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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.

Cotton Machinery in Lancashire.

THOSE who take a pessimistic view of the future of the Lancashire cotton trade will scarcely find support for their gloomy forebodings in the very decided increase in the number of spindles which has been recorded during the last few years. That additions have been steadily made at a rate of about a million per year is tolerably good evidence that the threatened competition of the Southern States is not regarded by Lancashire cotton spinners as marking the downfall of their industry, although the character of the extensions shows a recognition of the fact that it is in the spinning of the finer counts that the future of the trade will lie. Thus, of some sixteen new mills which are either in operation or soon will be, only one has other than mule spindles, while in those concerns which are being modernised and brought as nearly into line with the new ventures as possible, the trend is unmistakably in the same direction. As is inevitable, some of the older mills have given up participating in a struggle in which obsolete machinery forms an insuperable obstacle to even moderate success, and in which the doctrine of the survival of the fittest is nowhere more forcibly exemplified. That there is every need for keeping fully abreast of the times both in machinery and methods it is now idle to insist; for the fact is thoroughly well understood that with the many advantages which must result from the ability to manufacture on the cotton fields, the competition of the Southern States must inevitably make itself felt in Lancashire, coupled as it is with the use of labour-saving machinery of the most ingenious and practical character. It is in this latter respect that we cannot afford to miss any opportunities of improving our position, and hence it is pleasing to find that a keen interest is being taken on this side of the Atlantic in such inventions as automatic looms and other labour-saving appliances of British origin. So far, at least, as the shuttle-changing mechanisms are concerned, English inventors seem to have scored a point over the much-vaunted American ingenuity; for while it is by no means settled that the Northrop loom, when all things are considered, can be regarded as realising the expectations originally formed respecting it, there is not much room for doubt as to the complete success of at least one form of the attachments made in England – a fact which probably accounts for the visits of interested Americans who are now in this country inquiring into the merits of these devices.

The Round Bale in Practice.

THE round bale came into commercial existence with a brilliant future before it—theoretically; but for various reasons it has hitherto failed to become as general as its promoters could have wished. Fortunately, most of its drawbacks are of a kind which may be remedied; but until such remedies have been made, and until old customs have been discarded, the utilisation of the round bale will naturally be retarded. English cotton buyers have been far from eager to benefit by the advantages which the round bale claimed, rightly foreseeing difficulties in actual spinning practice, although the more prominent makers of cotton-spinning machinery have introduced apparatus adaptable to the new bale. Most of the cotton packed in round bales has gone to the Continent, and it is there one must look for the actual results of the bale's adoption, from a practical and commercial standpoint. A Continental contemporary has taken the trouble to collect statistics on the subject, and from these we find that on the score of reduced shipping dues, cotton spinners receive no advantage, for brokers make no distinction in price between cotton packed in round and in the old square bales. The cost of railway carriage from the receiving port to the spinner's district is so trifling that it may be left out of account altogether. So far, the round bale shows little if any advantage over the square bale; but when the cost of receiving, weighing, taxing, etc., is considered, it shows to a decided disadvantage. In Bremen, for instance, receiving, weighing, arbitrage, hoisting, taxes, and stamp duties amount to 2½d. per 100lb. for cotton packed in square bales, whilst that packed in the round bales totals up to 3¾d. per 100lb. This means that in handling alone the round bale costs 50 per cent. more than the square bale. The tare of the round bale is less than that of the square bale, but the latter is more profitable to the spinner, for the tare allowed on square bales is 6 per cent. and on round bales only 1 per cent. Taking an average of a large number of bales of both kinds, it was found that the actual tare on square bales was 4·64 per cent., and on round bales 0·885 per cent., so that the spinner gained by the current tare allowances to the extent of 1·36lb in every 100 with the square bale, and a miserable 0·115lb. with the round bale. Coming to the disposal of the bale wrappings, the round bale takes a very slight lead. The cover of the round bale usually arrives in fairly good condition, and can be sold or again used for packing yarn, etc. On the other hand, the cover of the square bale usually arrives in shreds, and is of very little value; but the iron hooping added to it puts the two bales practically on a par as regards their outer covers. In the actual manipulation of the cotton the round bale suggests an almost ideal form, but actual practice has shown this to be a delusion. The first half of the bale unwinds beautifully, but the compression when winding has been so concentrated on the inner layers that as the lap grows smaller these layers are found to be compressed to an almost unworkable degree. Sometimes, when moisture is present, the cotton resembles leatherette or pasteboard rather than a raw fibre, and in such a condition gives rise to considerable difficulty in the scutchers and openers. Apart from those later processes, it is no easy matter to unwind the more central layers, and it is frequently necessary to tear the fibres off with hand hooks, a proceeding which more than neutralises any advantage accruing from the earlier stages of unwinding. Another point—and one peculiar to the round bale—is the claim of uniformity which the round bale people put forward. This is to the effect that each square yard of the lap weighs 3lb., a claim which, if realisable in practice, would be of immense assistance to the spinner. However, this claim has been far from trustworthy, and from a test covering 100 bales a German spinner finds that the weight per square yard varies from ·778 to 1·783lb. This, doubtless, is quite as near as could be really expected in practice, considering the early stage of the fibre; but it would perhaps be safer and more businesslike to avoid the making of statements which are only approximately correct. Speaking generally, Continental criticism on the round bale varies, and opinion seems to be pretty equally divided. What is wanted, in England at all events, is a bale which will properly unroll throughout its whole length, and one in which the amount of moisture is fairly regular. This latter point, according to Continental tests, has not yet been achieved by the round bale, although a point of great importance. The question of proper unrolling is one of considerably less difficulty. In fact, when certain mechanical deficiencies have been attended to and the unrolling difficulty overcome, there is no reason why the round bale should not become generally used; but, of course, not till then. When this has been attained the matters of rates, carriage, and other charges will adjust themselves—probably in favour of the round bale.

Textile Inventions Wanted.

THE list of money prizes and medals annually offered by the Mulhouse Industrial Society has been issued for the current year, and affords interesting reading to all concerned in textile progress. The various mechanical and chemical requirements are drawn up by experienced commercial men, and, apart from any idea of entering the competition, should be valuable to all who desire to take some part in the invention of improved methods or machines. Reading through the list of prizes, we are also shown distinctly where modern science and practice fails to reach present-day requirements, and the direction is pointed out wherein the inventor can most profitably work. In addition to improved processes and machines, there are also offered medals and prizes for essays, ideas, and similar information. In the spinning section there are wanted :—A practical treatise on the working of carded or combed cotton, and also of waste, describing all the requisite machinery ; a treatise on the spinning of worsted in grey or colours on the best modern systems, and explaining the most suitable machinery ; a work on the twisting of cotton and wool by the most up-to-date methods ; and an essay on the power necessary to drive each machine in a cotton or worsted spinning mill. This latter question has been previously brought to the front by the society, but, as may be naturally supposed, the figures are constantly changing as new machinery and methods are introduced. Apart from these changes, however, there is a marked absence of reliable and, approximately, recent data available on this subject. There are also wanted : A new machine, or series of machines, for preparing all kinds of long-stapled cotton, silk or wool for combing, these machines to have features which will give them an advantage over those used in present practice, and which will present the fibres to the comb in a thoroughly cleaned condition ; a new machine, or series of machines, for cleaning all kinds of short cotton or silk and preparing them for carding ; and a spinning frame which will produce cotton wefts of from 44's to 72's counts, equal in every respect to mule yarns. Although applicable to almost any department of the textile industry, the spinning section also contains offers of medals and prizes for a practical installation which will enable the atmosphere of spinning rooms to be maintained with a saturation of 80 per cent., to lower the temperature to 22° C. in hot weather, and renew the air in a manner that will respond to the modern ideas of hygiene, without a draught being noticeable. Medals are also offered for installations which, although not fulfilling the above conditions, will still show a marked improvement on present practice. The weaving section invites the introduction of a positive under-motion for jacquards to be placed under or below the loom, or in the jacquard itself, which will not only be suitable for small designs, but will be as applicable for floral and other large effects, and not in any way reduce the speed of the loom ; and the invention of a machine for drawing-in and slaying warps which can be temporarily and easily affixed to any loom, either jacquard or otherwise, and which can be set to draw in warps ranging from 100 ends per inch downwards. In the bleaching and printing sections medals are offered for improvements in drying, steam admission, and similar minor departments. The chemical side of textile industries naturally receives the most attention, for in spite of rapid additions to dyestuffs and similar drugs, Continental interest is generally more of a chemical than of a mechanical nature. Essays are requested on the theory and manufacture of alizarin reds by a rapid process employing drugs which will make them readily soluble ; on the theory and manufacture of cochenille carmine of a superior quality ; on cotton colouring matters and their relation to the mordant in grey or partially-bleached goods ; the different compositions of aniline blacks ; the physical and chemical changes taking place in the transformation of cotton into cellulose ; the chemical changes which wool undergoes when under the influence of hypochlorites, chlorine, and the oxygen compounds ; the constitution of one of the colouring matters used for printing calicoes, whose composition has not yet been studied ; the solutions containing metals which leave their bases on textile fibres, and the conditions under which mordants and dyes give the best results ; and on iron mordants and the part they play in dyeing followed by oxidation and hydration. In the region of more definite work, medals are offered for the production, by synthesis, of cochenille colouring matters ; for a new means of manufacturing by synthesis some natural colouring matter largely used in the textile industry; for a theory of the formation of some natural organic substance which is largely used by synthesis ; for the introduction of some metal, not usually employed, in a useful form for dyeing or mordanting ; for an aniline or other black of the same solidity which does not weaken the cloth, and which will take printed colours (especially albumen prints) without affecting their shade ; for a black soluble in any vehicle which when used for dyeing resists the action of light and soaping as effectually as aniline black ; for a pleasing blue of low cost which will be qualified for blue-tinting wool goods and will resist the action of steam and light ; for a blue dyestuff of the same shade and solidity as ultramarine, which may be chemically fixed on cotton without the aid of albumen or other thickening matter ; for a full yellow dye going on the fibre like an alizarin, and possessing similar properties ; for a tannin red as vivid as alizarin red, composed of a material which, after a passage through emetic, is capable of withstanding soaping ; for a purple, dyeing cotton either with tannin or a mordant, and possessing the properties of aniline red when dyed on wool ; for the introduction of a colouring matter capable of replacing logwood in its different applications and having the same stability and solidity of shade ; for a reserve adapted for steam colours on wool, which will easily wash off, and is accompanied by something different to tinsalts, hydrosulphite, the sulphites or bisulphites ; for a new method of fixing aniline colours ; for a means of enabling immediate colours to resist soap boiling and the prolonged action of water ; and for metallic printing powders having the brightness of gold or silver and resisting scouring and steaming. Medals are also offered for an indelible ink for marking grey pieces, which will not run, stain, or disappear in the subsequent bleaching, dyeing, or printing processes ; for a reliable method of obliterating stains made by mineral oil ; for an improvement on the present methods of bleaching wool or silk ; and for an alloy or other substance with which to make the scrapers of printing rollers, which unites the elasticity and durability of steel with the property of being unaffected by chemical action when acid colours or metallic salts are being used. Numerous other medals—gold, silver, and bronze—are offered for allied subjects and improvements, some carrying prizes of £20 and downwards; but it is requisite that all information be written in French, and many of the mechanical improvements must be tested in Alsace. In case any of our English readers wish to undertake any of the subjects, it may be stated that their essays must be sent in by February 15, 1902, to the President of the Society, Mulhouse, who will probably be only too glad to supply further information on any subject.

Labour Questions.

AMONGST the numerous scientific subjects discussed at the recent meetings of the British Association was one which is of special interest to both employers and workpeople—classes which, as a rule, are little concerned as to the proceedings of learned societies. Although of interest, the matter was unfortunately rather crudely put by the reader of the paper, but it is as well to occasionally see things as other people see them, however pessimistic the other man may be. Almost at the same time the American papers were discussing the overbearing attitude of workers, and predicting ruin to certain industries through the rapacious demands of labour. Across the Atlantic strikes have been largely in evidence of late. In spite of American progressiveness in other directions, their strikes are conducted on both sides with the bitterness and short-sightedness which characterised those in our own country in the earlier years of the last century. There are many foolish ideas held in our own country by the great bulk of trade unionists, and it will be necessary to dispel these before the ending of labour troubles can be even thought of. This will not be done by denouncing members of trade unions in bulk, for these unions are with us and have come to stay, whether welcome or not, and they will in all probability play a very important part in the future. Putting party, and therefore prejudiced, feelings on one side, and looking at the matter from an outside view, the main error of most trade unionists seems to be an expectancy that work should be provided for all, even if incompetent, weak, or lazy. This demand might be rational if we had reached the millennium or attained to the position Socialists sigh for; but we have not got to either stage, and it cannot be expected that our millowners can run their factories on philanthropic lines. Another mistake trade unionists make is in their despotism—if they cannot or will not accept terms, they resort to the dog-in-the-manger policy of trying to prevent others undertaking the work. Fortunately the laws of our country, if intricate and troublesome, are just, and the recent decision of the House of Lords anent the picketing system of strikers will go far to relieve the more willing workers of being subjected to this baneful custom. In spite of their many glaring defects, trade unions have many good points. They have been the means of placing honest manufacturers in as good a position as sweaters ; they have increased the efficiency of the worker by improved sanitary and hygienic laws, which owe their existence partly to trade-union agitation and their publication of many unhealthy conditions ; they have also done much by having an organised system, which makes arbitration much more practicable than when a disjointed, undecided rabble had to be dealt with. The main points to be remembered are that the demand makes the supply, and that the demand can be increased by a cheap, good, and reliable production ; that good honest work puts wages on a better basis, while scamped work cheapens goods and lowers wages. If trade unions want something to discuss—and, as a rule, a discussion is what they mostly glory in,—a very good subject would be, "How to do Without Foremen and Overlookers." It is true many, perhaps most, workers would be glad to find these gentlemen dispensed with, but the abolition will never be made until such are of no use. Thousands of pounds are paid away every week in our textile industries simply for overlooking workpeople—for seeing they do the work for which they are paid. It is non-productive work in a direct sense, but if trade unions could instil the necessary conscientiousness into their members, so that each could be relied upon to work without being watched, a great saving, which would eventually reflect upon wages, would be made.

