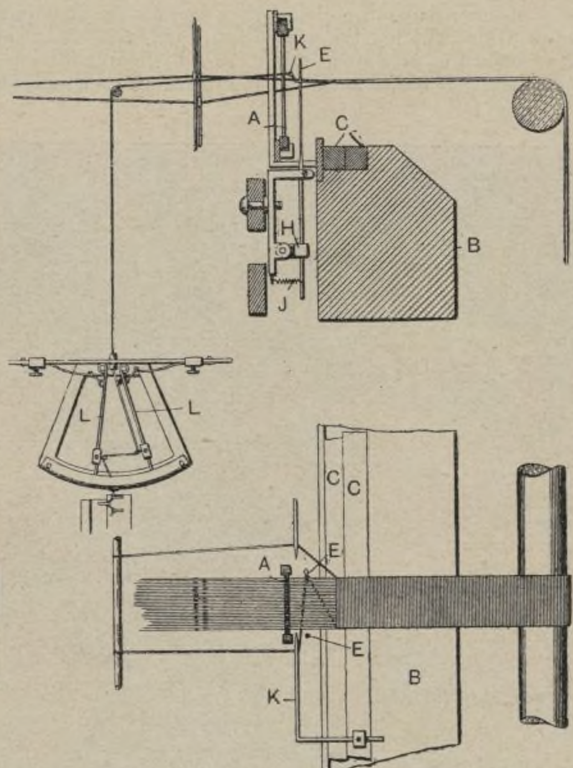


Fig. 8.



The New Needle Loom.—Fig. 9.

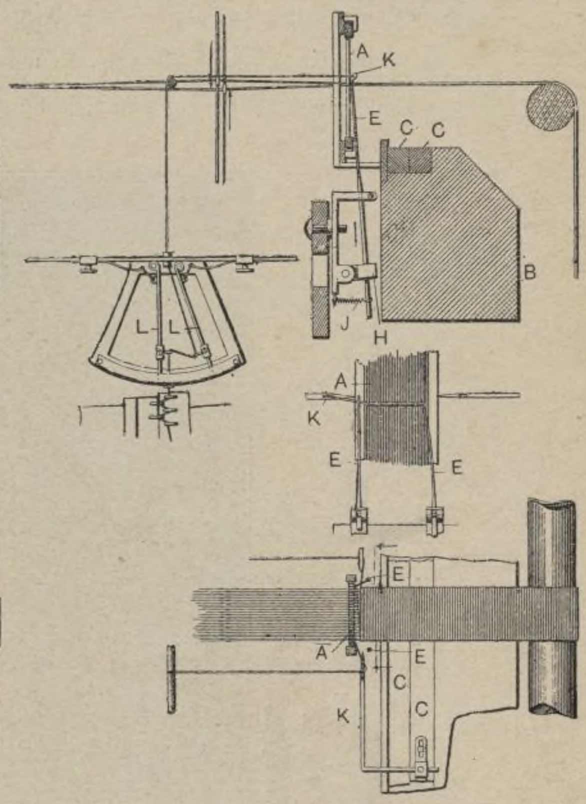
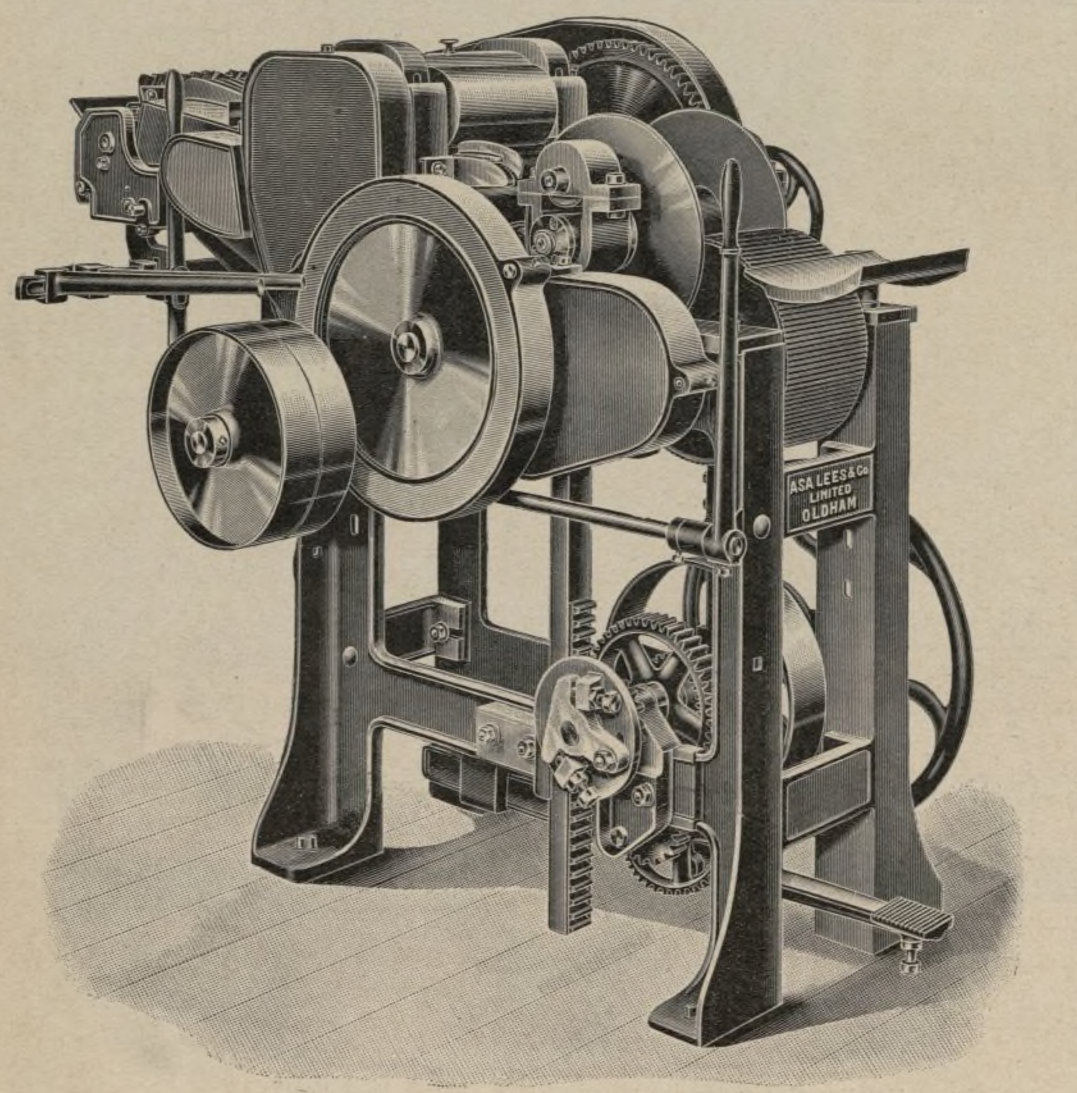


Fig. 10.

has been made sufficiently heavy and rigid enough to ensure an even running of the machine. To aid this, as well as to ensure well-fitted parts, all the attached surfaces are either planed or milled.

The slivers taken from the carding engine are put up at this machine, being placed at



Improved Combing Machinery.—Fig. 1.

the back in from fourteen to twenty cans. The series of slivers pass over the spoons of the stop motion, these spoons being pivoted and weighted so as to tilt up and stop the machine when any sliver breaks. This is done in a few revolutions and before the broken end of the sliver has time to enter the drawing rollers. The cotton, which is now roughly in lap form, passes through three pairs of drawing rollers, and then through two pairs of calender rollers, which are heavily weighted so as to compress the lap into a more solid form.

As delivered from these rollers, the lap is wound on to a core held between two metal flanges When each lap is complete—that is, when each bobbin contains sufficient length — the belt is thrown on to the loose pulley by a stop motion, which may be regulated to knock off for any length of lap. The width of lap on the machine we examined was 7½in.; but it is customary to make laps up to 10½in., according to requirements. These widths are presuming that the laps are to be passed on to a ribbon lap machine; if they pass direct to the comber, these widths should be exceeded by 1in., to compensate for the spreading of the lap in the ribbon lap machine. The sliver lap machine just described is estimated to turn out from about 450 to 500lb. a day, and requires about ½H.P. to drive.

For better-grade yarns it is customary to take the laps from the sliver lap machine and put them up behind the ribbon lap machine shown in Fig. 2, which, if used, dispenses with the need of a drawing frame prior to the sliver lap machine, even for the best yarns. Six laps are usually put up and each passes separately through four pairs of rollers, which give it a draft of about six, really treating the cotton in lap form in a similar manner to the way the drawing frame treats it in sliver form. Previous to entering the drawing rollers the lap passes under a brass roller and then over a tumbler stop motion. The weight of the brass roller on the lap causes the latter to press down the tumbler, so that if the lap breaks or runs out, the tumbler is allowed to rise and stop the machine. Each pair of rollers is separately weighted so that the distance between each may be exactly regulated to the length of fibre being treated. On emerging from the drawing rollers, each lap passes over a curved cast-iron plate, which is either covered with a sheet of highly-polished brass or is nickel-plated and thoroughly burnished. The curved plates bring the laps from a transverse into a longitudinal position, when the six laps are combined, pass through two pairs of consolidating calender rollers, and the whole, as one lap, is wound on to a core in a manner identically the same as in the sliver lap machine.

The resultant laps are about an inch wider than those fed into the machine, as the cotton opens out to this extent when passing over the curved plates. Like the preceding machine, care has been taken to give this a good foundation, and in one respect a great advance has been achieved on the older machines made by the same firm. This is in the way in which the bed is placed upon the supports of the machine. In the older machines this bed was carried on a bracket on the support, but it is now placed definitely on the support itself, thereby ensuring a permanent rigidity which it would be difficult to excel. The machine is designed to work with the sliver lap machine and be regularly fed by one of the same, and so has a similar output (from about 450 to 500lb. a day). About 1H.P. is required for driving.

The combing machine (Heilmann system) shown in Fig. 3 takes the laps direct from the ribbon-lap machine, it being usual to put up six or eight laps for each combed sliver. This machine has recently been greatly modified, most of the alterations being made with the aim of avoiding well-known troubles which only come to light in actual practice. The top comb has two rows of needles, and the nipper ends are fitted with slips of leather fitted between two plates, and so held that the protruding ends are much more serviceable than if attached to the surface. The general arrangement of the needle segment and these nipper ends has a marked influence upon the waste made by the machine, saving much that is often caused by the selvages being doubled over, so that the needles are unable to comb the extra thickness of the lap in those parts. The top comb shaft has been made thicker and stronger, and is now operated by two eccentrics, one at each end of the cylinder shaft.

In designing the cams great care has been taken to enable them to work very smoothly, and the machine on which they are milled has been specially constructed for the purpose. The detaching rollers are worked directly from the cams without the use of a rocking shaft, thus dispensing with a number of levers, connecting rods, etc., and reducing backlash and wear and tear. The stripper is now worked from the camshaft, an arrangement which enables it being worked much slower (although quite fast enough for its purpose), and this slower speed means both quieter working and less friction. As will be seen by the illustration, some radical alterations have been made at the driving end of the machine, which enable broken parts to be replaced without it being necessary to almost pull the whole of that end of the machine to pieces. In addition to the shaft mentioned, most of the other shafts and pins have been strengthened, as it is found that this enables faster speeds being used. The multiplication of eccentrics, cams, etc., is also found desirable in enabling all parts being started and worked together, and avoiding the slight torsion of gearing which often causes the driving end to get to work slightly in advance of the other.

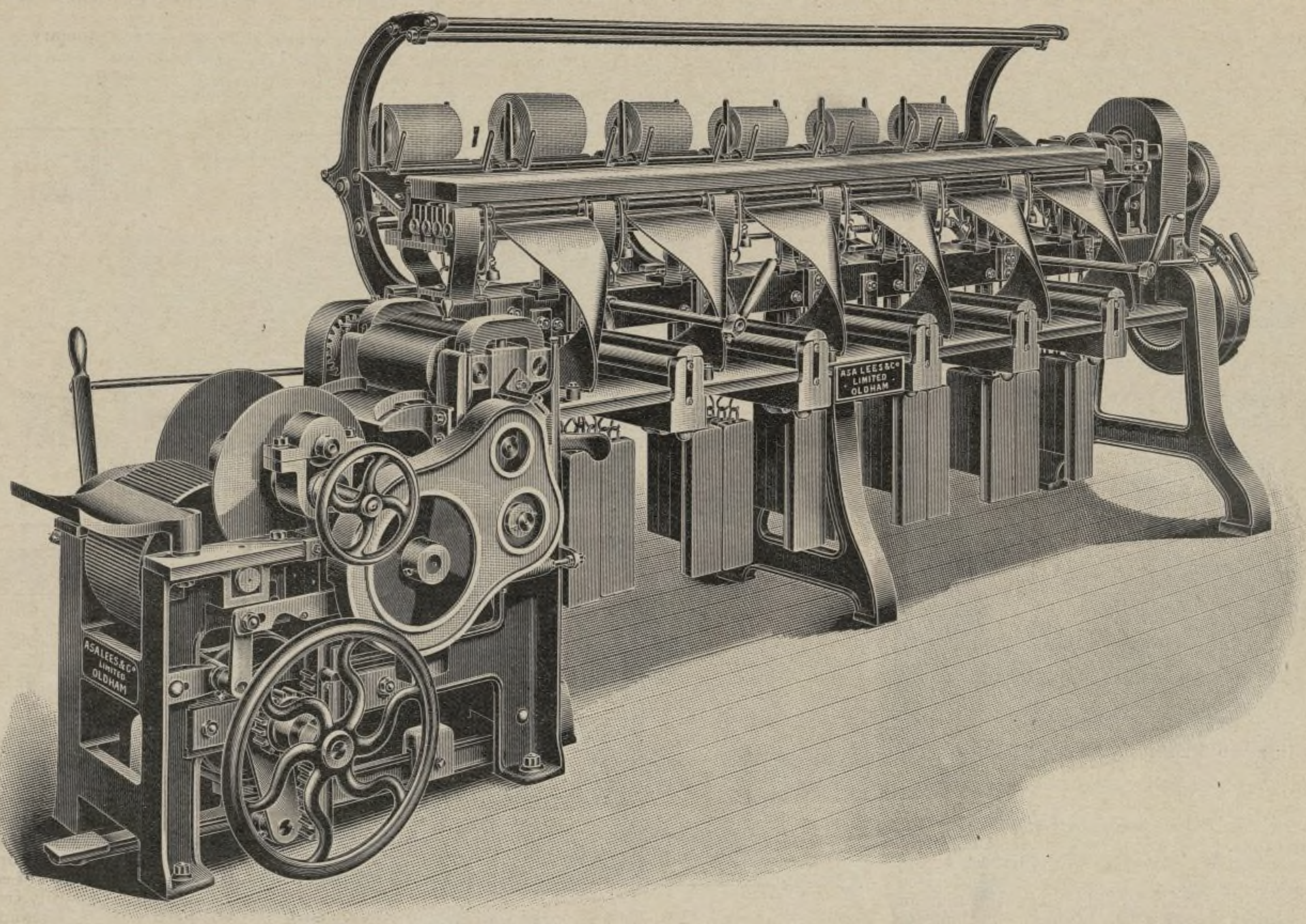


Fig. 2.

The frame has been built on similar lines to those of the new ribbon lap machine; the gearing headstock is built upon a solid cast-iron baseplate, and has two frame ends supporting the planed table on which the gearing is fixed. The production of the comber varies from 50 to 70lb. per day, according to the heads used, whilst a six-head comber requires about $\frac{5}{8}$H.P., and an eight-head comber $\frac{3}{4}$H.P. to drive. In this, as in the other machines mentioned, the parts are made from templet so as to be interchangeable without any fitting, all attached

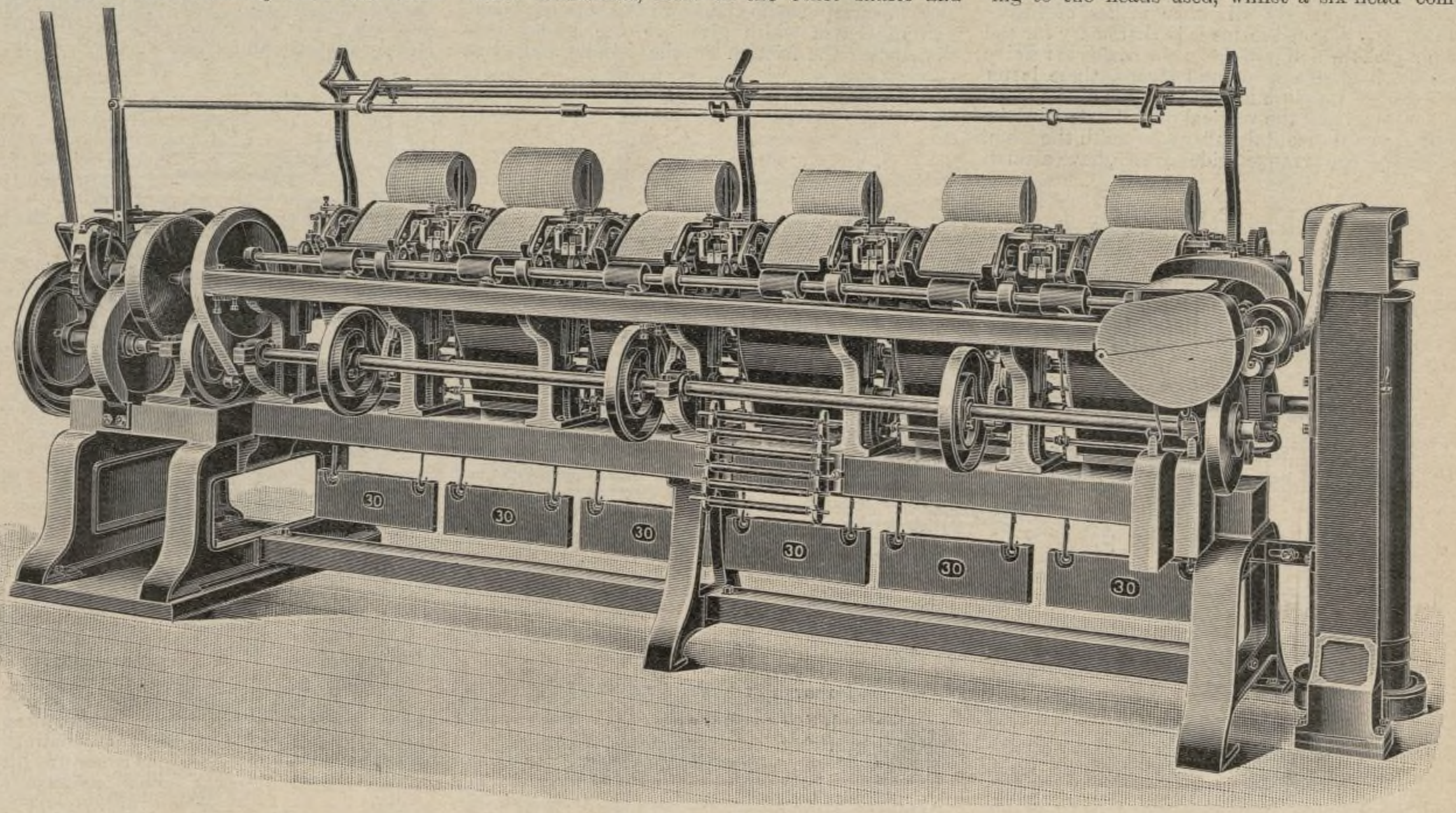


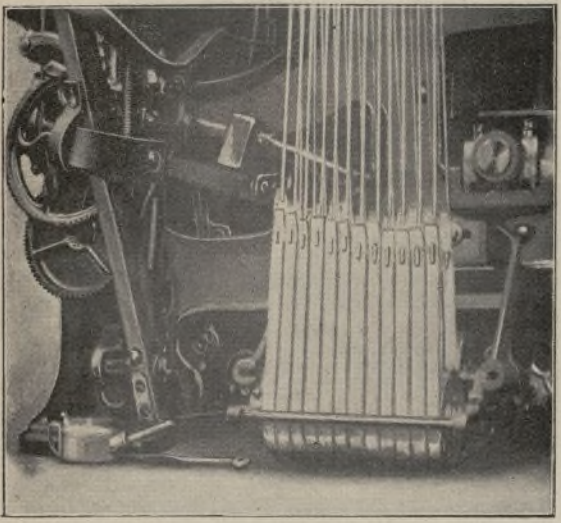
Fig. 3.

surfaces being planed or milled ; all the toothed wheels are cut out of the solid, and precautions have been taken to properly fence off or guard every moving part.

Improved Streamer Leather Attachment for Looms.

MR. G. LITTLEWOOD, TEWS HILL, LOCKWOOD, HUDDERSFIELD.

A VERY important item in the upkeep of a loom is the consumption of leather strapping. This material usually plays a prominent part in many places, for the picking, shedding, checking, and other motions are largely dependent upon it, and no economical substitute has as yet been discovered. Then good leather

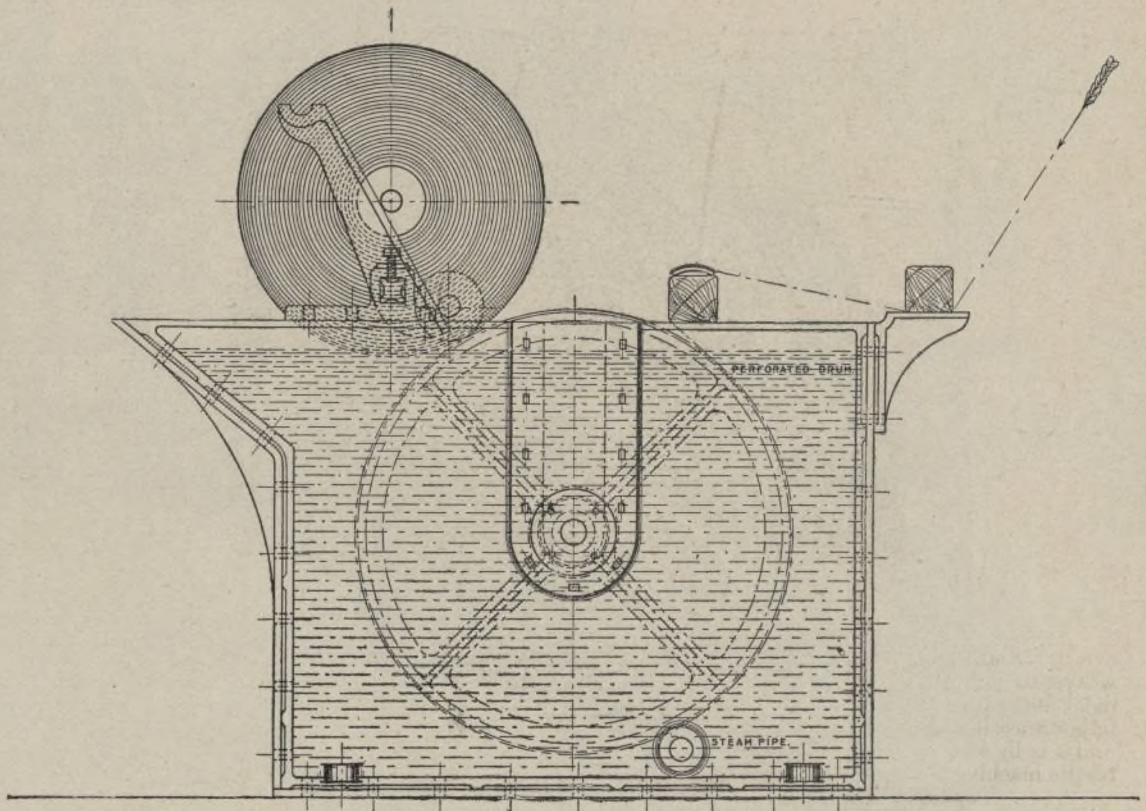


IMPROVED STREAMER ATTACHMENT.—FIG. 1.

is always an expensive commodity, and the great wear and tear on the leather strapping of a weaving shed means a serious amount in a year's working expenses. For many years the attention of practical men has been directed to this matter, and the various motions of the loom have been revised to a certain extent mainly with the aim of economising leather. The picking motion, for instance, has received special attention in this matter (for the leather wear in overpick looms is very heavy), but no recent improvement connected with any part of the loom seems to have made such a marked economy in the wear and tear of leather strapping as one recently introduced in the Huddersfield district for the undermotions of heavy looms.

In the usual streamer leather attachment for Dobcross and nearly all other makes of heavy woollen and worsted looms it is customary for the bottom jacks which pull down the healds to receive their motion from wires and straps, these latter passing over small pulleys at the base of the loom, and so converting the vertical pull exerted by the dobby into a horizontal pull underneath the loom. The pulleys are arranged side by side, have a small flange at one side, and are necessarily narrow, for they must be compressed into a small space—approximately the space required by the healds. No adequate lubrication is arranged for, and in time the pulleys frequently get worn, for their bosses are very narrow ; clogged, for there is no easy means of cleaning them ; and otherwise put out of action, and then the leather straps must necessarily slip around the surface of the pulley when the latter cannot rotate. Then the fact of the pulleys only having one flange means a wear on the straps even if the pulleys are in good working order, for each strap is in contact with the flange of an adjacent pulley, which oftener than not is moving in an opposite direction from its own. In the old arrangement it is impossible to overcome these difficulties, for space forbids a second flange to each pulley, while to prevent the straps being drawn between the pulleys it is necessary to have the latter arranged tightly against each other.

Under the new system (Dickson's patent) there is twice as much room arranged for each pulley, as will be seen by reference to the accompanying illustrations. Fig. 1 shows the new attachment in place on a Dobcross loom, whilst the detailed parts are better seen in the side elevation and plan



NEW BLEACHING MACHINERY.—FIG. 1.

shown in Figs. 2 and 3. The streamer leathers A, instead of being placed side by side, pass alternately to two rows of pulleys B, although still keeping their proper order or position in different planes. This arrangement enables each pulley and each leather to be twice the width it formerly was, and the extra space makes other advantageous changes possible. Each pulley has two flanges, so that the strap has no chance to slip between them, and the extra width given to the pulley boss distributes the friction on the spindle and gives greater stability to the pulleys. When in their normal working condition, the pulleys in each row are closely set against each other, but not so tightly as to prevent easy rotation. The spindles C upon which they are arranged, also carry springs D, which lightly press the pulleys together, but which can be compressed by hand as each pulley is separated from its fellows for oiling purposes. This arrangement makes a thorough lubrication of the motion both possible and easy, and there is no chance, in a properly-managed shed, of the pulleys getting dry for want of oil, or becoming clogged for want of cleaning. Another feature is the use of bars E, which are placed opposite to and just clearing the pulleys, and which keep the leathers in position. Thus the strap remains in position on its pulley if any other part of the undermotion breaks or works slack, and when healds are thrown out of use for weaving a smaller design the leathers are always in position ready for being again connected. This means a great saving of the tuner's time when gating up a warp requiring more healds than the preceding one—in fact, it makes the change just as easy as if the warp were following one exactly like it. The drawings show how the pulleys are connected to the loom frame, this being done in almost the same place as previously. Adjustment screws F are provided, and by these the whole series of leathers can be readily tightened up or slackened to meet the varying depths of healds.

Coming to the actual economy which the new leather attachment effects, no lengthy tests are as yet available, for the idea is not much more than twelve months old. But we recently visited a weaving shed where the attachment has been largely adopted, and where we saw leathers which have been constantly in use for the past year. To all appearances these leathers looked quite as good as new, and seemed equal to another three years' run before they would show definite signs of wear. In the same shed, under the old system an average of eighteen leathers per loom were required each year to meet the wear and tear. This quantity, multiplied by the looms of a large concern, means a heavy leather bill per annum. Not only is a saving effected in the number of straps worn out, but the cost of the straps is about 20 per cent. less, for under the old system specially-shaped leathers —straps which are formed to fit into the narrow

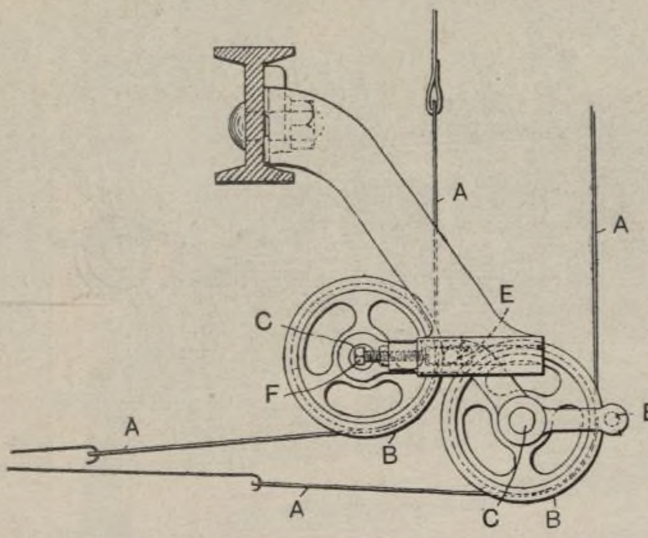


FIG. 2.

IMPROVED STREAMER ATTACHMENT

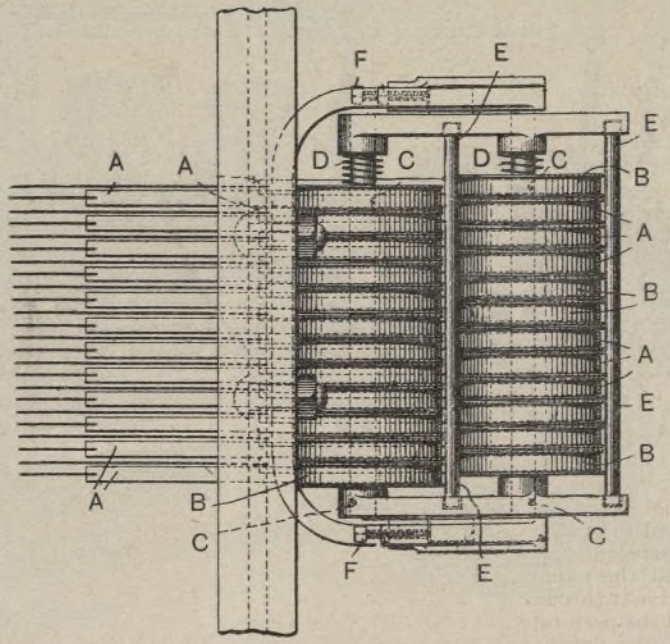


FIG. 3.

pulleys—are required, and the new leathers, although of greater width, cost much less money per strap.

Then the eighteen broken straps mentioned above represent—in addition to the cost of leather—nearly eighteen heald traps, the accompanying unremunerative labour of the weaver, power running to waste, damaged cloth, and extra expense in the burling room, most of which the new system avoids. The free-running, well-lubricated pulleys consume less power, and although the saving per loom in this respect may be only small, it amounts up when a number of looms are considered. This saving of power is also felt when the loom is turned over by hand, as it is frequently necessary for the weaver to do. Altogether, although the improvement only directly affects a motion of minor importance, it appears to carry widespread benefits, and it is by such changes that the efficiency of our textile machinery is sustained.

New Bleaching Machinery.

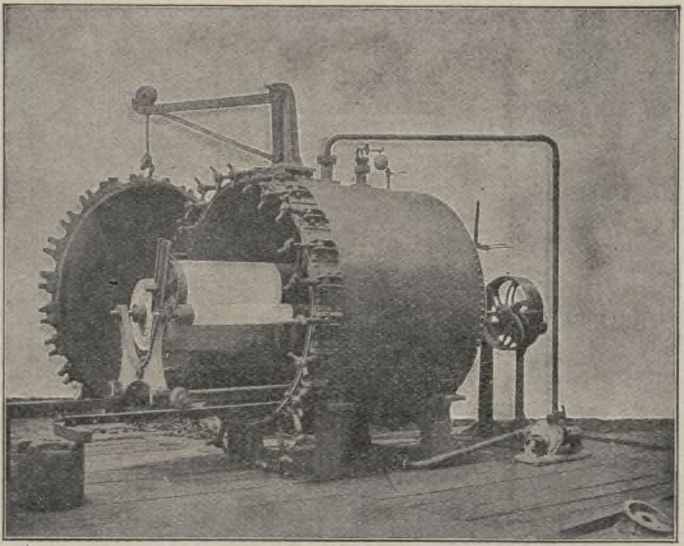
MESSRS. JACKSON AND BROTHER, WHARF FOUNDRY, BOLTON.