ARTICLES.

Winter Styles.

From Our Continental Contributor.

It has been the custom for many generations for England and America to look to Paris as the leader of their fashions, but for once places have been reversed and Parisians are following the lead of their former pupils. During the Paris

Fig. 1.

Exhibition there was shown at the stand of Messrs. H. G. Porter and Co. a variety of rough woollen goods having a surface more like a horse blanket than anything else, but the soft contrast in the colours of the figures, stripes, and checks at once showed a combination of beauty and originality—qualities which the Parisian mode artists are ever searching for. These hairy cloths were being made and

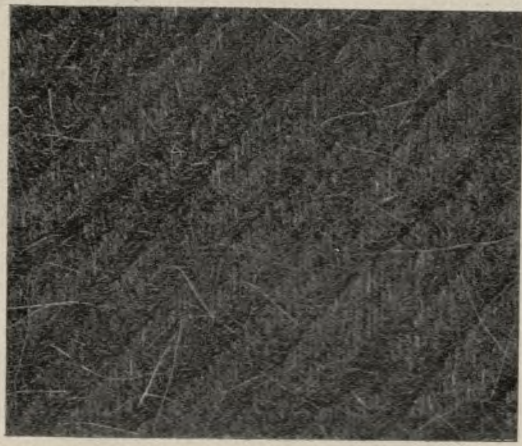


Fig. 2.

worn in both England and America, and the advent of lady visitors from those countries, wearing dresses of the new goods, gave an impetus which has pushed these cloths to the front in the world's fashions.

Fig. 3.

Following the plainer hairy cloths, effects of a more fancy nature were introduced, rather slowly at first, for there was a great doubt as to the lasting nature of the demand. Now, however, not only English, but French and German manufacturers are making large quantities of goods, using nearly every kind of hair that comes to hand which will in any way serve their purpose. There has been a long run on smooth-faced, solid-coloured goods for ladies' suits and costumes, and these have become very common and ordinary, otherwise it is doubtful whether such a successful advent could have been possible for hairy goods. Not only are large quantities in hand for the autumn and winter seasons, but many leading firms have been asked for light hairy cloths suitable for the spring of 1902,

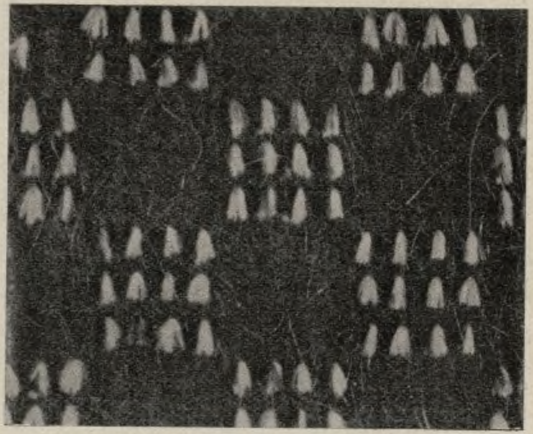


Fig. 4.

so there is every prospect of the goods becoming general for the next season or two. Some experimental cloths made with mixtures of wool and ramie, and wool and asbestos, have been tried, but so far they are very inferior in appearance to the usual mixture-coloured wool combined with white mohair noil.

Fig. 1, although having the appearance of a wool fabric, is composed chiefly of a cotton ground,

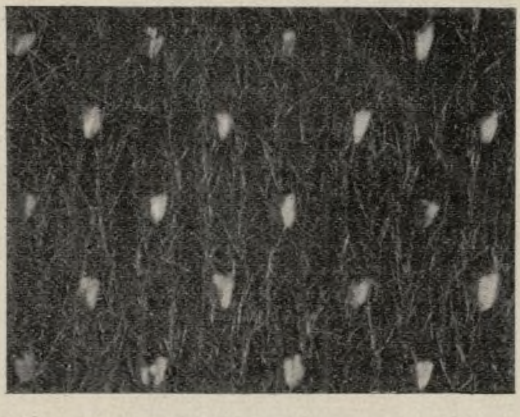


Fig. 5.

mercerised in both warp and weft, whilst a small overchecking of fancy yarn is worked in with long floats on the face. This fancy yarn is composed of strands of black cotton and white mohair, the mohair being looped. After weaving, the mohair

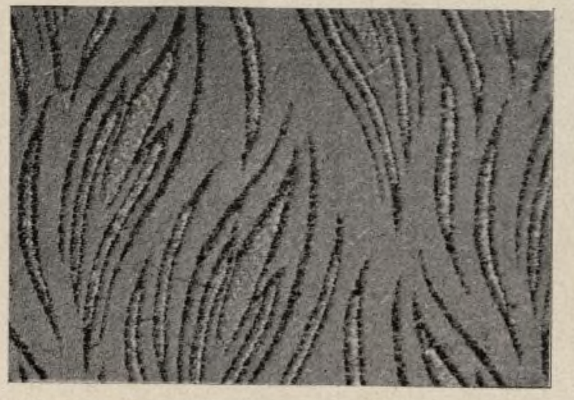


Fig. 6.

loops are cut in the shearing machine, and the cloth is well gigged on the face, giving it the appearance of fur.

Fig. 2 is a diagonal with undulating lines, which partly imitate crape and partly suggest an ondulé pattern running diagonally, the design being complete on 32 ends and 32 picks. The warp is a 2/32's mixture coloured worsted containing some common white mohair noil, while the weft is plain black worsted.

Fig. 3 is a Biarritz cloth, the stripes being composed of weft floating over four warp ends, each alternate stripe being bound plain on the face, and the others on the back, so making a reversible cloth of weft cord stripe and warp repp. The warp has 68 ends an inch of 2/60 black Botany, and 68 picks of weft, 1 pick 1/32 black worsted, and the alternate picks 2/32 mixed coloured worsted containing an admixture of white mohair noil.

Fig. 7.

Figs. 4 and 5 are two designs in a cloth of very novel construction. The reed has 13 dents an inch, of which every other is missed, and the alternate ones each contain the following ends :—

1 end worsted.	1 end black cotton.
2 „ black cotton.	1 „ white mercerised.
1 „ black mercerised.	2 „ black cotton.

The worsted end is the colour of the weft, and is douped, so that it floats backwards and forwards over the other seven ends, like extra weft. All the

Fig. 8.

ordinary black cotton ends weave plain in opposition to the two mercerised threads (both black and white), which also weave plain except where they are formed into a loop pile, the loops of which are afterwards cut. The weft is 1/32 mixture

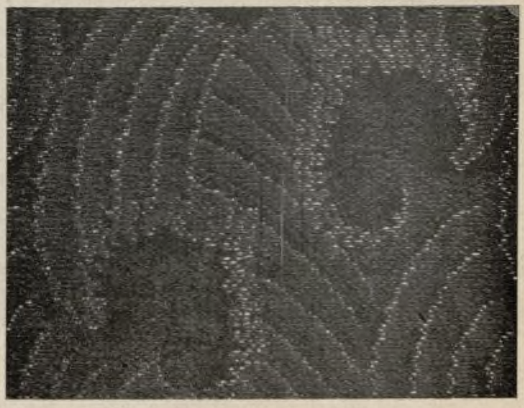
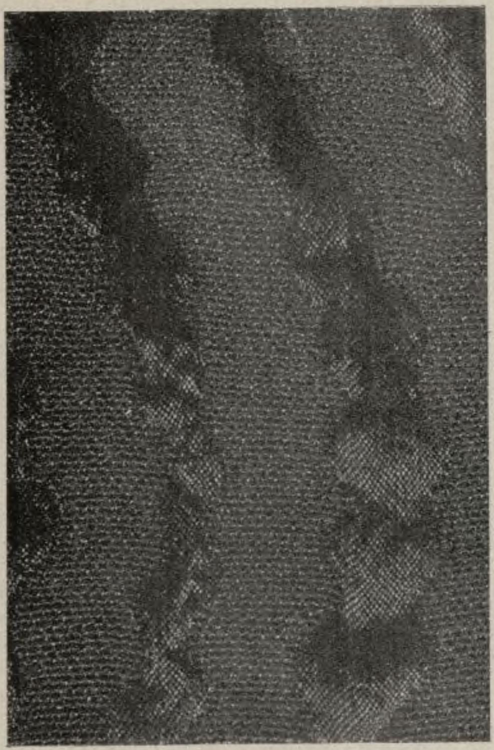


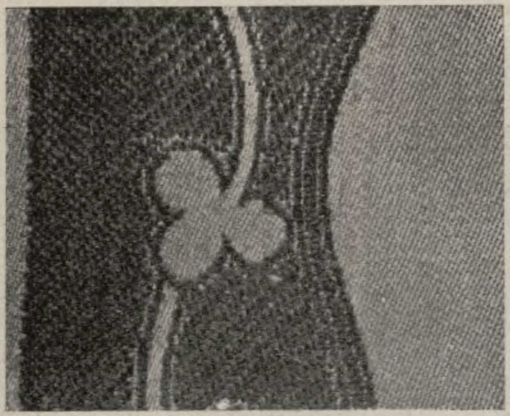
Fig. 9.

coloured worsted containing white mohair ; the cloth is well milled and shrunk about 15 per cent. in width, and then well brushed—a proceeding which lays the mohair fibres of the weft and the cut pile of the warp in a line with the warp, the warp pile forming little black and white bunches, which may be arranged in varied order according to the whim of the designer.



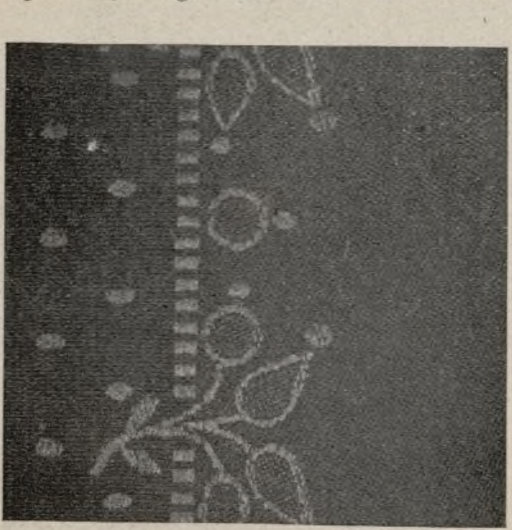
WINTER STYLES.—FIG. 10.

Fig. 6 is a jacquard pattern having 84 ends per inch of 2/60 coloured Botany in the warp, while the weft is put in pick-and-pick, one of 2/36 black



WINTER STYLES.—FIG. 11.

Botany, and the other 2/32 mixture coloured worsted, containing white mohair. The ground is warp sateen; the figures are outlined with the black



WINTER STYLES.—FIG. 12.

weft, while the centres are worked with the mixture weft, and a slight brushing and pressing after cropping give the required hairy appearance.

Leaving the hairy effects for the present, Fig. 7 represents a novel design, woven in the simple shalloon twill. The weft is all black woollen, while the warp is a twist yarn composed of a fine thread of black woollen and a strand of white silk bourette, knots being formed with the latter during spinning. There are 20 ends and 20 picks per inch.

Fig. 8 is a black épinghué crépon made with a 42-denier organzine warp, 140 ends to the inch; while the weft, which has 80 picks per inch, is 2/60 black Botany and grège silk, woven pick-and-pick. The warp weaves repp with both wefts to form the ground, whilst in the figure it only weaves with the grège weft, and the worsted floats on the back. The veins and outlines of the design are made with floatings of the black worsted weft.

Fig. 9 is another épinghué crépon which has the additional feature of sheeny floats of artificial silk. The warp consists of 74 ends per inch of organzine, and an additional 37 ends per inch of 2/100 cotton for binding purposes. The weft has 176 ends per inch, shot with a pick of heavy woollen for the rib, one of black grège for the figure, and one of white artificial silk for the spangles.

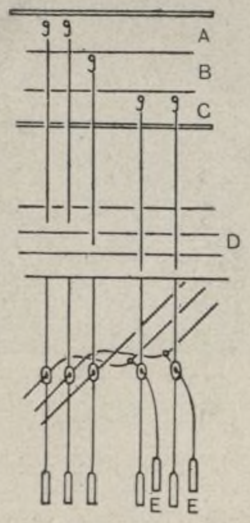
Fig. 10 is an undulated pekin stripe design having alternate stripes of crépon and canvas. The warp has 156 ends per inch of organzine and cotton threads alternately, and 96 picks of black grège and gold-coloured artificial silk, the former working in both stripes, whilst the latter forms the edgings.