THERE are some kinds of cotton goods which it is almost an absolute necessity to bleach or otherwise treat in an open full-width state if an approach to perfection is required in the finished cloth. With others, it is a matter of secondary importance, these being usually treated in rope form, which is the easiest and most convenient. These latter fabrics, however, would gain in appearance if treated full-width, although they are seldom considered worth the extra trouble and expense. This reasoning holds under the old system of bleaching which is common to most bleachworks; but by the new bleaching machinery about to be described, the process is so shortened and cheapened that there should be no reason for not treating all bleaching cloths in a full-width form in future. The old open-bleaching process carried out in jigs or cisterns is no longer found necessary, and the time is curtailed to a fraction of that occupied under the old-fashioned method.

The cloth is first run through the machine shown in Fig. 1, being fed in at the place indicated by the arrow. It passes under and over straightening rods, and then round and under a perforated metal drum. It is then batched on a smaller perforated metal drum which is arranged so as to slide up an incline as its fills. The weight of the small drum keeps the growing batch tight and in close contact with the large roller, so that the cloth is wound in a regular and perfectly straight manner. The cistern is made of cast iron and filled with caustic liquor which has previously been used in the kier about to be described. A perforated steam-pipe arranged along the bottom of the cistern keeps the liquor at the required temperature, and also serves to drive it through the cloth as it is travelling around the perforated drum.

The prepared batch, and the perforated metal roller upon which it is wound, are then taken to the kier shown in Fig. 2. This kier is placed in a horizontal position and made of steel plates capable of withstanding a working pressure up to 60lb. per square inch. The door is swung on a small jib crane mounted on the top of the kier, so that it can be either swung round or run in and out by means of the small grooved pulley from which the door is suspended. By this arrangement it requires very little strength for one person to remove or adjust the door. The kier contains a truck, which can be run in and out on rails. The batch is placed in position on this truck, and the whole is run in, connecting automatically with the shafts by which the rollers are afterwards rotated. These driving shafts enter the back of the kier by glands similar to those used in a steam cylinder, and which are capable of withstanding the internal pressure, whilst allowing the shafts to easily revolve. The mechanical arrangements inside the kier are similar to those in the souring and chemicking machine, and will be explained later.

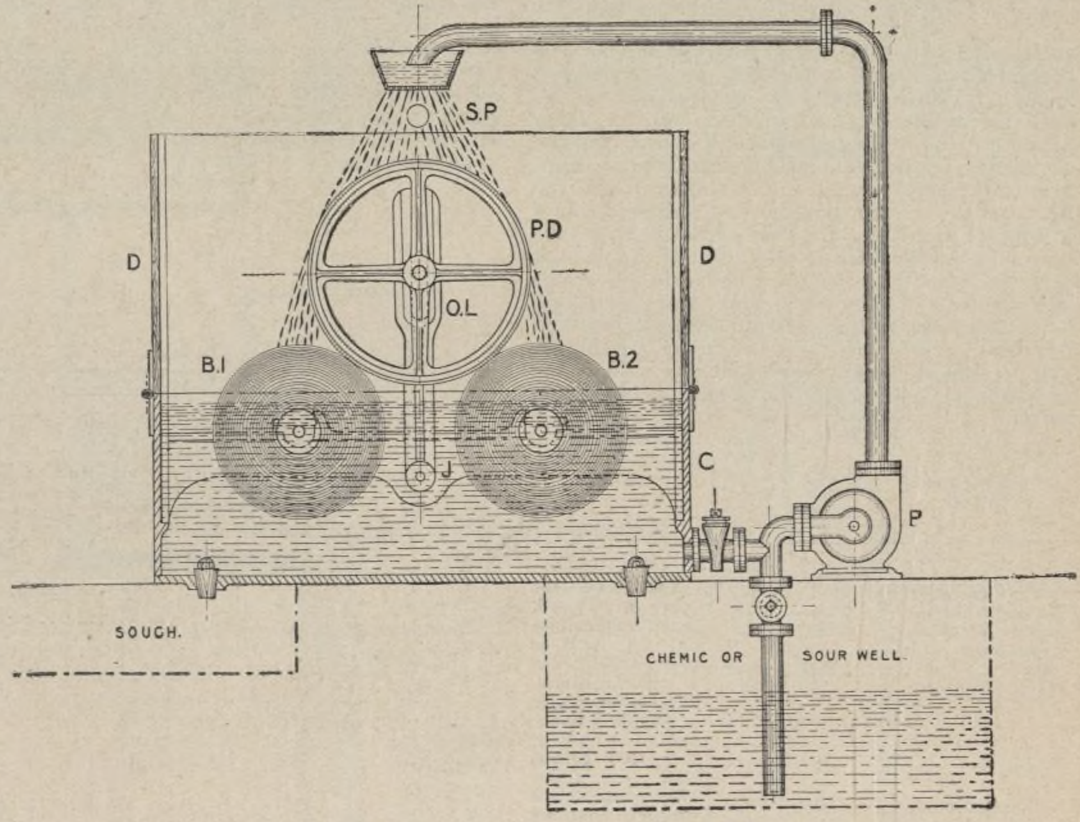
After the door of the kier is closed and screwed into place, the liquor is run in from an adjoining cistern, which also acts as a settling tank and prevents impurities from entering or re-entering the kier. Steam is turned on until a pressure of 40lb. is obtained, and the batch is constantly



NEW BLEACHING MACHINERY.—FIG. 2.

wound and rewound on to perforated rollers for a couple of hours. In the meantime a force pump is constantly circulating the liquor, drawing it from the bottom of the kier and delivering it in a shower on the top of the moving cloth. At the end of the time steam is turned off and the liquor drained out, when the door can be removed and the batch taken out and carried to the chemicking and souring machine. In the meantime another batch is placed in the kier, and the process progresses as before.

Some cloths require nothing but a washing after leaving the kier, but for chemicking and souring the machine shown in Fig. 3 is used. The



NEW BLEACHING MACHINERY.—FIG. 3.

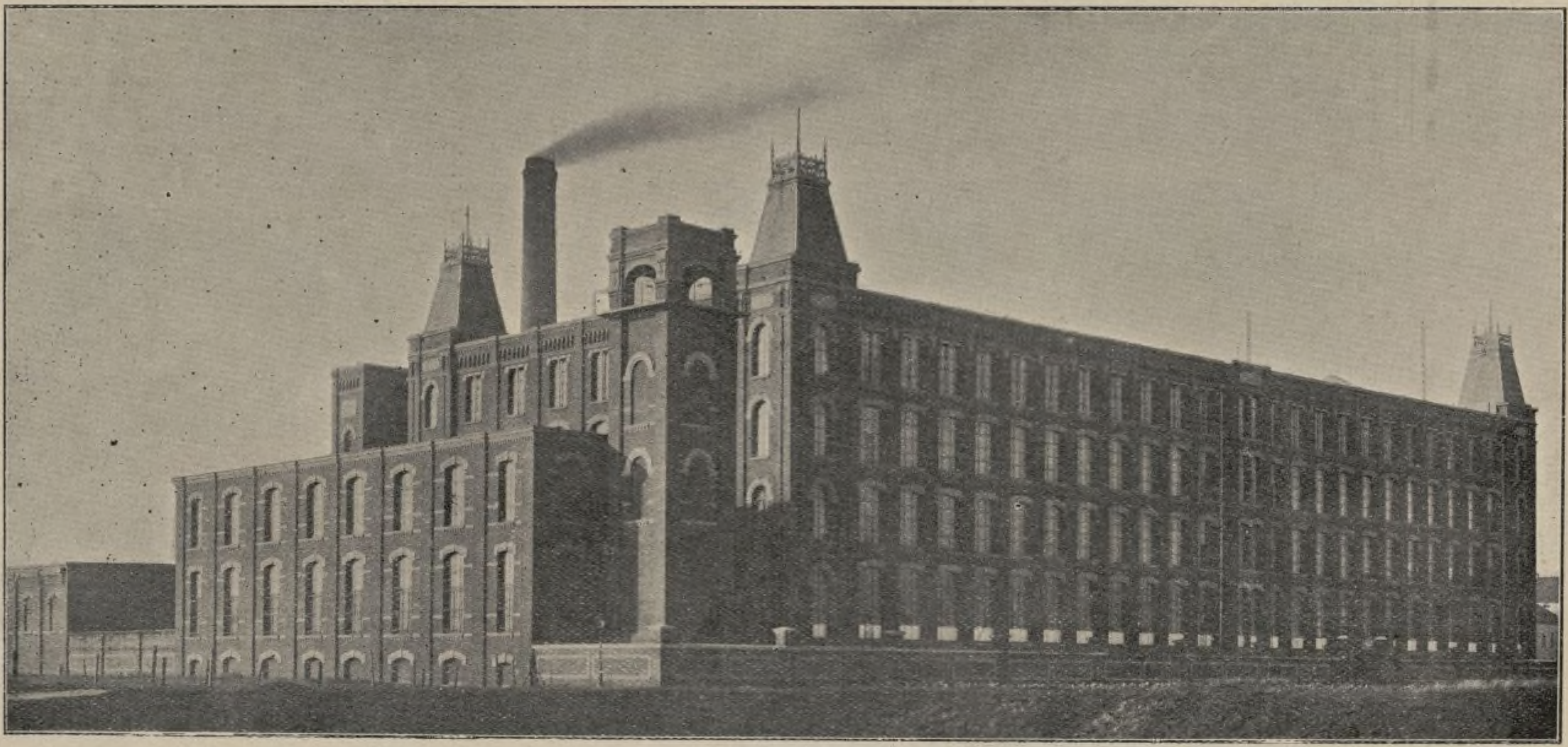
mechanical arrangements are identical with those in the interior of the kier, only the process is of course in this case carried out without pressure. The cloth is placed in the cistern D, as either of the batches shown. If, for instance, on batch B 1, it passes over the perforated drum P D and is wound on to the other perforated batch roller B 2. In the kier this winding and rewinding is repeated throughout the two hours' treatment, and an alarm bell rings when each winding is almost completed, so that the attendant may reverse the motion. Returning to the chemicking and souring machine, the pump P draws the liquor from the bottom of the cistern and returns it at the top, where it falls on to the moving cloth in a continual shower. The pipe S P is also placed over the cloth and is used for turning a spray of water on to the cloth after the liquor has been removed from the cistern.

Two of the sides of the cistern D are hinged just above the liquor line, one hinge being shown at C, so that these sides may be turned down to facilitate the removal or entry of a batch. Turn cocks are provided so that the liquor may either be circulated by the pump, drawn direct from the chemick or sour well, or returned to the latter. The large perforated drum P D is also deserving of notice. It is mounted on a lever fulcrumed at J, whilst the drum bearings ride loose in the slide O L formed at the other end of the lever. With this mounting the drum is free to rise and fall, or to lean in either direction, and so lend itself to the variation in the sizes of the batch rollers B 1 and B 2, putting a regular and continuous pressure upon both in all their stages between being full and empty.

In practice it is found that one preparing machine will easily feed two kiers, and it is best to have a separate machine for chemicking and washing, and another for souring and washing. With this arrangement the output is a batch per two hours from each kier—really four batches per day, allowing time for replenishing. A complete set like that mentioned above would thus mean eight batches per day, and as each batch consists of from 1900 to 2200yds. of cloth (according to the thickness of the fabric), it means a daily turnout of about 16,000yds. This is, however, only one consideration, others being the thorough manner in which the goods are bleached and their freedom from defects. We examined a number of samples of cloth treated on this principle, and found them to be all that the makers of the machines claim as regards a perfect bleach right through the fabric. The selvages, also, were perfectly straight, as was all the surface of the cloth, for creases or broken places need never appear with ordinary attention to the working of the process.

New Continental Cotton Mill.

A NEW cotton mill, one of the largest of its kind on the Continent, has recently been built at Crefeld, from the plans of Mr. Paul Sée, of Lille. As the mills planned by this gentleman are usually laid on modern and well-considered lines, a few particulars may be of interest to many readers. The general structure, which is built of brick, is shown in Fig. 1, while the plans and part elevation in Figs. 2 and 3 show the general arrangement of the rooms. At present 80,000 spindles and their preparing machinery have been installed, but accommodation has been made for double this quantity, and the rest will be added later. The greater part of the spinning machinery has been supplied by English firms. The main building consists of a basement and four storeys while the preparatory machinery is placed in a separate building with a dust cellar beneath and a mixing room above. The raw-cotton warehouse, boiler house, and chimney are placed between the two spinning departments. The boilers are of the Cornish type, and are fitted with superheaters and economisers. The engine is of Continental build, being triple-expansion and generating 1200H.P. The main drive is by means of hemp ropes. Particular care has been bestowed upon the staircases, lavatory accommodation, and fire-prevention apparatus, which are all arranged on the most modern principles.



New Continental Cotton Mill.—Fig. 1.

The Treatment of Boiler Feed Water.

(*Concluded from page* 383.)

WOLLASTON'S CONTINUOUS WATER SOFTENER AND FEED HEATER COMBINED (*see Fig. 4*).—(*I.*) One installation was visited. The water supply and exhaust steam enter a vessel (*a*) fitted with trays, and into the bottom of this a small stream of chemicals is pumped from a regulating tank (*b*) into (*a*) and to the bottom of the mixing and settling tower (*c*), 3ft. in diameter. Here the grease from the steam and the sediment from the water accumulate, the thoroughness of the settlement being doubtless due to the heat and to the fact that the new sediment comes in contact with the old. The overflow is led to the bottom of a large settling tank (*d*), 10ft. by 5ft. and 12ft. 6in. high, from the top of which the feed water is drawn off. This settling tank contains baffles, which are believed to accelerate the precipitation; but heat is doubtless the more important factor, and it would appear advisable to reduce the radiating surfaces of the tanks and to keep them warm :—

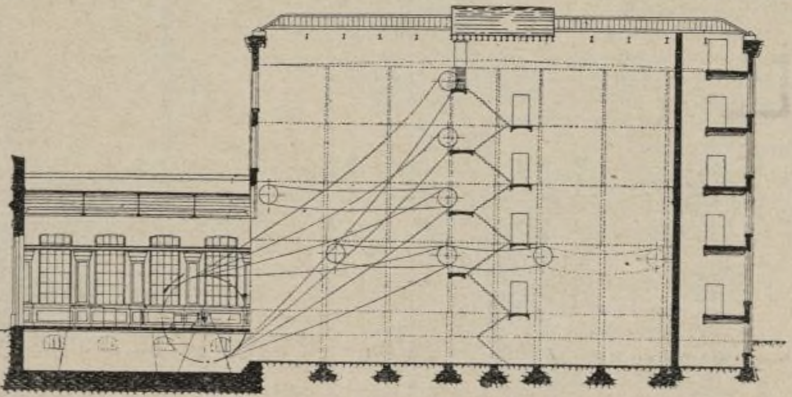
Composition of Water.	Before Treatment.	After Treatment.	
	Grains.	Grains.	
Calcium carbonate...	4·275	1·422	Two samples were analysed, but these cannot be compared, as they were taken at different times, and as the nature of the feed varies considerably. For this reason also the treatment could not be properly adapted. The condition of the boiler using this water was good.
Calcium silicate	2·076	1·241	
Calcium sulphate ...	4·081	3·830	
Magnesium carbonate	5·836	5·851	
Ferric oxide, etc. ...	1·088	0·024	
Scale - forming minerals	17·356	12·368	
Sodium chloride......	5·598	6·730	
Sodium sulphate ...	3·901	4·164	
Soluble salts	9·499	10·894	
Total mineral matter	26·855	23·262	
Carbonic-acid gas ...	0·98*	1·79	
Oxygen gas	0·56	0·66	

Treatment required : 0·25lb. lime, 0·35lb. caustic soda per 1000gals.

* This small amount of CO_2 is due to the water supplied being hot.

Brunn-Lowener Continuous Water Softener (*see Fig. 5*).—One installation (*J.*) was visited, and although no samples were obtained it seemed to be working satisfactorily.

J. The lime and soda ash, in proper proportions, together with a certain quantity of water, are placed in the chemical tank. It is of semi-cylindrical shape, and has a blade which every now and then stirs up the milky mixture. The water supply is run into a measuring tip, consisting of two triangular troughs. When one is full, it tips over and allows the other to fill; while tipping it moves the stirrer, and also momentarily opens a little valve in the bottom of this tank which allows a definite quantity of chemical to be discharged. This and the water from the tip fall into the mixer, and from there they flow into the settling tower, the sediment remaining at the bottom, and the nearly clear water passing through the filter to the feed tank. The arrangement would be an ideal one if the quantity of chemicals discharged through the valve each time the tip moves could be made independent of the depth of the milky fluid. A spoon for measuring out the chemicals, either fluid or dry, would seem to be more suitable.



New Continental Cotton Mill—Fig. 3.

Desrumaux Continuous Water Softener (*see Fig. 6*).—Two installations (*K.* and *L.*) were visited. Their main feature is that the motive power to be got out of the water supply is employed to turn a small water wheel which agitates the water in the lime tower, and in the newer forms it also serves to measure out the desired quantities of soda solution.

K. The water enters a small regulating tank with two nozzles, one discharging through a hollow shaft to the bottom of the lime tower, which is 39in. diameter and 12ft. high; and the other discharges over the water wheel into the mixing tank, which also receives a steady stream of soda solution from a tank. The water passes from the mixer to the bottom of the settling tower and filter, which is 8ft. 3in. diameter and 22ft. high. This installation treated nearly 3000gals. per hour, and reduced the hardness from 38 to about 2 grains, but no samples were taken.

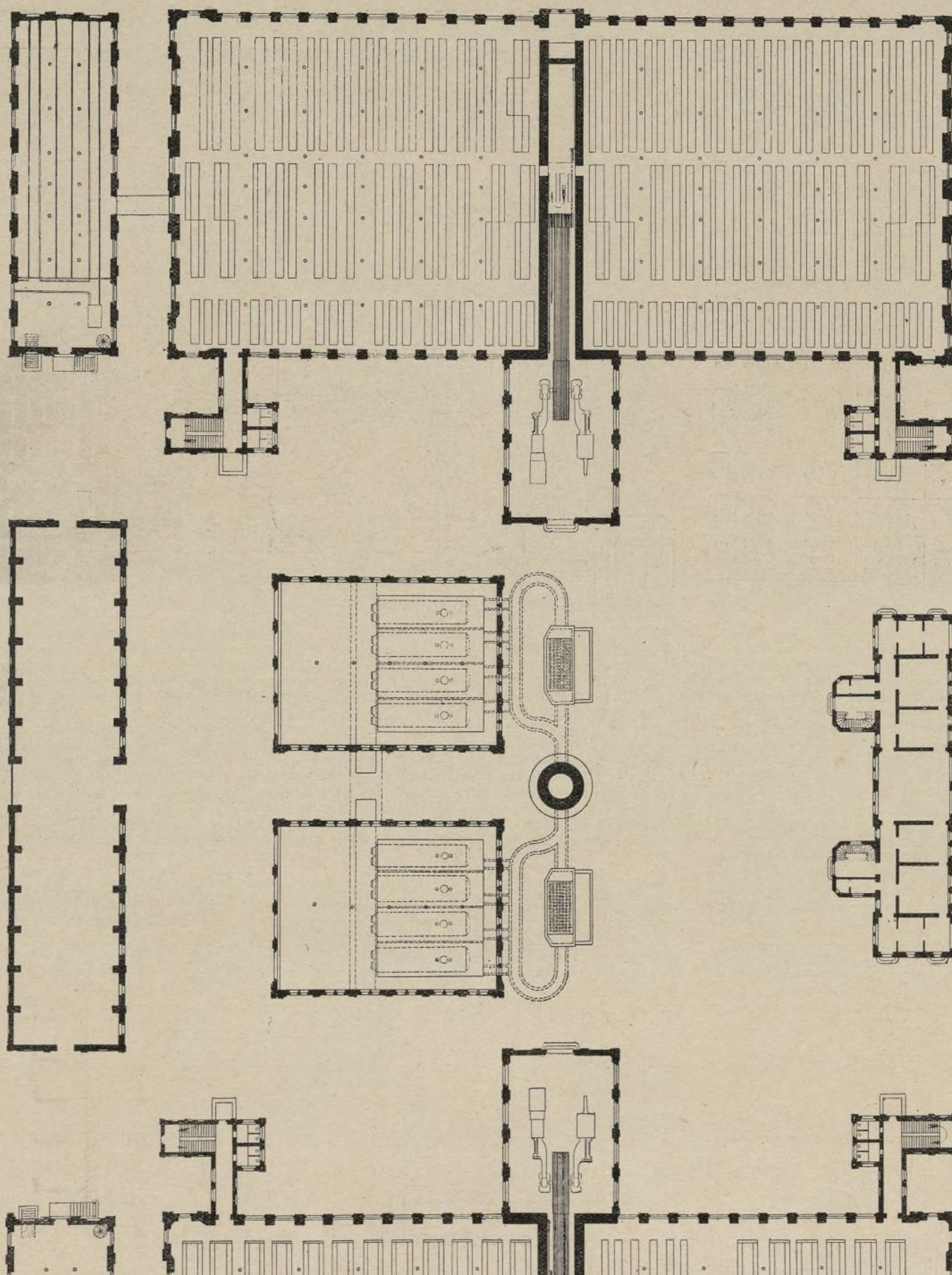
L. This installation had only just been erected, and was not working. The lime tower is 8ft. 4in. diameter, and the settling tower and filter are 18ft. 6in. diameter and about 46ft. high. This apparatus is intended to treat 60,000gals per hour.

The softener and feed heater were not seen at work, but as they contain several novel features they are here mentioned. In one apparatus the temporary hardness is removed by intense boiling, and the permanent hardness is removed by the addition of carbonate of soda. The apparatus shown in Fig. 7 treats the water by the cold process. The water supply enters the distribution tank, which has three accurately-bored nozzles. One discharges into the soda tower, the other into the lime tower, and the third into the bottom of the settling tank and filter. Every day the soda tower is emptied and refilled with strong soda-ash solution of a given density, while working water from the distribution tank runs into the top of this tower, and causes the dense soda solution to overflow into a funnel and through a pipe to the bottom of the settling tank, where it mixes with the water supply. Into the tower a given quantity of burnt lime is every day introduced, and a regulated supply of water, entering at the bottom, makes saturated lime water; the clear overflowing lime water also enters at the bottom of the settling tank. Here both chemical solutions mix with the remainder of the water supply, and the precipitate formed lodges in the bottom. The partially-clarified water passes to the top of this tank, which, as will be seen, has a filter across its middle, and the water then flows away to the feed tank. By an ingenious arrangement the current through the filter is momentarily reversed when the sediment in the filter has grown too thick and requires washing out.

The Archbutt-Deeley Water Softener (*see Fig. 8*), unlike any of the previous ones, works intermittently, and therefore two settling tanks are necessary, unless the softening is done overnight, or unless the water when purified is run into a storage tank.

Four installations (*M.*, *N.*, *O.*, *P.*) were visited.

M. This installation treated about 2500gals. at a time, or about 1000gals. per hour. There is a small tank into which weighed quantities of lime and soda ash are placed, to which water is added, and steam is then turned on till these chemicals are boiling. The water supply is turned on to the large mixing and settling tank, 8ft. cubed, and when full the chemicals are run in. Steam is now turned into the air injector, which drives air through the air-stirrer pipes in the bottom of the settling tanks, whereby a thorough mixing of the water, chemicals, and old sediment is effected. The new sediment adheres to the old, and during the following period of rest is quickly precipitated. When the upper layers of the water are clean, they are drawn off by means of the floating discharge. This stands in connection with a coke stove, and in passing out the water absorbs some carbonic acid, which, combining with the, as yet, unprecipitated lime in the water, makes it permanently clear. The water is now run into a storage tank of 5500gals. capacity, and is from there drawn off by the feed pump. The cost of this installation was stated to be from £150 to £200. About sixteen tanks aıe softened per week; of these only eight are carbonated by contact with the stove gases. The analysis of the water before and after treatment is given in the following table. As will be seen, the result



New Continental Cotton Mill.—Fig. 2

compares favourably with the previously-mentioned processes, but unfortunately in no case except this can the chemical treatment have been a correct one, and a comparison is therefore valueless. It should, however, be noted that an intermittent process like this one, which will not work unless chemicals are weighed out and boiled, and unless the apparatus is attended to, is more likely to be kept in working order than one of the continuous softeners, which, as the attendant will soon find out, delivers water, no matter what the quality, quite independent of any attention. In careful hands, however, the continuous workers should cost less for attendance.

Composition of Water.	Before Treatment.	After Treatment.	Change.
	Grains.	Grains.	Grains.
Calcium carbonate	6·659	1·704	4·955 loss
Calcium silicate	1·733	1·175	0·558 loss
Calcium sulphate	2·639	0·0	2·639 loss
Magnesium carbonate.	5·418	0·073	5·345 loss
Ferric oxide, etc.	0·330	0·148	0·182 loss
Scale-forming minerals	16·779	3·100	13·679 loss
Magnesium chloride ...	0·251	0·0	0·251 loss
Sodium chloride	2·675	3·211	0·536 gain
Sodium carbonate	0·0	0·883	0·883 gain
Sodium sulphate.........	0·0	5·402	5·402 gain
Soluble salts	2·926	9·496	6·570 gain
Total mineral matter...	19·705	12·596	7·109 loss
Carbonic-acid gas	7·161	1·00*	6·161 loss
Oxygen gas	0·66	0·66	0·0

Treatment required: Lime, 1·9lb.; soda ash, 0·35lb. per 1000gals. Treatment adopted: Lime, 2·5lb.; soda ash, 0·60lb.; alumino ferric, 0·15lb. per 1000gals.

The above treatment seems to be a correct one, the discrepancies between treatments required and adopted being due to impurities in the lime, and the addition of alumina ferric, which requires more soda and lime.

N. This installation can treat about 8000gals. at a time, or about 3000gals. per hour. The mixing and settling tank measures 12ft. 3in. square by 10ft. deep. The pure water is run into a large storage tank. The boiling and agitation in the large tank takes ten minutes, the settling about one hour, and the running out about another hour. At these works the carbonater is used only once a week, in the belief that this will keep the pipe free from scale. The reagents used are 6lb. lime and 1¼lb. soda ash per tank of 8000gals. The water is usually tested once a week, or when there is a change in the weather. The cost of this apparatus was £296.

O. The mixing and settling tank of this installation measures 10ft. square by 8ft. deep. It cost £150, and treats about 3000gals. per hour. Only lime is used as a chemical, and the hardness is reduced from 32 to 16grs. The attendant's labour amounted to about four hours per day. The clear water was not brought in contact with carbonic acid.

P. This installation is nine years old, and treats 24,000gals. at a time, the tank measuring 24ft. square and 10ft. deep. The water is not carbonated. Its hardness is reduced from 13·3 to 7·1grs.

The opinion of Mr. Baron, our chemist, is that the Archbutt-Deeley apparatus, and several of the more refined continuous water softeners, particularly if the treated waters are heated, should give excellent results, provided correct instructions are given as regards quantities of lime and soda to be added, and provided also that rough chemical tests are occasionally made to ascertain the hardness of the water before and after treatment. The idea of having to make such tests may deter some from adopting water softeners, but, as will be seen by the following brief description, the simple tests for hardness can be carried out by anybody.

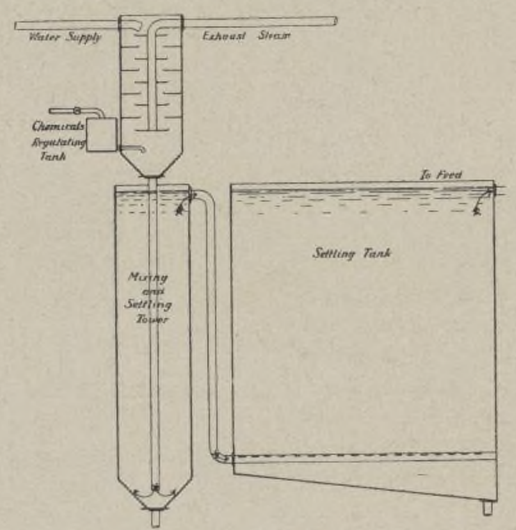


Fig. 4.

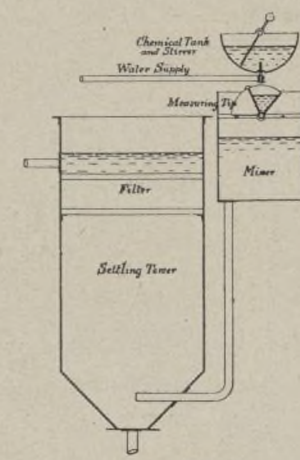


Fig. 5.

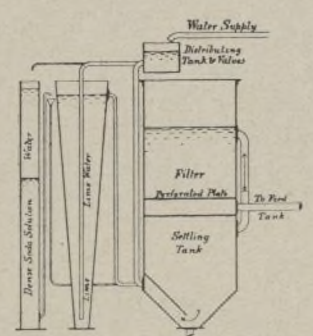
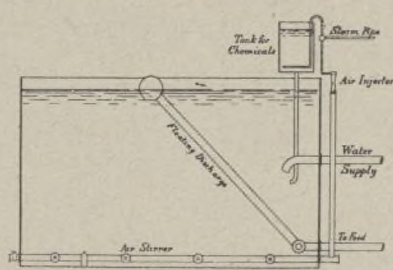


Fig. 7.



The Treatment of Boiler Feed Water.—Fig. 8.

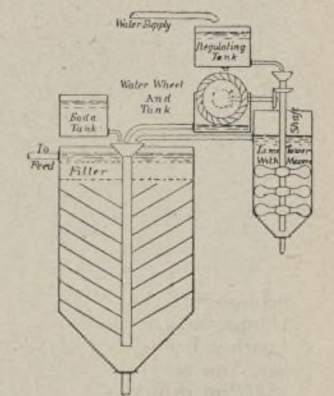


Fig. 6.

Chemical Tests.

SOAP TEST FOR TOTAL HARDNESS.

A standard solution of soap (which can be bought) is prepared by dissolving soap in water, and checking it against water of standard hardness.

A small quantity of water to be tested is measured and poured into a glass-stoppered bottle; a small quantity of standard soap solution is added, and the mixture then shaken. At first the water contains too much hardness to form a lather, but as more and more soap is added it gets softer and softer, and lather is formed which does not disappear on standing. The quantity of standard soap solution added is the measure of the

I. Total Hardness of the water.

II. The Permanent Hardness is determined cold by the soap test after first boiling the water for a long time so as to remove all temporary hardness. The difference of I. and II. is the temporary hardness, but this test is not very accurate. It is better to test for

III. Temporary Hardness as follows: A standard acid solution (which can be bought) is prepared by mixing a given quantity of pure acid with water. A small quantity of water to be tested is measured into a white bowl, and one drop of an aniline dye, called methyl orange, is added, and then small quantities of standard acid are poured in until the yellow colour of the dye changes into a red one. The quantity of standard acid added is the measure of the Temporary Hardness, and the permanent hardness is the difference of I. and III.

Roughly speaking, the degrees of temporary hardness fix the amount of lime or caustic soda to be used, and the degrees of permanent hardness fix the amount of soda-ash to be used.

From the preceding remarks on the fifteen water-softening installations visited, and from other information, it would appear that, roughly speaking, the cost of the plant per 1000gals. treated per hour would be from £100 to £150, and as 750gals. per hour is about as much as one 8ft. Lancashire boiler can evaporate, it will be seen that it is cheaper to adopt a water softener than to lay down a spare boiler, if only one boiler is in use, and even if there are six boilers the advantage would still be with the softening plant on account of lesser cost of the chemicals which could then be used, and the saving in the cost of scaling.

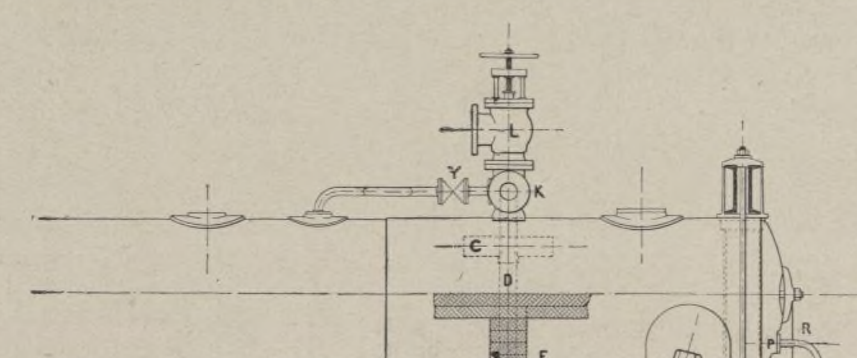


Fig. 1.—The Babcock and Wilcox Steam Superheater.

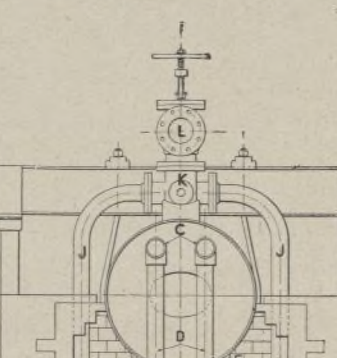


Fig. 2.

* Note.—This sample was not carbonated. Carbonating increased the CO_2 to 6·3grs.

The Babcock and Wilcox Steam Superheater.

MESSRS. BABCOCK AND WILCOX LIMITED, ORIEL HOUSE, FARRINGDON-STREET, LONDON, E.C.

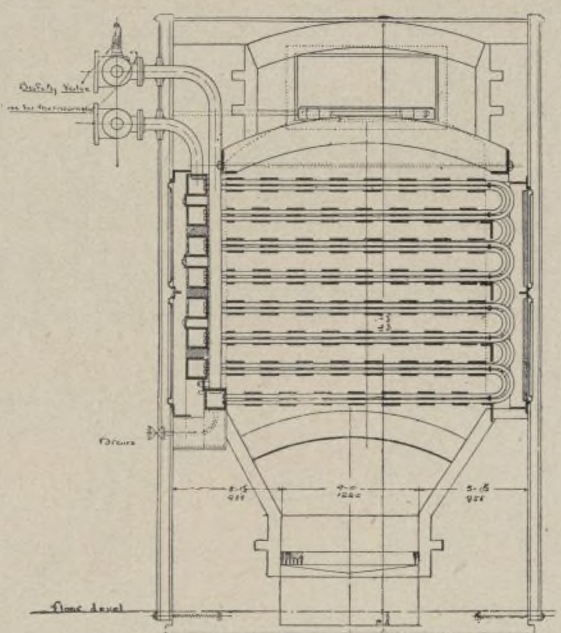
THE advantages to be obtained by the moderate and effectual superheating of steam have long been recognised, but the difficulties met with in practical working, both in regard to the deterioration of the apparatus and the regulation of the degree of superheat, have greatly impeded the adoption of what is, in other respects, a most desirable method of improving the economy of the steam engine. Latterly, however, the problem of evolving a practical system of superheating has had much attention bestowed upon it, and the several arrangements now in use show that the difficulties have in a large measure been effectually overcome.

Prominent among those who have given long and careful study to this question we find Messrs. Babcock and Wilcox, the makers of the well-known water-tube boiler, and it is to their latest form of steam superheater that we now direct attention. Of the accompanying illustrations, Figs. 1 and 2 give a side elevation and section of this firm's standard superheater, which consists of solid-drawn steel tubes bent into U-shape, and connected at both ends with boxes or manifolds F and H, one of which F receives the natural steam from the boiler, the other, H, collecting superheated steam after it has traversed the superheater tubes G, and delivering it to the valve L placed above the boiler. Handholes are placed at the ends of the tubes for inspection. A flooding arrangement is provided by connecting the water space of the boiler drum and two cocks, by means of the larger of which N the water enters the lower manifold H at will, and fills the superheater to the boiler water level. Any steam formed in the superheater tubes is returned into the boiler drum through the collecting pipes D, which, when the superheater is at work, conveys saturated or natural steam into the upper manifold F. Prior to opening the superheater stop valve L and using superheated steam, the water is drained away from the manifolds by the flooding pipe and the smaller cock. A sight glass is attached to the drain outlet for observing that all the water has been drawn out of the superheater when draining.

Although the makers prefer, whenever possible, to make the superheater a part of the boiler, there are cases in which it is necessary to use a separately-fired apparatus, and to meet this case the separately-fired superheater shown in Figs. 3 and 4 is applicable. This also consists of a series of U-shaped tubes connected at the ends with boxes or manifolds. The steam from the steam main enters the first box and is conveyed through the tubes into the second, third, and fourth boxes, and so on, passing from the last box back into the steam main. The gases generated on the grate rise upward, passing through a perforated wall—which muffles the flames and ensures comparative evenness of temperature—into the superheater chamber, and thence through a similar perforated wall into the chimney. The amount of heat passing through the superheater chamber can be regulated at will. The temperature is kept comparatively low, the grate surface required being small. The quantity of fuel required is very small, and any kind can be burned. The superheater is provided with a by-pass in case of any necessity for repairs, and also with the necessary valves to enable the superheater to be shut off from the steam main if desired without interfering with the general running of the plant.

Figs. 5 and 6 show the arrangement which is recommended by the makers when applying their standard type of superheater to Lancashire, Cornish, and other shell boilers. It consists, in the main, of an arrangement of seamless steel tubes, expanded and bell-mouthed in steel manifolds, handholes for access being provided opposite each group of tubes. The steam is circulated through this arrangement as it comes from the boiler. It will be observed from the arrangement of the dampers that the gases can pass either through the superheater after passing through the internal flues of the boiler on their way along the sides, or they can pass direct along the sides or underneath The steam can be "by-passed" by the arrangement of valves shown.

A feature of these superheaters is the entire absence of flanged joints, all the tubes being expanded. Freedom of expansion is secured by leaving the tubes free at the end and by avoiding a rigid connection between the manifolds; while prevention of overheating during steam raising is ensured by the arrangement for flooding with boiler water and using the superheater as part of the boiler-heating surface whilst steam is being raised. Finally, it may be pointed out that the tubes are placed in a position where there is practically no deteriorating condensation of the gases, but where the temperature is sufficiently high to ensure the steam receiving from 100 to 150° F. of superheat.



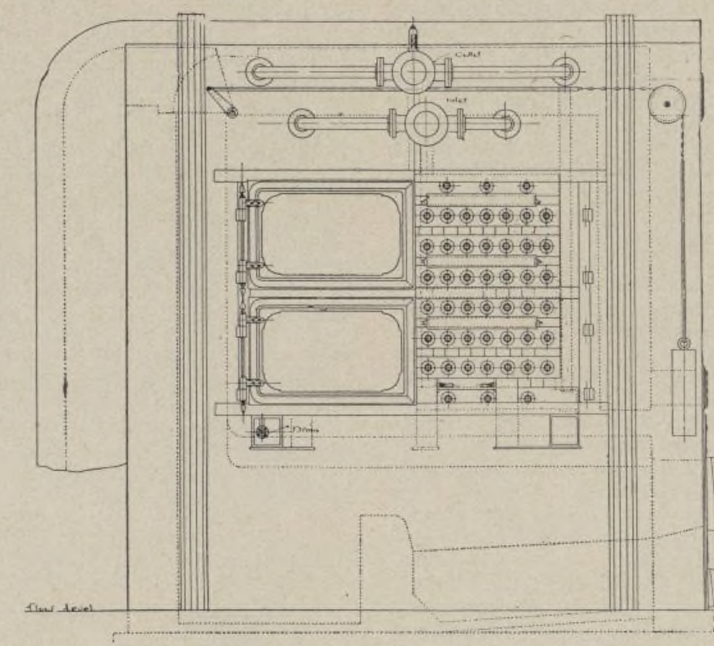
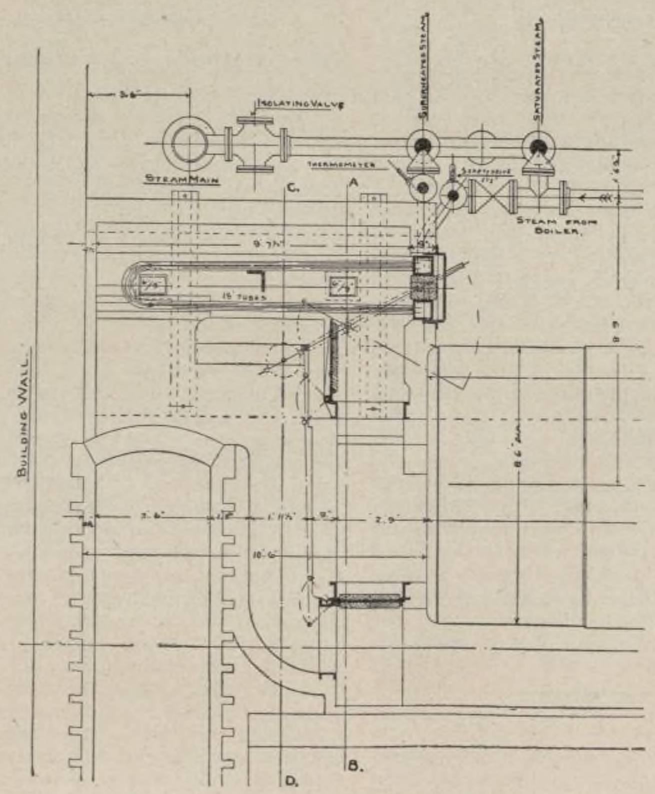


FIG. 3. THE BABCOCK AND WILCOX STEAM SUPERHEATER. FIG. 4.



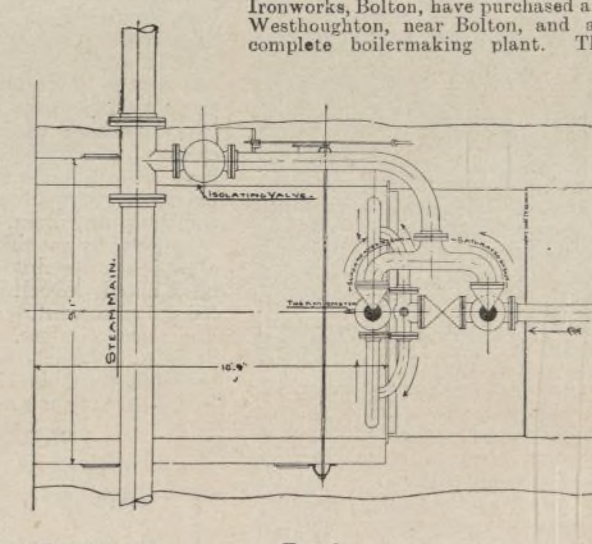


FIG. 5. THE BABCOCK AND WILCOX STEAM SUPERHEATER. FIG. 6.

MESSRS. JOHN PRIESTMAN AND SONS Albert Mills, Bradford, have placed an order for ten boiler circulators with Messrs. Makins Limited, of Manchester.

MESSRS. ROYLES LIMITED inform us that their business has been transferred to Irlam, where they have erected modern works suitable for their specialities.

MESSRS. MUSGRAVE AND SONS LIMITED, Globe Ironworks, Bolton, have purchased a large plot of land at Westhoughton, near Bolton, and are putting down a complete boilermaking plant. The company intend making all their boilers at Westhoughton when the works are complete, electricity being the motive power.

MESSRS. PLATT BROTHERS AND CO. LIMITED, of Oldham, have received the order for the mules required for the Dawn Mill at Shaw. The firm of Mr. George Saxon, of Openshaw, are making the engines, and the Oldham Boiler Works Company the boilers.

THE directors of the Haugh Spinning Company, Milnrow, have decided to extend their mill. The contract has been placed in the hands of Mr. E. Clegg, contractor, Ladyhouse. The extension, which is to be filled with the latest machinery, is to be ready for the spring. The company has now 27,148 ring spindles.

RAW MATERIALS, PROCESSES, FABRICS, &c.

Recent Improvements in Cellulose Yarns.

THE artificial spinning of cellulose filaments would naturally suggest an easy means of obtaining threads of any thickness, especially where the thick counts were concerned; but such is far from the actual case. Taking, for instance, threads made of sufficient thickness to imitate horsehair, it has been found that the artificial thread is very brittle, whilst it is impossible to make a knot in either a single thread or a bunch of threads without their breaking. To get over this, Mr. Lehner, of Zurich, is using the following plan. In place of producing a single thick thread from the cellulose by forcing it through a single aperture of suitable thickness, two or more correspondingly thinner threads (but somewhat thicker than those used in making artificial silk) are made by forcing the material through several small openings, which threads, immediately after emerging from the spinning tubes, are caused to run together into one thread in a setting fluid or air. This is done by causing the semi-solidified threads to pass together through a glass fork. Owing to their surface being hardened by the setting fluid they can be drawn through the fork without adhering to it, although they still possess sufficient adhesive qualities to stick together and thus form one thread. This combination of the threads must, however, take place so short a time after the substance emerges from the spinning tubes that the separate threads still possess the property of mutually merging into one another in order to form a complete solid, thick artificial horse-hair thread. No separate pressure is necessary for this, but merely the pressing together of the threads in the fork suffices.

In contrast to the usual process for making artificial silk, in which a large number of separate very fine threads, which, as with natural silk, are loosely combined into a thread by twisting the separate threads at the time of their production, temporarily adhere by reason of their damp condition in order to obtain a uniform delivery of the complete thread, in the present process the separate threads must combine or merge permanently and completely into a thick thread after their discharge from the spinning tubes, and so thoroughly that the eye cannot detect the joining. This artificial horsehair thread is eventually denitrated and dyed in the usual manner, thus affording a perfect material for replacing the natural horsehair. This horsehair thread (more particularly owing to its unlimited length) is also suitable for weaving purposes, and when impregnated with illuminating salts for making mantles for incandescent gas-lighting, after being carbonised.

The method of working is shown in the accompanying illustrations, where Figs. 1 and 2 are side view and plan respectively, whilst one of the glass forks is shown in Fig. 3. These forks are shown in position at A. B is a vessel filled with the raw solution and ending in a series of tubes projecting into the solidifying fluid C. D is the reel for winding on the combined fibre.

A new method of making filaments from solutions of cellulose has been invented by some German chemists, and the plan is claimed to produce yarns of a strength, elasticity, and lustre which will compete more evenly with natural silk. Such threads have not been previously obtained because, although the general principle of the method—namely, the expression of the ammoniacal cupric solution or zinc chloride solution of the cellulose, into an acid—has been known, the threads produced have been of inferior kind owing to ignorance of the essential condition, which is the strength of the acid.

When sulphuric acid of the strength commonly called "dilute"—that is, containing from 10 to 20 per cent. of real acid—is used for receiving the expressed cellulose solution, the cellulose is only incompletely precipitated or separated from its solution, and what does separate seems to have undergone a partial decomposition, so that the threads frequently break as they are wound up, are gummy, and without the necessary softness and strength after they have been dried. By the new process the cellulose solution is expressed into sulphuric acid containing from 30 to 65 per cent. of real acid. An energetic reaction ensues, and the cellulose seems to undergo a kind of intro-molecular change by which its particles are drawn together to form a strong product. If the cellulose solution has been well filtered, the thread obtained by this method may be withdrawn from the acid at considerable speed, and even in its wet condition may be wound without breaking. The best results are obtained at the ordinary temperature with sulphuric acid containing about 50 per cent. of H_2SO_4; but the concentration may be varied within the limits named for the purpose of regulating the action to suit variations of temperature. Acids weaker than these have the disadvantages aforesaid, and stronger acids attack the separated cellulose too much.

In the manufacture of solutions of cellulose, besides ammoniacal solutions of cupric hydroxide, similar solutions of other cupric salts dissolve cellulose, as is known. Hitherto, however, solutions of cellulose in ammoniacal cupric hydroxide solutions have alone been used for making artificial silk-like threads. By a new process invented by the same persons as the preceding improvement there is prepared a solution of cellulose in an ammoniacal solution of cupric carbonate, which, by reason of its high content of cellulose, is well adapted for the manufacture of artificial thread. An aqueous solution containing 16 to 18 per cent. of ammonia is saturated in the cold with cupric carbonate, and the cellulose is dissolved in this liquid. Such a solution of cupric carbonate contains more of this salt than does one prepared at a higher temperature. The dissolution of the cellulose in the cupric carbonate solution is also preferably effected in the cold, as it is then more rapid; moreover, it is advantageous to keep the prepared solution at a low temperature up to the moment when it is to be manufactured into

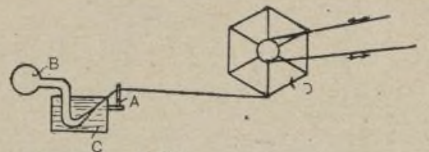


FIG. 1.

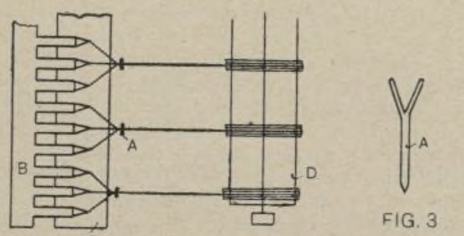


FIG. 2. FIG. 3

IMPROVEMENTS IN CELLULOSE YARNS.

thread, as in this manner any decomposition of the cellulose which might diminish the ease with which the solution can be made to yield thread, and the strength of the finished thread, is avoided.

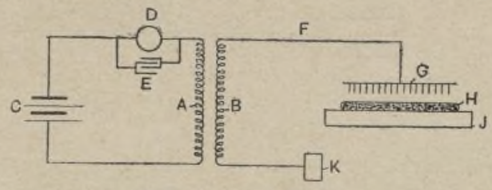
Solutions of cellulose prepared according to this method have the advantage that they may contain more copper than corresponds with the molecular proportion which is preferable when cupric hydroxide is employed. Further, since salts of copper, like cupric carbonate, have no oxidising action on cellulose, solutions of the latter in ammoniacal cupric carbonate are more stable than solutions of cellulose in ammoniacal cupric hydroxide. Thus even after a long time, neither is the ammonia oxidised to nitrous acid nor the cellulose to oxycellulose. The cellulose used may be the usual degreased and bleached cotton, although it is advantageous for the preparation of solutions containing a high content of cellulose, to use cellulose which has undergone one of the known preparatory processes. The conversion of the solution into thread is effected in the usual manner—namely, by causing the solution to issue through a capillary opening into dilute acid, and winding on a spool the cellulose thread as it is separated from its solvent. The finished thread behaves like pure cellulose. Substantive dyestuffs dye it directly. Basic dyestuffs only properly dye the thread after this has been mordanted with, for instance, tannin and tartar emetic.

Electricity in Fibres.

IN many preparing machines, and sometimes even in the spinning frame and loom, the static electricity generated in the fibres by friction is a source of trouble. This is especially noticeable in dry weather or in a dry room where the atmosphere is incapable of carrying off the electricity as it is formed. Wool and cotton are both subjected to this trouble, especially in the combing and carding processes, while the nature of silk makes it specially liable to it. Charged fibres or yarns have a tendency to bristle or stand out, and so fibres will make rough yarns, or spun threads will catch and entangle with each other or some other object in the vicinity.

Many devices have been tried to obviate this evil. The easiest seems to be that of keeping the air of the rooms moist, while another is an arrangement which ensures that the parts of the machine which the fibres touch shall be metal and metallically connected to the ground. A later device has recently been patented by a London firm, and is explained by the accompanying diagram.

A and B are the primary and secondary circuits respectively of an induction coil. The primary coil is connected in circuit with a battery C (or any other source of direct current) and an interrupter D of any suitable type, this interrupter being shunted by a branch circuit containing the condenser E. One terminal of the secondary coil B is connected by an insulated wire F with a series of metallic points G, arranged in proximity to the wool H or other material in course of manufacture. The points G are supported by a suitable attachment on the machine performing the operation of carding, combing, spinning, etc. I represents the rollers, combs, or other parts of the machinery employed in the manufacture of these materials. The other terminal of the secondary coil is connected to earth K.



ELECTRICITY IN FIBRES.

The essence of the process consists in applying to the wool or similar material under manufacture a charge of electricity for the purpose of neutralising the charge collected in it and thereby de-electrifying the material. Instead of de-electrifying the wool while it is actually on the machine it may be de-electrified after it leaves the machine, and this de-electrification may be performed, not only by the means described above, but also by the action of the "X" or cathode rays. This may be effected by passing the wool in front of a Crookes tube, arranged to emit these rays in the well-known manner.

The idea seems theoretically good, but scarcely in a shape which will attract the majority of spinners. However, it may be useful for extreme cases where humidity and other means stubbornly fail to give relief.

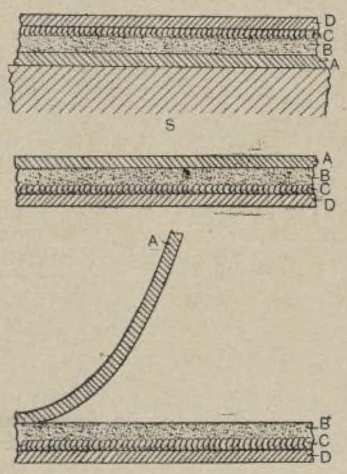
New Methods of Waterproofing Fabrics.

ALTHOUGH there is now a very large variety of waterproof fabrics, the best type is very far from perfect. The softer handling and more natural looking of the fabrics are, at the best, only showerproof, whilst those which are really and permanently waterproof are stiff textures, suggesting neither comfort nor beauty. Much attention has, however, been recently paid to this class of fabric, and some of the more recent innovations are given below.

One method, and one which will give a wider range of means for beautifying waterproof goods, has been patented by a Manchester waterproof manufacturer, and consists of facing the fabric with finely-ground flocks, hair, or similar fibres, by a new process. The old custom has been to apply a coating of indiarubber solution to the cloth and then scatter the flocks on the top, and subject the whole to pressure. Unfortunately, the cloths manufactured in this way are not very durable, and the flocks cannot be very evenly applied.

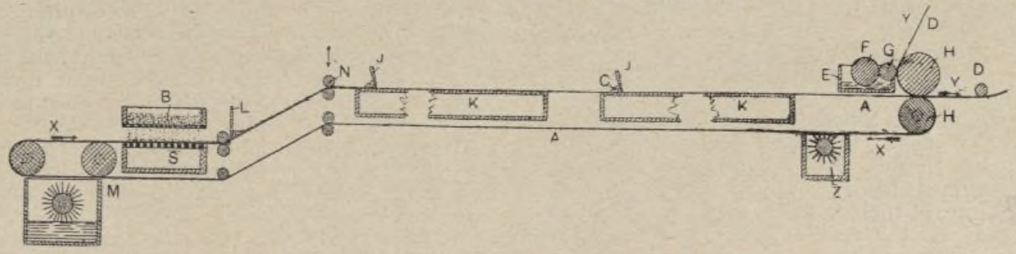
In the new process the facing material is spread upon a temporary support, and afterwards transferred to the fabric on which it is intended to remain. Fig. 1 will better illustrate this. On a suitable support S a sheet of linen A is laid. This is coated with a very weak adhesive material, the nature of which may vary according to the kind of facing material used. Its object is merely to obtain a temporary adherence of the facing material to the linen, and must not be so strong as to prevent the facing material leaving the linen when the latter is stripped. When using ground woollen flocks or ground hair it is found that sufficient adherence is obtained by slightly wetting the linen with water. On this prepared linen the facing material is shaken from a sieve so as to form an even layer B of the desired thickness. The linen A is tilted and slightly shaken so as to shake off surplus facing material. Over the layer of facing material adhering to the linen is applied a coating of indiarubber solution. This first coating is very weak, and consists of a solution of 1 part of indiarubber in 20 parts of naphtha. This thin solution permeates the facing material and binds it together into a sort of pellicle or skin. When sufficiently dry a further layer C of indiarubber of the usual strength used in waterproof cloth making (say 1 part of indiarubber to 5 parts of naphtha) is laid on. A sheet D of the fabric to be treated (coated in the usual manner with indiarubber composition) is now applied to the pellicle, and is rolled or pressed into intimate contact. The whole is now inverted, as shown in the second position in Fig. 1, and the sheet of linen A is stripped off, leaving the facing material behind on its final support, as shown in the lowest position. The temporary adhesive material (if other than water is used on the temporary support) is then removed by washing or other means. The faced fabric can be vulcanised in a hot room with the aid of steam, or it may be vulcanised in the cold process, according to circumstances.

This process can be carried out by hand when the goods are only made on a small scale, but for large quantities the machine shown diagrammatically in Fig. 2 is used.



NEW METHOD OF WATERPROOFING FABRICS.—FIG. 1.

An endless sheet or apron (corresponding to the sheet A of Fig. 1) travels in the direction indicated by the arrows X. At M it passes over a water vessel containing a revolving brush, which throws up a spray to damp the apron. The ground flock B is shaken from a sieve on to the apron as it passes over the table S. For some materials it is preferable to perforate the table (which is in this case hollow) and to put the interior into communication with an air exhaust fan. The apron with the layer of ground material passes thence in an upwardly-inclined direction to a pair of rollers N, the bearings of which have a rapid but small vertical oscillatory motion imparted to them so as to shake the apron and to cause the excess flock to fall back against the board L, whence it is occasionally removed by hand. K are two steam-heated tables, each provided with a doctor at J as is usual in spreading machines. At the first doctor a thin coat of rubber solution is applied, and by the time it reaches the second spreading table K it is ready to receive the thicker solution C, already described. The foundation fabric D, which is already coated with proofing material, is brought face side down in the direction of the arrows Y on to the apron A, and passes with it through the



NEW METHOD OF WATERPROOFING FABRICS.—FIG. 2.

squeezing rollers H, where it picks up the rubber-coated flock from the apron A, and is then taken away for such further treatment as may be necessary. If it is desired to vulcanise by the cold curing process, a vessel E (containing a vulcanising preparation of chloride of sulphur and bisulphide of carbon or other such suitable materials) is placed just before the foundation fabric meets the apron A. A roller F, rotating in the vulcanising preparation, picks it up and delivers it to another roller G rotating in surface contact with the fabric D, and thus applies the vulcanising preparation immediately before the two surfaces of indiarubber come into contact. A brush Z removes from the apron A any flocks which still adhere, and cleans the apron ready to receive a fresh supply.

A rather peculiar kind of waterproof fabric is the result of the work of some Parisian engineers, and is said to possess all the flexibility of ordinary material, although containing cork strips or sheets. It really consists in securing, by a suitable cement, extremely thin sheets of cork to a backing or foundation of some woven fabric. Its inventors say that it has not the drawback of becoming detached or altered by disintegration, is not in any way affected by moisture, and does not shrink with the heat. It has the advantages of rubber materials without having their drawbacks. Its lightness ensures it a number of applications where other materials could not be used with advantage on account of their too great density or weight. The following are the various processes for manufacturing the material. The cork is divided into very thin sheets without using agglomerated substances These sheets are then cemented to the fabric. For the first operation a certain amount of skill is required, which is rapidly acquired by practice. The quality of the cork must be well chosen so as to obtain extremely fine sheets or layers. It is obvious that cork thus cut and sustained or backed by a relatively thin or light fabric, united together by a suitable adhesive and strong compression, will maintain all its elasticity, and present the appearance of a new material. In the second operation the intimate adhesion is obtained by the compression in a hydraulic press of the fabric impregnated or coated with glue or other adhesive substance and the thin sheets of cork.

Layers or coverings of wool or cotton flock or floss of silk are obtained by attaching these materials in a comminuted state to the cork, which is first coated on its surface with glue.

A process, the invention of an Austrian, consists of taking perfectly dustless, well opened, and torn fibres, which are drawn by means of a blast into an air chamber containing warm air suitable for the purpose intended, and are caused to be deposited in the form of flakes on an endless band or cloth previously coated with a suitable adhesive substance. This cloth travels over two rollers, one of which is driven from a source of power, and is slowly drawn through the air chamber, each layer of material conveyed thereon being thus dried. In the further course of the endless cloth, this layer passes through a calendering machine standing outside the air chamber, in which machine the fibre and adhesive are thoroughly combined by strong pressure and then conveyed into a spreading machine effecting the application of the adhesive, or one of the spraying machines, which again effect a further application of adhesive. A further layer of fibre is during this time being blown on to the endless band in the air chamber. This layer is then again passed through the rollers and coated with a layer of adhesive, and then again covered with fibre by another passage through the air chamber. This process is continued until the sheet to be made has reached the desired thickness.

English and American Patent Laws.*

THERE is one reason why the Americans especially are so much ahead of us in inventions. They have had the good sense to make their Patent Office a great help, instead, as ours long was, a great hindrance to inventors. In the beginning of the last century, when inventors were busy with the steam engine, locomotives, and navigation, the difficulty and cost of obtaining patents were enormous. In a lecture given at Dundee eight years ago by Mr. George C. Douglas, over which I presided, he gave an amusing account of the manner in which specifications were written on skins of parchment, stitched together, and then rolled up into cumbrous rolls, sometimes several specificatons on the same roll, so that it was anything but easy to refer to them. They were kept in three different offices, one appropriately named the Rolls Chapel; another less appropriately the Petty Bag; and the third the Enrolment Office—all of which for security had to be gone through, without the aid of indices, but with the necessity of paying fees to the attendants who unfolded the musty rolls. An application for a patent had to pass through nine stages, in seven distinct offices, situated in different places, the reason for which avowedly was that "the clerks should not by any manner of means be defeated of any portion of their fees." The support of officialdom, not the encouragement of invention, was then the supreme object. A patent cost £350—to the poor inventor a prohibitory sum. In 1852 the fees were reduced to a total of £175 for fourteen years—payable £5 on application, £20 on completing the patent, £50 at the end of three years, and £100 at the end of seven years. Until 1852 the number of patents issued scarcely exceeded 1000 a year, and even thirty years later they had only reached 6000.

One of the first subjects I took up when I entered Parliament was the reduction of the fees on obtaining the renewal of patents. I pleaded that the fees in this country were greatly in excess, not only of those in America, but of the principal European countries: that small fees were more productive than exorbitant fees, which strangled applications for patents; that it was unwise to tax inventions; that the surplus revenue of £110,000 was excessive, and should be applied in reducing the fees, enlarging the Patent Office, and giving inventors greater facilities of access to specifications. In addition to the reduction of fees, other reforms were very much needed, and I took an active part in a Select Committee of the House of Commons, which recommended a number of useful reforms that still remain to be carried into effect.

As compared with the patent system of the United States, ours is still too expensive and discouraging to the poor inventor. That of the United States excels in three important respects: It is cheap; it is for a satisfactory number of years; and it follows upon an examination for originality. The duration of a patent in this country is fourteen years. Protection for the first four years costs £4. The fifth year the patentee must pay £5; the sixth year £6; and so on until the fourteenth year, £14, making a total of £99 for the fourteen years. All the advantage the patentee enjoys is in having his specification registered. He has no security whatever for the validity of his patent. No examination is made whether a similar patent has been registered before, and soon after paying his fees he may find all his trouble and expense have been in vain.

In the United States, on the other hand, the duration of a patent is seventeen years. Its cost is about £8, and there are no subsequent renewal fees. For £8 a patent is obtained for seventeen years, against £99 required for fourteen years in the United Kingdom. Not only so, but the American Patent Office examiners make a fairly thorough examination, and if required assist the applicant to put his application into proper shape. The result is that far more patents are applied for in the United States than in this country. The desire to become a patentee of some new invention is quickened, and there are multitudes of new and successful inventors every year. Irrespective of the cost of a patent, the most important point is the examination for originality, so that applicants may not waste their money in taking out patents which have been previously granted for similar inventions. I have, along with others, over and over again contended that, in view of its surplus revenue of over £100,000, drawn from inventors, our Patent Office ought to examine every application and specification to ascertain whether the invention is original or novel. I am happy to state that, after innumerable complaints on this subject and long resistance, the Board of Trade last year appointed a Departmental Committee to inquire into what additional power should be given to the Patent Office in respect of inventions which are obviously old or which have been previously protected by Letters Patent in this country. It was an able Committee, presided over by Sir Edward Fry, and it found that between 6 and 7 per cent. of the applications at given periods in the last three years had been wholly covered by previous patents, while between 35 and 36 per cent. had been partially anticipated in the same way. In their report they say, with regard to inventions previously protected, their number is large, both positively and relatively, and they make this emphatic declaration: "Both from the evidence before us and from the knowledge possessed by members of our Committee, we are of opinion that the grant of invalid patents is a serious evil, inasmuch as it tends to the restraint of trade and to the embarrassment of honest traders and inventors; and this fact, coupled with the result of the inquiry, is in our opinion a cogent argument in favour of some inquiry as to anticipation by prior Letters Patent. We are therefore of opinion that in addition to the existing inquiries an examination ought to be made in the Patent Office into the question whether any invention claimed in a deposited specification has been claimed or described in any and what specifications of Letters Patent granted in the United Kingdom dated less than fifty years previous to the date of the application." After setting forth the method they recommend for the examination for novelty, they say: "We are of opinion that if this scheme receive the sanction of the Legislature, it will be highly beneficial to honest and *bonâ-fide* applicants, whilst it will tend to discourage the taking-out of patents for objects

* Abstract of an address by Sir John Leng.

other than the protection of a real invention." Thus, at last, what some of us have long contended for has received the approval and recommendation of an authoritative committee of a Government department, to be followed, I hope, by early legislation.