Fig. 11 is a jacquard bordering for a plain whipcord cloth formed by an extra black warp and weft; whilst Fig. 12 is a similar type of design, where only extra warp (spun silk) is used.

Jacquard Effects in Velvet and Gauze.

By LOUIS LEPERS.

WHEN weaving figured patterns in velvet and gauze it is unusual to use shafts or healds, the jacquard being used where necessary as a gauze harness. The machine is divided into sections, or sets of cords, according to the crossings which the gauze portion requires, one example of which is given in Fig. 1. This is a view taken from the back, showing the gauze cords at A, the pile cords (the threads of which also act as stationary ends when weaving gauze) at B, and the cords operating the doups at C. The loose



JACQUARD EFFECTS IN VELVET AND GAUZE.—FIG. 1.

slips of the doups are shown at E, while D represents the comberboard. An example showing a specimen setting in an 880 machine is as follows:—

Velvet warp ...... 160 ends in the pattern.
Gauze .... 320 „ „

480
160 ends per inch.

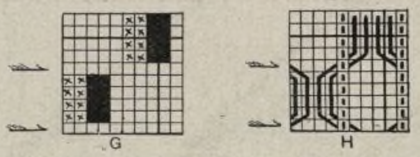
Velvet weaving .... 160 hooks.
Gauze „ .... 320 „
Doup slips .... 320 „

800
80 hooks cast out.

When weaving a plain portion, which is neither gauze nor velvet, it is often preferable to do it by lifting the hooks of B alternately with the hooks of C—a method which greatly relieves the wear and tear upon the loose slips of the doups E, giving them a straight lift instead of bending them round the stationary thread.

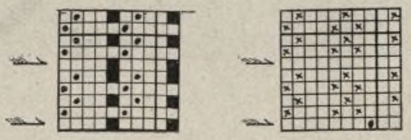
Supposing the gauze portion takes four picks in the shed, each set of threads working opposite to each other, as shown diagrammatically at H in Fig. 2, the design shown at G in that figure will give the required lifts. Provision is made for the wires of the velvet portions on the picks marked by arrows, for velvet may be weaving concurrently in some other portion of the design. The longitudinal rows of empty squares represent the stationary threads (B in Fig. 1), the full squares the gauze ends lifting, and the crosses show where the doups lift.

The velvet or pile portion is shown in Fig. 3, the doup hooks being inoperative in this part, as may



JACQUARD EFFECTS IN VELVET AND GAUZE.—FIG. 2.

be seen by the double rows of unmarked squares. The pile threads (which act as stationary ends in the gauze portion) are shown by full squares, and the ground (which weaves gauze in the gauze portion) by dotted squares. This ground weaves plain and makes a firm foundation for the pile, which itself is regulated in height by the size of wire used. The pile threads must be wound upon bobbins placed in a creel behind the loom and



JACQUARD EFFECTS IN VELVET AND GAUZE.—FIGS. 3 AND 4.

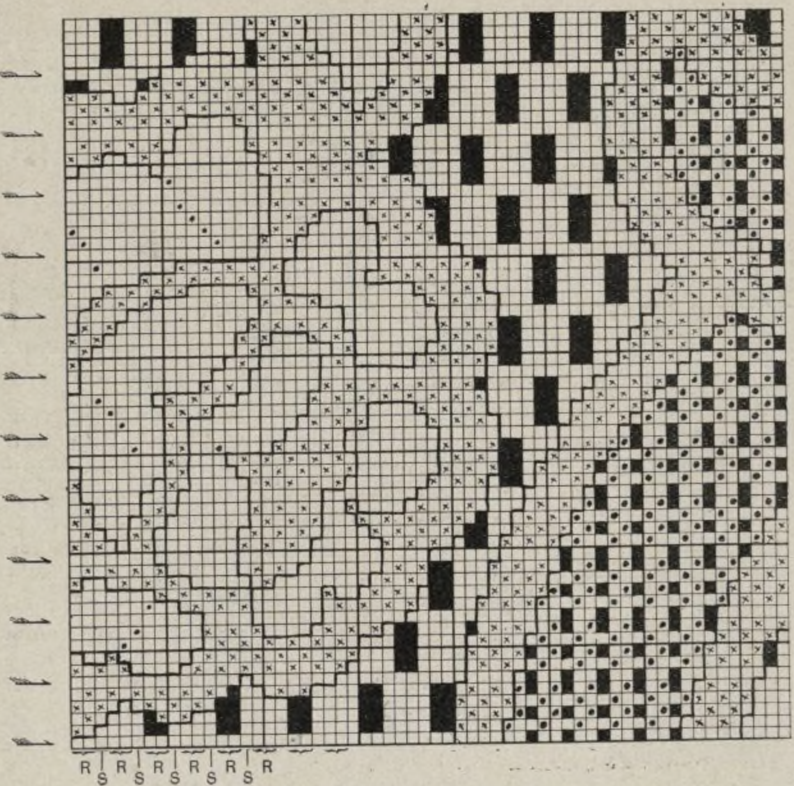
supplied with some simple tension device, for the intermittent way in which they come into work in making figured velvet makes it impossible to use a beam or roller for the pile threads.

If portions of absolutely plain cloth are required in such a pattern as is being discussed, this plain portion is arranged as shown in Fig. 4, vertical blanks being left where the doup hooks work, and horizontal blanks where the pile wires are inserted. Upon this plain ground (which may be twill or other weave, if made on similar lines) an ordinary jacquard figure, broché, or other effect may be worked without partaking either of the character of the velvet or gauze portions. The wires which form the pile threads into loops are oval in section, and are provided with a slot, running all along

JACQUARD EFFECTS IN VELVET AND GAUZE.—FIG. 5.

their upper surface, for the cutting knife which eventually severs the threads to slide in. The rows of loops are not cut until about seven or eight others have been formed, otherwise there would be a risk of the severed ends being pulled out by the tension put upon them by subsequent wires or by shedding. Pile fabrics are not wound upon a beam when woven, but are delivered by a spiked roller into a box or basket, in a manner to prevent the crushing of the pile.

To show the method in which the above-mentioned weaves are combined in a fancy figured pattern, Fig. 5 is given, showing a combination of



Jacquard Effects in Velvet and Gauze.—Fig. 6.

the different weaves. All the ground is four-pick gauze; the black floral sprigs are weft floats with an edging of plain to hold it together and separate it from the open gauze; and the parts worked out in mid-grey are velvet. The portion marked off in the left-hand bottom corner of Fig. 5 is shown worked out in design paper in Fig. 6. Here the wires are marked by arrows; gauze threads are shown at R, and pile threads at S. The doup hooks are omitted, for these would only distort the design; they are treated as cast-outs during the first cutting, and put in afterwards. The doup hooks lift when their gauze ends are down in the gauze portion, and are down everywhere else unless they are utilised for plain weaving in preference to gauze hooks. With an expert card cutter it is really only necessary to paint the design in one colour for each kind of weave, and then different kinds of gauze or pile may be cut direct from lifts like those given in Figs. 2, 3, and 4, as required, and a different gauze or a different pile put in to suit circumstances, without altering the main design.—"L'Industrie Textile."

Designs for Cotton Fabrics.

Specially Contributed.

PATTERN No. 199 is a good sample of a cheap blouse cloth of winter weight. The black warp is a single-twist cotton, while the weft is a soft-spun single cotton, containing a slight

Cotton Designs.—Fig. 2.

admixture of wool. On the strength of this small percentage the fabric is classed as a flannel, after being slightly raised. The fabric is not only cheap, but very easily made, although requiring a dobby. The ground is plain. Another two shafts are required for the four centre ends of the small stripe, which weave repp, and two healds and a doup for the gauze effect, which, however, could be woven

Cotton Designs.—Fig. 1

without doups on the bead system described on page 149 of the current volume of The Textile Manufacturer, if double ends were substituted for the present single ones.

Pattern No. 200 is a good specimen of a fancy stripe with two doups. Of late years douped

Cotton Designs.—Fig. 3.

effects have been made on a large scale, and almost every conceivable arrangement has been tried at one time or another; but some of the most attractive specimens are usually to be found on a small number of doups. The pattern shown illustrates a type of design which could be adopted to give very pleasing effects in coloured goods and in better-class cloths, for the plain ground, with two picks in a shed, shows the stripe up to advantage.

Fig. 1 is a design for a cotton muffler made with a 96-reed harness, and shot with about 100 picks to the inch. The figuring should be worked with warp and weft, getting plenty of different effects, such as oatmeal, bold warp and weft twills, and fast weft. The ground should be 4-and-1 warp satin. This is a good style of design for mufflers, and very suitable for mercerising.

Cotton Designs.—Fig. 4.

Fig. 2 is a sketch for cotton linings. The warp should be in a 70 reed, and shot 66 picks to the inch. The black figuring should be weft, shaded into the 4-and-1 warp satin ground. The grey should be fast weft. Inside the figures a cross 3-and-1 twill may be used to make it different from the ground.

Fig. 3 is a design very suitable for a zephyr cloth, made with a 76 reed, and shot with about 70 picks to the inch. The black figures should be weft, and the grey warp on a tabby ground. Inside the grey shapes a bold warp twill should be used to lift the figuring above the ground.

Fig. 4 is a design on similar lines to the above. The black diamonds should be weft, with the grey figuring warp bound down with 4-and-1 satin, lying on a tabby ground.

Cotton Designs.—Fig. 5.

Fig. 5 is a sketch for a cotton all-over cloth made with an 84 reed and shot about 110 picks to the inch. The figuring should be made from the warp, and inside the grey figures should be tabby. The ground of the design should be 4-and-1 weft satin.

Fig. 6 is a pattern for a cotton handkerchief made with an 80-reed harness, and shot with 86 picks to the inch. The figuring should be made with the weft. The oatmeal should also be weft lying on a 3-and-1 warp twill. The ground inside the pansy and where the coral work is, should be

Cotton Designs.—Fig. 6.

4-and-1 warp satin. The white shape round the figure should be tabby, which will give a firmness to the cloth.

Fig. 7 is a sketch for a cloth made with a 90 reed and shot with 100 picks to the inch. The black figuring should be floating weft, with the grey 4-and-1 warp satin. The ground should be tabby. Care should be taken when drafting this pattern to run the weft by threads as much as possible, so that it will look sharp and clear and float well.

Designs for Silk Fabrics.

Specially Contributed.

PATTERN No. 201 is a combination of chêne and gauze stripe, the latter being made to give the appearance of insertion work. The ground warp is dressed, printed, and woven in a plain groundwork from one warp beam, the gauze threads being on separate rollers. Only one doup is necessary, and the insertion or lace effect is got by the crossing threads surrounding groups of two and eight weft threads alternately. These chêne effects generally result in designs of soft contrast, but it is doubtful whether the extra expense incurred by printing the warp will ever enable this type of cloth to become really popular.

The chief feature of Pattern No. 202 is the imitation gauze stripe, consisting of an undulating design made by the jacquard. The whole ground warp is black, and the wavy black line in the stripe is made from this ground warp, whilst the white portion of the stripe, weaving rib, is made from extra ends arranged end-and-end with the black in the portion devoted to the stripe. It will be noticed that the black portions lying on the white are nothing more than short twilled portions running alternately in opposite directions; yet a decided sinuous appearance is produced.

Fig. 1 is a good design for a silk brocade made with a good net silk warp in a 2000/4, and shot 00 picks of tram to the inch. The floral figuring should be made from weft, with a little warp introduced. The grey figuring should be fast weft with 2-pick inside as a groundwork, and small weft flecks scattered about. The ground should be 7-and-1 warp satin.

Fig. 2 is a sketch suitable for piece goods made with a 2000/2 net silk warp, and shot with 110 picks of tram to the inch. The black zig-zag should be made from weft bound down with 7-and-1 twill,

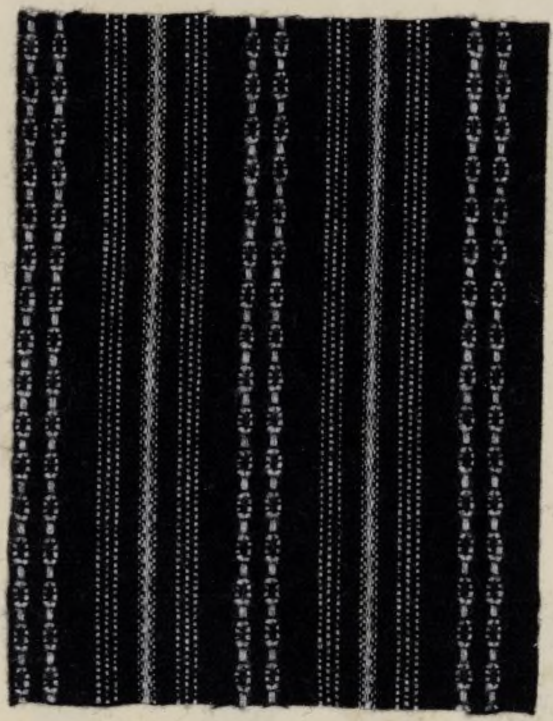
Cotton Designs.—Fig. 7.

and the grey zig-zag should be 2-pick. The running figure should be weft, well floated except where running over the weft zig-zag, and there it should be 7-and-1 warp satin. The ground of the design is a 3-and-1 warp twill.

Fig. 3 is a pattern for a blouse cloth made with an 1800/2 spun or net silk warp, and shot with about 96 picks to the inch of tram. The figuring

PATTERN SHEET No. 108.

Samples of Cotton Cloths.



PATTERN No. 199.

PATTERN No. 200.

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. 109.

Samples of Silk Fabrics.

PATTERN No. 201.

PATTERN No. 202.

should be made from the weft, except where white in the flower, and there a 7-and-1 warp satin should

Fig. 1.

be used. The ground of the pattern should be 3-and-1 warp twill. The smaller figuring on the

Fig. 3.

ground should be bound with 3-and-1 and 5-and-1 twills to keep it under the flower.

Fig. 4 is a design for piece goods made with a 2000/4 net silk warp, and shot with about 120 picks of tram to the inch. The figuring should be made from weft, with a little warp introduced to give a

Fig. 5.

bright effect. The ground figure should be made from the warp, bound down with 3-and-1 twill so as to give a shaded appearance. The ground should be tabby.

Fig. 2.

Fig. 5 is an all-over design which can be well worked up for a cloth with a net silk warp. The black should be weft, and the grey 3-and-1 weft twill, but floated to 7-and-1 satin on the edges. The ground inside the leaves should be 7-and-1 warp satin, and the ground of the design 3-and-1 warp twill.

Fig. 4.

Fig. 6 is a good fancy ground suitable for a tie cloth, made with a 2000/4 net silk warp, and shot with 90 picks of tram to the inch. A nice swivelled figure should be put "off points," to make a good tie pattern. This design would come up well woven with a black warp, shot black, and a cardinal or sky swivelled figure.

Fig. 7 is a ground suitable for a 2000/2 tie cloth, woven in the gum. This would also look well with a swivelled figure put in with fast colours to stand the "boiling off." When cutting this draft, the white should be tabbied, to give firmness to the cloth.

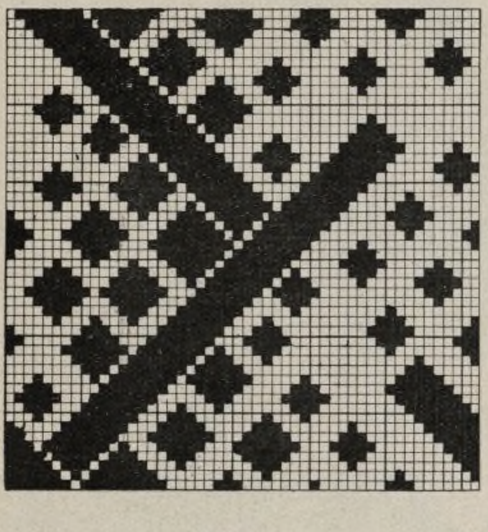


Fig. 6.

Fig. 7.

Silk Designs.

The Mechanism of Spinning.—XVII.

By H. R. Carter.

The sliver balling machine mentioned in the last article is shown in Fig. 45. P is the pulley through which the machine is driven by a belt from the line shaft ; D is a disc plate driving the friction bowl 1 which slides upon a feather upon the vertical spindle 2, and which is driven at a speed corresponding with its distance from the centre of the friction plate D. The friction bowl is raised and lowered by a fork 3 surrounding its grooved pap, which fork is connected by a link with the centre of the pressing roller 4 which lies upon the lap as it is being formed upon the lap roller 5. As the lap is formed, the pressing roller is gradually raised in consequence of the increasing diameter of the lap, and carries the friction bowl nearer to the centre of the disc, in this way keeping the surface speed of the lap constant. The slivers are drawn from a number of cans C placed behind the machine, and pass through the pivoted conductor 6 before being lapped upon the pin or roller. A bell arrangement 7 may be provided to measure off the length of the lap, so that by employing a set of laps of average constant weight to feed the finisher card in the same way as in the cotton scutcher a uniform sliver may be produced. F are the flanges for forming the ball, the dotted flange showing the position when taking out the ball, to which position it is shifted by eccentrics actuated when required by the lever 8.

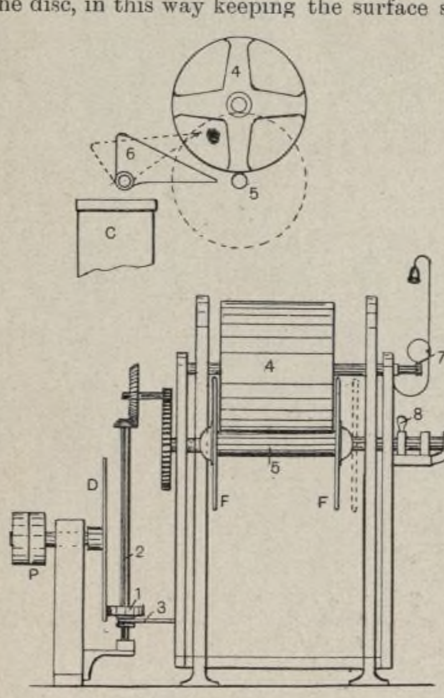
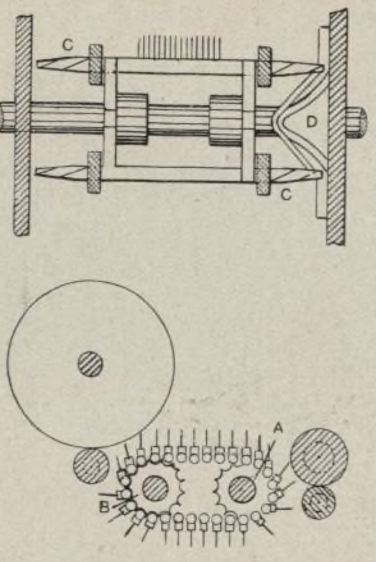


Fig. 45.

Fig. 46 shows one of the best forms of "push-bar" gill boxes, suitable for running at high speeds, as in the card drawing head, Fig. 43. The name "push bar" originates from the fact that the gill bars, instead of being linked together by chains, as in Figs. 26, 29, and 47, or moved along in the threads of a screw, as in Figs. 27, 31, 32, and 42, are pushed along slides by those behind, while they are lifted in the rear by the teeth of the wheel A and lowered in front by the teeth of the wheel B. The beauty of the mechanism lies in the arrangement for causing the gills to rise and fall as perpendicularly and as close to the rollers as possible. The point is an important one, in that if the gills rise too far from the back rollers and at a considerable inclination to the vertical, they do not penetrate or "pin" the sliver properly; while if they drop before approaching close to the drawing roller, the drafting of the sliver is uncontrolled, and the material "gulped" or drawn away irregularly, causing thick and thin places in the sliver produced. In the arrangement shown, which is known as Gamble's, in order that the gill bars and gills may be controlled during their ascent and descent into the required angle, the ends of the bars C are made flat or oval, and are more or less twisted as shown. Special guides D act progressively along the twisted surface, and, coming in contact with different portions of it, turn the bar into the required position and keep it there while the bar rises and falls.

A combing machine on Heilmann's principle is sometimes used to extract short and tangled fibres from the more valuable tows, while attempts have been made to use Noble's comb for long flax and hemp, with the object of dispensing with the hackling process. The tow comb is similar in principle to the cotton comb (Fig. 16), but of course much stronger, heavier, and better adapted for a long and inelastic fibre. Instead of being made into a lap, the slivers are drawn from the cans—which are placed to the number of about twelve behind the machine,—passed over brass conductors to a feeding and retaining arrangement, consisting of intersecting gills, then through and between the cushion plate and nipper to the comb circle, which, together with the top comb, works in a similar manner to those already described. The detaching roller, which, together with the drawing-off segment, draws away the long and combed fibre, is surrounded by a leather apron which serves to carry the fibre quickly forward, leaving it sufficiently slack to be drawn away, notwithstanding the intermittent motion of the machine, by a condensing roller revolving constantly. This latter roller delivers the compressed sliver into a can.



The Mechanism of Spinning.—Fig. 46.

The remaining machines used for preparing hemp and flax tow, also hemp, flax, and jute line, are drawing frames on the chain or screw-gill principle, arranged to draft and double the slivers in order to obtain uniformity and to reduce them gradually to the weight of the rove or slubbing from which the yarn is afterwards spun. Fine screw gill frames are constructed on exactly the same principles as the coarse frame, Fig. 27, and are proportioned to suit the numbers to be spun. Fig. 47 shows a good example of a chain gill drawing frame as used for jute, which is particularly interesting from the fact that it is of German construction. English machinery of this class still holds the lead, but that of foreign make is not to be despised, as German flax combs, for instance, are acknowledged to be superior to those of English make.

A practical detail of this class of machine not yet mentioned is the "dead" and revolving rubber. The former, shown at A, B, C, D, and E, and the latter at F, G, and H, keep the rollers with which they are respectively in contact clean. A "dead" rubber is sometimes applied below the "jockey" roller K, but is not to be recommended. In the case of a "dead" rubber, the short fibre and dirt caught by it are held until the accumulation is removed by hand or gets away into the sliver in a lump. It is to avoid this latter catastrophe that the revolving rubber is devised, so that the fibre and dirt lap round it are retained until cleaned off. These rubbers are all covered with thick flannel to hold the dirt. The means by which the rubbers B, C, and E are held against their respective rollers by means of levers and weights, as well as the facilities afforded for removing them, are clearly shown in the figure. A feature of this frame which we have not yet met with, and which is sometimes useful in drawing long fibre, is the double set of drawing rollers L M, N O.

The roving frame is the last machine of the series in the preparing-room. When the sliver reaches this frame, it has been drawn out to such an extent that if it is to be drawn out still farther it must be given a slight twist to strengthen it, and it must be wound upon a bobbin or spool. For these purposes the roving frame, which is in reality a drawing frame, must be provided with spindles and flyers which are placed vertically in front of the boss or delivery roller. In general appearance the frame resembles the gill spinning frame shown in Fig. 32, but is provided with additional mechanism, as is a gill spinning frame for fine work, to prevent excessive strain being put upon the roving as it is being wound upon the bobbin. The following are examples of machinery in everyday use. Firstly, for preparing jute long

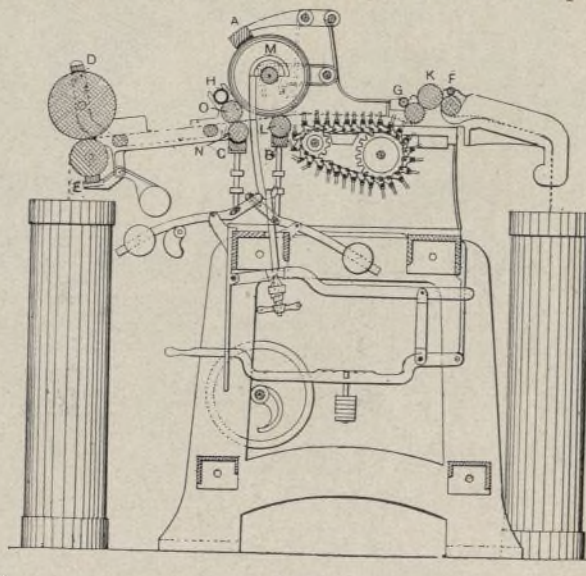


Fig. 47.

line to be spun into yarn from 1200 to 1800yds. per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	3	3	6
Rows per head ...	4	4	6	6	8
Length of reach ...	40in.	36in.	32in.	28in.	24in.
Breadth of gill ...	7in.	5in.	4in.	3in.	2in.
Breadth of conductor	6in.	4in.	3in.	2in.	¾in.
Length of pins in gill	2½in.	2in.	1¾in.	1½in.	1¼in.
Pins per inch (two rows)	3	4	5	6	7
Pitch of screw......	1in.	⅞in.	¾in.	⅝in.	½in.
Deliveries per head	1	1	1	2	8

For spinning flax, hemp, and jute long line into yarn from 1500 to 2700yds. per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	3	3	6
Rows per head ...	4	4	6	8	10
Length of reach ...	40in.	36in.	32in.	28in.	24in.
Breadth of gill......	6½in.	4½in.	3½in.	2¾in.	2in.
Breadth of conductor	5½in.	3½in.	2½in.	1¾in.	¾in.
Length of pins in gill	2½in.	2in.	1¾in.	1½in.	1¼in.
Pins per inch (two rows)	4	5	6	7	8
Pitch of screw......	⅞in.	¾in.	⅝in.	½in.	½in.
Deliveries per head	1	1	1	2	10

For spinning flax, hemp, and jute long line into yarn from 2400 to 3600yds. per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	3	3	6
Rows per head ...	4	4	6	8	10
Length of reach ...	38in.	35in.	32in.	23in.	24in.
Breadth of gill......	5in.	4in.	3in.	2½in.	2in.
Breadth of conductor	4in.	3in.	2in.	1¾in.	¾in
Length of pins in gill	2¼in.	1⅞in.	1⅝in.	1⅜in.	1¼in.
Pins per inch (two rows)	5	6	7	8	9
Pitch of screw......	13/16in.	11/16in.	9/16in.	7/16in.	7/16in.
Deliveries per head	1	1	1	2	10

For spinning flax and hemp tows into yarn from 2400 to 4800yds. per pound, forming the sliver upon a 5 by 6ft. card, 16 pins per square inch on the cylinder, with 6½ pairs of rollers :—