Taking a still wider outlook, we should have an Imperial Patent Office, so that a British patent would hold good throughout all our colonies, dominions, and possessions. Mr. Douglas, writing to "Engineering" in June last, said: "Should an American apply for a patent in the United States through a patent attorney, he will pay £20, and get protection for seventeen years, and he will have about 95,000,000 people to deal with. If a British subject were to apply for a patent in India and the chief colonies, he would pay at least from £200 to £300, and in almost every colony renewal fees would have to be paid at the end of four years, and of course the cost of the British patent would have to be added."

Mr. Douglas's suggestion of an Imperial Patent Office is valuable, but we should go a step further, and endeavour to arrange an international patent system, so that the same patent should hold good the world over. I sometimes wonder why the trade unions, councils, and congresses in this country do not take up questions of this kind, which concern the interests of their members more than some that engage their attention.

Finishing Fine Doeskins.

THERE is always considerable trouble with steam-finished goods on account of the marking from the seam, and while with proper care much trouble may be saved, it is safe to say that it can never be entirely removed. When the goods roll up, the face of one round lies against the back of the previous one, so that if the seam is made on the back of the goods the face of the next round will receive the whole imprint of the seam, and consequently will have to be cut off when finished, whereas if the seam is made on the face it will have its imprint on the back, where generally it does little harm. These little things are well worth looking after, and contribute much to the success of the finisher.

Another matter needs mention here, and that is the number of pieces to be steamed at one time. It is held by many that not more than two pieces should be steamed at a time. But to say the least, this is quite a waste of valuable time, and makes it necessary to have more machines than are really required. Of course, it depends much upon the weight of the goods and also upon the way the cylinder is perfected; but if this is properly looked after, there is no reason why four and six pieces should not be steamed at a time. When the goods have been tightly rolled on the cylinder and the leader well secured with ropes to prevent the goods from blowing off sideways, we are ready to turn on the steam, keeping the cylinder turning all the time, and when the steam comes through evenly all over the pieces, we look at the time and leave the steam turned on seven or eight minutes. If good and clean material is used, as is mostly the case on these goods, this is a fair time for the steam to be on; but on lower-grade goods it is not advisable to have the steam on so long, as it is apt to tender the goods. At the expiration of the stated time the steam is turned off and cold water turned on, and this is left on until the goods are cold all over. Be sure and feel them, and not have a warm spot in them before taking them off the steamer.

When goods are cold all over, turn off the water and again turn on the steam. Although there is much water to be forced out, the steam will come through faster than the first time, and when it comes through give the goods five minutes more, then turn off steam and turn on water again for the final cooling. Then take them off, and they are ready for the dyehouse. If it is necessary to increase the capacity of the steaming, plug up a row of holes on the cylinder on each side with shoe pegs, and this will enable you to add goods enough so as to make your goods stand an inch higher on the cylinder, which means about one more piece. Care must be taken, however, not to overdo things on this line, for it will not do to have less than 46in. of perforated surface for 54in. goods. Have the goods and the perforations correspond, and the best results will be obtained.

For instance, if your goods are 54in. wide, it means about 56in., selvage and all, and when the cylinder is perforated 46in., there is a difference of 10in., which gives us 5in. on each side of the goods without any perforations under them. Now if goods enough are put on to equal these 5in., the conditions will be even, and the steam will come through evenly. As soon as more goods are put on than 5in. high, the steam will come through the centre of the goods all right, but the side will not get the same amount of steam, and when the goods are finished they will slide from side to centre, and most finishers know how nice it is to have goods come that way; but very few will admit that the steaming is to blame. Again, if the cylinder should be perforated 48in. instead of 46in., and the goods are run on 5in. high, the steam will get out at the sides first, thus reducing the force in the centre; and while a little steam may come through at the centre, it will not be anywhere near what the sides are getting, and the result will be the same as before.

Perhaps this may be the means of clearing up some difficulty at some place or another, and if it is we certainly have accomplished our end. Look to the steamer and have things right there, and nine times out of ten the goods will shade all right. After the goods come from the dyehouse they go at once to the washer and are given a weak soap bath, after which they are thoroughly rinsed, and then we give them a good bath of fuller's-earth, another rinsing, send them to the wet gig, and have them well gigged and tightly rolled up. Put a wrapper around them, and stand them up and leave them over-night. At about 9 or 10 o'clock in the evening all the rolls should be turned over on the other end, and if this is done they will be in good condition in the morning.

Now take the rolls to the squeezing machine, which must be provided with a stand for this purpose, and run the goods through the squeezer right from the roll with as little handling as possible, and be careful not to have any finger marks on the face. These goods are highly finished, and it does not take much to leave a finger mark. They are now ready for the dryer, after which they are looked over on the back for knots, although if the burling has been properly performed this is hardly necessary. A good steam brushing is next in order. Do not stint the goods at this point; give them plenty of runs, but do not have the steam valve open too far. A little steam is all we want, and this, with the action of the brush, will bring the goods in the best condition for the finishing shear. If the goods have been properly cropped, says the "Boston Journal of Commerce," the shearing at this time is simply a touching-up process, and generally it is hardly necessary to go up more than four notches. Give them plenty of runs, and make sure to have the nap as square as possible, which, of course, can only be done by giving them quite a few runs after all the notches have been turned down. When sheared, they are carefully perched, for it is better to do the perching now than to do it after pressing, and when they have been perched they go again to the brush, and with a good head of steam are here made ready for the press. Press them back to the cylinder and give them a good, hard pressing. Press them hard enough so that it will take at least four runs on the steam brush to get them in condition to be doubled, measured, and rolled, and you will have a piece of doeskin which, in point of finish, is second to none.

Angola Yarn.

COMPETITION has wrought wonders in all branches of trade in the way of sharpening the wits of competitors, and it is to be feared that, where such a thing is possible, adulteration has been one of the results. This evil, says the "Indian Textile Journal," is intensely aggravated when the general public get hold of an idea that any particular branch of trade is a certain source of wealth to the trader, for then over-competition is followed by over-production, and sorry indeed are the shifts to which people are put in the endeavour to outstrip their neighbours and secure that competency for which good men pray. A few years ago people were seized with this notion with reference to the woollen and worsted trades, and consequently made a rush to invest their money in them. Unfortunately, not only did too many do this for all to succeed, even had the conditions remained the same, but trade fell off, markets to which quantities of goods had formerly been sent at remunerative prices were closed, or virtually closed, by hostile tariffs, and bitter have been the consequences to very many. The result most affecting the public generally is the adulteration which is now carried on to an enormous extent in the woollen trade; but they know perfectly well that to secure a good article they must give a good price, and that things ridiculously cheap are not genuine. Still, such are the changes of fashion in dress nowadays, that even garments composed of materials formerly considered good enough for anything are often thrown aside as old-fashioned when only half worn.

The man into whose fertile brain the thought first entered of mixing materials so different in every way as wool and cotton certainly deserves a monument; but if such an honour were decreed, and the various claimants took the case into the law courts, the duration of the Tichborne trial would be as nothing compared with the length of time it would take to settle to whom it was due. Whoever tried the experiment first, it is certain that he could have had no idea of the extent to which his example would be followed: for now, even in better goods, Angola yarns are the rule, and all-wool yarns the exception. Not only is raw cotton used, but the cotton waste from the Lancashire mills—"strip," "fly," "laps," "roller end," and greasy waste—is in daily use, dyed and otherwise, for mixing in different proportions with animal fibres of various classes, to produce yarns which it is often hard even for the practiced eye to distinguish from "all wool." The reason people mix cotton with wool and other expensive animal fibres is to cheapen the yarn. The reason people mix cotton with mungoes and other cheap animal fibres is to add to the strength of the yarn and cause it to spin to the requisite length without going to the expense of using wool or other materials proportionately. The aim of the manufacturer in making an Angola yarn is certainly a deceptive one, for he works to produce as good an imitation as possible of yarn unadulterated with cotton, and to do this he has many difficulties to contend with, for even supposing him to have succeeded in making a yarn first-rate to all appearances, the question arises, How will that yarn look in cloth ready for the market, after going through the various processes of making and finishing? It would be impossible here to enter into details with regard to the various sorts of animal fibre with which cotton is mixed—such as alpacas and many other varieties of hair, silk, etc.,—but a few remarks on mixtures of wool and its descendants, in various generations, with cotton, is all that will be attempted in this article.

The proportion in which cotton is used in Angola yarns varies very greatly according to the price at which the yarn is required, length to which it is to be spun, and the purpose for which it is to be used. Perhaps the principal difficulties to be contended with in its use are a certain hardness of feel natural to the cotton itself, and which it requires great skill to overcome when the proportion of cotton used is large, and the disinclination it has, common with all other vegetable fibres, to be permanently affected by dyes.

Manufacturers know well that for producing a soft handle of cloth nothing is so well adapted as lamb's wool. Still, even when they could well afford to go to the expense of using wool of this class unadulterated for their yarn, a small percentage of cotton is sometimes mixed with the wool for the purpose of making the yarn more compact, and checking a tendency this wool has to spread too much on the face of the cloth. In this case, of course, the difficulty of the hardness of feel mentioned above is quite overcome by the wool bursting and spreading on the surface of the cloth in the milling process, and with the small proportion of cotton which is often used the most practiced hand could not detect, from the feel of the cloth, that the yarn used in its manufacture was Angola, whilst the appearance of the cloth would in some cases (as mixtures, etc.) be better and clearer than if cotton had not been used. In low-priced yarns for soft-handling goods, such as the plain and fancy cotton warps made in the neighbourhood of Leeds, in which very little wool (or Botany noils, which are used in preference to wool by some manufacturers) can be afforded, the requisite "handle" is attempted with more or less success by the use of fine mossy mungoes. The whites are mostly pulled from flannels, and the various fancy shades to suit the customer are dyed from the same. The regular browns and greens are from fine meltons, and one or two standard drabs from carriage linings. The flannels are, of course, merely lamb's or Cape wool at second hand, and answer their purpose very well, coming well to the top in the milling process. In addition to this, large quantities of cutting flocks are used, and prove a great help in covering the hardness of the cotton. Fine Peruvian cotton is the best adapted for this class of yarn, and though some sorts of cotton waste are often used, on account of the advantages gained in price, it is always at a sacrifice of clearness and straightness in the yarn, and consequently of the appearance of the cloth, for if the cotton is "neppy" the hardness of the "neps" is made ten times worse in the milling process. White cotton is always used where possible in preference to dyed, not only on account of the poor colours obtainable on cotton, but also because of the much greater ease with which white cotton can be worked. Still, whatever sort is used, the greatest care is necessary in the mixing and scribbling. The oil should be kept off the cotton as much as ever possible, and in the case of delicate mixtures, such as lavenders, light steels and middle steels, light drab mixtures, etc., all of which colours are largely used in the fancy trade, it is of great advantage to have a "plucking machine," through which the job may be passed after scribbling, as a further precaution against unevenness and consequent burry pieces. It may be remarked that a "plucker" or "teazer" is simply a machine composed of cylinders furnished with iron teeth, which breaks up the material as it passes through from an endless sheet, and throws it out on a heap, ready for sheeting-up and condensing. In making backing yarns for worsted coatings, cotton is very largely used. The most general way of making these yarns is to use black cotton and carbonised mungo, or mungo from which all the bits of cotton have been extracted either by the solution of oil of vitriol or some other process. The reason of this is that the worsted pieces are then dyed in the ordinary way as wool goods, and the backs come up a proper colour; whereas when white cotton and ordinary uncarbonised mungoes are used, as is the case in a great many of the low cotton-warp worsteds made so largely in the neighbourhood of Dewsbury (and where even white cotton warps are often used), the goods have to be heavily "burled" or "cotton-dyed" in order to cover the white cotton used. Some worsted manufacturers are very particular as to the sort of black cotton to be used in making their backing yarns, and are willing to pay an extra price to the yarn maker so that he may use a perfect fast black cotton, the reason of this being that many people dyeing their own cotton produce a good dark brown instead of a black, which of course spoils the appearance of the goods. The backing warps used for worsteds often contain more than 40 per cent. of cotton. The wefts are made with less, on account of having to be slightly "raised" in the finishing process. These yarns are now supplied to the worsted manufacturers at ridiculously low prices, as are the Angola mixture yarns now so largely used for backing mixture worsteds, and which are made to match the colour of the face. In these yarns the difficulty of getting a permanent colour on cotton is again seriously felt, although, of course, the goods have not to be milled. In the woollen trade, where the goods have to be milled, it is a constant source of trouble; for even supposing a colour to have come out right, the next round, made from identically the same lots of yarn, may be quite different in shade or may be completely spoilt by the colour running from the cotton on to the other colours. If the alkali used in scouring is at all too strong, or if the miller allows his pieces to get too dry and hot in the milling machine, the damage is done at once. There seems no likelihood of this difficulty in dyeing ever being overcome; but if it ever were overcome, the making of fancy goods with Angola yarns would be very much simplified, and manufacturers would be greatly aided in their efforts to imitate the better cloths even more successfully than they have already done.

Gleanings from Consular Reports.

FLORENCE.—The silk industry was once one of the most important industries in the province of Florence, and is one of the oldest, having been in existence as early as 1204. It reached its greatest development and reputation in 1474, when Florence counted eighty-four manufacturing establishments. Richly and exquisitely-finished gold and silk stuffs and silver brocades of every colour were manufactured and exported to Lyons, Geneva, Spain, Sicily, Turkey, Syria, and even to the United Kingdom and Germany. It is a fact worthy of remark that silkworms were not introduced into Tuscany before the end of the fifteenth century, and that up to that date the raw material was imported from abroad. At present a marked decline has followed the old prosperity, and the manufacture of silk stuffs has almost ceased, there being but a few throwing and twisting mills, which fight their way with great difficulty.

There are fifteen silk-throwing mills in ten communes, eight of which are worked by steam, employing about 1034 men. One small silk-twisting mill at Pistoia has 240 spindles, one 3H.P. steam engine, and one 3H.P. hydraulic engine. Sigg. Cantini and Borgognini produce silk tissues for furniture and umbrellas. Their mill has twenty-six looms (twelve old-fashioned and fourteen jacquard), and employs twenty-three women. There is also another small mill possessing four looms and employing ten women.

Cotton weaving is carried out by thirteen firms, using hand looms. With the exception of the Compiobbi Cotton Mill (Cotonificio di Compiobbi), none of the other mills employs workmen on the premises, but distribute the work at the various weavers' houses. The total number of workmen employed in cotton weaving is over 400.

With one or two exceptions cotton dyeing and bleaching are carried out in shops employing only three or four hands, using no machinery. The total number of hands working therein amounts to 196.

From time immemorial the Tuscan shepherd and his flocks have led a nomadic life, and passed the summer on the Apennines and the winter in the Maremma, the sheep living in the open air at all times. There are no large proprietors of sheep, a flock of some importance yielding approximately 3000kilos. (6614lb. avoirdupois) of wool. It would be impossible to calculate on an average the total quantity of wool produced in this province, as the yield is subject to great variations, owing to the climatic conditions of the region, and to the diseases among the sheep. Moreover, the production is constantly tending to diminution in consequence of the increased tilling and cultivation of land in the Maremma. Many attempts were made to improve the breed of sheep, but they were all given up, as the effect of crossing was lost in a short time, and no permanent improvement obtained. However, Tuscan wool is said to be strong and long, and therefore suitable for the manufacture of ordinary cloth for durability, and especially for military clothing. The wool gathered in the provinces is consumed for the greatest part at Prato. For fine tissues large quantities are imported from Northern Italy, Australia, and Russia, and especially from America.

The woollen industry is carried out chiefly in the commune of Prato, where numerous spinning, weaving, and carding mills are worked, making large use of "shappe," which is the wool obtained by unweaving old tissues, undoing the twist, and rendering the woollen fibres free by separating them from each other. Mention may be made of the following important mills:—

A. and G. di Beniamino Forti, with 3 engines of 70H.P., 2000 spindles, and 300 hands.

Messrs. Kössler, Mayer and Kinger (exclusively a weaving mill), with 1328 hands, 5 engines, and 500 jacquards; produces ladies' woollen stuffs (of combed wool), wool tissues mixed with silk or cotton, cashmeres, thibets, meltons, paramatta, etc.

L. Targetti's spinning and weaving mill: 140 hands, 3 engines of a total of 80H.P., 1200 spindles, 20 jacquards, and other machinery.

Signor F. Cavaciocchi: 1500 spindles, 14 jacquards, 50 hand-looms, 1 hydraulic engine of 70H.P., a gas motor of 2H.P., and 200 hands.

Sigg. C. Villoresi and Son: 1000 spindles, 24 jacquards, 50H.P. steam engine, and 140 hands.

There are many other smaller mills spread throughout the province.

The total number of hands employed in the woollen industry in this province, including the firms already mentioned, is 3270, the greater part being males.

Formosa.—The trade in cotton goods, which is chiefly in the hands of Chinese merchants, appears to be improving.

Grey shirtings have increased from £8266 in 1899 to £12,996 in 1900, and white shirtings have increased from £16,175 in 1899 to £24,471 in 1900, both of which totals are, however, slightly smaller than those for 1898.

Nankeen cloths and cotton sateens figure for the first time in the table.

Piece goods, cotton and woollen, show an increase of £4111 over the figures for 1899. The whole of this import comes from Japan.

The import of camlets and lastings for 1900 was valued at £7529, an increase of only £366.

Rio de Janeiro.—Judging from the imports of raw cotton—159,765 bales in 1900, as against 159,029 bales in 1899,—the production of local mills continues to expand, although the results in many cases are reported not to be altogether satisfactory. One of these establishments is now turning out printed goods with considerable success, and no British imports of that class will be affected in consequence. The British manufacturer, however, still far out-distances all his competitors, except in the following specialities:—Upholsterer's textiles and trimmings, cotton and cotton and wool (mixed), blankets, hosiery, undershirts and knitted goods, and embroideries. A large quantity of the last-named article and of undershirts comes from Portugal; but in these, as in the other things here specialised, the largest suppliers are Germany and France.

With regard to woollens, in piece goods the British position continues very satisfactory in comparison with other suppliers; but in ready-made clothing (which is an important item) France and Germany take the lead. In knitting wool and wool yarn, Germany and France are ahead of the British maker, but in the second of these articles the lead is held by Belgium.

Germany does a large trade in shawls, while in upholsterer's stuffs she again, in company with France, is preferred to the British maker.

These countries also do a fair trade in slipper carpets.

The British position in the linen, jute, and hemp manufactures is also very satisfactory, but we lose ground in table and bed linen, shirts, and made-up articles of clothing, and in tapes and braids of all kinds. France and Germany are again the leaders in these things. Germany also sends in more rope than the British manufacturer.

The United Kingdom has but a small share in the silk trade, the great bulk of which, in all its branches, except cravats, handkerchiefs, and a few British specialities, falls to France, Germany holding the second place.

Germany.—The entire import of raw sheep's wool amounted in 1900 to 3,042,903cwt., with a value of £10,232,648, compared with 3,917,041cwt., with a value of £16,099,313, in 1899. This shows a decrease in weight of 874,138cwt., or 22·3 per cent., and a decrease in value of £5,866,665, or 36·4 per cent. The great fall in prices which took place in the summer can be seen by the difference of the percentages between weight and value.

Of the entire import of the past year, 1,357,705 cwt., or 44·6 per cent., came from the Argentine Republics, compared with 1,653,110cwt. in 1899; from Australia, 915,893cwt. (1,034,233cwt. in 1899); from the Cape, 180,630cwt. (324,788cwt. in 1899).

The import of raw wool from the United Kingdom amounted to 199,039cwt., or 6·5 per cent. of the entire import, compared with 380,561cwt. in 1899.

These above-mentioned unfavourable conditions were disastrously felt by the worsted industry. Here, too, large purchases were made, partly out of fear of under-production, and partly in the hope that trade would keep in its former flourishing condition. Financial difficulties followed, and though every effort was made to limit the production, nothing could avert the fall in prices. In autumn the utter stagnation was to a certain extent relieved, but the desire to sell was so strong that only poor prices were obtained. The end of the year saw perhaps the lowest ebb of the crisis, and the cheapness of the fabrics may lead to an increased consumption, which will in its turn help the trade to resume its normal condition. The principal German companies engaged in this trade, which have hitherto paid a handsome dividend, now announce a loss in the aggregate of £1,000,000.

Woollen yarn participated to a very great degree in the general depression, and both export and import trade showed a diminution. The imports in 1900 of woollen yarn amounted to 545,729cwt., with a value of £5,196,421, compared with 583,350cwt., with a value of £5,556,912, in 1899. The export decreased in weight by 37,621cwt., or 6·4 per cent., and in value by £360,491, or 6·5 per cent.

In the German wool-weaving industry the demand was small and production was limited, and this was only partly compensated for by the increased demand for knitted goods. The greater quantity of woollen yarn came from the United Kingdom, which sent of the entire German import 457,714cwt., or 78·5 per cent.

The export of woollen goods from Germany amounted in 1900 to 194,704cwt., with a value of £2,793,333, compared with 196,207cwt., with a value of £2,809,608, in the previous year. This export also decreased in weight by 1503cwt., or ¾ per cent., and in value by £16,275, or over ½ per cent.

The United Kingdom took 37,850cwt., or 19·4 per cent.

In 1900 the import of woollen yarn into Germany exceeded the export by £2,403,088.

Business in lace and embroidery must be considered on the whole as satisfactory. In 1900 32,200cwt. of lace and embroidery of various kinds, with a value of £2,330,627, were exported, compared with 26,769cwt., with a value of £1,923,039, in 1899. According to these figures the export has increased by 5501cwt. in weight, or 20·6 per cent., and by £415,588 in value, or 21·6 per cent. It may be computed that at least 90 per cent. of this was sent from the Saxon Vogtland. The principal market was the United Kingdom, which took 46·6 per cent. of the entire export.

NEW COMPANIES.

Barnoldswick Cotton Trade Insurance Company Limited.

REGISTERED November 11, with 100 members, each liable for 10s. in the event of winding up, to take over upon such terms as may be agreed upon the liability under any policies granted to employers indemnifying them against liability to make compensation to servants and workmen or their dependents for injuries, to grant or make policies or other instruments of assurance, and to carry on the general business of an employers' liability insurance company. The number of directors is not to be less than three nor more than nine; the first are J. Nutter, A. Pilkington, T. S. Edmondson, S. Pickles, B. Holden, F. H. Slater, and W. Bradley; qualification, 1 share; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Butts Mill, Barnoldswick, Yorkshire.

Dolphin Doubling Company Limited.

Registered November 25, with a capital of £20,000, in £1 shares (10,000 preference), to acquire the business formerly carried on by the late Francis Greg, at the Cast Metal Mill, Stockport, under the style of the Cast Metal Mill Company, to develop and extend the same, and generally to carry on the business of spinners, doublers, gassers, manufacturers, weavers, waste dealers, dyers, bleachers, printers, finishers, sellers, and general commission merchants with respect to cotton, silk, linen, worsted, woollen, and other goods. 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, £100 per annum, divisible.

Registered by Busk, Mellor and Norris, 45, Lincoln's Inn Fields, London, W.C.

D. Marsland Limited.

Registered November 13, with a capital of £10,000, in £1 shares, to acquire the business carried on by D. Marsland at Clarendon-street Mill, Hyde, Cheshire, to adopt an agreement with the said vendor, 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 and woollen spinners, yarn merchants, worsted stuff manufacturers, bleachers, dyers, etc. No initial public issue. The number of directors is not to be less than three nor more than five; the first are D. Marsland, A. H. Marsland, H. A. Marsland, and W. Marsland; remuneration, as fixed by the company. Registered office, Clarendon-street Mill, Hyde.

Lewis and Tylor Limited.

Registered November 14, with a capital of £15,000, in £1 shares, to adopt an agreement with L. Lewis and L. Tylor, and another agreement with H. Hollingdrake, and to carry on the business of manufacturers, refiners, storekeepers, warehousemen, hand and machine belt manufacturers, spinners, weavers, tanners, curriers, steam packing manufacturers, mill furnishers, etc., and for such purposes to manufacture, get, work, and deal in cotton, hair, jute, flax, hemp, manilla, asbestos, wool, silk, and other textile or fibrous materials, leather, indiarubber, ores, minerals, oils, paints, greases, enamel, compositions, etc. No initial public issue. The number of directors is not to be less than three nor more than five; the first are L. Tylor, D. Lewis, and H. Hollingdrake; qualification, £250; remuneration, as fixed by the company. Registered office, St. Mary's Leather Works, Clarence-road, Cardiff.

John T. Lewis and Sons Limited.

Registered November 23, with a capital of £100,000, in £1 shares (10,000 preference), to acquire the business hitherto carried on by John T. Lewis, as James Lewis and Co., at 22, Fountain-street, Manchester, and in London, Glasgow, Belfast, and elsewhere, and generally to carry on the business of cotton spinners and manufacturers, bleachers, dyers, raisers, printers, and manufacturers of silk, woollen and mixed goods of every description, cloth merchants, commission agents, warehousemen, brokers, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are John T. Lewis (governing director for life), Thomas M. C. Lewis, and John W. Lewis; remuneration, as fixed by the company. Registered by Jordan and Co., 120, Chancery-lane, London, W.C. Registered office, 22, Fountain-street, Manchester.

Westgate Weaving Company Limited.

Registered in Dublin, November 22, with a capital of £20,000, in £5 shares, to acquire the business carried on at Westgate, Drogheda, or elsewhere, by the Drogheda Spinning and Manufacturing Company Limited, and to carry on the business of cotton spinners, weavers and doublers, linen manufacturers, bleachers, dyers, etc. The numbers of directors is not to be less than three nor more than seven; the first are W. P. Cairnes, the Right Hon. T. A. Dickson, J. McQuillan, C. Tighe, G. Daly, W. R. Still, and A. P. Hannah; qualification, £250; remuneration, as fixed by the company. Registered by Haynes and Sons, 24 and 25, Nassau-street, Dublin.

Star Knitting Company Limited.

Registered November 7, with a capital of £4000, in £1 shares, to acquire the business of hosiery knitters now carried on at Thornes, Wakefield, Yorkshire, and elsewhere, as The Star Knitting Company, and to carry on the business of knitters of and dealers in wool, silk, cotton, and other fibrous substances. No initial public issue. The number of directors is not to be less than two nor more than seven; the subscribers are to appoint the first; qualification, 100 shares; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Denby Dale-road, Thornes, Wakefield, Yorkshire.

Rawtenstall Bleaching Company Limited.

Registered November 18, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of the Rawtenstall Bleaching Company, to adopt two agreements with the Bleachers' Association Limited, and to carry on the business of bleachers, dyers, and finishers of textile fabrics, etc. No initial public issue. The general manager or general managers for the time being of the Bleachers' Association Limited shall be the director or directors of this company. Registered by Patersons, Snow and Co., 25, Lincoln's Inn Fields, London, W.C.

Samuel Walch Limited.

Registered November 18, with a capital of £100, in £1 shares, to acquire the goodwill and trade marks of the business of Samuel Walch, of Outwood Bleachworks, near Prestwich. All other particulars are the same as in the Rawtenstall Bleaching Company Limited.

Moore, Eady and Co. Limited.

Registered November 29, with a capital of £100,000, in £10 shares (6000 preference), to acquire the business hitherto carried on in co-partnership by F. Moore, J. W. Eady, C. B. Carryer, and W. Moore, at Granby-street, Leicester; at Burbage, Leicester; and at Derby and elsewhere, under the style of Moore, Eady and Co., to adopt an agreement with the said F. Moore, J. W. Eady, and C. B. Carryer and W. Moore, and to carry on the business of manufacturers of and dealers in hosiery, yarn spinners, cloth manufacturers and merchants, combers, slubbers, dyers, finishers, weavers, bleachers, stovers, pressers, millers, fullers, and printers of cloth, manufacturers of and dealers in yarns, warps, wool, worsted, cotton, silk hair, alpaca, flax, hemp, jute, mohair, and other 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 F. Moore, C. B. Carryer, and W. Moore, each of whom may retain office so long as he holds £4000 shares. Ordinary qualification, £500; remuneration, as fixed by the company. Registered by C. Doubble, 14, Serjeant's Inn, London, E.C.

Coventry Weaving Company Limited.

Registered November 5, with a capital of £1600, in £1 shares, to carry on the business of manufacturers of ribbons, frillings, tapes and other textile goods, silk throwsters, general merchants, commission and shipping agents, etc., in the city of Coventry and elsewhere. No initial public issue. Registered without articles of association by Jordan and Sons Limited, 120, Chancery-lane, London, W.C.

Lancashire Paper Tube Company Limited.

Registered November 9, with a capital of £10,000, in £1 shares, to acquire works for the manufacture of paper tubes for textile machinery, and to carry on the business of manufacturers of paper, paper pulp, paper tubes, paper bobbins, paper boxes, paper blocks, paper beams, perforated tubes, cross winding tubes, tubes for bleaching and cop dyeing, tubes made of metal, wood or any fibrous materials, spools, cannettes, pirns, brass and steel rings for spindles, tubing apparatus and cop tube machinery, 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 J. Gregson, F. A. Holt, J. Nesbit, A. K. Seville, and J. J. Smithies; qualification, 250 shares; remuneration, as fixed by the company. Registered office, 3, King-street, Rochdale, Lancashire.

F. and W. E. White Limited.

Registered November 23, with a capital of £30,000, in £1 shares (20,000 preferred), to acquire the business carried on at Loughborough, Leicestershire, and elsewhere, as "F. and W. E. White," to adopt an agreement with F. R. White, M. Barker, and E. M. White, and to carry on the said business, which is not described. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are F. R. White, E. M. White, F. W. Burnham, and G. A. Simpkin; qualification, £500; remuneration of F. R. White £400, of F. W. Burnham £250, and of E. M. White and G. A. Simpkin £200 each per annum. Registered by Waterlow Bros. and Layton Limited, Birchin-lane, London, E.C.

Gibbs, Hillier, and Co. Limited.

Registered November 26, with a capital of £10,000, in £1 shares, to adopt an agreement with W. J. Gibbs, H. H. Gibbs, and A. R. Gibbs, and to carry on the business of hosiery manufacturers, woollen and worsted spinners, worsted stuff manufacturers, dealers in wool, cotton, silk, and other fibrous substances, suppliers of power, 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, one share; remuneration, £40 per annum, divisible. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Shepshed, Leicestershire.

THE GAZETTE.

ENGLAND.

Partnerships Dissolved.

Beveridge, Whitling and Smith, manufacturers and merchants of jute, hemp, and Manila goods, 47, Aire-street, Leeds; as regards H. Smith.

J. H. C. Hodgson and C. Weatherall, worsted spinners, Thornton, near Bradford.

J. W. Gill and Co., dyers and manufacturers, Openshaw, Manchester.

S. Aspinall and C. Rothera, machine comb makers, Mount-street Mills, Halifax.

J. H. Buxton and C. C. Clarke, manufacturers of logwood, fustic, and tannin extracts, Park-street Mills, Greenheys, Manchester, as Hulme, Buxton and Co.

Voluntary Winding-up.

Lower Lumb Spinning Company Limited, Heptonstall; Mr. T. Blane, Blackpool, and Mr. C. Crabtree, Hebden Bridge, liquidators.

The Bankruptcy Acts, 1883 and 1890.

Adjudications.

George Mitchell, woollen cloth manufacturer, Dale-street, Ossett.