—	Drawings.				Roving.
	Bell Frame.	Set Frame.	3rd.	4th.	
Heads per frame..	2	2	3	4	7
Rows per head ...	6	6	6	8	10
Deliveries per head	1	1	1	2	10
Doublings	6	6	6	4	1
Length of reach ...	12in.	11in.	10in.	9in.	8in.
Pitch of screw......	⅝in.	9/16in.	½in.	7/16in.	⅜in.
Breadth of conductor	2¼in.	2 1/16in.	1⅞in.	1¾in.	½in.
Breadth of gill......	3in.	3in.	2¾in.	2½in.	2in.
Length of pin out of stock	¾in.	¾in.	¾in.	¾in.	¾in.
Pins per inch (two rows)	8	10	12	14	16

For spinning flax, hemp, and jute long line into yarn from 3000 to 4800yds. per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	2	3	7
Rows per head ...	4	4	6	8	10
Length of reach ...	38in.	35in.	32in.	28in.	24in.
Breadth of gill......	4½in.	3½in.	2½in.	2⅛in.	1¾in.
Breadth of conductor	3½in.	2½in.	2in.	1½in.	½in.
Length of pins in gill	2⅛in.	1¾in.	1½in.	1¼in.	1⅛in.
Pins per inch (two rows)	6	7	8	9	10
Pitch of screw......	¾in.	11/16in.	⅝in.	9/16in.	½in.
Deliveries per head	1	1	1	2	10

For spinning flax and hemp long line from 4200 to 5400yds. per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	2	3	7
Rows per head ...	4	4	6	8	10
Length of reach ...	38	35	32	28	24
Breadth of gill ...	4¼in.	3¼in.	2¼in.	2in.	1¾in.
Breadth of conductor	3¼in.	2¼in.	1⅞in.	1½in.	½in.
Length of pins in the gill	2in.	1⅝in.	1⅜in.	1¼in.	1⅛in.
Pins per inch (two rows)	7	8	9	10	12
Pitch of screw......	¾in.	11/16in.	⅝in.	9/16in.	½in.
Deliveries per head	1	1	1	2	10

For spinning flax and hemp long line into yarn from 5400 to 6600yds per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	2	3	7
Rows per head ...	4	6	6	8	10
Length of reach...	38in.	35in.	32in.	28in.	24in.
Breadth of gill ...	4in.	3in.	2¼in.	2in.	1¾in.
Breadth of conductor	3in.	2¼in.	1⅞in.	1½in.	½in.
Length of pins in gill	2in.	1⅝in.	1⅜in.	1¼in.	1⅛in.
Pins per inch (two rows)	8	9	10	12	14
Pitch of screw......	¾in.	11/16in.	⅝in.	9/16in.	½in.
Deliveries per head	1	1	1	2	10

For spinning flax long line into yarn from 6000 to 9000yds. per pound :—

—	Spreader.	Drawings.			Roving.
		1st.	2nd.	3rd.	
Heads per frame...	1	2	2	3	7
Rows per head ...	6	6	6	8	10
Deliveries per head	1	1	1	2	10
Length of reach ...	36in.	30in.	28in.	26in.	24in.
Breadth of gill......	4in.	3in.	2½in.	2in.	1½in.
Breadth of conductor	3in.	2½in.	1¾in.	1¼in.	½in.
Length of pin	1¾in.	1⅜in.	1¼in.	1⅛in.	1in.
Pins per inch	9	10	11	13	15
Pitch of screw......	11/16in.	⅝in.	½in.	7/16in.	⅜in.

A system for spinning flax tow into yarn from 4800 to 7500yds. per pound, forming the sliver upon a 5 by 6ft. card, 18 pins per square inch on the cylinder :—

—	Drawings.				Roving.
	Bell Frame.	Set Frame.	3rd.	4th.	
Heads per frame..	2	2	3	4	7
Rows per head ...	6	6	6	8	10
Deliveries per head	1	1	1	2	10
Length of reach...	14in.	13in.	12in.	11in.	10in.
Pitch of screw......	½in.	½in.	7/16in.	7/16in.	⅜in.
Breadth of conductor	2½in.	2¼in.	2in.	1¾in.	½in.
Breadth of gill ...	3in.	2¾in.	2½in.	2¼in.	1½in.
Length of pin	1in.	1in.	⅞in.	⅞in.	¾in.
Pins per inch in gill	10	12	14	16	18

A system for spinning flax long line into yarn from 9000 to 15,000yds. per pound :—

—	Spreader.	Drawings.				Roving.
		1st.	2nd.	3rd.	4th.	
Heads per frame..	1	2	3	4	5	7
Rows of gills per head	6	6	8	8	12	10
Deliveries per head	1	1	1	1	2	10
Length of reach ..	30in.	26in.	22in.	18in.	15in.	12in.
Pitch of screw......	½in.	½in.	½in.	⅜in.	⅜in.	⅜in.
Breadth of conductor	2½in.	2in.	1½in.	1in.	¾in.	½in.
Breadth of gill ...	3¼in.	2¾in.	2¼in.	1¾in.	1½in.	1¼in.
Length of pin	1⅞in.	1¾in.	1½in.	1¼in.	1in.	¾in.
Pins per inch in gill	10	12	15	18	21	24

A system for spinning flax long line into yarn from 15,000 to 24,000yds. per pound :—

—	Spreader.	Drawings.				Roving.
		1st.	2nd.	3rd.	4th.	
Heads per frame..	1	3	3	4	5	7
Rows of gills per head	6	8	8	8	12	10
Deliveries per head	1	1	1	1	2	10
Length of reach...	30in.	26in.	22in.	18in.	14in.	10in.
Pitch of screw ...	½in.	½in.	½in.	⅜in.	⅜in.	⅜in.
Breadth of conductor	2½in.	2in.	1½in.	1in.	¾in.	⅜in.
Breadth of gill ...	3¼in.	2¾in.	2¼in.	1¾in.	1½in.	1¼in.
Length of pin......	1⅞in.	1⅝in	1⅜in.	1⅛in.	⅞in.	⅝in.
Pins per inch in gill	10	14	18	22	26	30

A system for spinning flax tow into yarn from 7500 to 12,000yds. per pound, forming the sliver upon a 5 by 6ft. card, 25 pins per square inch on the cylinder :—

—	Drawings.				Roving.
	Bell Frame.	Set Frame.	3rd.	4th.	
Heads per frame...	2	2	2	3	7
Rows of gills per head	6	6	8	8	10
Deliveries per head	1	2	2	4	10
Length of reach ...	12in.	11in.	10in.	9in.	8in.
Pitch of screw......	½in.	½in.	7/16in.	7/16in.	⅜in.
Breadth of conductor...............	2¼in.	2in.	1¾in.	1¼in.	½in.
Breadth of gill......	2¾in.	2¾in.	2½in.	2in.	1¼in.
Length of pin	1in.	1in.	⅞in.	⅞in.	¾in.
Pins per inch in gill	12	15	16	21	24

A system for spinning flax tow into yarn from 12,000 to 24,000yds. per pound, forming the sliver on a 5 by 6ft. card, 36 pins per square inch on the cylinder, and combing it for the finer numbers :—

—	Drawings.				Roving.
	Bell Frame.	Set Frame.	3rd.	4th.	
Heads per frame...	2	2	3	3	7
Rows per head ...	6	6	8	8	10
Deliveries per head	1	1	2	2	10
Length of reach ...	11in.	10½in.	10in.	9½in.	9in.
Breadth of gill......	2½in.	2in.	1½in.	1¼in.	1in.
Breadth of conductor	1¾in.	1¼in.	⅞in.	¾in.	⅜in.
Length of pin	1⅛in.	1⅛in.	1in.	1in.	¾in.
Pins per inch	12	14	16	18	21
Pitch of screw......	½in.	½in.	7/16in.	⅜in.	5/16in.

A system for spinning flax long line into yarn from 24,000, to 36,000yds. per pound :—

—	Spreader.	Drawings.				Roving.
		1st.	2nd.	3rd.	4th.	
Heads per frame..	1	2	2	3	3	8
Rows per head ...	6	8	8	8	8	10
Deliveries per head	1	1	2	2	2	10
Length of reach ...	28in.	26in.	24in.	22in.	20in.	18in.
Pitch of screw ...	⅜in.	⅜in.	5/16in.	5/16in.	¼in.	⅕in.
Breadth of conductor	1¼in.	1⅛in.	⅞in.	¾in.	9/16in.	½in.
Breadth of gill ...	2¼in.	2⅛in.	1½in.	1¼in.	1in.	¾in.
Length of pin......	1⅛in.	1in.	⅞in.	¾in.	⅝in.	9/16in.
Pins per inch in gill	20	24	28	32	35	38

A system for spinning flax line into yarn from 36,000 to 75,000yds. per pound :—

—	Spreader.	Drawings.				Roving.
		1st.	2nd.	3rd.	4th.	
Heads per frame	1	3	3	3	4	7
Rows per head ...	4	8	8	8	8	12
Deliveries per head	1	1	2	2	2	12
Length of reach ...	18in.	17in.	16in.	15in.	14in.	13in.
Pitch of screw ...	⅜in.	⅜in.	5/16in.	5/16in.	¼in.	3/16in.
Breadth of conductor	⅞in.	¾in.	⅝in.	⅜in.	¼in.	1/12in.
Breadth of gill ...	1½in.	1¼in.	1in.	⅞in.	¾in.	½in.
Pins per inch in gill	36	40	45	50	55	60

(To be continued.)

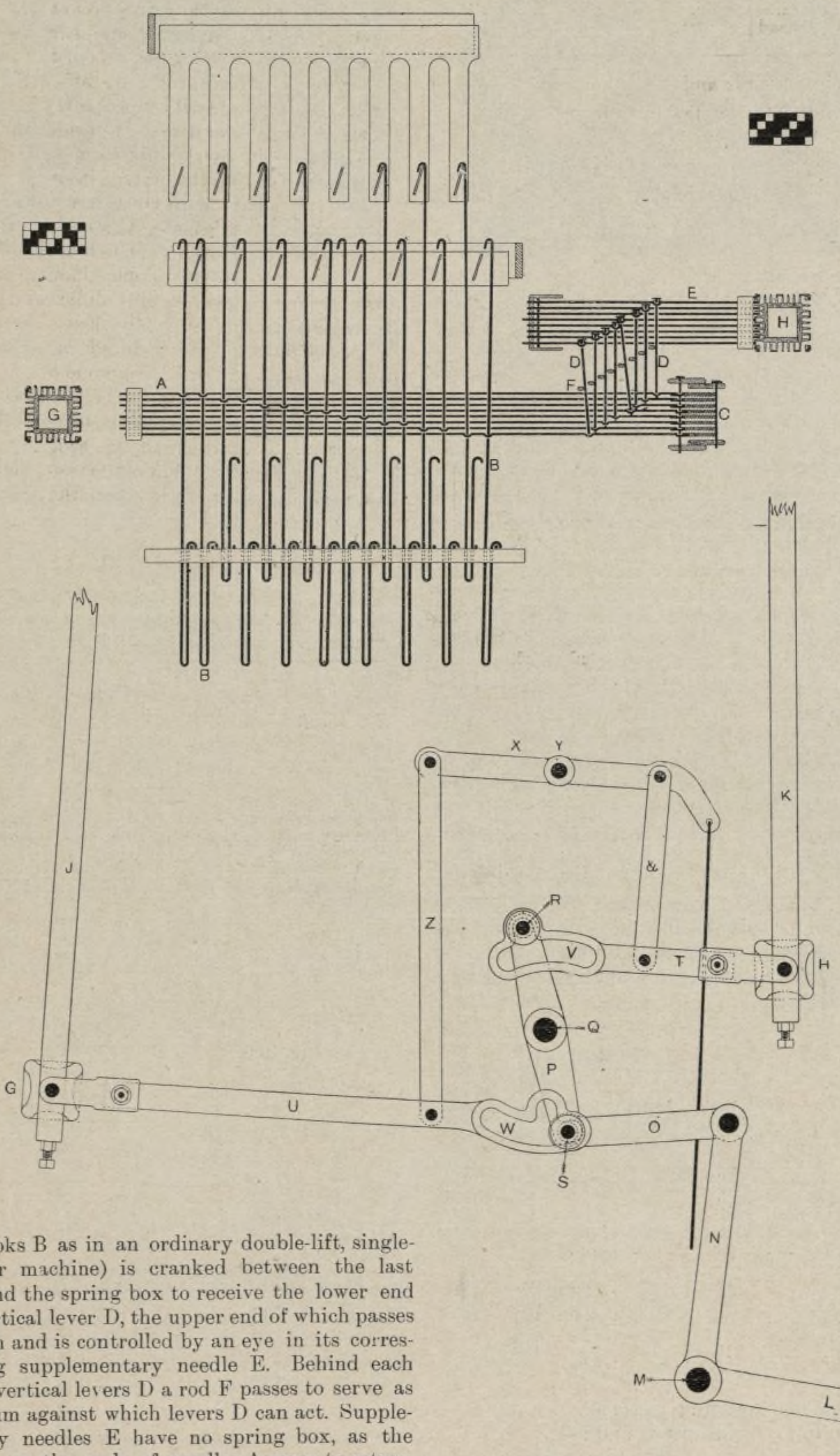
Jute and Linen Weaving.—XXII.

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

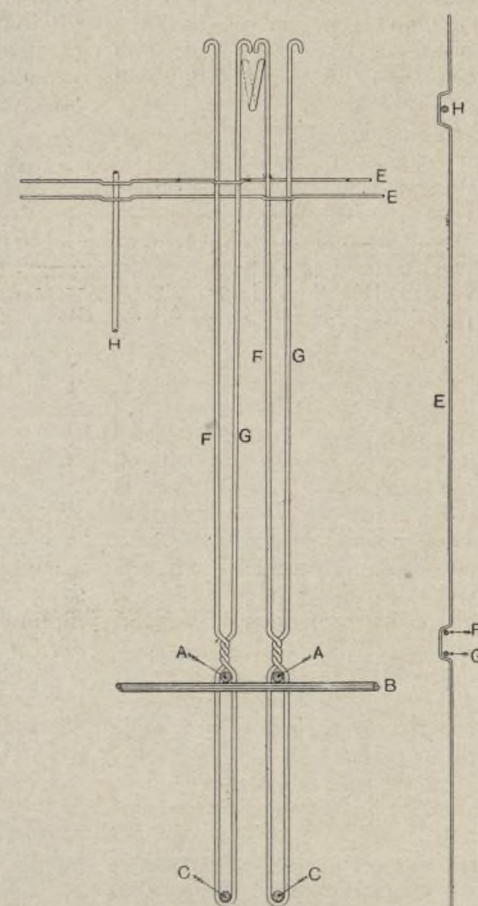
ANOTHER device, introduced by Messrs. Davenport and Crossley, which practically constitutes a special machine, is shown in Fig. 118. It consists of an ordinary double-lift, single-cylinder machine, the needles A of which are made longer than the ordinary needles between the hooks B and the spring box C. Each needle (besides controlling two hooks B as in an ordinary double-lift, single-cylinder machine) is cranked between the last hook and the spring box to receive the lower end of a vertical lever D, the upper end of which passes through and is controlled by an eye in its corresponding supplementary needle E. Behind each row of vertical levers D a rod F passes to serve as a fulcrum against which levers D can act. Supplementary needles E have no spring box, as the springs on the ends of needles A serve to return both sets of needles to their normal positions. It is evident that a blank in the card acting on either cylinder would move the corresponding hooks in the same direction—that is, off the knife. The action of cylinder G, which usually carries the centre cards, is already well understood; and the action of cylinder H, which in general carries the cross-border cards, is shown in the figure where blanks in the card opposite the fourth and eighth needles have caused the said needles through levers D to pull back the corresponding long needles A just as if cylinder G had acted direct. The cards for cylinder G are laced and wired in the usual manner, but the cards for cylinder H, if cut in the usual way, must be wired on the opposite side in order that the reverse side or back of the card might be presented to the needles E.

The method of bringing each cylinder into operation as required is illustrated in the same figure. Cylinders G and H are suspended as usual by their respective battens J and K, and receive motion from the crankshaft through an ordinary connecting rod attached to the lever L fulcrumed on shaft M, which extends across the machine. From M, connections to the cylinders are as follows, and are duplicated at the other side of the jacquard:—Lever N and link O impart motion to an equal armed lever P centred upon stud Q. P carries near its ends projecting studs R and S, which, when desired, may actuate spanners T and U respectively, and through them the cylinders H and G. Spanners T and U are provided with concentric slots V and W, which are recessed at a suitable point to receive the studs R and S. Stud R is in the recess of V, while stud S is in the concentric slot of W. It is therefore evident that any movement imparted to lever P, through parts L, N and O, will cause stud R to transfer a similar movement to the cylinder H, while at the same time stud S will simply move backwards and forwards in the concentric slot W. Spanners T and U are so connected by lever X fulcrumed at Y and links Z and &, that by pulling on the cord attached to the extremity of lever X they are brought into the positions shown; but by releasing the said cord, T is raised and U lowered until stud R can move in the concentric slot V, while stud S is placed in the recess of slot W. Cylinder H is thus placed out of action and cylinder G brought into action. The principle of this machine may be, and sometimes is, applied to a single-lift jacquard.

A special machine introduced some few years ago by Mr. Robert Hutchison, Dunfermline, and now extensively used in and around that centre of damask weaving, is that shown in Fig. 119. It is a single-lift machine, and has the advantage of having only one set of needles A. Each needle is cranked or looped round a double upright or hook B, the heads of which face in opposite directions to cylinders C and D. The needles A have no springs, as each double hook is a spring in itself and returns to the normal position when the needle is released by the cylinder in action. Between each pair of uprights B and under the knives E a flat bar F is fixed, which assists in retaining the hooks in a vertical position, regulates the extent to which the needles may project beyond the face of the needle boards G and H, and at the same time serves as a fulcrum for, and virtually creates the spring in, the hooks. Excessive friction between uprights B and bars F is prevented by a stop-band of tin J, which



Jute and Linen Weaving.—Fig. 118.



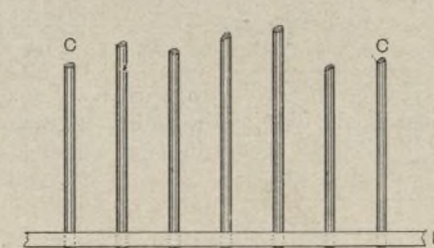


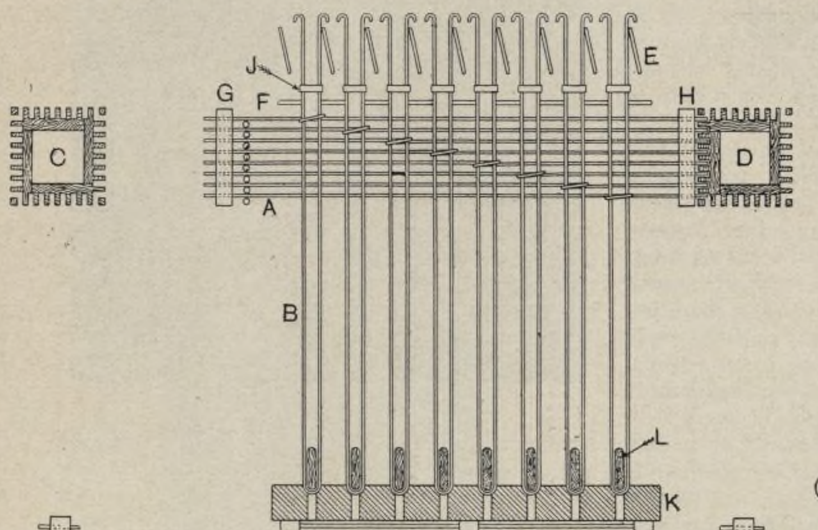
Fig. 120.

is soldered to one upright and encircles both. The uprights rest, as shown, on a grooved board K, while a flat wooden bar L serves to keep them facing the cylinders.

When cylinder D is in action the threads in the warp will be lifted by the action of the knives E on the right-hand hook of each double upright B; but when cylinder C is in action the shedding is performed by the action of the same knives on the left-hand hook of each double upright. Clearly, then, an alteration in the position of the knives from that shown in the figure must be effected. Each knife rests in a V-shaped slot, and is capable of being rocked in the said slot by two bars M, which are moved into position by a projection N on the side of the batten as either cylinder is brought into play. This action of course takes place when the knives (nine in a 400's and thirteen in a 600's) are in the lowest position, and therefore clear of all hooks.

bottom of the uprights are fixed in a framework D which is connected to and moves with the griffe. Rods A and C serve as resisting points to the action of the needle E upon the upright, preventing it moving bodily in the direction of the thrust, and of course confining the needle's action to one or other of the arms or hooks F or G. Each hook is thus constituted a spring in itself, and returns to the normal position immediately the cylinder recedes. Wire H limits the movement of the needle in both directions.

Another device introduced for expediting the change of border and centre cards, and one which is also largely used in the Dunfermline district, is illustrated in Fig. 121. The cross-border portion is simply an addition to the ordinary single-lift machine illustrated in Figs. 104, 105, and 116. All parts to the left of the framework are supported by spindles A, and are moved to and from the needles by the action of a common swan neck.



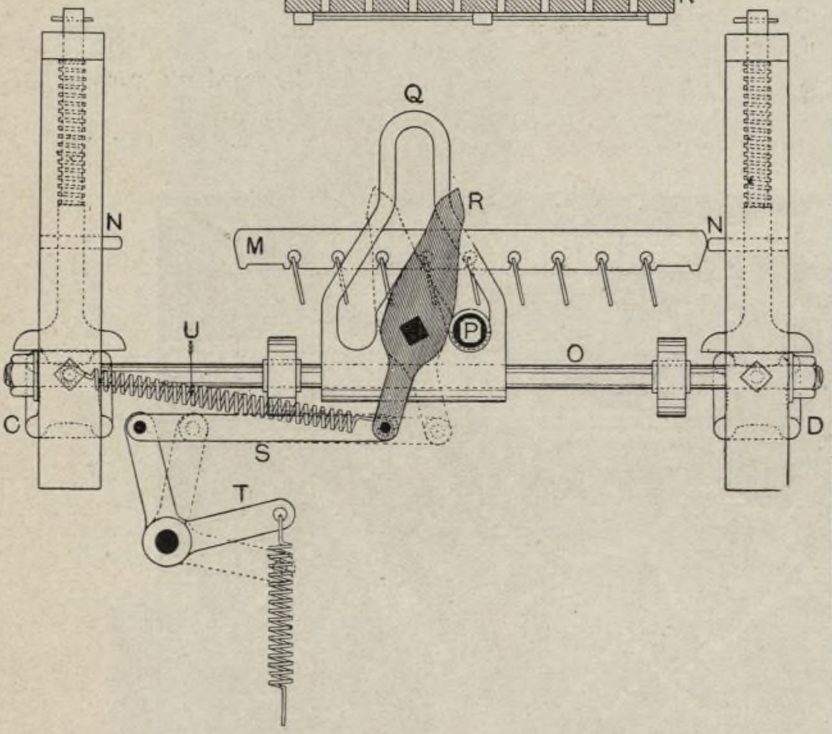
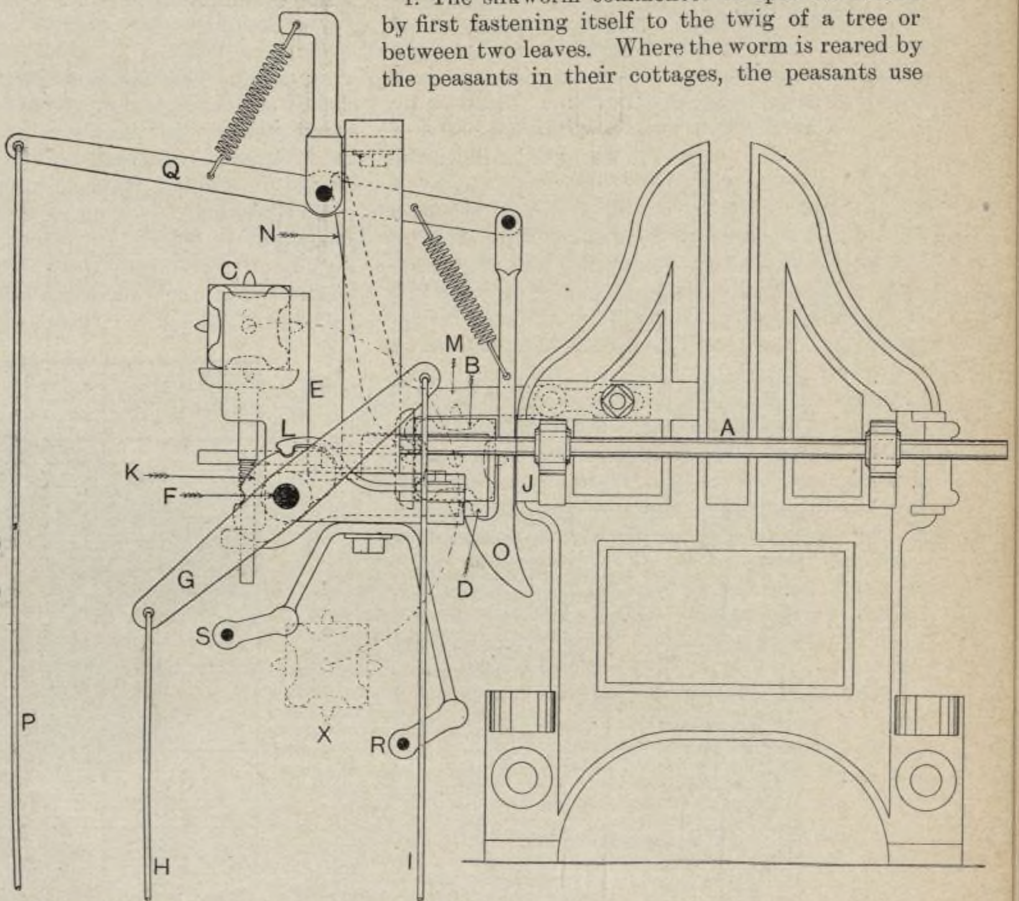


Fig. 119.



Jute and Linen Weaving.

Fig. 121.