Edward Smith (as S. E. Smith and Co.), woollen manufacturer and merchant, Station-road, Batley.

Joseph Richard Hadwen (described in the receiving order as J. R. Hadwen), commission agent and woollen merchant, High-street, Leyton, Essex.

James M'Caffry (carrying on business as M'Caffry, White and Co.), stuff merchant, Adelaide-road, Hampstead, London; Leeds-road, Bradford; and Aldermanbury, London.

Receiving Orders.

J. R. Hadwen, commission agent and woollen merchant, 201, High-street, Leyton, Essex.

James M'Caffry (as M'Caffry, White and Co.), stuff merchant, 37, Leeds-road, Bradford, and 51 and 52, Aldermanbury, London.

Joseph Scarlett Crowther, cloth manufacturer, Albion Mills, Morley.

Amended Notice.

William Roberts and Jane Richards Owen (as D. Owen and Co.), linen, cotton, and woollen merchants, as executors under the will of the late Selina Owen (in respect of which probate has not yet been applied for), at 19, 21, and 23, Lever-street, Manchester, Jane Richards Owen trading separately and apart from her husband.

JOTTINGS.

The United Turkey-red Company, Dumbartonshire, have purchased the extensive dyeworks at Burnbrae, Milngavie, near Glasgow. The purchase completes the combine.

A simple test for the purity of Manila or sisal rope is as follows:—Take some of the loose fibre and roll into balls and burn them completely to ashes, and if the rope is pure Manila the ash will be a dull greyish black. If the rope is made from sisal the ash will be a whitish grey, and if the rope is made from a combination of Manila and sisal the ash will be of a mixed colour.

For the first time in the history of exhibitions and markets it is intended to hold a gathering for the textile, drapery, hosiery, and the allied trades at the Royal Agricultural Hall, London, from July 26 to August 1, 1902. The management of this undertaking will be in expert hands, and the gathering should prove not only interesting and instructive to the trades concerned, but also to the general public.

The Technical Committee of the Bradford Corporation have received the sub-committee's report recommending that a new building be erected. The recommendation was referred back, because new members have recently come into the Technical Instruction Committee. The matter will therefore come up again after the new members of the committee have had reasonable opportunity of going into the subject for themselves.

Previous to 1888 chenille fabrics were woven entirely on hand-looms. Their cost was necessarily high, and comparatively few persons could afford to use them. Since that time the selling price has fallen so low as to bring them within reach of the most humble, the reduction in price being due to two causes: The advent of the power-loom in their manufacture, and the development and the growth of the industry. Until about the year 1890 the Scotch and Austrian manufacturers had a monopoly of the market.

During November the total value of goods exported to the United States from the Huddersfield consular district was £19,294, against £17,383 for November, 1900. The value of the woollen goods exported last month accounted for £4948, compared with £3699 in the preceding month, and £3583 in November, 1900. Worsted goods were represented by £6470 last month, £5040 in October last, and £4481 in November last year. Compared with November, 1900, the exports of chemicals and dyes rose last month from £3014 to £4408, and card clothing fell from £2055 to £795, and sewing cotton from £2235 to £327.

The Board of Trade returns for November and the eleven months ended November 30 show that the declared value of goods imported during the month amounted to £46,810,553, against £49,733,730 in 1900, and £44,244,811 in 1899; and during the eleven months to £475,506 540, against £477,275,947 in 1900, and £444,339,264 in 1899. Of foreign and colonial merchandise exported in the month the value was £5,079,601, against £5,013,255 in 1900, and £5,169,512 in 1899; and in the eleven months £61,934,596, against £58,042,682 in 1900, and £59,393,658 in 1899. The value of British and Irish produce and manufactures exported in the month was £22,842,436, against £24,624,649 in 1900, and £24,571,940 in 1899; and in the eleven months £256,185,112, against £267,839,334 in 1900, and £242,622 158 in 1899.

A copy of a return has been received showing the quantity of yarn spun, and woven goods manufactured, in each Province of British India, and in Berar and the Native States, for the four months ended July, 1901, as compared with the corresponding periods of the two previous years. The following is a summarised statement extracted from the return, showing the details in a comparative form for the four months ended 31st July of the years 1899, 1900, and 1901:—

—	Four Months ended 31st July.		
	1899.	1900.	1901.
British India, Berar, and Native States.	Lb.	Lb.	Lb.
Yarn spun	186,985,855	98,752,933	187,272,362
Woven goods produced	33,779,048	25,656,730	37,277,767

The following are particulars of the exports of New Zealand hemp from New Zealand for the undermentioned years:—

Yarns and Textiles.

—	United Kingdom.	Australia.	United States of America.	Other Places.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.
1896	1,405	1256	307	—	2,868
1897	1,076	1376	317	—	2,769
1898	2,448	1809	571	22	4,850
1899	7,866	1563	852	90	10,371
1900	11,867	2603	1175	261	15,906
1901 (first 6 months).	—	—	—	—	4,962

The total exports for 1900 is the highest in the five years, and exceeds the preceding year by over 50 per cent. The largest increase is in the shipments to the United Kingdom, though the proportionate increase in the export to Australia is greater. The export for "other places" in 1900 includes 260 tons for Japan.

Cotton is grown all over the Chinese Empire, but that which finds its way to the seaports is grown within 400 miles of the coast. The sowing of cotton takes place about the end of April. The tilling is done either with the three-pronged hoe, or with a buffalo and plough, the latter being of the rudest and simplest construction—little more than a crooked branch of a tree with a thin iron plate attached, which turns up the soil only 5 or 6in. deep. The land is cultivated in small patches by farmers, who devote their own labour and that of all the available members of their families to the little spot which they call their own, and which is seldom large enough to require hired labour to work it. The seed is generally sown broadcast, but sometimes it is planted in regular rows and covered by treading it into the ground with the feet. After the plants have sprung up they are carefully hoed and weeded, and if the seed has been sown broadcast they are thinned out until they stand at an interval of about 15in. When the plants have reached the height of 18in. the main stalk is often nipped off to strengthen the branches. The harvesting is done by hand.

THE TEXTILE COLOURIST:

DEVOTED TO

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

Cleaning Jute, Hemp, and Ramie.

BEFORE bleaching, jute must always undergo a cleaning process. In dyeing jute that has been first cleaned and bleached, the delicate shades are more pronounced and of greater brilliancy. On account of its tenderness the cleaning of jute should be undertaken only with mildly working alkalies or with only low-percentage solutions of the stronger alkalies. The employment of a dilute bisulphite solution causes no weakening of the fibres. For the most part, jute consists of a combination of cellulose with lignine or a similar body, the so-called bastine. The combination of bastine with cellulose bears the name of "bastone." The latter is easily reduced by acids, but the jute shows, as may be understood from its behaviour towards sodium bisulphite above described, a certain resistance against the action of acid solutions. As jute is frequently dyed in an acid bath attention must be paid, in dyeing the same, to the fact that the fibres are particularly sensitive to mineral acids. The firmness of the jute already suffers in consequence of the action of dilute acids. For this reason only weak acids should be used in dyeing. Acetic acid proves to be the most adaptable, without causing any fear of weakening the fibres. Of the salts with stronger acids that may be used in the dyeing of jute may be mentioned aluminium sulphate or alum (potassium or sodium). Up to 5 per cent. alum may be added to the boiling bath. No damage will be done to the jute fibres through this addition. As a rule, however, an addition of 3·4 per cent. will be quite sufficient.

If jute be treated with 5 per cent. soda solution at ordinary temperament (15° C.) during a period of twelve hours, the fibres, after the action and while still moist, appear light yellow and have a fine gloss. Jute thus treated may, after washing and drying, be dyed with basic dyestuffs, fine and glossy. After the fibres, however, in consequence of longer action, have suffered a weakening, this process is not to be recommended. If a 5 per cent. soda solution be allowed to act on jute for only an hour at ordinary temperature (15° C.), the finer fibres particularly will be weakened. They may, without previous treatment with tannin, be immediately dyed with basic dyestuffs and take up the dyestuff, during dyeing, quickly and completely; but, on account of the decrease in firmness, this method is not to be recommended in practice. Chinese jute is more durable than East Indian. As boiling in soda solution is mostly recommended for the practical cleaning of jute previous to bleaching, tests have been made to exactly determine the behaviour of jute towards soda solutions of various concentrations, at ordinary and at boiling temperatures.

If jute be treated with 1·5 per cent. soda solution at ordinary temperature (15° C.) for several minutes and then be immediately taken out of the bath, washed and dried the fibres will be shown to have increased in firmness. The increase is not considerable, but nevertheless perceptible. If, instead of a 1·5 per cent. soda solution, a solution of 3 per cent. be employed, and the same process gone through as above, the fibres, taken all in all, show the same behaviour. By both methods the jute retains its gloss (in the case of the East India quality even a heightened gloss is perceptible); the fibres, after being treated, appear weak whitish yellow (not light yellow). If a 1·5 per cent. soda solution be allowed to act on jute during a period of twelve hours at ordinary temperature (15° C.), the fibres, after being taken out of the liquid, washed and dried, will be found to have assumed a light yellow colour and to have retained their gloss. There is no diminution in firmness by this process. If, instead of a 1·5 per cent. soda solution, a 3 per cent. be used, the fibres (treated exactly as above) appear, after being acted on, dyed light yellow and glossy. They suffer but inconsiderably as regards firmness. Jute fibres prepared by the foregoing methods may be dyed direct and durably. As is known, cotton may be mercerised not only with concentrated but also with the weaker alkaline solutions (cold or at ordinary temperature). Jute behaves likewise as a result of brief alkaline action.

If jute be treated warm with 5 per cent. sodium hydroxide solution (5 parts caustic soda to 100 parts distilled water) the fibres, after brief action (thirty minutes), will be changed in shade after drying and washing. The fibres will change from smutty white or weak yellowish to a distinct light-yellow shade. With regard to gloss the fibres do not suffer. They likewise retain their original firmness. After prolonged action (three to four hours) the jute is still more light yellowish. A weakening of the fibres, although in small degree, is perceptible. Individual fine fibres of East India jute appear to be badly attacked. The soda solution, in boiling with jute, is dyed light yellow. After standing a while the liquor gives off a flaky whitish sediment. If jute be boiled with rather strong soda solution for two to three hours, a considerable weakening will ensue. Thus, for example, East India jute, by being treated with a 15 per cent. soda solution (specific gravity 1·16) is very strongly attacked. It loses its gloss and can be easily shredded. Chinese jute, as a result of this treatment, likewise suffers in gloss and firmness, yet it appears somewhat more durable than the East India quality. If jute (fabric or yarn) is to be subsequently bleached, it is recommended that the same be first boiled off for two to three hours with a 4 per cent. solution of sodium hydroxide. A mercerisation of the fibres does not follow, as such action does not ensue upon the employment of hot lyes.

If jute be treated cold with a dilute solution of sodium bisulphite ($NaHSO_3$), satisfactory results will be achieved. If a mixture of a portion of a 20° Bé. strong solution of sodium bisulphite and 10 parts distilled water be allowed to act upon jute for twenty-four to thirty hours, the previously smutty white or weak yellowish dyed fibres of Chinese jute will, after washing and drying, appear almost pure white and as glossy as before. In the case of yellowish East India jute the fibres become much lighter and cleaner. They appear but very weakly dyed yellowish, and suffer nothing in respect to gloss. Both qualities retain their original firmness. Jute thus prepared (Chinese and East India qualities) may be dyed direct. Fast dyeings were obtained wherein the silky gloss of the jute was beautifully in evidence. For many dyeing purposes the foregoing cleaning processes are fully sufficient.

Manila hemp, treated with 5 per cent. soda lye, and boiled with the same for two to three hours, loses nothing in gloss after being washed and dried. The firmness of the fibres, also, is about the same. The fibres, after the operation, appear clearer and brighter, and in the case of the lighter kinds are almost white, or weak whitish yellow. During boiling, dyestuff is given off into the soda lye, the latter being thereby dyed light yellow. In boiling with 5 per cent. soda solution, Manila hemp changes but little after rather brief action. By longer boiling (three to four hours) the fibres, after being washed and dried, show a fine, light-yellow gloss. The resistance power of the fibres suffers nothing as a result of this treatment. Treated with 10 per cent. soda solution (in like manner), the fibres also appear, after brief action, dyed light yellow and glossy. As to firmness, they suffer nothing. By longer action the fibres become more pale yellowish, although their resistance (especially that of the finer kinds) is somewhat diminished. The foregoing tests show that the fibres of Manila hemp may be properly cleaned by about three hours' boiling with a 4 to 5 per cent. soda lye, or by four hours' (not too strong) boiling with a 5 per cent. soda solution.

If it be desired to combine with the cleaning a bleaching that will suffice as a preparation for dyeing, a solution of sodium bisulphite will serve. Manila hemp, when put through a twelve-hour treatment with sodium bisulphite solution, with the exception of where the fibres are held, which places remain brown, comes out nicely white. The fibres, after the operation, which is followed by carefully washing and drying, come out as glossy and firm as they originally were. They may be dyed with basic dyestuffs, although dilute tannin mordant makes the shade more lasting. The foregoing process is especially adapted for the finer kinds of Manila hemp, the glossy fibres of which are frequently used as weft in silk and cotton stuffs for furniture.

By the action of dilute mineral acids, Manila hemp fibres are weakened. They are distinguished, with regard to their constitution, very little, in the main, from jute fibres; for Manila hemp contains about 64·7 per cent. cellulose; light jute, 64·2 per cent. The quantity of the incrustating substances in the case of Manila hemp reaches about 22 per cent., while in the case of jute it is about 24 per cent. (including bastine). The behaviour of Manila hemp against chemical agents is therefore similar to that of jute. Jute fibres and Manila hemp fibres have a great hygroscopic power—that is, they absorb much water: the former up to 23·3 per cent., the latter up to 40 per cent.

Ramie comes upon the market in the form of fine, white, cotton-like fibres. They may be cleaned by soap solution with addition of a little pure potash. Ramie fibres contain up to 78 per cent. pure cellulose, whereas lignine (wood substance) is not present. For direct dyeing, substantive cotton dyestuffs may be used.

Cocoa fibre (coir) has mostly a brownish-red colour. If cocoanut fibre be treated with 5 per cent. soda lye in such a way that, after the lye is poured over it, it is boiled from two to three hours with the lye, the fibres appear dyed more light brownish and yellow, and are partly decolourised with weak yellowish shade. The boiling liquor, during this treatment, is dyed yellowish to weak yellowish green. Therefore colouring substances must have been given off. The firmness of the cocoa fibre, in consequence of the brief action of 5 per cent. soda lye, is not damaged. If, however, the cocoa fibre be subjected to prolonged boiling heat with 5 per cent. soda lye, the finer portions of the fibre are somewhat attacked. In the boiling of coir with 5 to 10 per cent. soda solution (two to three hours) the boiling liquor is dyed a dull yellow. There is also precipitated from the same (after pouring off and after standing a while) a flaky precipitate. For the rest, the fibres, after this treatment, behave in the same way as after the action of soda lye. Water-glass mixture may also be used in cleaning cocoa fibres. After the washing and drying, however, there is always more or less silicious earth adhering to the fibres, wherefore this method would appear less worthy of commendation. If the cocoanut fibres be treated cold, or at ordinary temperature (15° C.), for twelve hours with a mixture of one part 20° Bé. solution of sodium bisulphite ($NaHSO_3$) and ten parts rain water, the same will show, after being well washed and dried, a light yellow coloration. After eighteen hours' action the fibres appear quite light yellow. The sodium bisulphite solution may also be reduced with a few drops of hydrochloric acid, in order to heighten the action of the same.

However, satisfactory results may be obtained without this addition for ordinary purposes. In respect to the resistance power, the fibres suffer no marked damage in consequence of the foregoing process. A somewhat larger addition of hydrochloric acid would have a weakening effect. Cocoanut fibres prepared as above described may be dyed with basic dyestuff (preferably upon weak tannin mordant) into lasting shades. They are also frequently dyed, however, with acid dyestuffs, in connection with which alum and acetic acid are used, under conditions as before described in the case of jute.

Mexican fibre is dyed somewhat yellowish by boiling with 5 per cent. soda lye. A weakening of the fibres does not occur. By the use of stronger lyes the fibres are dyed dark yellow and suffer considerably with respect to firmness. The fibres behave similarly as towards soda lye when boiled with 5 to 10 per cent. soda solution. After the action of the above-mentioned fluids, the fibres are cleaned, but the yellowish coloration thereby acquired acts detrimentally upon the subsequent dyeing. If Mexican fibre be treated with sodium bisulphite mixture, which is prepared in the same manner as described in the case of cocoa fibre, an almost pure white fibre is obtained. It suffices to put the fibre in a sodium bisulphite bath for twelve hours at ordinary temperature. After being taken out of the bath the fibres are well washed and dried. They do not suffer any damage by this process, and may be dyed with basic dyestuffs, either direct, or, preferably, upon a tannin mordant. In cleaning as well as bleaching Mexican fibre the brown ends of fibre are removed, as they also appear brownish after the action of the bisulphite. Even by the addition of a little hydrochloric acid to the bisulphite bath this brownish coloration cannot be removed. — "Dyers' Trade Journal."

New Dyeing Materials.

NOTES ON THE PATTERNS ILLUSTRATED.

PATTERNS Nos. 1, 2, and 3 are cotton twill cloths dyed with 3, 4, and 6 per cent. respectively of Immedial Sky Blue (Cassella). The goods are dyed in a standing bath with the addition of 3 per cent. sodium sulphide, 1 per cent. soda ash, ½ per cent. Turkey-red oil, and 5 per cent. common salt, for light shades, or 6 per cent. sodium sulphide, 1 per cent. soda ash, 1 per cent. Turkey-red oil, and 10 per cent. common salt, for dark shades. The sodium sulphide necessary for dyeing is first dissolved in about ten times as large a quantity of boiling water, and half the quantity of soda requisite for dyeing is added. The Immedial Sky Blue paste is well stirred together with this liquor in a wooden vessel and brought into solution by the addition of hot water. The dissolving may be accelerated by a short boiling up of the solution; continuous boiling is not required, complete solution setting in within a very short time. Dyeing takes place at from 120 to 140° F., and from 4 to 8 ends are given according to the quantity of goods being dyed. The dyeing operation should not last longer than from three-quarters to one hour, and then the goods are well pressed through squeezing rollers, cuttled, and then after-treated with bichromate of potash and sulphate of copper as follows :—For light shades : 1 per cent. bichromate of potash, 1 per cent. sulphate of copper, and 3 per cent. acetic acid. For dark shades : 1½ per cent. bichromate of potash, 1½ per cent. sulphate of copper, and 3 per cent. acetic acid. This after-treatment should be carried out at about 175° F. for twenty minutes, when the goods are rinsed.

Patterns Nos. 4, 5, and 6 are cotton sateens dyed with ½ per cent. of Diamine Heliotrope G, O, and B respectively (Cassella), with the addition of 1 per cent. soda and 10 per cent. Glauber's salt.

Patterns Nos. 7 and 8 are cotton yarns dyed with 1 per cent. and 3 per cent. respectively of Diamine Fast Yellow F F (Cassella), the former with the addition of 1 per cent. soda and 10 per cent. Glauber's salt, and the latter with 2 per cent soda and 20 per cent. Glauber's salt.

Pattern No. 9 is a plain wool fabric dyed with Fast Light Yellow 3 G (Bayer), 20 per cent. Glauber's salt crystals, and 5 per cent. sulphuric acid, the whole being worked for one hour at the boil.

Pattern No. 10 is a bleached wool cloth printed with 3 per cent. Fast Light Yellow 3 G (Bayer), 30 per cent. British gum, 57 per cent. water, and 10 per cent. acetic acid 9° Tw. The cloth is steamed for one hour without pressure, and then washed.

Pattern No. 11 is cotton yarn dyed with 10 per cent. Katigen Yellow Brown G G (Bayer), 4 per cent. sulphide of soda crystals (2 per cent. concentrated), 5 per cent. soda ash, and 15 per cent. Glauber's salt crystals. The yarn is worked for one hour at the boil.

Pattern No. 12 is worsted yarn dyed with 12 per cent. Alizarin Cyanine N D extra paste (Bayer), 2½ per cent. tartar, 3 per cent. bichromate of potash, and 3 per cent. acetic acid.

Lustring Woollen Goods.

THERE is a great difference in lustre between the different kinds of natural wool, and the finisher is often called to produce a high degree of lustre on wool which is naturally inferior in this respect. The differences are difficult to equalise, and an experienced hand can generally tell whether the lustre is natural or acquired. In general, fine Silesian and Saxony wools, and wools from Sydney and Port Philip, have a better lustre, and hence are more suitable for lustred goods, than South American and other wools, especially wether wool. The latter wool is the most troublesome of all for the finisher, on account of its obstinate character. We often hear a buyer, says a writer in the "Wollengewerbe," after examining a piece of cloth, say, "The material is not so bad, and the finishing has been carefully done, but it is a pity there is some wether wool in it. However much the wool is carded, shorn, brushed, and hot-pressed, the hair will stick up again sooner or later, and spoil the effect of the finishing." As the effect depends upon the hairs lying flat and parallel, as well as upon the individual lustre of the separate fibres, hairs sticking up in any quantity quite spoil the general appearance of the fabric. The only remedy is thorough soaking in water and leaving the wet goods folded up for a long time, and finally carefully brushing, drying, and hot-pressing. All these operations also increase the natural lustre of the fibre.

The first thing is cleanliness and the absolute freedom of the wool from all grease and residues of alkali and colouring matter. These foreign bodies, especially any excess of alkali remaining in the wool after scouring, make the hair stiff and hard, incapable of lying down properly, and also diminish the lustre of the fibres singly. Any soap or alkali in the wool is best removed with fuller's-earth. It is important that the soaking, which comes next, should be thorough and prolonged. During the roughing to separate the hairs, so that the subsequent brushing may lay them down in parallel ranks, the wool must be kept wet. The carding helps the lustre of the fibres and gives them a preliminary parallel arrangement side by side. The carding is begun with old blunt cards, and the wool must not be quite so wet for them as it must be later when sharper cards are used. This graduating of the wetness of the wool during the successive carding operations conduces to that production of a close surface layer which is so important for the lustre. To fix the lie of the hair and the lustre, wet hot pressing is resorted to, preceded by a steeping in boiling water to remove all dirt which may have got in during the carding operation, and also to remove dirt which the previous cleaning operations, carried out while the fibre was still matted together, were unable to reach. The hot wet pressing over, the goods are carefully brushed, and should then be perfectly clean and show as good a lustre as the nature of the material will permit of.

Decatising is, on the whole, the best method of lustring. The goods, first well brushed while wet, are treated on a hollow perforated roller alternately with steam and hot and cold water, these being admitted to the inside of the roller and passing out through the fabric; the goods are well covered up on the roller during the process. The steaming lasts from four to five minutes after the steam begins to appear outside, and the lustre is then fixed by forcing cold water into the roller until it appears on the outside of the coverings. If necessary, the whole series of operations can be repeated. The great precaution to be observed is not to use the steam too hot—*i.e.*, at too high a pressure. From 15 to 22lb. pressure should never be exceeded. Again, its action must not be too prolonged, or the fabric will become less durable. The roller slowly rotates during the whole of the operations. There are machines in which hot water is used in decatising, as well as cold water and steam. They are usually provided with an injector, by means of which water can be forced in at any desired temperature. An improved machine of this type has two separate chambers, each containing a decatising roller. Hence, when one is in action goods can be put into the other. The water is received after passing through the fabric and forced back again until the process is over. Experience has shown that the effect is improved by using the same water again and again, as it is constantly getting softer by the action of the steam upon it.

The decatising finished, the pieces are brushed and either lapped on rollers or left folded up for from 24 to 36 hours before being dried. In the latter case they are reversed the while several times—*i.e.*, the top of the pile is made the bottom, so as to distribute the moisture evenly. If put on rollers, these must be horizontal, and must be turned occasionally, with the same object. At first the rollers must be turned rather often, for if the upper part is allowed to get too dry the water will no longer spread uniformly. With regard to the subsequent drying, it must be noted that the harder the stuff is to lustre the sharper it must be dried—*i.e.*, the higher the drying temperature must be. The handle certainly becomes a little stiffer, but keeps its lustre much better.

The final pressing is preceded by shearing, but the usual brushing with steam is best omitted, as it partly removes the lustre. The shearing must not be done too closely, or the lustre will suffer. The pressing is done with hydraulic presses to get the pressure necessary for an intense and durable lustre. The pieces must go into the presses neither too dry nor yet while still warm, if the lustre is to be satisfactory. If necessary the pieces, after drying, must be allowed to absorb moisture from the air in a cool place, or, if there is no time for this, they must be sprinkled with water. The press-plates must be well heated, which is best done by electricity.

The pressed pieces must be decatised at once or they will lose part of their lustre. They are rolled as lightly as possible on the hollow rollers, and the steaming, at a pressure of from 22 to 28lb., may last from one to one and a half or even two hours. The goods must not be removed from the rollers till quite cold, and are then rinsed for at least an hour with clean water, to restore the soft handle. It is a mistake to suppose that the durability of the lustre is enhanced by shortening the rinsing period. The only result of doing so is a stiff feel and an inferior lustre. The goods are next left folded wet for a day or two and dried. The shrinking may be done on sharp rollers under sharp pressure or in a special machine, which leaves the goods softer than if shrunk on the rollers. The soft feel, however, is restored by the final cold pressing, which is indispensable in any case.

Bleaching Vegetable Fibres.

BY E. TASSEL.

(Concluded from page 390.)

DECOLOURISING THE EXTRANEOUS SUBSTANCES.—We shall now consider the manner in which the various colouring matters of flax become oxidised and decolourised. It has already been mentioned that the goods still contain, after the alkali treatment, a certain amount of nearly all the colouring matters with which they were contaminated originally, this amount depending on the degree to which the treatment was pursued. Consequently the action of chlorine on these various substances has now to be studied ; and this matter is one that has been investigated personally by the author.

Action of Chlorine on the Pectic Principles.—The reagent employed was a pure sodium-carbonate lye that had been used for lye-boiling goods in the Mather kier. This operation had been performed on fabrics previously submitted to energetic treatment with caustic soda, and there was every reason to believe that this lye contained merely pectates, and was free from fats, resins, adipo-celluloses, etc. On treating this liquor with a small quantity of calcium hypochlorite it became partly decolourised and deposited an abundant precipitate, containing :—

1. A large quantity of lime in the form of carbonate.
2. Calcium pectate in very small amount. On adding a certain quantity of hypochlorite to the filtered liquor, the latter clarifies, in furnishing a further precipitate.

It should be observed that the hypochlorite is immediately decomposed, and that until the decolouration of the liquid is complete no trace of free chlorine can be detected by the iodide-of-starch test. A large quantity of hypochlorite is required to effect total decolouration, and as soon as this is accomplished the potassium-iodide test-paper will give the blue colouration.

This experiment shows why a white bleach cannot be produced without the alkali treatment ; the amount of bleaching powder necessary to effect this object being so great as to corrode the fabric before it becomes thoroughly bleached. To ascertain what becomes of the pectic acid it was considered advisable to trace the source of the small quantity of calcium pectate thrown down by the hypochlorite. With this object a small quantity of the non-decolourised liquor was tested with potassium chloride, which gave a decided precipitate of calcium pectate. Since this precipitate does not occur subsequent to decolouration, it is certain that the small quantity of pectate thrown down is due to the presence of calcium chloride in the hypochlorite, or resulting from the decomposition of the latter. Consequently the modified (oxidised) pectic acid still remains in the liquor. It should also be remarked that so long as the liquid remains coloured it gives a precipitate with hydrochloric acid and with calcium chloride—a certain proof of the presence of pectic acid ; and that this precipitation ceases when decolouration is complete.

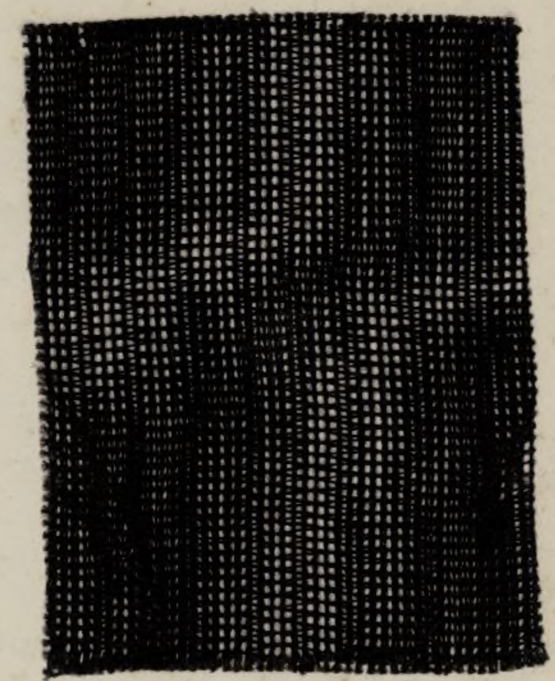
The perfectly-decolourised liquid is filtered and slowly evaporated on the water bath (one litre evaporates in three hours). The vapours liberated during this operation have an odour of chlorine, and at the same time the liquid turns yellow, the colour being quite brown by the time the odour has disappeared. On continuing the evaporation, a pasty brown mass is obtained. The author repeated this experiment several times, employing only just as much hypochlorite as was necessary to produce decolouration ; the results were constant throughout. The results of decolouration seem to controvert the theory of Kolb, who alleges the complete transformation of the reacting hypochlorite into calcium chloride. This the author could not decide, owing to the difficulty of employing merely so much of the hypochlorite as is necessary to effect the decolouration.

To reconcile this experience with the Kolb theory, it would have to be admitted that calcium chloride is capable of reacting on the peroxidised pectate in the warm, in liberating chlorine and furnishing a coloured compound. This is possible ; nevertheless, to make positively sure, it would be necessary to determine, by quantitative analysis, how much calcium chloride is left in the liquor after having previously estimated the weight of chlorine gas in the hypochlorite taken. On taking up with water the brown mass left on evaporation, the latter partly dissolves and furnishes a highly-coloured brown liquid. The insoluble portion, on being analysed, is found to consist entirely of calcium carbonate. As for the liquor, this contains, in addition to the organic matter, a very large quantity of sodium chloride and calcium chloride. In view of the difficulty of recovering the colouring matter free from extraneous organic products, its investigation was postponed, except that by a qualitative examination (with hydrochloric acid and sub-acetate of lead) the liquor was proved to be free from pectates and meta-pectates. On treating

PATTERN SHEET No. 112.

Samples of Cotton Cloths.

PATTERN No. 207.



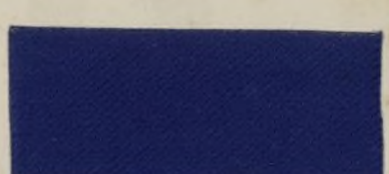
PATTERN No. 208.

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. 113.

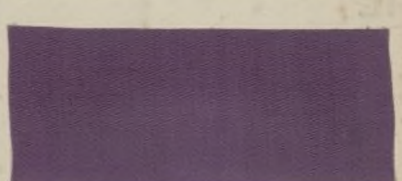
Illustrating New Dyeing Materials.

No. 1.



No. 2.

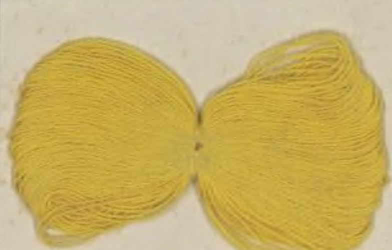
No. 3.



No. 4.

No. 5.

No. 6.



No. 7.

No. 8.

No. 9.

No. 10.

No. 11.

No.

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

this brown liquor anew with hypochlorites, complete decolouration was produced; but the operation was a very slow one. On evaporating the resulting liquor, vapours charged with chlorine were evolved, but no trace of colouration could be detected. On continuing the evaporation, an almost perfectly white mass, containing very large quantities of calcium chloride, was obtained.

Since the reactions occurring in the alkaline liquor containing the pectic principles are the same, chemically, as those going on in the fabrics charged with the same principles, one is able to deduce from this experiment what happens in the bleaching process when hypochlorite is allowed to react on the fibre. In the first place, it is seen that decolouration proceeds slowly, which is explained by the necessity of dissolving a large part of the colouring matter. Secondly, one sees how and why the fabric so quickly turns yellow during the lye-boiling after the first chemicking bath, highly soluble colouring compounds being produced. And finally an explanation is afforded of the necessity for alternating the lye-boiling and chemicking processes.

Action of Chlorine on the Other Colouring Matters and Hypochlorites.—In order to study the action of chlorine on colouring matters other than the pectic principles, the liquors from the first lye-boiling process are tested with the aid of caustic soda. These liquors naturally contain, in addition to the pectic principles, a portion of all the substances which it is the task of the bleaching process to modify. When a sample of these lyes is treated with calcium hypochlorite it will be at once evident that the decolouration is never complete, despite a large excess of free chlorine. The conclusion to be drawn from this is that caustic soda dissolves certain colouring matters which sodium carbonate is unable to remove unaided; hence the need for employing the caustic alkali. On filtration there is obtained, as in the case of sodium carbonate, a precipitate formed of lime, calcium carbonate, and a little calcium pectate derived from calcium chloride. Despite the large excess of hypochlorite taken, the filtered liquor is still slightly coloured.

On evaporating over the water bath, vapours laden with chlorine are evolved, but, contrary to the experience in the previous case, no increase occurs in the colouration of the liquor. When the smell of chlorine disappears it is succeeded by an odour of oil of mirbane (bitter almonds), such as is not met with in treating the sodium-carbonate lye with hypochlorites. Since the caustic-soda lye necessarily contains all the dissolved products present in the sodium-carbonate lye, it is impossible to attribute the colouration occurring exclusively in the former case to products non-existent in the carbonate liquor. One is therefore compelled to admit that caustic soda, when brought into contact with pectic bodies and oxidising agents, forms colourless compounds of greater stability than those produced in the case of sodium carbonate.

So far as the odour of bitter almonds is concerned, this proves the previous contention that caustic soda dissolves certain resinous or fatty bodies (adipocelluloses) on which sodium carbonate has no action. It is probably due to these substances that the liquor is not completely decolourised by hypochlorite; hence the necessity for thoroughly dissolving them before putting the fabric through the chlorine process. These substances, peroxidised by the chlorine, furnish the odour of bitter almonds. In addition, it should be remarked that the odour is not so pronounced unless an excess of hypochlorite has been employed. The result of evaporating the liquid to dryness is again a yellowish mass, which carbonises at a red heat. The author would direct attention to the fact that if chlorine be allowed to act on fabrics which have been treated only with sodium carbonate, or merely imperfectly treated with caustic soda, the adipocelluloses just mentioned are oxidised in such a manner as to be rendered almost insoluble: they are fixed on the fabric. From this peculiarity arises the necessity of not allowing the chlorine to come into action before a certain moment, which depends both on the nature of the fabric and the degree of whiteness to be attained.

The proportion of adipocelluloses being far greater in flax of Russian origin, the defects produced by hasty oxidation are more readily apparent in fabrics from this flax than any other. The marbling frequently observed, even in highly-bleached goods, is due to this cause entirely.

In this connection it has already been said that the oxidation produced by grass-bleaching is identical with that effected by the aid of hypochlorites; the reactions are the same as those produced by atmospheric oxidising agents—with less intensity, it is true, but with far more certainty, since in such case the action of chlorine gas and basic substances has not to be taken into account. It should be added that even in grassing premature oxidation is injurious, and that there also the fixation of a certain quantity of adipocelluloses occurs. Hence the goods should not be grassed until they have been almost entirely freed from adipocelluloses—*i.e.*, until after the third or fourth lye-boiling.

Choice of Bleaching Agents.—In order to clearly indicate the grounds on which a selection should be made from among the various decolourants offered by commerce to the bleacher, it is necessary to revert to the action exerted by powerful bases on cellulose in presence of oxidising agents. According to Witz, cellulose is very rapidly attacked by strong bases, and especially by lime, when accompanied by an oxidising agent, oxycellulose and glycocellulose being produced, the latter soluble in an excess of alkali, particularly when warmed, a pale yellow colouration being developed.

Since oxycellulose possesses the faculty of attracting dyestuffs, and especially methylene blue, it is easy, by dyeing a fabric with methylene blue, to ascertain whether certain parts have suffered alteration—*i.e.*, transformation into oxycellulose. This property of modified fabrics for absorbing the above dyestuff is by no means characteristic of an alteration produced by chlorine, but is the result of the presence of oxycellulose, however this body may have been formed. The point should be emphasised, because the author's experience goes to show that a number of absurd errors are committed on this subject. For example, a *soi-disant* expert in the North of France recently cited the Witz reaction in support of a contention that a fabric had been altered by the action of chlorine, forgetting entirely that oxycellulose is formed in nearly all the changes produced in the bleaching process (fermentation, etc.), and that to be certain an alteration has been caused by chlorine it is necessary to confirm the presence of glycocellulose (a substance easily recognised by its solubility in alkalies), which is also formed under other conditions of alteration, but dissolves in the excess of alkali in the warm.

This being remembered, it will be readily understood that the best decolourant will be a liquid free from all traces of base, or, at least, absolutely neutral.

The following decolourising agents are met with in commerce:—Chlorine (chlorine water), hypochlorous acid, hydrogen peroxide, calcium hypochlorite (bleaching powder), sodium hypochlorite (neutral or more or less alkaline), chlorozone or peroxidised sodium hypochlorite, potassium hypochlorite, hypochlorites of alumina, magnesia, baryta, and zinc.

1. *Chlorine Water.*—On steeping bowked yarn in chlorine water it is gradually decolourised, but the cellulose undergoes dissociation when the bath attains a strength sufficient to produce rapid bleaching. The active principle in chlorine water is not the chlorine, but the oxygen resulting from the decomposition of the water by the chlorine. This decomposition being very gradual, the yarn remains a very long time in contact with the chlorine, consequently the attack is both rapid and violent. When chlorine water attains a strength of 5 chlorometric degrees it attacks cellulose and is unsuitable for use.

2. *Hypochlorous Acid.*—A practical method of preparing hypochlorous acid consists in saturating a solution of bleaching powder with chlorine gas. It decolourises tissues very rapidly, and, given equal strength of reagent and duration of exposure, the resulting white is far more handsome than that from chlorine water. The strength of the fabric is scarcely impaired, and there is no alteration to speak of unless the goods are left a long time in a concentrated bath. It is easy to comprehend why hypochlorous acid should be less injurious than chlorine water; since, given an equal strength of solution in both cases, the fabric in the hypochlorous-acid liquor is exposed to only one-third as much chlorine as in the other case. Furthermore, in chlorine water, the fibre, as we have seen, remains in contact with the chlorine for a long time, whereas hypochlorous acid undergoes rapid decomposition, and furnishes hydrochloric acid too low in strength to attack the fibre.

3. *Bleaching Powder.*—We know that this body bleaches by liberating oxygen, and that it furnishes calcium chloride; hence if it be pure and neutral there will be no trace of either chlorine or free base, and the conditions would be ideal for safe bleaching. This would be the case if it were possible to prepare a solid bleaching powder free from excess of lime; unfortunately, experience has shown that such a product would be unstable, and one is therefore obliged to prepare, under the name "chloride of lime," a somewhat complex mixture containing a portion of uncombined lime. When treated with water, this lime dissolves, so that dissolved bleaching powder contains a little lime in solution—a circumstance not without danger to the fibre, since, being in presence of an oxidant, the conditions are favourable to the production of oxycellulose. In fact, Cross and Bevan ("Cellulose") assert that in liquid chloride of lime this free lime is in a special state of oxidation which increases its activity. Under these circumstances, bleaching powder should be employed with extreme care and in very dilute solution. For example, an 0·6° bath allowed to act for twelve hours at 20° C. will have no action on the fibre, but when the concentration reaches 3° the exposure should not exceed three hours.

4. *Hydrogen Peroxide.*—When in a highly concentrated form hydrogen peroxide rapidly attacks cellulose; and for the strength of the fibre to be retained unimpaired the reagent solution must be reduced to 50 per cent. By reducing it still further, liquors quite suitable for use and giving good results are obtained; but the price of the reagent precludes its extensive employment.

5. *Sodium Hypochlorite.* — This substance is formed when bleaching powder is treated either with sodium carbonate or sulphate, or even with caustic soda. The remarks made on bleaching powder generally apply to this substance as well, though the latter possesses the great advantage of being preparable on the spot at the time of use, and can therefore be obtained in an almost neutral state—*i.e.*, in the most favourable condition for ensuring good results.

Moreover, in this case there is no risk of the free soda becoming peroxidised in the reaction, and therefore the dangers arising from the presence of the free base are considerably diminished. It follows, therefore, that the employment of sodium hypochlorite can always be recommended when the articles to be treated are of a costly character, and therefore bring more to the bleacher. On the subject of hypochlorites it is interesting to note that their bleaching power is considerably retarded by the presence of a free base; and the reason why the lime salt is a quicker bleaching agent than the sodium salt is just because in the former case the low solubility of lime precludes the presence of more than a small quantity of this base in the liquor, whereas in the sodium hypochlorite a practically illimitable amount of free alkaline may be present.

6. *Chlorozone.*—This product, which was invented by Brochoki, is a sodium hypochlorite prepared by saturating a solution of caustic soda with a current of ethereal gas peroxidised in a special manner. It is probably a hypochlorite more or less charged with chlorine peroxide and certain oxide bases (Wills). It gives chemical reactions identical with those of sodium hypochlorite, and is as easy to use, but is too dear to enjoy extensive employment.

7. *Potassium Hypochlorite.*—The properties of this compound are analogous to those of sodium hypochlorite. *Magnesium Hypochlorite* is too unstable to be fit for use. *Zinc Hypochlorite* attacks the fibre.

8. *Decolouration by Electrolysis.*—For some years past it has been proposed to employ an electrolytic solution resulting from the decomposition of a solution of magnesium chloride and sodium chloride. The principle is as follows:—Magnesium chloride is decomposed in a suitable electrolyser, along with the water in which it is dissolved. The chlorine liberated by the chloride, and the oxygen furnished by the water, unite under the influence of the current at the positive pole, and thus form a compound which, though unstable, is of high decolourising power. The magnesium seeks the negative pole, decomposes water, and becomes magnesia; the hydrogen escapes. When textile materials are placed in this liquid, the oxygen of the chlorine compound is liberated, and oxidises the colouring matter of the fibre. The chlorine unites with the liberated hydrogen, forming hydrochloric acid, which in turn converts the magnesia into magnesium chloride, which is then ready to be acted upon anew by the current.

This perfectly neutral solution does not attack cellulose, the only free base being magnesia, which has no action on the fibre. As for the chlorine, this is only produced a little at a time, and is immediately converted into hydrochloric acid, so that it has no time to react. Finally, the oxygen is itself only produced in very small amount, and is immediately absorbed.

From the theoretical point of view, therefore, the electrolytic method seems to be thoroughly rational and scientifically perfect, but in practice the expansion of the process has been restricted by the high price of magnesium chloride. In fact, for the method to be practical the solution would have to be used over and over again; but the chemicked linen goods acquire dirt and other impurities from their sojourn on the grass, and thus quickly render the electrolytic liquid unsuitable for further employment.

To sum up the different methods, bleaching powder is the best for coarse fabrics, whilst finer goods should be treated with sodium hypochlorite or chlorozone. As for the electrolytic solution, this is capable of doing good service in the bleaching of fabrics, but only at the end of the process—*i.e.*, when the bath liquor is in no danger of being soiled by the fabric, and can therefore be used repeatedly.

Action of the Sun on Chlorine Baths.—The action of heat (65 to 85° C.) so modifies bleaching powder that goods entered in the bleaching bath at these temperatures will be inevitably corroded. The reaction is highly complex; nevertheless, it is certain that the injurious action of the solution must be ascribed to a disengagement of chlorine gas. Hypochlorite baths are rapidly changed by insolation into chlorites, recognisable by the yellow colour ensuing on the addition of weak acids. The insolated bath is endowed with a very energetic power of decolouration: it will bleach indigo even in presence of arsenious acid, but it also actively corrodes cellulose. Hence the chemicking baths should be protected from the rays of the sun.

Acid Baths After Chemicking.—After the goods have remained for a longer or shorter period in the chemicking bath they are washed and then soured. The object of washing is not merely to free the fibre from the excess of chlorine, but also to remove all impurities and to dissolve the products transformed by the chlorine. Notwithstanding the greatly improved types of washing machines now available, the operation is never perfect, and hence the goods require souring in an acid bath. To facilitate the selection of the best acid for this purpose, let us examine the action of the various acids on bleaching powder. Before the time of Kolb it was believed that bleaching powder gave off chlorine when treated with acids, and that one equivalent of acid liberated hypochlorous acid $CaOClO + SO_4H = ClO + CaOSO_3 + H_2O$, which in turn reacted on the calcium chloride present and converted it into lime, which was then acted upon by a second equivalent of sulphuric acid $ClO + CaCl + H_2SO_4 = CaOSO_3 + Cl_3 + H_2O$. Kolb, however, proved that hypochlorous acid has no action on calcium chloride, and that consequently the foregoing deductions were inaccurate. As a matter of fact, the liberation of chlorine does not always occur, hypochlorous acid being frequently the product disengaged.

Carbonic acid, for example, acts in accordance with the equation $CaOClO + CaCl + 2CO_2 = CO_2 + CaOCO_2 + ClO + CaCl$; and therefore liberates hypochlorous acid instead of chlorine. This reaction is one of great importance, and explains the now almost universal practice of alternately submerging and lifting the goods from one kier to another, instead of leaving them covered up in the bath liquor throughout. In this treatment the atmospheric carbonic acid, reacting on the hypochlorite impregnating the fabric, disengages hypochlorous acid, which bleaches without attacking the cellulose as chlorine would have done.

Very dilute sulphuric acid also liberates hypochlorous acid; but, on the other hand, hydrochloric acid furnishes chlorine, by reacting on the hypochlorous acid $ClO + 2HCl = 3Cl + H_2O$; and all readily oxidisable acids also liberate chlorine.

Remembering what has already been stated about the action of chlorine on cellulose, whereas it is left untouched by hypochlorous acid, it becomes easy to select the acid to be used for souring after the chemicking baths, and the choice will fall on sulphuric acid alone. This acid will react on all traces of undecomposed hypochlorite, liberating hypochlorous acid, and thus completing the bleaching process, whilst at the same time hindering the secondary reactions which might subsequently result in the corrosion of the cellulose. It also assists in dissolving the substances modified by chlorine, and finally itself attacks the colouring matter, though only to a slight extent. It is always noticeable that fabrics on issuing from the chemicking process, even though thoroughly washed, never have the same taking appearance as they do after souring. The goods may be soured by immersion in wooden kiers or by passage through a roller washer.

Oxalic acid, although liberating chlorine from hypochlorites, is still employed for bleaching partly-dyed goods which would be discharged by sulphuric acid. By employing very weak liquids, accidents may be prevented. Oxalic acid is also of great assistance to the bleacher for brightening the colour of goods that have become soiled during grassing, or spotted with rust. When the water supply of the bleaching works is highly ferruginous, a final bath of weak oxalic acid is indispensable, the goods being immersed for 20 to 30 minutes.

Washing After Souring.—Thorough washing after scouring is a *sine quâ non*, no matter whether the goods are to be dried or whether they have to pass through a further course of treatment. It has already been shown that concentrated acids attack cellulose, so that in the course of drying the resulting concentration of the acid might burn the fibre. Similar accidents, always at the expense of the strength of the fibre, may arise in the subsequent operations if the goods are left in the air or are entered into very hot baths before their contained acid has been properly removed.

Alkali Treatment After Chemicking.—The experiments cited above show the utility of following the chemicking with alkali treatments until the impurities have been completely eliminated from the fibre. It follows, therefore, that the whole process of bleaching may be divided into three or four series of lye-boilings, separated by grassings, the final operation being invariably a chemicking bath. The lye-boilings after grassing produce just the same effect as the corresponding operation after chemicking. Unfortunately it has been shown in practice that after chemicking the fibre is more readily attacked by alkalies than before; hence the necessity for employing none but absolutely mild alkalies subsequent to chemicking. This is easily explained. It is known that the action of chlorine on cellulose furnishes two compounds: one, oxycellulose, is completely insoluble; the other, glycocellulose, on the contrary, dissolves readily in alkalies and colours them pale yellow. Now, however weak the chemicking baths may be, the cellulose is always attacked to some extent, though perhaps feebly. That such is the case may be shown by dyeing two samples of the same fabric with methylene blue, one before and the other after chemicking.

At the first the corrosion of the cellulose may go unperceived, but it will become apparent when the glycocellulose has been dissolved by the lye. Consequently, neutral, or only slightly caustic, sodium carbonate alone should be employed for the alkali treatments after chemicking. The operation is performed in open becks of sheet iron or wood.

Soaping.—Between the various lye boilings and grassings, the goods are soaped, the object of this operation when the goods are already white, being not—as before chemicking—to assist in dissolving the colouring matters and saponifying the oxides, but to remove the dirt, etc., acquired during grassing, and to open the yarn so as to facilitate the absorption of chemicals. etc. Finally, soaping introduces into the fibre a certain quantity of the fatty acids of the soap, and thus helps to restore to the flax the suppleness it originally derived from contained adipocelluloses. The appliances used for soaping are numerous and well known, and need therefore be little more than mentioned. Irish bleachers use rubbing boards, the soaped goods being passed between two fluted surfaces, receiving a reciprocating motion. In fact, this machine plays the part of hand rubbing in ordinary domestic washing. It is, however, slow in action, and stretches the goods.

Very light fabrics are soaped in a milling machine, where they are beaten by four plungers actuated by cams, thus thoroughly impregnating them with the soap. The machine most in favour is a simple roller washer, the two ends of each piece being fastened together so as to form an endless band. As the fabric enters the soapy liquor at the bottom it becomes impregnated with soap, which is then pressed out again by the rollers. Attempts have been made to improve this machine by adding brushes to force the soap more completely into the fabric; but this has been abandoned, the friction of the brushes raising a nap on the surface of the goods.

Soaping Goods to be Grassed.—Some bleachers are in the habit of impregnating the fabric with a solution of soap and caustic soda before grassing, the result being to accelerate oxidation and bleaching, without harming the fibre in any way.

The reactions thus occurring are the more curious when it is remembered that a fabric impregnated with caustic soda is usually corroded entirely if left exposed to the air. What really happens it is difficult to say. *A priori*, it may be admitted that the soap forms a kind of varnish on the cellulose, preventing the access of air, and therefore rendering innocuous the action of the caustic soda. It may also be supposed that the soap plays the part of a fatty acid, and forms with the cellulose an ether on which caustic soda is powerless to act. However that may be, the fact is beyond dispute that goods impregnated with caustic soda and soap can be grassed without danger.

All the operations comprising the bleaching of flax have now been reviewed. The reader will readily understand that the number of operations necessary to bleach a fabric, their variety, their duration, the care they entail, the knowledge that must be displayed in selecting the kind and order of the treatments given, all combine to render bleaching one of the most difficult industries in existence, and one wherein no man should hold himself to be a master, but rather be always ready to learn.

EXPERIMENTS have been conducted in the laboratory of Trinity College, Hartford, Conn., in electrolytic bleaching. The fabric to be bleached was saturated with a solution of sodium chloride containing free hydrochloric acid, and placed between two carbon electrodes carrying a weak current at an electromotive force of two volts. The bleaching effect at the anode is credited to the nascent oxygen, produced by the secondary chemical reaction between the liberated chlorine and the water. The best results are obtained with a very small current-intensity, and an electromotive force below 1·67 volts.

Anilines Soluble in Oils.

THE number of colouring matters soluble in oil is very small in comparison with the great range of compounds suitable for other purposes. In recent years the number has increased greatly, but the newer numbers of the class have hardly been developed, and are not familiar to anyone outside of the laboratories where they have been prepared. Strictly speaking, they are not dyes at all, but simply stains which colour their solvent, and not the material to which they are applied. We must make an exception in the case of a few—namely, those which are free colour bases, and which at times unite with the material to be coloured in the same way that basic dyes combine with the tannin or mordanted cotton, or a closer analogy is the combination of jute or wood fibre with basic dyes. So far the application of this class of dyes has been to the tinting of oils and varnishes and for staining wood in cases where it is intended to avoid "raising the grain," as is the case with spirit and water stains. We also find a limited use of those products in tinting pigments ground in oil, although the cost of organic colouring matters necessarily limits their extended use in this field. However, they form a ready means of obtaining a brilliancy not natural to the pigment, and thus enhancing its value for the time being, although the test of sun and weather will soon remove all traces of the addition. An instance is known where an oilcloth manufacturer obtains brighter shades by the use of "anilines" soluble in oil.

Several years ago it was proposed to use oil-soluble dyes in the colouring of silk and mixtures of silk and cotton, says the "Dyers' Trade Journal." The colouring matter was to be dissolved in a volatile solvent (benzine, for instance) together with an elastic resinous material (gum-damar, mastic, or copal), the fabric impregnated with the solution and quickly evened by whizzing or passing between rollers and dried. Such a dyeing would be fast to washing, rubbing, and, on account of the protection afforded by the resin, faster to light. If this process were a success, it has never been extensively used, for we hear very little about it now.

The colouring matters are drawn from all classes of dyestuffs. The natural are represented by annatto (yellow) and alkanet (red). The nitro colours give us Victoria yellow and orange. The azo bodies furnish the larger number, prominent among which are Aniline Yellow, Sudan G (yellow), Sudan I (orange), Butter Yellow (sensitive to acids), Sudan II (red), Sudan Brown, etc. The triphenylmethane derivatives furnish Aurine or Rosolic acid and the oleates, stearates and resinates of Malachete green base, Rosaniline base, as well as the fatty acid salts of the bases of the entire series of basic colours of this class, many of which are not found on the market. The next class of importance is that of the Induline bases, which includes Nigrosines in the so-called insoluble form —*i.e.*, insoluble in water. These are either sold in their natural state or combined with fatty acids, the ordinary nigrosenes and indulines being the same compounds sulphonated and neutralised with soda. This class furnishes dark blues and blacks which have an extended application at present.

New Application of Indigo.

SULPHUR enters readily into reaction with indigo leuco compounds, such as indoxyl, indoxylic acid, and indigo white. The reaction consists apparently in a combination of the sulphur with hydrogen of the leuco compounds whereby sulphuretted hydrogen is formed. In any case the indigo leuco compound is converted into indigo. This reaction has been discovered by the Badische Anilin and Soda Fabrik of Ludwigshafen on-Rhine, who also find that it can be effected in the presence or in the absence of textile fibre. If textile material, suitably prepared with sulphur, be introduced into an indigo vat, the conversion of the indigo white to indigo blue takes place at once in the vat during the dyeing process. Animal and vegetable fibres have the property of fixing sulphur mechanically. If material that has been suitably prepared with sulphur be dyed in an indigo vat, the presence of the sulphur causes the indigo to be taken up by the fibre essentially faster than if no sulphur be present, and the formation of indigo takes place already within the vat. Thus woollen material, suitably prepared with sulphur, upon dyeing in the indigo vat, in a short time, and whilst immersed in the vat, assumes an indigo blue colour, and in one passage through the vat it is dyed approximately as strongly and as fast as unprepared wool would be dyed by three passages through the same vat. This new process of dyeing can be carried out using an indigo vat that is kept alkaline by means of lime, magnesia, or other alkaline earth, and it is applicable to cotton and to woollen goods.

A special application of the new process of great technical importance consists in preparing, or impregnating, woollen or cotton material, in some parts with sulphur, whilst leaving the other parts free from sulphur. Upon dyeing such material in the vat the parts prepared with sulphur assume a darker shade than the others. In this way a pattern in light and dark blue can be prepared in a simple manner, whilst hitherto such results could only be achieved by means of a complicated process. The new process can also be advantageously applied when printing indigo shades. For instance, when printing with indophor (indoxylic acid) the process previously used consisted in printing this body on to the material and then passing the material through a bath containing an oxidising agent, such as ferric chloride. According to the present method a mixture of indophor and sulphur is printed on to the goods, and then, upon steaming, the indigo blue is directly formed upon the fibre. Instead of preparing material with sulphur itself, mixtures producing sulphur, such as sulphide of sodium or sulphide of calcium, with acids, can be employed. The following examples will serve to further illustrate the process. The parts are by weight:—

Oxidation of Indoxylic Acid to Indigo.—Prepare a melt, rich in indoxylic acid. Dissolve about 50 parts of the melt in water, and add dilute sulphuric acid until the solution is but weakly alkaline or neutral Then add 4 parts of finely-divided sulphur, whilst slowly warming the solution. The indigo separates out, and can be collected in the usual way.

Dyeing Loose Wool or Other Woollen Material.—Dissolve 120 parts of sodium thiosulphate and five parts of alum in 300 parts of water To this add a solution of about five parts of concentrated sulphuric acid containing about 96 per cent. of H_2SO_4. In this way a suspension of finely-divided sulphur in water is obtained. Introduce about 250 parts of the material to be dyed into this bath at ordinary temperature. Manipulate the woollen material in the bath for about half-an-hour, whilst raising the temperature to between 50 and 55° C. Press out the water, swill with cold water, and introduce the goods into the vat. The passage of the goods through the vat should occupy about half-an-hour, so that the effect of the sulphur may be thoroughly exercised.

Production of a Dark-blue Pattern on a Light-blue Ground on a Woollen Material.—Print the material with a paste consisting of 80 per cent. of gum thickening (1 : 1) and 20 per cent. of finely-divided sulphur (flowers of sulphur). After printing, steam for about five minutes with damp steam, and pass the material into the vat. The parts prepared with sulphur assume a darker blue shade than the unprinted parts assume.

Production of a Dark blue Pattern on a Light-blue Ground on Cotton, Linen, or Mixed Cotton and Linen Goods.—Print the material with a mixture of 80 parts of gum thickening (1 : 1), 4 parts of finely-divided sulphur, and 10 parts of caustic soda lye (containing about 35 per cent. of NaOH). After printing, steam the goods with dry steam for about five minutes, then pass the material through acidified water, and swill lightly with cold water. Dye in a vat of medium strength, allowing the material to remain in the vat for about half-an-hour.

Indigo Printing with Indophor.—Print the cotton material with a mixture of 50 parts of indophor, well mixed with 20 parts of finely-divided sulphur, 200 parts of a solution of borax of 3° Bé., and 730 parts of tragacanth thickening (50 : 1000). Steam for five minutes and swill with water.

Improved Bleaching Process.

A METHOD of bleaching vegetable fibres without the lengthy open-air exposure has recently been patented in France. A bath is used consisting of the combination of oxidised or peroxidised alkalies or alkaline earth compounds with soap or with salts of magnesium or aluminium, alkaline silicates, amylaceous materials, fecula, starch or gelatinous soluble gums. These various substances, in conjunction with the alkaline-oxygen compounds, serve to soften the material. The composition of the bath varies according to the origin of the materials to be treated, according to their quality, to the degree of fineness of the fibres, and according to the state of preparation of a textile to be bleached, the following example indicating suitable proportions:—

In the quantity of pure water ordinarily necessary for the washing of the material, for each 100 parts by weight of the material are dissolved:—(*a*) An alkaline peroxide, ½ to 3 per cent.; (*b*) white soap, ½ to 4 per cent.; (*c*) salts of magnesium or alkaline silicates, or carbonate of sodium or salts of aluminium, 2 to 8 per cent.; (*d*) amylaceous material or gelatinous material, or gummy or resinous material, 4 to 6 per cent. According to requirements, only one or other of the softening materials (*b*), (*c*), (*d*), may be employed, or only (*b*) and (*c*), or (*c*) and (*d*), or (*b*) and (*d*). The following examples have been found to give very good results:—

With Silicate of Sodium (or Potassium).—1 to 3 per cent. of peroxide of sodium or potassium, 2 to 8 per cent. of silicate of sodium or potassium, and 2 per cent. of Marseilles soap.

With Precipitate of Magnesium (or Aluminium).—2 to 3 per cent. of peroxide of sodium or potassium, and 2 to 8 per cent. of chloride of magnesium. The gelatinous precipitate of magnesium is formed by treating chloride of magnesium with caustic soda, using a slight excess of caustic soda in order to avoid all action of chloride of magnesium formed from the peroxide.

With Carbonate of Sodium (or Potassium).—1 to 3 per cent. of peroxide of sodium or potassium, 4 to 8 per cent of sodium carbonate, and 3 to 5 per cent. of white neutral soap.

With Amylaceous Materials.—1 to 3 per cent. of peroxide of sodium or potassium, 4 to 6 per cent. of starch or flour very finely ground, and 1 to 3 per cent. of white soap. The peroxide is added to the cold mixture of flour and soap.

The fabrics to be bleached are plunged into the bath or simply soaked or impregnated by the passage of the liquid through them, and according to requirements the bath is heated to a temperature which may vary from 50 to 100° C. The softening materials (*b*), (*c*), (*d*) modify the action of the alkaline oxygen compounds, and there results a methodical progressive oxidation, which continues slowly without alteration of the fibres. This oxidising operation takes about 4 to 6 hours, according to whether it is effected in a closed vessel or in the open air, and brings about the complete and perfect decolourisation of the material to be bleached, without necessitating an exposure on the grass or to the air. The material treated is afterwards carefully washed with pure water, then submitted for some hours to acidulated water to remove every injurious trace of the softening and oxidising substances, or of their products of transformation.

The same treatment applied to cotton material is said to permit a considerable reduction of washings and of the degree of the chlorine materials and acids usually employed, and produces more economically the purest white, at the same time diminishing the chance of alteration and damage of the materials submitted to the treatment. The substances (*b*), (*c*), and (*d*) constitute protecting materials for the vegetable fibres, as they protect them against the destructive action of the alkaline peroxides. The action of these substances is rather of a physical than of a chemical nature, as on the one hand they thicken the bath of which peroxide is the base, and on the other hand they coat or envelop the vegetable fibres to be bleached in such a manner that the oxidising body can only act very slowly by a gradual raising of the temperature of the bath. The substances (*b*), (*c*), or (*d*) retard the decomposition of the alkaline peroxide; they do not provoke it. Their action is entirely physical. They do not hinder the satisfactory continuation of the bleaching in the case where the subsequent washings have not entirely removed them from the fibre after oxidisation by means of peroxide.

NOTES ON DYEING, BLEACHING, FINISHING, &c.

Specially compiled for THE TEXTILE MANUFACTURER.

FAST LIGHT YELLOW 3 G.—This is an additional brand to the acid wool colours (Bayer), being clearer and greener in tone than the older G brand. It dyes in a strongly acid bath, and is said to be specially fast to light, besides fulfilling other requirements. It is adapted for dyeing yarns to go with white, and also for printing wool fabrics, slubbing, and for silk. The colour can be discharged a good white with zinc powder, but tin crystals do not give a good result.

INDANTHRENE X AND S.—This is a new dyestuff (Badische) adapted for all kinds of vegetable fibres. It is very useful for articles requiring shades of exceptional fastness to light and washing, such as, for instance, embroidery and crochet yarn, damask, coloured woven goods, lace trimmings, curtains, and dyed and printed dress and shirt materials. Indanthrene gives with soda lye and a suitable reducing agent—preferably hydrosulphite of sodium—a blue solution, a kind of vat, out of which the cotton takes up the dyestuff direct, without, however, as with indigo, an oxidation process taking place. It immediately forms a blue dyeing, which does not noticeably change when brought out of the dyebath into the air. For printing cotton material, Indanthrene is used in combination with soda lye and a reducing agent (protoxide of tin), and is fixed by steaming. A second method may be employed—that of printing on the dyestuff with sulphate of iron and tin salt, and developing by a passage through soda lye. It gives reddish-blue shades of great brightness and beauty. By slightly soaping the cotton dyed with indanthrene with ⅝ part soap per 1000 parts water at about 140° F., the shade comes up slightly more reddish and brighter. By treating in a boiling soap bath containing soda, the shade changes somewhat more to a reddish-blue, and is purer and clearer. The goods once boiled in soap do not change in shade, even if subjected to further severe washing.

KATIGEN CHROME BLUE 2 R.—This is a new Katigen Blue (Bayer) suitable either for using alone or in combination with Katigen Indigo B. It is easily soluble, and the direct-dyed shades (which are not of much importance) still yield, by oxidation, very useful tones. When after-treated with bichrome and copper sulphate, however, more important shades are produced. The fastness to light of shades dyed and oxidised by the action of the atmosphere is about the same as that of indigo, but when afterwards treated with bichrome and copper, as mentioned, their fastness to light is superior. The colour is also said to be fast to cross dyeing, and can further be employed as a combination colour.