The cylinders C and D are supported at opposite ends of the slide rod O, and are actuated from the griffe through stud P and double swan neck Q. Either neck may be opened or closed at will by a switch R through the medium of link S, bell-crank lever T, and spring U. When cylinder D is in action, the switch R occupies the dotted position, and although both cylinders are moving together, that which is considered out of action approaches the needles only half-way. With the switch R in the position shown, it is obvious that stud P will next descend into the left-hand groove of the swan neck. Cylinder C will thus be brought into contact with the needles, and bar M will, by the action of projection N, cause the knives E to ncline to the right.

A newer form of double upright for the machine just described is shown in Fig. 120. Its form will be readily understood from the illustration, and it is supported when in its lowest position by rods A immediately under the twisted portion of the upright. Transverse rods B support rods A, and keep hooks facing the cylinder. Rods C at the

The arrangement consists principally of two cylinders B and C, set approximately at right angles to each other, and carried by the two arms D and E of an L-shaped bracket, which is centred on a shaft F at the junction of the two arms. Keyed to the same shaft is a lever G, by means of which, through cords H or I, either cylinder with its respective cards may be brought into position opposite the needle board J. The extent of movement from the one position to the other is restricted by a sector piece K having two recesses in its periphery, into either of which, as the case may be, the head of the spring L can rest. When cylinder C faces the needle board, cylinder B occupies the dotted position X. The normal or forward pulling catch M is provided with an arm N which projects over the cylinder C while the latter is being moved into position opposite the needles. The reversing of the cylinder is brought about by catch O through cord P and lever Q. In the case of cards being required to work in the backward direction (that is, for patterns symmetrical in the way of the weft) a second catch will be necessary to act upon the underside of the cylinder. Rollers R and S guide the cards to and from their respective cylinders B and C.

(To be continued.)

Silk Spinning.—VII.

By Filsoie.

SILK WASTES.—The term "silk waste" covers all classes of the raw silk which are unwindable and altogether unsuited for the throwing process. The term "waste," understood in the general sense as conveying the idea of something worthless or of no use, is quite a misnomer now. But before the introduction of silk waste spinning the refuse from the reeling and winding mills was indeed waste, there being at that time no use for it whatever, except for what could be combed and spun by distaff and spinning wheel, as still practised by peasantry in India and other Eastern countries. Considering that of all the silk spun by the silkworm more than half is useless for the throwster, it will readily be understood that there must have been a large accumulation of this material, and therefore a great future before an industry which could use up this so-called rubbish. Although there are a great many different grades and different classes of waste silk, there are really few distinct ways in which they are all produced, most, if not all, varieties being the waste from one or more of the following seven processes :—

1. The silkworm commences to spin its cocoon by first fastening itself to the twig of a tree or between two leaves. Where the worm is reared by the peasants in their cottages, the peasants use straws, to which the worms attach themselves. All this silk is unwindable and too coarse and uneven to be of any use for the throwster, even if reelable. Naturally this first waste is very much mixed with straw and leaves, and is of a dull, coarse nature.

2. The cocoons are made up of layers of silk, and the outside ones, or the first spun by the worm, are too coarse and uneven for reeling, so the outer coating is stripped off and cast aside as waste.

3. As the silkworm nears the completion of its cocoon, the thread becomes finer and finer, insomuch that several of the last layers are made up of silk too fine to be strong enough to unwind, so that after the better or middle layers are reeled from the cocoon, the remaining part is discarded as useless for further reeling.

4. Among the cocoons there are some which are altogether unsuitable for reeling, included among which are the pierced cocoons. Although of no use for reeling, they are very acceptable to the silk-waste spinner.

5. During the process of reeling from the cocoon into hanks or skeins (described in a previous

article), the silk sometimes breaks, and in consequence there is waste made by the attendant in finding the true and sound thread.

6. Waste is produced in rereeling tsatlees into rereels.

7. All the waste produced in the throwster's mill, as described fully under the heading "Throwing."

Practically speaking, the various wastes are divided into two general classes—gum wastes and ordinary wastes. Gum wastes, whether home, European, or Eastern, are really all throwster's wastes, and are epecially adapted for the making of special yarns. But this will be treated on in a later article.

Steam Waste.—The best-known and most widely-used silk waste in England is Canton filature waste, better known as steam waste. It is not a gum waste. There are two varieties, and several grades of each. The one which has generally found most favour with spinners is the "opened" waste, but owing to its lending itself so easily to adulteration, spinners are now paying more attention to the unopened quality. Opened steam waste is the unopened waste pulled out by the natives, who work among it with their fingers and teeth, opening out the hard knubs which have been formed when the wet waste has been thrown down by the reeler and allowed to dry and mat together, on account of the natural gum which has been softened by the hot water in the basin attached to the reeling machine. Owing to the labour difficulty in China it is becoming more and more important that spinners accustom themselves to the use of unopened steam waste. There are really three grades of steam waste, which some years ago were known as "Selected," No. 1, and No 2. But year by year the Chinaman seems to have got the better of the European silk inspector, and has let down the quality. In the "selected" he would leave a certain amount of No. 1, and in No. 1 he would put the No. 2, until at length the admixture of 1's and 2's was so much that No. 2 as a separate grade disappeared, all being mixed up with the No. 1, and passed as all No. 1. Naturally, the so-called "selected" got a greater percentage of No. 1, so that in time the European shippers decided to work up a better grade and call it "Extra selected." This latter came forward very nicely for a time; but gradually the Chinaman's cunning got the better of the inspector, with the result that he again lowered the quality of the so-called "extra selected," and therefore the "selected." This process was again repeated, and there came a grade known as "Extra extra selected" steam waste, but this was likewise doomed to the fate of the former changes, and to-day there is known what is called the "Extra extra extra selected" steam waste, which in point of fact is to-day not so good as the old well-known "selected," and the "extra extra selected" is a mixture of the old 1's and 2's. The deterioration goes on year after year, each succeeding year being worse than the preceding one, and each season showing a gradual falling away from the standard established at the commencement of the season. It is a lamentable state of affairs, but so far the cunning Chinaman seems to have always managed to get the better of all the European inspectors, and so long as the present system of buying and passing of the waste is in vogue at Canton, so long will the Chinaman be able to hoodwink the inspectors.

Frisons are cocoons with varying quantities of silk upon them which has been slightly pulled loose. Some qualities are full of wormy matter, but all are well liked by Continental spinners for schapping. Wadding, or blaze, is also used almost exclusively on the Continent, is the first silk spun by the worm—that is, the silk which is wrapped around the twigs or straws and leaves, and is in consequence full of such vegetable matters when sold to the spinner. The nature of the silk is dull, lustreless, and coarse. It is very heavily charged with gum, and consequently loses much when boiled off, and even then it is very inferior stuff. Wadding is a term also applied to silk which has been used as a packing inside the Chinaman's coat as a lining, and it may be of long fibre or otherwise. Frisons and cocoons are types which may come from all silk-producing countries.

Steam waste—that is, waste produced in the filature establishments in the Canton district—is the most widely used waste in England. Good waste is of a fair white colour, and in the gum state feels long and strong in staple, but is much subject to adulterations of a rotten nature, and brown in colour.

Tussah Waste, exported from China, is of a dark-brown colour. Usually known as Newchwang waste, it is nearly all spun in England, and used either for plush purposes or for dress goods. It is marketed in the waste in two grades, known as No. 1 and No. 2, which are packed quite separate in bales, and parcels are generally offered as 60 per cent. of No. 1 and 40 per cent. of No. 2, or 50 per cent. of each, written usually 60/40 and 50/50 respectively.

Nankin Buttons is a gum waste from the interior of China of exceptionally good white colour and lustre. The bulk of it is long in staple, but it is always mixed with so-called buttons, which are really small portions of silk slightly matted together, and, a worse fault still, cut into half-an-inch to one-and-a-half-inch lengths. This waste is exported from Shanghai.

China Wastes are from various sources, chiefly from English, French, and Italian throwsters. They are all long in staple. China soaped waste is from English and Scotch throwing mills. It feels soft, and its lustre has been hidden in the washing. French China is always bright, and not being weighted with soap often fetches a little more per pound than English silk. Italian and Swiss wastes are of the same nature.

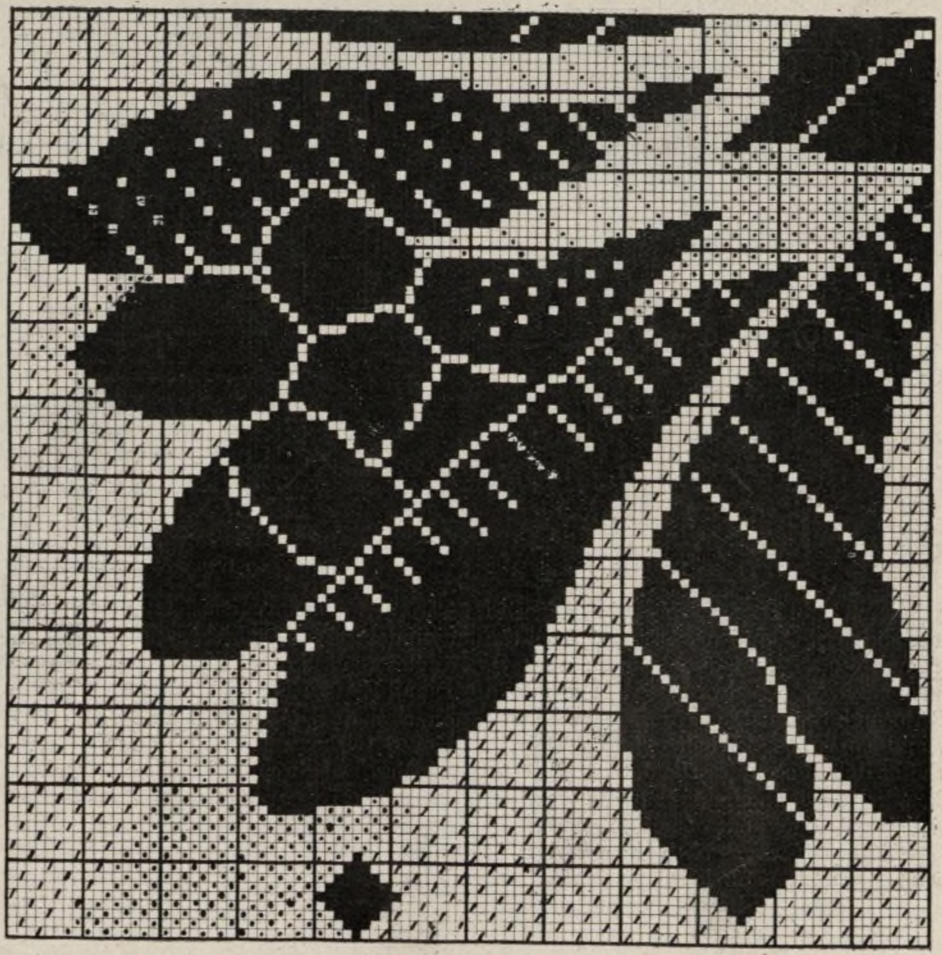
Shanghai Waste is all gum waste, not quite so white as European silk, and harsher in feel. It is classed as fine white, fine yellow, coarse white, and coarse yellow. In the fine white are three well-known grades—Chintzah, which is the whitest and longest in staple; Hangchow, which is really a second picking or sorting over of the Chintzah grade, rather inferior in colour, not so long in staple, and more subject to twist waste and foreign matter; and the ordinary fine white, which is variable in colour, but good sound waste. The yellow varieties are produced in much smaller quantities, of similar qualities, but usually more mixed together, which really makes an inferior sort of article. Every sort is sold on its own merits; some spinners use only coarse varieties, and others only fine.

Shanghai Szechuen (or seychuen or sechuen) is a yellow waste, and the prefix Shanghai is to distinguish it from Canton waste of similar nature, sold as Canton szechuen. All Shanghai wastes were formerly offered as 1's, 2's, and 3's. Some shippers now continue this, but the No. 3 being very small in quantity and low in quality, parcels are often offered now as 1's and 2's. As the No. 3 is, however, still produced in the East, spinners are

FANCY DRESS FABRICS.—FIG. 208.

suspicious that in many cases it is judiciously mixed with the No. 2 portion by the expert Chinese packers. However that may be, proportions are generally $\frac{75\%}{\text{No. 1}}$, $\frac{25\%}{\text{No. 2}}$; or $\frac{70\%}{\text{No. 1}}$, $\frac{30\%}{\text{No. 2}}$; or $\frac{60\%}{\text{No. 1}}$, $\frac{30\%}{\text{No. 2}}$, $\frac{10\%}{\text{No. 3}}$. All these grades are always packed separately.

Indian Waste.—Of all the wastes used by spinners, the Indian wastes are the most mixed and unreliable. The colour varies from grey to yellow, but there is by far the larger proportion of yellow. The fibre of some is as fine and clean as the best China and Japan silks, whilst others are coarser than the punjum waste. It is always subject to cotton, twist, black hairs, string, paper, etc. They are all gum wastes.

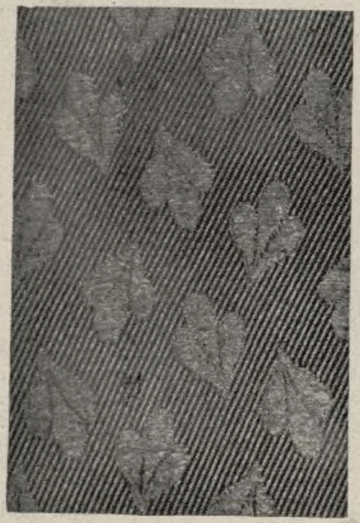


FANCY DRESS FABRICS.—FIG. 209.