CELESTINE BLUE B.—This is a new chrome mordant dyestuff (Bayer), which can also be used on an alumina mordant, thereby producing a fine blue alumina tannic acid lake. Very good white discharges on a blue ground can be obtained by discharging the alumina padded cotton pieces in the ordinary way with citric acid, and then dyeing the goods according to the method given below. Dye for one hour whilst raising the temperature to the boil with 2 per cent. Celestine Blue B, 2 per cent. tannic acid, 10 per cent glue solution 1 : 10, and ½ per cent. chalk; then wash, dry, and pass through chlore of 0·3° Tw., and steam.

FINISHING HOSIERY.—By singeing hosiery a smooth finish and fine surface and lustre can be produced, but to secure this result it is necessary prior to singeing to subject the goods to such a treatment that the nap or fibre is brought to such a condition that every portion can be properly removed by the singeing. An improved way of carrying out this preparatory treatment has recently been devised in America, consisting of subjecting the hosiery first to a treatment that brings the nap or fibre to a condition whereby the fibre can be more readily and effectually removed by singeing. The treatment by which such a condition of the nap or fibre is effected may differ, and the one selected for the purpose of illustrating the process is chemical. In singeing hosiery it is found that the nap or lint cannot be singed completely unless the stockings are treated so that the nap or lint becomes more inflammable or combustible. It is possible, of course, to singe a stocking in the white, as it is called, or as it comes from the knitting machine, but this not only does not remove all of the fibres, but the subsequent dyeing process will raise up further nap or lint. The idea is, then, to increase the combustibility or inflammability of the nap or lint. Now in dyeing stockings by the aniline-black process there are two principal steps—first, the oxidising step, and then the chroming step, and this latter step is called the finishing. This chroming, or finishing as it is called in the trade, succeeds the singeing. It is found that the solutions to which the stockings are treated to produce the oxidation also make the nap or lint more inflammable and combustible. Therefore, in carrying out this process it is not necessary to use any other means to obtain this end. A stocking that is singed in its natural stage before being dyed, or that is singed after the dyeing is complete, or after the chroming or finishing step, does not show the same result as when singed in a state of oxidation or when the fibres have been made more combustible and inflammable, prior to the singing operation. The process is carried out in the following manner:—The goods are saturated in a solution which consists of the following ingredients, in about the proportions given—namely: Chloride of soda or chloride of potash, 1lb.; blue stone, ½lb.; and aniline salt or aniline oil, 4 or 5lb. This is known as the aniline-black solution. After complete saturation the goods are dried in the atmosphere, and are then placed on a corner or board so that the stocking is in such a form that when singed every portion of the fibres forming the nap or lint is removed, and the board with the stocking is then passed through a singeing machine, the nap or fibre being effectually removed by the singeing, which latter step produces on the goods the smooth finish and lustre.

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.

4th November.

22,150 J. BARBOUR, Halifax. Apparatus for adjusting the presser rollers of drawing, roving, and spinning frames.
22,153 ASA LEES AND CO. LIMITED and R. TAYLOR, JUN., Manchester. Bearings of drawing rollers, bobbin and spindle driving shafts, and the like.
22,154 G. E. ROSS and J. FAIRCLOUGH, Manchester. Carding engines.
22,189 C. D. ABEL, London. Colouring matters belonging to the triphenylmethane series. (*Actien-Gesellschaft für Anilin-Fabrikation, Germany.*)
22,222 G. W. JOHNSON, London. Production of brown dyes containing sulphur. (*Kalle and Co., Germany.*)

5th November.

22,246 A. BEEDHAM and F. WADSWORTH, Droylsden. Swivel or jointed cross-border jacquard hook.
22,252 A. STELL and OTHERS, Keighley. Doffing apparatus.
22,271 W. L. HEPTON and OTHERS, London. Clip for cloth and like materials. (*Grafton and Co., Canada.*)
22,306 R. B. RANSFORD, London. Dyestuffs. (*L. Cassella and Co., Germany.*)
22,331 H. H. LAKE, London. Machines for moistening fabrics and the like.* (*F. B. Comins, United States.*)

6th November.

22,370 J. FRASER and OTHERS, Glasgow. Drawing and roving frames.
22,385 C. D. ABEL, London. Sulphurised colouring matters directly dyeing cotton. (*Actien Gesellschaft für Anilin-Fabrikation, Germany.*)
22,402 W. L. WISE, London. Weaving.* (*P. Schopp, Norway.*)
22,404 T. COULTHARD AND CO. LIMITED and T. COULTHARD, JUN., London. Spindle apparatus.
22,407 C. F. TOPHAM, London. Fibres or filaments produced from solutions of cellulose.

7th November.

22,447 D. B. WRIGHT, Glasgow. Picking motion of power-looms.
22,465 E. and R. CORNELY, London. Machine for fixing spangles, sequins, and the like upon cloth or other textile fabrics.
22,474 A. FOURNIVAL and OTHERS, London. Spindles of winding frames.

8th November.

22,516 FRY BINNS AND CO. LIMITED and H. HARTLEY, Manchester. Union cloth.
22,526 H. E. MUSGRAVE and G. A. BARNES, London. Traverse motion for guiding yarn or other fibrous materials to the rollers in spinning, preparing, and similar machinery.

9th November.

22,594 A. CLEGG and R. SLATER, Manchester. Self-acting mules.
22,611 S. HULME, Glasgow. Ring frames for spinning and doubling cotton or other fibrous materials.
22,641 R. MULLER, Manchester. Manufacture of part-silk piece goods and ribbons.*
22,659 G. GIARDINO, London. Weft carrier with needles to replace the shuttles of weaving looms.

11th November.

22,674 A. SMITH, Stockport. Method of preparing indelible inks for marking linen and cotton textile materials.
22,678 A. SMITH and S. JACKSON, Keighley. Means for mechanically changing shuttles in looms.
22,688 W. RODGER, Manchester. Method of producing variegated or parti-coloured effects upon yarns or fabrics.
22,689 W. RODGER, Manchester. Method of producing variegated or parti-coloured effects upon woollen, worsted, and silk yarns or fabrics.
22,731 C. D. ABEL, London. Sulphurised colouring matters directly dyeing cotton. (*Actien-Gesellschaft für Anilin-Fabrikation, Germany.*)
22,762 J. Y. JOHNSON, London. Colouring matter of the anthracene series. (*The Badische Anilin and Soda Fabrik, Germany.*)

12th November.

22,769 A. SMITH and S. JACKSON, Keighley. Means for mechanically changing shuttles in looms.
22,773 R. W. IBBERSON, Manchester. Bearings for drawing rollers and the like. (*M. Gebotszrajber, Russian Poland.*)
22,775 A. WHITEHEAD, Manchester. Nap-raising machines.
22,778 A. T. METCALF and J. GENT, Keighley. Machines for drying fabrics.
22,789 ASA LEES AND CO. LIMITED and J. CLEGG, Manchester. Self-acting mules and twiners.
22,831 J. HOGG, London. Feed mechanism for card machines.*

13th November.

22,901 J. K. CHADWICK and E. BENTLEY, Tottington. Bracket made of malleable or any other kind of iron for cotton loom.
22,912 A. FAIRGRIEVE and J. MERCER, Glasgow. Sliver-rubbing apparatus or condensers of carding machines.
22,968 A. J. E. HILL, Twickenham. The treatment of fabrics.
22,974 A. J. BOULT, London. Combs for fibrous materials.* (*E. Crepy and L. Fremaux, Belgium.*)

14th November.

22,988 F. UNWIN, Keighley. Machinery for winding yarns or threads of fibrous substances.
22,989 W. GRUNDY, Keighley. Spinning mules.
22,996 J. T. PEARSON, Burnley. Mercerising, lustring, drying, and otherwise treating yarn and other similar fibrous substances with liquids, air, and other gases.
23,042 C. BARDY, London. Viscose silk.
23,055 O. VENTER, London. Apparatus for dyeing loose material, fabrics, hosiery, and the like.*

15th November.

23,071 J. CHARLESWORTH, Huddersfield. Warp sizing and drying machines.
23,073 E. HOLLINGWORTH, Dobcross. Warp stop motions for looms. (*H Wyman, United States.*)
23,083 E. ASHWORTH, Manchester. Means for attaching the clothing to the revolving flats of carding engines.
23,089 J. APPLEBY, JUN., Hooley Hill. Fixing thread guides to spinning and like machinery.
23,091 G. MORTON, Glasgow. Apparatus for the manufacture of tufted fabrics.
23,096 J. A. HART, London. Apparatus to be employed in ventilating with conditioned air.
23,104 M. MITCHELL, Bacup. Threading shuttles for weaving.
23,129 H. HERBERZ, London. Hot-air drying apparatus.*

16th November.

23,164 S. WHITWORTH, Rochdale. Method of making shuttle and shuttle wheels for looms.
23,181 T. PRATT, Manchester. Apparatus for mercerising cotton yarns in hank form, applicable also for dyeing, bleaching, drying, and otherwise treating such yarn or yarns of other fibrous material.
23,191 K. R. WALKER, London. The treatment of fabrics.

18th November.

23,304 W. WATSON, London. Silk-dressing machines.

19th November.

23,339 DOBSON AND BARLOW LIMITED and T. H. RUSHTON, Manchester. Machines for winding yarns and threads of cotton, flax, and other fibrous materials.
23,340 DOBSON AND BARLOW LIMITED and T. H. RUSHTON, Manchester. Machines for winding yarns and threads of cotton, flax, and other fibrous materials.
23,342 W. H. RANKINE, Halifax. Carding machines.
23,344 L. FISH, Manchester. Weaving weft-pile fabrics.
23,354 J. KEITH and W. W. WARDLE, Glasgow. Apparatus for carrying goods through drying chambers.
23,425 S. WALKER, London. Spinning machines.*
23,434 H. H. LAKE, London. Dyeing and printing of vegetable fibre. (*Farbwerke Mühlheim vorm. A. Leonhardt and Co., Germany.*)

20th November.

23,486 G. E. HIBBERT, Manchester. Machinery for cutting, grinding, pulping, and circulating fibrous and other materials.
23,492 R. H S. READE and OTHERS, Manchester. Rubbers of preparing machines for flax and other fibres.
23,513 F. AUSPITZER, London. Cloth laying, measuring, cutting, and folding or doubling machines.*
23,556 W. H. PERKIN, JUN., and WHIPP BROS. AND TOD LIMITED, London. Treatment of raw cotton and cotton goods to reduce the inflammability thereof.
23,557 W. H. PERKIN, JUN., and WHIPP BROS. AND TOD LIMITED, London. Treatment of raw cotton and cotton goods to reduce the inflammability thereof.
23,560 O. BRUNSCHWICK, London. Process for the manufacture of a textile fabric with an oblique weft.

21st November.

23,597 H. NEREN, Glasgow. Automatic card-reversing device for jacquard machines.
23,626 J. H. SCOTT, London. Needles for knitting and like machines.
23,665 B. SHAYER and H. ATKINSON, London. Woven trimmings.

22nd November.

23,680 H. H. HACKING, Bury. Shuttle-changing motions of looms.
23,695 R. J. URQUHART, Manchester. Process of dyeing piece goods with sulphur dyes.* (*Chemische Fabriken vorm. Weilerter Meer, Germany.*)
23,697 G. H. BROWN and OTHERS, Halifax. Jacquard machines.
23,731 H. H. LAKE, London. Plaiting machines. (*G. J. Burns, United States.*)

23rd November.

23,791 J. SIME, Glasgow. Machinery for the softening of jute and other textile fabrics.* (*J. Steen, India.*)

25th November.

23,870 W. T. SMITH, Manchester. Woven fabrics.*
23,892 L. LILIENFELD, London. Pigment-printed textile fabrics.*
23,912 R. KORITSCHONER, London. Ring spinning frames.
23,944 J. Y. JOHNSON, London. Production of new colouring matter, of colouring matter lakes, and of intermediate products for use therein. (*The Badische Anilin and Soda Fabrik, Germany.*)

26th November.

23,956 A. H. COXON, Manchester. Means for cleansing and burnishing the rings of ring spinning frames.
23,975 G. MORTON, Glasgow. Double cylinder or cross-border jacquard machines.
24,027 W. B. CONRAD and J. A. CAMERON, London. Machines for dividing textile fabrics into required widths.*
24,042 W. FEHR, London. Heddles.*
24,053 M. RIVOLLIER, London. Cloth-finishing machines.*

27th November.

24,069 S. BRADBURY, Manchester. Means for washing and cleansing calico printers' blanketing.*
24,071 J. PAGE, Manchester. Bobbins, pirns, and the like.
24,088 D. BLACK and J. M. WRIGHT, Glasgow. Machine for combing and assorting varying lengths of hair and other animal or vegetable fibres.
24,106 C WELCH and OTHERS, Manchester. Means to be used in combination with a sewing machine for producing ornamental pleating in cloth.

28th November.

24,167 T. ASHWORTH and J. S. GAUNT, Manchester. Apparatus for spinning and doubling cotton and other fibrous substances.
24,172 W. McGEE and C. E. BRADBURY, Glasgow. Take-up and let-off motions in wire weaving looms.
24,209 L. SEREPEL, London. Looms for weaving pile fabrics.*

29th November.

24,280 J. P. HARGREAVES and D. HARRISON, Burnley. Loom shuttles.
24,322 E. BOTTELLI, London. Dressing and finishing fabrics.
24,354 J. Y. JOHNSON, London. Colouring matters of the anthracene series and their employment in dyeing. (*The Badische Anilin and Soda Fabrik, Germany.*)

30th November.

24,367 T. FERGUSON, Glasgow. Power looms.
24,375 J. HUTCHESON, Glasgow. Washing machine.
24,382 ASA LEES AND CO. LIMITED and R. TAYLOR, JUN., Manchester. Spinning and doubling frames.*
24,387 F. JOHNSON, London. Straight-bar or rotary knitting machines.

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.

14,277. Circular knitting machines. Aug. 9. J. Y. Johnson, London (communicated by R. W. Scott and L. N. D. Williams, 2079, East Cumberland-street, Philadelphia, U.S.A.). Consists of improvements in the knitting machines shown and described in Patent No. 11,421, 1894, and No. 14,157, 1899.—Nov. 9, 1901.

15,191. Dyeing apparatus. Aug. 25. J. O. Obermaier, Lambrechts, Rheinpfalz, Bavaria. Relates to apparatus for dyeing and rinsing fabrics and recovering excess of dyestuff from the fabric, comprising the combination with a dyevat and a storage tank of two three-way cocks, liquid circulating means, pipes to connect said cocks with the dyevat and with the storage tank, and with a water admission pipe, the apparatus being adapted to enable the connection of the dyevat with the water supply or storage tanks respectively to be changed by manipulating the cocks.—Oct. 25, 1901.

17,738. Spindle bolsters. Oct. 6. W. Holroyd, Cambridge-street, Rochdale. Relates to an improved tool or top picker to be used for picking dirt and foreign matter from spindle bolsters of mule or other spinning machines.—Oct. 5, 1901.

17,783. Dyes. Oct. 6. J. Stevenson, 4, Albert-terrace, Trinity, Edinburgh. The object is to provide colour pigments and dyes of such a composition that when applied to cloth or other material the colours produced thereon will gradually change, owing to the action of light or internal chemical action, or the chemical action caused by exposure to the atmosphere.—Oct. 5, 1901.

17,738. Tuft yarn tube frames. Oct. 8. F. J. R. Jelleyman, Kidderminster. In the general manufacture of tube frames the row of guide tubes has been soldered on to a strip of tin, which has then been affixed by nails or screws to a strip of wood, also a length of wire or strip of flat metal has been affixed to the wood at the point where the tuft yarn enters the guide tubes in order to reduce the chafing of the tuft yarn on entering the guide tubes. The improved way is as follows:—A is the tube frame, K is the loom frame, C, C^1 and C^2 the heddles operating the warps D, D^1 and dead warp D^2, while H, H are various levers for operating the tuft spools J. A length of angle iron is used having its one flange a^1 at such an angle to the others as to give the required slope or pitch to the row of guide tubes B, which are soldered or brazed thereto.

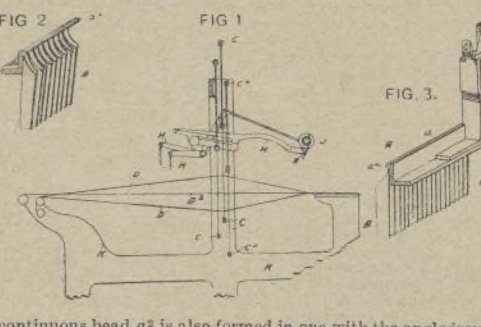


FIG 2 FIG 1 FIG. 3.

The continuous bead a^2 is also formed in one with the angle iron A and upon one edge of the flange a^1 at the point where the tuft yarn enters the guide tubes, thus reducing the chafing of the tuft yarn on entering the guide tubes B. The angle iron frame also forms a substantial support for the tuft spool carrier M, which is soldered or riveted thereto, as shown in Fig. 2, while for convenience in soldering the angle iron A would be first coated with any metal suitable for taking the solder.—Oct. 8, 1901.

18,026. Yarns and fabrics. Oct. 10. L. Harmel, Boulzicourt (Ardennes), France. Relates to fabrics adapted to produce in contact with the human body a voltaic action owing to the presence in the textile threads of metallic threads of different natures.—Oct. 10, 1901.

18,062. Card-ribbons setting machines. Oct. 11. A. Scrive, Rougebarres-lez-Lille, France. Relates to that class of card-ribbons setting machines at present used, and comprising in its construction an arm having a point at its forward extremity which, given a series of intermittent forward thrusts by means of a rotary cam, has also imparted to it a simultaneous upward movement into the position required, by means of a stationary incline or cam up and over which it is caused to travel by its forward movement. The principal improvement consists in providing separate means for imparting the forward and upward movements of the arm, and is attained in a simple and efficacious manner by mechanism which includes an improvement in a part of the ribbon-feeding mechanism.—Nov. 11, 1901.

18,079. Treating textile fabrics. Oct. 11. G H. France, Water-lane Dyeworks, Bradford. Relates to improvements in the method of discharging, dyeing, bleaching, or otherwise treating textile fabrics, particularly certain cotton goods with liquids. A long vat is used, one side of which is inclined from the top inwards at an angle of about 45°, and the other side is vertical; and a revolving winch or cylinder is mounted a suitable distance above. Instead of forming the pieces of fabric into endless bands or separate drafts working over said winch whilst the bulk lies in the vat they are made into a chain and passed continuously and consecutively through the liquor.—Oct. 11, 1901.

18,138. Slubbing frames. Jan. 11. S. Dyson, 231, Entwistle-road, Rochdale. Relates to the winding motion used in slubbing, intermediate, roving and like frames where cones are employed for giving the requisite differential speed to compensate for the varying diameter of the bobbin as the roving is built up thereon, and the principal object is to ensure the equal driving of the regulating strap by the use of an improved differential expanding motion, instead of the reversed cones usually employed for that purpose. Instead of the usual solid cones, two skeleton drums (one upon the upper and one upon the lower shaft) are used, which are capable of expansion and contraction in equal ratio, but so arranged that their external form always remains cylindrical, and hence the driving strap is not subject to any torsion, and consequently its equal driving is ensured and the life of the strap prolonged.—Nov. 9, 1901.

18,458. Looms. April 17. M. Cherpin, 31, Rue de l'Hotel-de-Ville, Lyons. Relates to weaving looms and has for its object to dispense with the use of a spool in the shuttle, the production of a proper and reliable selvage, a correctly acting take-up motion and a series of mechanisms for ensuring the production of a cloth, either plain or figured, of a superior manufacture.—Oct. 19, 1901.

19,082. Circular knitting machines. Oct. 25. J. Parker, Long Row, Nottingham, C W. Hammersley, and H. A. Bettney. Relates to improvements in circular knitting machines designed to produce plain or ribbed fabric, and to automatically change from rib to plain, plain to rib, or from one kind of rib to another kind of rib, the present invention relating more particularly to improvements in machines of the type described in Patent No. 7459, 1899, the object of the present invention being improvements in the means and method of effecting the transfer of the needles from one cylinder to the other, and improvements in the construction and arrangement of the various mechanisms and in the construction and general arrangement of the whole machine.—Oct. 19, 1901.

19,175. Lubrication of spindles. Oct. 26. G. Josephy, 71, Fabrik-Strasse, Bielitz, Austrian Silesia. The front of the spindle bearings is provided with a wide longitudinal slot, and arranged in grooves of the spindle frame is a steel band having attached to it a strip of felt or similar material in such a manner that the band with the strip of felt can be passed along the open front of the spindle bearings. The strip of felt properly imbibed with oil will lubricate the spindles through the slots provided in the spindle bearings, and from the spindles the oil is conveyed also to the bearings.—Oct. 19, 1901.

19,202. Colouring matters. Oct. 26. G. B. Ellis, London (communicated by F. A. Pertsch, Avully, Switzerland). Relates to the manufacture of anthranilic acid from 5-nitro-2-amidobenzoic acid, which may easily be prepared from salicylic acid, and of colouring matters from intermediate products.—Oct. 26, 1901.

19,358. Chenille yarn. Oct. 30. T. W. Millward, Albert Mills, Levenshulme, near Manchester; and E. Hollingworth. Relates to improvements in machinery more especially designed for taking the twist out of chenille yarn of a fan-shaped cross section or somewhat similar character, and feeding it into cases of receptacles which are eventually placed in shuttles and used in the weaving of fabrics.—Oct. 12, 1901.

19,743. Circular weaving looms. Nov. 3. C. G. Hill, Arnot Hill, Daybrook, Nottingham. Relates to improvements in circular weaving looms, such as described in Patent No 28,607, 1896.—Nov. 2, 1901.

19,792. Jacquards. Nov. 5. W. Paton, Kenmuir, St. James's-road, Carlisle. Relates to a combination with the ordinary set of jacquard needles and cylinder of an auxiliary set of jacquard needles, arranged and constructed so as to be acted upon by a pattern cylinder located on the same side of the jacquard as the cylinder for actuating the ordinary needles, and brought into play alternately therewith for cross border weaving.—Oct. 26, 1901.

20,127. Spinning and twisting. Nov. 8. C. J. Selosse, Lille (Nord), France. Relates to an apparatus for regulating progressively with the copping the friction of the drag bands upon the bobbins in spinning and twisting machines.—Oct. 26, 1901.

20,472. Yarn winding. Nov. 13. E. Nagler, Schülestrasse 1, Augsburg, Bavaria. Relates to the arrangement of a composite or solid glass rod in front of the thread guides for the purpose of tensioning the threads, avoiding injurious effects, and dispensing with brushes and plushes.—Oct. 12, 1901.

20,485. Carding. Nov. 14. J. Tetlow, Britannia Mills, Cleckheaton; and D. Crabtree. Relates to machinery for carding fibrous substances. There are two or more swifts and their respective workers, and between each pair of these swifts are two doffers and their fancies, so that from each swift two separate fleeces are taken and arranged to be received by appropriate carriers (such as drums or rollers and aprons, preferably the latter) mounted in position to join them together again, and feed them to the next or succeeding swift, until after being finally doffed from the last swift in the machine they are again received by separate carriers, which are arranged in duplicate so that the two fleeces may be fed to the condenser separately or joined together, or one or other of them may be conducted to the floor until produced in proper condition to be joined to the other before being fed to the condenser, so that in addition to attaining better results freedom of access is afforded to the parts that have to be cleaned from time to time, as is well understood.—Nov. 2, 1901.

20,498. Warping machines. Nov. 14. J. W. Midgley, Keighley. Relates to improvements in warping machines, with a reed which is capable of being removed or reciprocated in a vertical direction.—Oct. 12, 1901.

20,563. Jacquard machines. Nov. 14. R. H. S. Reade, York-street Flax Spinning Company Limited, Belfast; and T. Orr, F. Morton, and W. R. Gilpin. Is designed to provide a twilling jacquard machine by which one twill may be given to the ground and a different twill to the figure of the fabric.—Oct. 26, 1901.

20,718. Colouring matters. Nov. 16. B. Willcox, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). Relates to the manufacture of colouring matters from methyl-anthraquinone.—Oct. 19, 1901.

20,719. Colouring matters. Nov. 16. B. Willcox, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). Relates to the production of colouring matters of the anthracene series by treating such halogen derivatives with ammonia, or agents producing ammonia, during the reaction. In this way colouring matters are obtained which can either be used at once in dyeing or after previous sulphonation, and the dyed goods possess a high degree of fastness.—Oct. 26, 1901.

20,734. Hand looms. Nov. 16. R. Flower, Knockatrina House, Durrow, Queen's County. Relates to the application and use in a hand loom of bevel-wheel gearing for driving from the main spindle secondary spindles which by gearing adjustable as to speed transmit motion to spindles provided with cams that actuate the healds whereby it becomes possible to work each heald independently.—Nov. 16, 1901.

20,737. Shuttles. Nov. 17. H. Milner and S. Firth, Manor Mill, Yeadon. The clasp has a groove cast in longitudinally for the shuttle peg to rest in, and is fixed into the shuttle with two pins and one screw. The fast portion of the clasp has also a projection of the channel that the peg rests in to weave bobbins with or without staples. The movable portion is connected below the centre by a pin, is closed by means of a spring, and is opened by taking the peg out of the shuttle. The shuttle peg has two notches near the end to hold it into the shuttle, the end notch fitting under a pin which is placed nearest the shuttle tip, and the bottom notch fitting on the top of a pin at a suitable distance from the other pin, which helps to steady and hold the peg in its proper position in the shuttle.—Oct. 19, 1901.

21,072. Yarn from vegetable waste. Nov. 21. F. V. M. Raabe, 9, Highbury Grange, Highbury, London. Has reference to the manufacture in an economical manner from by-products of tow yarn of the same number and size as ordinary tow yarn, but superior in quality to such yarn, and capable of being readily bleached or dyed, and of being used for superior purposes in the linen trade.—Nov. 9, 1901.

21,101. Steaming piece goods. Nov. 22. W. Mycock, Spring Mill Printworks, Whitworth, Rochdale. Relates to improvements in the apparatus for subjecting textile piece goods to the action of steam. In the process of calico printing, for example, after printing the fabric it is exposed to the action of steam. In some cases the cloth is suspended in a steam chamber, in other cases the cloth is rolled or lapped round a perforated pipe or roller, to which steam is admitted, so that the steam leaving the perforated pipe or roller passes radially through the surrounding layers of cloth into the atmosphere. The latter operation is now reversed. The cloth is lapped round a perforated pipe or roller, the interior of which is then connected to a conduit or exhaust pipe. The whole is surrounded by a casing or chamber, to which steam is admitted under pressure, so that the steam is caused to pass radially inwards from the circumference of the roll of cloth to the perforated pipe in the interior, and thence away through the conduit or exhaust pipe.—Oct. 19, 1901.

21,260. Automatically changing shuttles. Nov. 24. M. Sowden, Shipley. Relates to looms for weaving of the class in which an automatic supply of shuttles is maintained from a magazine through the agency of connections controlled from the weft fork, and the object is to simplify the arrangement and parts of such connections, together with improved means of locking and steadying the revolving box on each of its movements or part revolution. On the axis of the revolving box is mounted a star wheel in communication with which is a peg disc; the back of the disc is provided with a stud on which the hook of the draw lever acts for turning the box so that as the disc is turned by the hook of the draw lever the star wheel is moved, and when the shuttle cell of the revolving box is opposite the shuttle race the box is locked securely in such position by the concave and convex surfaces of the star wheel and disc. The connections from the weft fork are by way of the weft lever to the holding rod of the setting-up motion, thence by a lever to a rod extending to the back of the loom, and the latter is in communication with and receives motion from a moving part of the revolving box mechanism.—Oct. 12, 1901.

21,310. Sulphide colour. Nov. 24. R. B. Ransford, Upper Norwood (communicated by Leopold Cassella and Co., Frankfort-on-Main). Relates to the improved manufacture of blue sulphur dyestuff by heating p.-dialkylamido-p.-oxydiphenylamine with sulphur and alkaline sulphides, dissolving the melt in water, precipitating the colouring matter with acids, dissolving out the leuco compound of the blue sulphur dyestuff, and filtering off the solution of the pure leuco compound thus obtained, and oxidising the same.—Oct. 26, 1901.

21,335. Ingrain carpets. Nov. 26. J. Morton, Darvel, Ayrshire. Relates to Scotch or ingrain carpets, and has for its

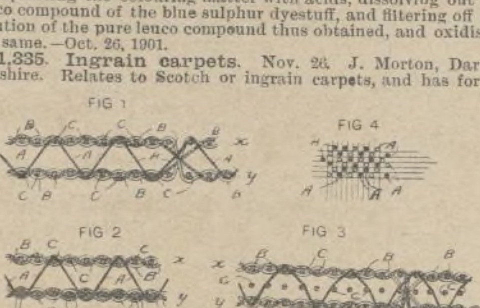


FIG 1 FIG 4 FIG 2 FIG 3

object to improve the manufacture and enhance the appearance and durability of carpets. Fig. 1 is a section taken transversely of the weft of a two-"shot" carpet; Figs. 2 and 3 are similar sections of a carpet having three "shots" of weft, the latter figure having one of the shots serving as a stuffer. Fig. 4 is a plan of one form of "weave" produced according to the invention. As shown by the drawings, A is the fine binding warp, B are the ground warps, and C are the weft shots, the binding warp A being manipulated as above described to tack or bind together the plies of cloth equally throughout the fabric, and independently of the binding effect due to the crossing of the ground and figure warp and wefts in the usual way.—Oct. 12, 1901.

21,365. Colouring matters. Nov. 26. G. B. Ellis, London (communicated by the Société Chimique des Usines du Rhone, Lyons). Relates to the manufacture of ortho-sulphonated derivatives of toluylic aldehyde, and to their employment in the manufacture of colouring matters and dyestuffs.—Nov. 2, 1901.

21,793. Lap rollers. Dec. 1. W. B. Soman, Parel, Bombay. Relates to improvements in or applicable to the lap rollers of scutching and the like machines for preparing cotton previous to carding or other operations. It consists of a tube or sleeve which is placed on the roller of the scutching machine, and upon this tube the lap is built. When the lap is removed from the roller of the scutching machine the tube is also removed with it, and the whole is transferred to the carding engine. The innermost fibres are thus undisturbed, and all the lap being suitable for treatment in the carding engine it can be all used up.—Oct. 12, 1901.

21,821. Production of indigo. Dec. 1. B. Willcox, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). Relates to a process for producing phenylglycocoll-ortho-carboxylic acid.—Nov. 9, 1901.

21,825. Decorticating. Dec. 1. H. Plassan, London (communicated by J. G. Hernandez, Amargura 7, Havana, Cuba). Relates to machines for decorticating ramie and other fibre, and has reference more particularly to the class of such machines in which the fibre to be treated is fed from a suitable table between two feeding rollers and under a presser bar to a vertically reciprocating frame formed with a transverse slot or opening, the upper and lower edges of which are provided with knives or cutting edges so that the plate in its movement breaks up and removes the woody portion of the ramie. For the aforesaid vertically reciprocating slotted frame, which is comparatively heavy in weight, and therefore requires considerable power to operate it rapidly, a device is adapted to oscillate about suitable end supports. This device preferably consists of a hollow semi-circular length of metal of approximately C-shape in cross-section, and extends transversely across the machine with the mouth thereof facing the feed rollers or feed roller of the machine. It has a longitudinal slot in its wall opposite to the mouth through which the ramie passes after being broken up by the said semi-circular device.—Nov. 2, 1901.

21,897. Dyestuffs. Dec. 3. H. E. Newton, London (communicated by F. Bayer and Co., Elberfeld). In Patent No. 23,927, 1894, was described the manufacture of new products and colouring matters by allowing hydroxyanthraquinones to act in a suitable manner on organic amido compounds of the aromatic series, and the conversion of the products or colouring matters thus obtained into other new derivatives thereof. It is now found that by treating derivatives of erythro-oxyanthraquinone with primary aromatic amines, blue colouring matters are obtained which are analogous to those prepared by condensing quinizarin with one molecule of an amine (quinizarin blue).—Nov. 2, 1901.

21,898. Dyestuffs containing sulphur. Dec. 3. H. E. Newton, London (communicated by F. Bayer and Co., Elberfeld). It is found that sulphurised substantive colouring matters react as thiophenols, inasmuch as alkylated or alphylated substitution products result, when they are treated with alkylating or alphylating agents. The said new bodies thus obtained differ from the original substances by reason of greater clearness and fastness of shades.—Oct. 19, 1901.

22,017. Carding engines. Dec. 4. C. O. Liebscher, Gera, Reuss, Germany. An automatic feeder is constructed in combination with a balance consisting of a plate suspended by two beams, so that the material falling off the feeding band glides down the plate, and comes on to the card table.—Nov. 9, 1901.

22,709. Drawing frame. Dec. 13. J. Moorhouse, 10, Park-parade, Ashton-under-Lyne. Relates chiefly to the ordinary textile drawing frame stop-motion devices, consisting of a small lever, pivoted to a fixed support, weighted at one end, at the other end of V formation, and commonly called the "spoon" or "tumbler" lever. The object is to make the action more sensitive and rapid without directly adding weight to the weighted end of the lever, and the V or spoon end is perforated with round, square, oval or other shaped holes.—Nov. 2, 1901.

22,776. Dyeing. Dec. 13. G. de Keukelaere, Alost, Belgium. Relates to improvements in machines for dyeing textile materials, such as cotton flock, wool on bobbins, and the like. Its object is to provide novel means of easily introducing the material into the machine and removing it therefrom after dyeing, and of ensuring without difficulty the regular circulation of the dyeing fluid across the material to be dyed and the uniform action of the liquid upon the material. It is characterised by a movable case intended to contain the material to be dyed, the case being closed at the top, and having perforated sheet metal lateral walls, and in the centre a conduit formed by two perforated metal plates. The machine is further characterised by a flush-joint arranged at the lower part of the case, and adapted to be automatically connected with the supply-pipe of the dyeing fluid through the weight of the movable case. A dyevat surrounds the movable case in such a manner that there is a space between the lateral walls of the vat and the perforated walls of the case, so as to ensure the free passage of the dyeing liquid across the case from the conduit to the perforated sides.—Nov. 16, 1901.

22,807. Shuttles. Dec. 14. J. Jucker, 29, Peter-street, Manchester. Relates to that type of loom shuttle which has a slot in connection with the shuttle eye, through which the thread is passed into the eye instead of being sucked through the same. Into the recess formed in the shuttle at the inner end of the slot and eye, a wire is secured, the upper end of which is bent sideways and enters the side of the recess in front of the respective or inner end of the said slot. In front of the wire and opposite to the inner end of the shuttle eye is secured a hook pointing downwards. The wire or piece serves to guide the thread into the slot and as it enters the eye, also underneath the hook, which prevents the thread jumping out or leaving the eye and slot.—Oct. 19, 1901.

22,812. Spindles. Dec. 14. E. Sykes, Turnbridge Ironworks, Huddersfield. Refers to self-contained spindles for ring and traveller and other like spinning and doubling frames, and comprises an improved application of oil cups or tubes to the bolster bearings. It consists of the application of the oil cup or tube outside the bolster bearing, such being made of suitable enlarged diameter to receive the bolster bearing, over which it is passed from the underside and secured in position by corresponding internal and external multiple screw threads.—Oct. 19, 1901.

22,825. Automatic change of shuttles. Dec. 14. E. Immer, Mülhausen. Relates to an appliance for the obviation of a stoppage of the loom when the spool runs out, by means of a mechanical substitution for the running-out shuttle shortly before it actually runs out, and with a contrivance for only an occasional tendance of the loom.—Oct. 19, 1901.

22,929. Buffers. Dec. 15. J. Booth, Standard Leather Works, Ramsbottom. Relates to improvements in picker savers or buffers used in looms for weaving, and the object is to make the picker saver or buffer and the buffer strap more durable, and to reduce the cost of the same.—Nov. 9, 1901.

22,947. Yarn. Dec. 15. R. Spitz, Water-lane Works, Thornton-road, Bradford. Relates to the manufacture of yarn from human hair, or human hair combined with other strong fibre, the human hair predominating.—Oct. 26, 1901.

23,157. Filaments from cellulose. Dec. 18. C. F. Topham, Sandycombe-road, Kew Gardens, Surrey. Relates to apparatus whereby filaments are formed from solutions of cellulose or other material, by forcing the solution through small orifices, the apparatus being such as to facilitate the manufacture and thoroughly filter the solution and keep it free from air bubbles, and also such that cleaning can be readily done.—Nov. 9, 1901.

23,541. Picking sticks. Dec. 24. E. Porter, 594, Manchester-road, Great Lever, near Bolton. Relates to improvements in picking sticks for overpick looms. These are made flat, preferably on two of their sides, instead of being rounded as heretofore, the flattened portion gradually tapering like the rounded portion previously did.—Nov. 16, 1901.

23,762. Punching jacquard cards. Dec. 29. J. Gibb, 33, Bartholomew-street, Bridgeton, Glasgow. Relates to jacquard card-punching machines, and has for its object to improve the selecting mechanism.—Nov. 16, 1901.

23,902. Colouring matters. Dec. 31. F. Kehrmann, Ecole de Chemie, Geneva. By the action of certain suitable oxidising agents—for instance, chlorine, bromine, ferric chloride, lead peroxide, chromic acid, bichromates, nitrous acid, persulphates and the like—thiodiphenylamine is easily converted into the corresponding phenazthionium compounds, in which R indicates an acid radicle. These phenazthionium compounds have an extraordinary reactive power, so they form valuable intermediate products for the manufacture of colouring matters.—Nov. 2, 1901.

1901.

176. Carding engines. Jan. 3. J. Rothwell, Roach Bank Villa, Tollcross, Glasgow. The lap rod is turned independently of the friction of the lap on the surface of the roller so that it will not cease to turn when the lap becomes small in diameter. Each end of the lap roller is provided with a metal rim projecting about 1in. beyond the surface, the surface of the rim being indented or corrugated like a shallow toothed wheel. As the lap decreases in diameter and becomes nearly empty the lap rod gradually falls until it comes in contact with the corrugated surface of the rim on the lap roller, and then the lap rod is driven direct by frictional contact so that there can be no stretching or breakage of the lap of cotton.—Nov. 9, 1901.

309. Printing metallic powders. Jan. 5. S. Schwabe and Co. Limited, 56, Mosley-street, Manchester; and J. Gilbertson. Relates to improvements in printing metallic powders and colours on textile fabrics, and in means or apparatus therefor. It has been practically impossible to successfully print on an ordinary garment printing machine with engraved rollers simultaneously more than one metallic colour on a piece of cloth, as the engraved roller, used for supplying the second metallic cover, has more or less obliterated the effect of the metallic colour applied by the first roller. This defect is obviated by employing in conjunction with the second engraved roller a roller which is recessed with a repeat of the pattern by the first engraved roller or cut away, so as to avoid such pattern. The cloth to be printed after receiving the first metallic colour is led away from the main printing bowl, and through the nip formed by the second engraved roller and the specially recessed roller, which also acts as a printing bowl, and by which means it receives the second metallic colour, whilst all pressure upon and consequent injury to the first metallic colour is avoided.—Nov. 9, 1901.

344. Printing machines. Jan. 5. J. Henderson and E. G. Gibb, Glendye Cottage, Dundee. Relates to continuous fabric or like printing mechanism, the construction and arrangement of parts consisting of a pair of impression rollers having their axes contained by the same plane for mutual action, or so that the one forms a printing base or bed for the other.—Nov. 9, 1901.

392. Blue-grey dyestuff. Jan. 7. O. Imray, London (communicated by Meister, Lucius and Brüning, Hoechst a/Main). It is found that by the action of sulphides of alkali metals on such compounds as are formed by introducing hydrogen sulphide into the heated solution of 1:5—dinitronaphthalene in concentrated sulphuric acid, blue-black cotton dyestuffs may be obtained.—Nov. 16, 1901.

834. Shearing wool. Jan. 14. Burgon and Ball Limited, Sheffield (communicated by W. H. Eyres, Hamilton-street, Sydney, New South Wales). Relates to mechanically-driven animal shears, and has for its object the obtaining of a more uniform contact between the cutter and the comb, the reduction in friction of the working parts, and the preventing of dust entering the interior of the machine.—Nov. 16, 1901.

913. Shades fast to washing. Jan. 14. H. E. Newton, London (communicated by F. Bayer and Co., Elberfeld). The new process consists in replacing the paranitrodiazobenzene (obtained by diazotising paranitraniline) by the diazo derivatives of dichloroanilines, such as orthoparadichloroaniline, ortho-metadichloroaniline, or meta-paradichloroaniline.—Nov. 9, 1901.

1239. Stripping flats. Jan. 19. W. Philipson, T. W. H. Philipson, and P. C. Philipson, Holland-street Ironworks, Astley Bridge, Bolton. Refers to improvements in the stripping and cleaning of carding engine flats, and relates to improvements upon the subject matter of Patent No. 3565, 1898, and consists in means for dispensing with the stationary flat and filleting mounted thereon, and substituting therefor a "comb" mounted on a shaft located in adjustable or other bearings in or on fixings secured to the framework on each side of the carding engine.—Nov. 16, 1901.

1388. Lacemaking. Jan. 21. A. G. Bloxam, London (communicated by A. and E. Henkels, of Langerfeld, Prussia). Relates to the bobbins in a circular lacemaking frame. A spring bolt is provided, which both keeps the bobbin in its place in its position of rest and urges it back within range of the driving notch when it is to be driven. In this manner certain operation of the machine is secured.—Oct. 26, 1901.

1571. Mangling textile piece goods. Jan. 23. C. Edmeston, Cannon-street Works, Salford. To facilitate the operation and improve the action of the mangling operation, the invention consists in replacing the plain surfaced metal rollers with finely-engraved rollers or bowls to improve the closing action of the rollers, thereby to better and more efficiently close and finish the fabric. The pattern on the rollers may be varied in form, such as fine lines, or fine figured patterns, as may be most suitable for the fabric to be treated.—Nov. 16, 1901.

1717. Drying wool. Jan. 25. J. Fielden, 32, Sussex-street, Rochdale. Relates to the improvement of the conveyers and driving mechanism in machines such as form the subject of Patent No. 5227, 1878.—Nov. 16, 1901.

1730. Winding and measuring yarn. Jan. 25. S. V. A. Hunter, the Universal Winding Machines Company, Deansgate Arcade, Manchester. Relates to improvements in measuring devices, more particularly designed to measure the length of yarn wound on to a spool, tube, or spindle.—Oct. 26, 1901.

1787. Colouring matters. Jan. 25. J. Y. Johnson, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). Relates to the production of reddish-yellow to orange colouring matters on the fibre by means of certain pyrazolone carboxylic-acid derivatives, and to the manufacture of certain new pyrazolone carboxylic-acid derivatives.—Nov. 16, 1901.

3051. Looms. Feb. 12. W. Weber-Honegger, Rüti, Switzerland. Relates to power looms wherein a rising shuttle box is employed; the improvements comprising mechanism for changing the position of the shuttle box. The motion whereby the change of position of the shuttle cells is effected is of such a character that, during the working of the loom, the desired shuttle cell is brought to the required level without any shock resulting, and irrespective of the previous position of the shuttle-cell box.—Nov. 2, 1901.

3238. Spindles. Feb. 15. J. Webster, Dundee (communicated by W. Panton, Seebpore, Calcutta). Relates to improvements in spindles and their nuts, or caps, used in connection with cop-winding machines, the object being to provide means for rapidly permitting of the removal or replacement of cops.—Oct. 19, 1901.

3735. Treating vegetable stems. Feb. 21. J. A. Lacote and P. E. Marcou, Rue du Debarcaderie No. 10, Paris. Relates to a new machine for stripping and preparing vegetable stems, such as ramie stems and the like, preparatory to spinning. The machine comprises two grooved rollers. The upper roller is mounted in movable bearings, which can be adjusted by means of screws. The object of this arrangement is to vary the distance between the two rollers. The vegetable stems are introduced into the machine over the plate or guide, and pass between the two grooved rollers, which, in carrying them forward, break the wood in the interior of the skin of the stem into small pieces, without, however, breaking the external longitudinal fibres. Thence the stems pass between grinders or rubbing devices.—Nov. 16, 1901.

4244. Cap bars for spinning frames. Feb. 27. Brooks and Doxey Limited, Union Ironworks, West Gorton, Manchester; and W. H. Cook. Provides for the securing of the loose fingers of cap bars of ring spinning, roving, and other frames to permit of the more perfect and easy adjustment of the loose fingers upon the supporting bar or spindle. It consists essentially in securing the fingers to the supporting bar by a triangular key by which they can be securely fastened in any position without cutting slots in the fingers.—Oct. 12, 1901.

4245. Ring rails. Feb. 27. Brooks and Doxey Limited, Union Ironworks, West Gorton, Manchester; and W. H. Cook. Relates to improvements in the poker or bar by which the ring rails are raised and lowered to render the same easily adjustable. In the lower end of the poker foot is inserted a grub screw without any projecting end or head. This screw is formed without a head, but with square or angular internal socket to receive a square or angular key by which it is screwed up or down. The end of the poker in the foot rests upon the screw, and by screwing in or out of the screw the poker is adjusted.—Oct. 12, 1901.

7225. Winding yarn. April 6. W. Clegg and J. S. Hargreaves, Spring Mill, Heywood. Relates to means whereby yarn and the like can be wound on to a beam or spindle. In order to dispense with the flanges on the beam, which are necessary with the ordinary method of winding the yarn or other material, it is plaited or cross wound for a short distance as regards the threads that are near to each end of the beam, the intervening portion being wound thereon straight.—Nov. 2, 1901.

7649. Slivers. April 13. H. H. Lake, London (communicated by C. Patrone, 44, Via Cernaia, Turin). The object is to produce a twisted sliver in hank form so as to ensure a greater degree of strength as compared with ordinary slivers, and to enable them to be readily dyed immediately or to be conveyed. The sliver *a* delivered from the cylinders *b* passes over an arm *c*, not, as usual, to the coiler rotated by a shaft *d*, but on to bobbins *j*, *j* arranged parallel on the fork *f* forming the twisting frame *g* in such a manner as to wind the sliver so as to form a small hank. The winding

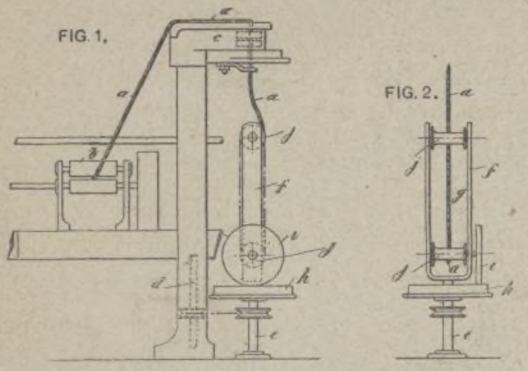


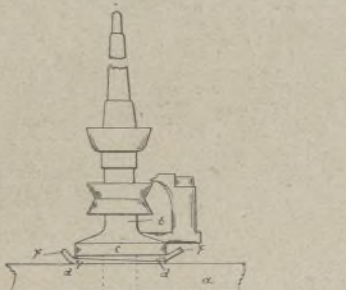
FIG. 1. FIG. 2.

operation is effected by causing the lowermost bobbin *j* to be rotated around its own axis through the intervention of the friction disc *i*, friction disc *h*, and shaft *e*. The friction disc *h* is mounted loose on shaft *e*, but is prevented from rotating therewith by any suitable means. As the two bobbins *j*, *j* are at the same time rotated around the axis of the shaft *e*, it will be evident that the sliver receives the required twist, which latter may be undone after the dyeing operation or other manipulation by twisting in an opposite direction.—Nov. 9, 1901.

10,188. Braid. May 16. A. W. Franklin, London (communicated by Kaiser and Dicke, Gewerbeschulstr 90/92, Barmen, Germany). Relates to an improved manufacture of braid specially applicable for producing ornamental designs. The braid is made up of two or more plaits independent of each other, except that their threads are interlaced or meshed at their edges only, the threads not being carried completely across the width of the braid as is usual.—Nov. 16, 1901.

11,022. Monobrom-indigo and dibrom-indigo. May 21. A. Rahtjen, Mittelweg 19, Hamburg. It has been discovered that brom derivatives and chlor derivatives of indigo are directly obtained of indigo of natural and of artificial origin, by adopting the usual methods which are applied to substitute the H atoms in the aromatic series by bromine and chlorine.—Nov. 2, 1901.

12,967. Plumbing spindles. June 25. W. P. Thompson, Liverpool (communicated by H. Kelly, Biddeford, Maine, U.S.A.). Relates to devices for plumbing spinning spindles, and consists of two bifurcated wedges, the space between the forks being sufficient to give entrance to the shank of the spindle case. Said wedges are placed one upon the other and between the top of the rail and the shoulder on the outside of the spindle case, and are provided with means for rotating the wedges upon each other and around the shank. In the drawing, *a* represents the rail, *b* the spindle case, *c* a shoulder on said case adapted to support the spindle case upon the rail, the shank *h* of the spindle case passing



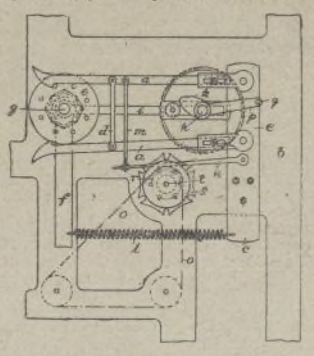
downwards through a hole in the rail (shown by dotted lines) and being secured beneath the rail by means of a nut *g*. The wedges *d*, *d* are of like construction, so that the description of one is the description of all. The outline or outer perimeter of the wedge is circular, having upon one side a greater thickness, which diminishes regularly to the other edge. At the thinnest part of the circle the material is removed, leaving a bifurcation, the width of which is equal to or very slightly larger than the diameter of the shank, while it extends into the wedge to such a distance that the part of the wedge left remaining at its thickest part is equal to the difference between the circumference of the shank and the circumference of the shoulder *c*.—Sept. 21, 1901.

13,893. Roving cans. July 8. G. S. Perkins, 1075, Boylston-street, Boston, Mass., U.S.A. Relates to improvements in the manner of re-enforcing the tops of roving cans or like receptacles, and consists in securing to the interior of the top or open end of such articles a re-enforcing band of fibre or similar material, the upwardly-projecting portion of which is afterwards soaked in water and bent outwardly and allowed to shrink against the exterior of the can.—Oct. 5, 1901.

13,941. Looms. July 9. W. F. Draper, Hopedale, Mass., U.S.A., and C. F. Roper. Relates to the production of an organised loom of great simplicity in its construction, and characterised by increased accuracy and definiteness of operation. It is particularly adapted for looms provided with mechanism for automatically replenishing the filling when necessary, but some of its features are also valuable with a plain loom of ordinary construction. There is provided means operative upon a predetermined decrease in the running speed of the loom to automatically stop the same.—Sept. 7, 1901.

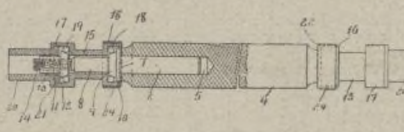
14,090. Drying apparatus. July 10. H. H. Lake, London (communicated by F. Hiorth, Christiania). Relates to a method of drying materials consisting in conveying the materials through a drying channel and circulating a volume of air through the channel in the same direction as the materials are moved, the air being held in continuous circulation through the drying channel and an air-heating apparatus, a small volume of moist air being allowed to escape and a corresponding volume of fresh air being taken into the channels in front of the heating apparatus.—Sept. 28, 1901.

14,422. Reversing apparatus. July 15. H. Albersmann, Nordwalde, Westphalia, Prussia. Relates to a device for reversing the direction of motion of the card cylinder in looms provided with shuttle-changing device of the types of Hacking, Fleer, Keighley, Smith, and others. The cylinder-reversing hooks *a* are pivoted to the iron bar *c*, secured to the main framing *b*, the hooks being maintained at the proper distance apart by means of the bar *d* pivoted to them. The pin-wheel *e* is rigidly secured to the shaft *g* of the card cylinder mounted in the oscillating arms *f*, and receives its motion from the bar *i* actuated by the driving shaft *h*, by means of a cam *k* keyed to the latter. Between the bar *c* and oscillating arm *f* a spiral spring *l* is arranged for the purpose of returning the pin-wheel *e* to its initial position when the cam *k* no longer bears against the bar *i*. In order that on advance of the bar *i* the card cylinder shaft *g* may be turned forwards or backwards, or stand at rest, the hooks *a* must be adjusted accordingly. This is effected by the hooks being connected by a rod *m* with a flat spring *n*, which rests on the pattern chain *o*. The links of the latter are of various heights, whereby the spring *n* receives an up-and-down



motion, according to the height of the links. When the spring *n* rests on the lowest link, the upper hook *a* engages in the pin wheel, so that when the bar *i* advances, the pin-wheel is held at the top, and a right-hand motion is imparted to the cylinder shaft. When the spring *n* rests on the link of middle height, the hook *a* seizes none of the pins of the wheel *e* on advance of the bar *i*. When the spring lies on the highest link, the lower hook *a* engages the pin-wheel *e*, so that on advance of the bar *i* a left-hand motion is imparted to the cylinder shaft. The fly-arm *p* secured to the driving shaft *h*, in turning engages with its pin *q* in the star-wheel *s* mounted on the shaft *t* of the pattern-chain cylinder *r*, rotating the latter. The pattern-chain cylinder and the star-wheel can be coupled and uncoupled as desired. The star-wheel is displaced laterally by the operation of the pattern card, so that the pin *q* can engage in the said wheel; when the action of the pattern card ceases, the wheel returns to its first position, so that the qin *q* no longer engages it.—Sept. 28, 1901.

14,515. Top rolls. July 16 L. W. Campbell, 540, South Main-street, Woonsocket, Providence, U.S.A.; and M. Campbell. Relates to top rolls for textile machinery, and more particularly to that class of rolls in which anti-friction devices are employed in the bearings. The object is to prevent dust and lint from gaining access to the anti-friction devices so as to clog them and prevent free rotation of the roll, and this is accomplished by the employment of guards and caps. The roll 4 is of the type in which the



bearings are at the end, being provided with sockets 5 for the spindles 6 which rotate therewith. Each spindle is formed with a shoulder 7, coincident with the end of the roll, and is reduced at 8 to receive the bevelled bearing collar 9, said collar having a radial or peripheral flange 10. At its end the spindle is threaded to receive an internally-threaded collar 11, which is bevelled at 12, oppositely to the collar 9. The hub 13 of the collar 11 is elongated, and is slotted at its end to receive a screwdriver or other implement by which it is screwed on the threaded end of the spindle. The collar is locked after adjustment by a screw 14 passed into the hub and "driven home" against the end of the spindle. Surrounding the spindle and the collars is a sleeve 15, which is adapted to receive the saddles, and is formed with cups 16 and 17 at its ends for the series 18 and 19 of anti-friction balls. The cup 16 extends over the flange 10, and fits rather snugly therearound, while the cup 17 is somewhat elongated, and is internally threaded to receive the threaded end of a tube 20, which has a flange 21 to engage the end of the said cup. The tube fits comparatively snugly around the hub 13 of the collar 11, and is extended some distance beyond its end to prevent dust, lint, or other foreign matter passing between them. A dust cap 22 is employed at the inner end of the sleeve 15, being perforated at 23 to receive the spindle It is placed between the collar 9 and the end of the roll, and it has a flange 24 which encircles the cup 16. Owing to the fact that the dust cap is clamped between the collar 9 and the end of the roll so as to rotate with the roll, there can be no passage of foreign matter through the opening 23 of the cap; and the depth or width of the cup 16 and the overlapping or encircling flange 24 is such that, although one rotates around the other, such foreign matter cannot practically pass the entire length of the narrow space between the cup and the flange.—Nov. 9, 1901.

14,619. Dyeing and sizing. July 18. W. E. Heys, Manchester (communicated by A. Masseron, J. Pivert, F. Chaplet, E. J. Mueller, and J. Caquelin, 19, Rue Cambon, Paris). Relates to improvements in apparatus for dyeing and sizing or slashing warps, whereby the warps may be wholly or in part dyed and sized or slashed in connected apparatus. In addition to these operations the warp may be simultaneously washed and otherwise treated with liquids.—Oct. 5, 1901.

14,711. Yarn-guiding cylinders. July 19. J. Tattersall, 30, Oldenzaal-straat, Enschede, Holland. Relates to a roller

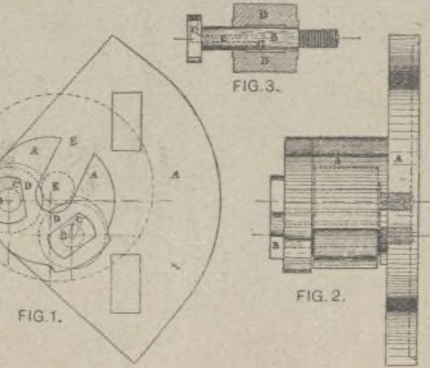


FIG. 3. FIG. 1. FIG. 2.

bearing for yarn-guiding cylinders. The bearing is illustrated in front view by Fig. 1, in side view by Fig. 2, and Fig. 3 gives a detailed view of the rollers D. As is evident from the drawing, A is the bearing proper, in which the two screws B, B, which are provided with a boring C, are fixed. By means of the screws B the rollers D are attached to the bearing A. Further, the ends of the guide cylinder E rest on the bearing. By means of the boring C in the screws B the lubricating material is introduced into the boring of the rollers D, so that the rollers D revolving around the screws B are regularly lubricated.—Sept. 14, 1901.

15,010. Looms. July 23. C. Hämig, Pfersee, near Augsburg, Germany. Relates to a new stop motion adapted for various kinds of power looms, and is based upon the fact that it instantaneously stops the loom on stoppage of the shuttles from any cause. Fig. 1 shows a side view of the loom in the position in which the device is inoperative during the normal working of the loom. Fig. 2 shows the device in operation The hook *b* is fixed to the rod *a*, arranged in bearings at each side of the shuttle box, so that it is raised or lowered according to the revolution of the said rod *a*. The latter is so influenced on normal working of the shuttle that the hook is held downwards. At the side of the brake wheel *n* is placed a brake block *c* which, with its pivot and guide *d*, is so arranged in a groove that it has a slight play to permit a forward and backward movement. The draw rod *e* for applying the brake by means of the hook and a releasing rod *g* connected with the lever *f* are attached to the said brake block. On the rod *a*, in addition

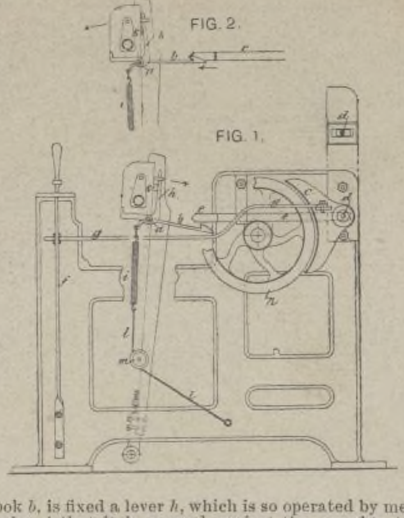


FIG. 2. FIG. 1.

to the hook *b*, is fixed a lever *h*, which is so operated by means of a strong spring *i* that it is pressed against the movable tongue *k* projecting from the shuttle box. The said spring is connected with a belt or strap *l*, which is fixed at its lower end to the loom, and passes over a pulley *m* arranged on the chest support.—Oct. 19, 1901.

16,141 Knitted fabrics. Aug. 12. M. Lutz, Herdweg 3 B, Stuttgart, Germany. Relates to knitted fabrics, and has for its object to produce a long striped material wherein every second or alternate row of meshes will consist of wide twisted meshes slanting upwardly, while the rows of meshes, otherwise known as "wales," lying between are formed of narrow straight-running meshes.—Nov. 16, 1901.

16,142. Reeds. Aug 12. E. W. Kemna, Gosenburgstrasse 79, Barmen. The general form of the reed is a trapezium. It consists of the narrow bridge *a* and the broad bridge *b*, which are connected by the lateral inclined stays *c*, c^1. Over the narrow bridge

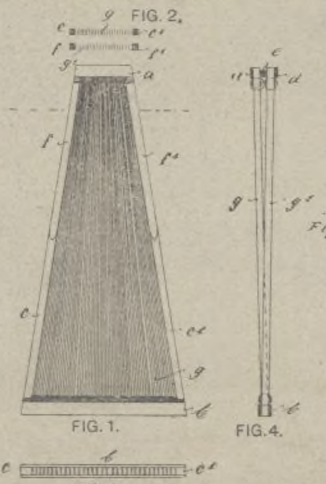


FIG. 2. FIG. 1. FIG. 4. FIG. 3.

is arranged a second bridge *d* which is separated from the first one by a metal piece *e* and connected to the shanks *c*, c^1 by means of shorter shanks *f*, f^1. The dents *g*, g^1 are all fastened with one end to the broad bridge *b*. Passing to the small bridge they are divided and one part *g* secured to the bridge *a* and the other part g^1 to the bridge *d* as shown in Fig. 2.—Oct. 26, 1901.

16,285. Cloth cutters. Aug. 13. G. J. Nopper, Paca-street, Baltimore, U.S.A. The object is to provide a cloth-cutting machine which will operate at a high rate of speed with little vibration, which will impart a direct vertical reciprocating motion to the cloth-cutting knife, and which will be balanced on the standard projecting upwardly from its baseplate, so that the machine may be easily and accurately shifted by the operator over the table supporting the layers of cloth to be cut.—Oct. 5, 1901.

16,322. Looms. Aug. 14. A. Shorrock, 4, School-terrace, Golborne, Newton-le-Willows. Relates to means for automatically applying tension to the warp beam at the end of a loom during the period that the warp is being drawn therefrom.—Oct. 26, 1901.

16,876. Dyestuffs. Aug. 22. A. G. Bloxam, London (communicated by Dr. Zimmermann and Co., Brugg, Switzerland). Relates to the manufacture of new, greenish-black, directly-dyeing, sulphurised dyestuffs for cotton by sulphurising monosulphonates of aromatic hydrocarbons of the benzene series, either separately or mixed, or by sulphurising the monosulphonic acids or the sulphochlorides or the sulphamides of the hydrocarbons.—Oct. 19, 1901.

16,980. Measuring fabrics. Aug. 23. A. J. Boult, London (communicated by C. J. C. Gierisch, Markt 8, Kamenz, Saxony). Relates to a device for winding off, stretching, and simultaneously measuring weaving materials from the large piece, as, for instance, during stocktaking or for selling from the piece. For this purpose a frame is provided carrying a winding mandrel receiving the large piece of fabric to be unrolled, a pair of stretching rollers pressed together by springs or other pressure devices, and a pair of measuring rollers. The pair of measuring rollers consist of a measuring roller proper of determined circumference, and provided with a counter, and also of a counter-pressure roller. The springs by means of which the stretching rollers are pressed together can be regulated as desired.—Nov. 2, 1901.

17,038. Cutting fabrics. Aug. 24. A. Breese, 75, Aldermanbury, London. Relates to improvements in cutters having a reciprocatory movement for cutting fabrics and other materials. Heretofore these cutters have either been in the form of an endless band or have been supported at the upper and lower end. The object is to produce a cutting knife with a vertical reciprocating movement at a high rate of speed which may be supported by a holder connected to the mechanism at its lower end and driven by a crank or cam, leaving the upper end free.—Nov. 2, 1901.

17,568. Embossing calendering machines Sept. 2. C. D. Abel, London (communicated by Johann Kleinewefers Söhne, Crefeld). Relates to embossing calendering machines of the kind in which each series of rollers is composed of an engraved metal roller and a corresponding counter-roller provided with a coating of paper, cotton, or the like, and it is intended to obviate the difficulties attendant upon the great pressure to which these devices are exposed during operation.—Oct. 5, 1901.

20,082. Lace edgings. Oct. 8. S. Kops, 216, East Fifty-eighth-street, Manhattan, New York. Relates to machines employed for the purpose of inserting tape or ribbon into lace edgings, and the object is to provide in the same device means for threading the lace upon a needle and for storing the same thereon, and for thereafter removing the lace edgings with the tape or ribbon inserted in the holes therein.—Nov. 16, 1901.