Canton Gum Waste is very similar in appearance to the rereel waste, but is not so reliable, and is very often more mixed with black hairs, cotton, hemp, etc. No. 2 gum is now a very scarce article in this country, spinners finding it too much mixed with rubbish, and hence too costly in picking, etc.

FIG. 210.

Rereel waste is a Canton gum waste produced in the mills where the Canton raws are rereeled, just in the same manner as Shanghai gum in the more northern districts, but the former is of a softer nature, and has more lustre—in fact, Cantons are the most lustrous of all silks, but are of a creamy shade. The silk of Canton gum and steam waste is spun by the same genus of worm.



FANCY DRESS FABRICS.—FIG. 212.

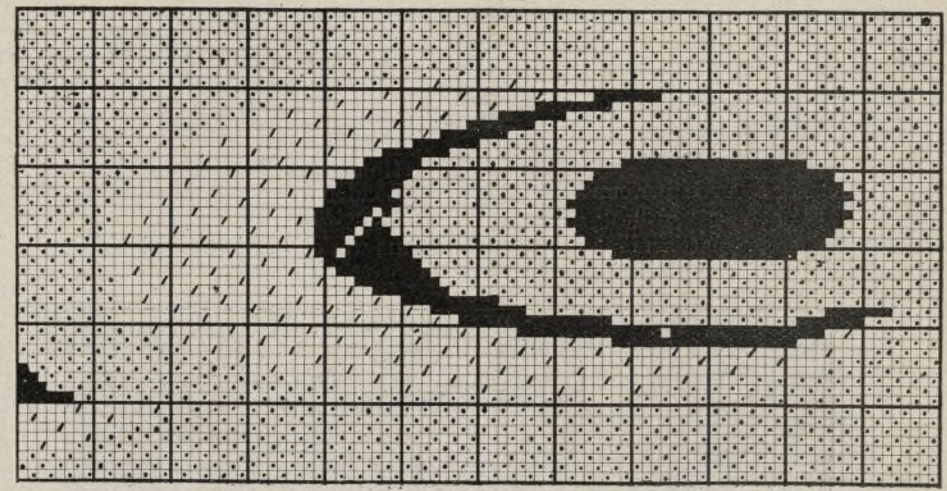
Canton Szechuen Waste is a yellow gum waste with a good, bright colour, but apt to be greasy. The production is very limited, and it comes forward in little lots of 5, 10, or 15 bales. It yields fairly well.

FANCY DRESS FABRICS.—FIG. 214.

Steam Punjums are allied to both punjum waste and to steam waste. They are said to possess the virtues of both—*i.e.*, they yield well and have the colour of steam, and they combine the lustre of punjum.

Punjum has peculiar characteristics of its own, and is supposed by many people to be the most lustrous of all silks. It is a stringy waste in appearance, and loses very heavily in boiling off—something like 50 per cent. It is reeled from cocoons, a number of ends together, and put into book form very similar to the tsatlees, as described under the heading "Tsatlee Reel" in "Raw Silk"; but owing to the admixture of rice water, or some such substance, the threads mat together, and are consequently unwindable. In this form the waste is known as punjum books, which are divided into grades 1's, 2's 3's, and 4's—3's and 4's being the general run for English spinners, generally half-and-half. The waste is produced in exactly the same manner, except that no attempt is made to run it into a moss; but as an end breaks or runs off the waste is thrown aside.

(To be continued.)



FANCY DRESS FABRICS. FIG. 211.

Fancy Dress Fabrics.—XXI.

BY G. WASHINGTON.

FIG. 208 contains a full repeat of the design for a silk fabric, and is only about half of the original size each way. Great skill is shown in the apparently careless manner in which the various groups have been placed, and also the variations in the method of developing the petals, etc., of the flowers, so that while all are similar in general appearance and outline, there are not two flowers alike in the whole design; also, there is a similar diversity in arranging the flowers into groups. Fig. 209 is taken from the flower nearest the left hand bottom corner, and contains specimens of most of the weaves employed in the design. The large curved figures are developed in plain weave, marked in round dots, and appear rather lighter than the ground, which is 5-end sateen, indicated by strokes. The weft flush portions are shown in solid black, and contain irregular weft figures, twills of various sizes, and a sateen effect, combined together, so as to produce a great variety of light and shade. Other points of interest in this design are the small diamond figures set at intervals along one edge of the curves, which give definiteness to the outline, and also increase the contrast between the curves and ground. As the design contains very few straight lines, the small triangular figures of solid weft, with straight edges at various angles, have been introduced, forming a pleasing contrast and considerably enhancing the general effect :—

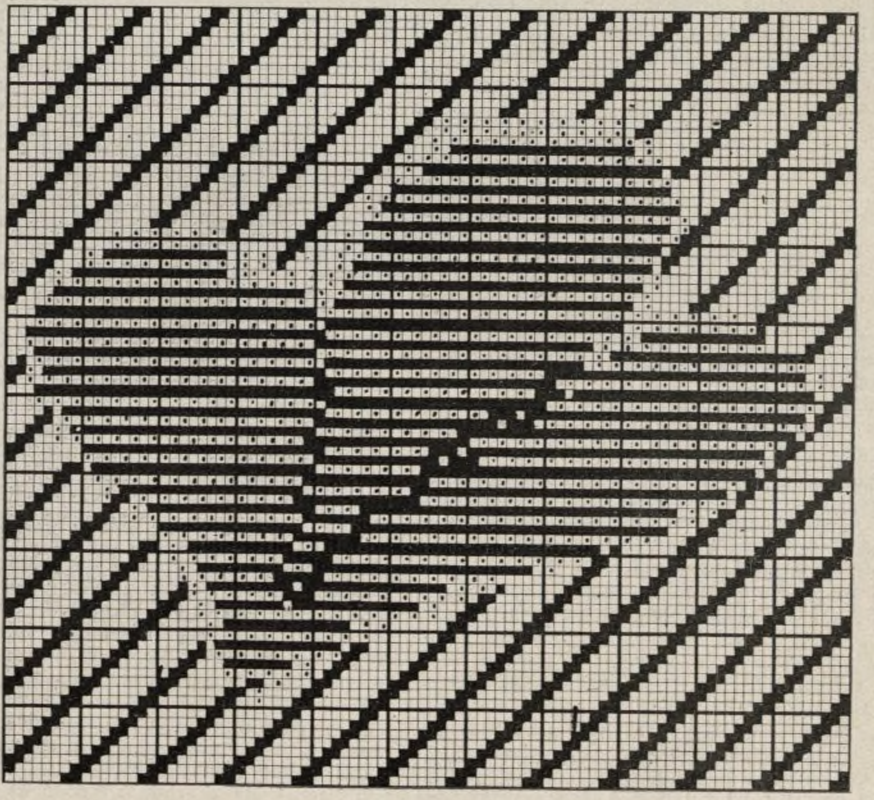
Warp.

60/2 yellow silk.
120 ends per inch.

Weft.

60's white silk.
96 picks per inch.

Another style of silk fabric is shown in Fig. 210. The leaves and flowers are formed of 8-end warp sateen, with a narrow band of weft at one edge. Like the stems, these edges are either solid weft or are tied at intervals to prevent extra long floats.



FANCY DRESS FABRICS.—FIG. 213.

The ground is plain weave, and the setting gives it a poplin structure. Fig. 211 is the design for the crescent-shaped figure and round ball at the end of one of the sprays :—

Warp.

Black silk, 7000yds. per ounce.
288 ends per inch.

Weft.

Black silk, 2000yds. per ounce.
80 picks per inch.

In the silk fabric illustrated in Fig. 212, diversity is imparted by placing the small figures in four different relative positions. The full design contains 8 figures in sateen order. Part of the design is given in Fig. 213. The three leaves are separated from each other by changing the alternate picks from face to back; the cord weave is continued round the edge of the figure wherever it is necessary to bind the long floats of weft, thus making a compact edge and clear division between the twill ground and the figures:—

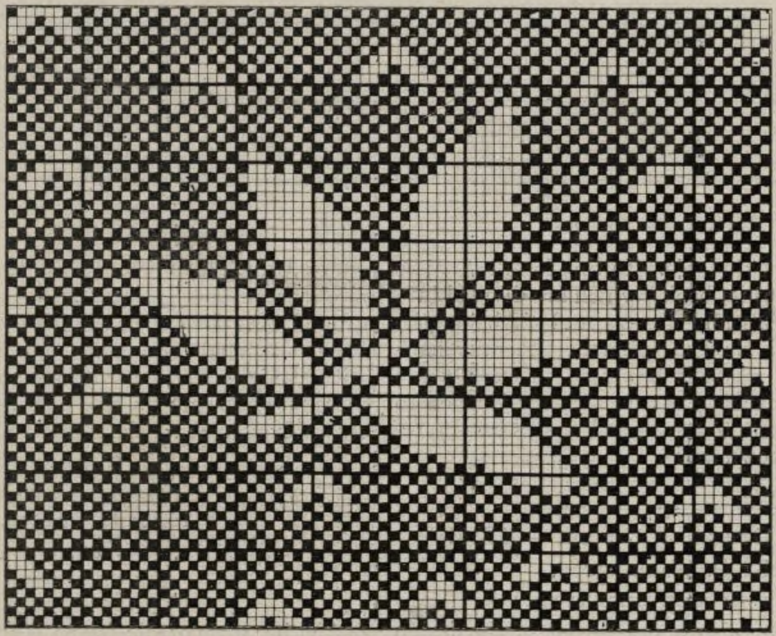
Warp.

Black silk, 7000yds. per ounce.
192 ends per inch.

Weft.

Black silk, 2500yds. per ounce.
104 picks per inch.

A simple but effective pattern is shown in Figs. 214 and 215, with solid warp figuring on a plain ground. The full design contains four of the sprays placed in broken crow order. The small V-shaped spots, although all exactly the same size and pointing in the same direction, are irregularly and skilfully distributed over the ground in such a manner as to avoid all stiffness or tendency to appear in rows and give character to the design:—



Fancy Dress Fabrics.—Fig. 215.

Warp.

50/2 white silk.
100 ends per inch.

Weft.

24's coloured cotton.
72 picks per inch.

(To be continued.)

LETTERS TO THE EDITOR.

CITY AND GUILDS OF LONDON INSTITUTE LIST OF BOOKS.

Sir,—No one will doubt the great work done by this institute, particularly in its technological and manual training classes. The teaching, however, is not meant to be final; indeed, the object of the system of training and instruction is rather to create a desire for information on technical matters, than to satisfy it. Every intelligent student is well aware that when he has gone through the course of training, the tuition provided at this and kindred institutions, his education is just commencing. He has been told what to do, and why he should do it, and he has now to ascertain by personal experience how to do it. I have the programme of the institute for the coming session, and it is full of valuable information, but there is a feature of it that is not at all satisfactory. After the syllabus of each subject taught in the institute, a list of "Works of Reference" is given. They are described as works of reference in the programme, but I find amongst them text-books, reference books, trade and technical journals, and art hand-books. The list appears to have been compiled by someone not fully acquainted with the literature of the industries dealt with, since some of the works named are certainly not now standard reference books, and some are even out of print. But the errors of omission are the most serious. A student who works to acquire reference and text-books to assist him in mastering the practical details of his trade should have the best and most up to date. In some industries the latest published are the best, yet I find many really useful practical reference books not even mentioned, and in some of the lists there is no mention made of the very instructive trade journals published. A student who is inquiring as to works dealing with the industry he has chosen to follow must not rely upon the lists given by the compilers of this programme. He will miss much useful literature if he does. W. Thomson.

London, September 17.

REVIEWS OF BOOKS.

Cotton Spinning: Vol. I., First Year; Vol. II., Intermediate or Second Year; and Vol. III., Honours or Third Year. By Thomas Thornley. London: Scott, Greenwood and Co. 3s., 5s., and 5s. net.

This work comprises a series of three volumes, each representing one stage of the cotton-spinning syllabus of the City and Guilds of London Institute. The system on which the writer has worked has put the books more in the form of a textile catechism, for after stating the ground required to be covered by the student, the principal questions asked in recent examinations are inserted, and answered in a terse, yet full, manner. Naturally, such a collection results in a somewhat scrappy compilation, although every credit is due to the writer for the systematic arrangement of the various queries. The one fault, and perhaps the only noticeable one, which the three books have in common, is the very crude manner in which the illustrations are drawn—that is, objects of an original nature for which machine makers' drawings or blocks could not be obtained. This fault is of little moment, however, for the rough sketches given are sufficient to explain their purpose. The first book treats on questions relating to the cultivation, ginning, and other early treatment of raw cotton, and takes the first series of manufacturing processes, from the bale-breaker to the card. The second volume covers the ground relating to the comb, drawing frame, fly frame, mule, and the ring-spinning machine; while the third discusses more advanced cotton questions, treats on cotton-spinning machinery and the subsequent processes of doubling, reeling, warping, etc. This third volume seems by far the most interesting of the series. It departs from the well-beaten track in some few parts, and discusses commercial questions and terms, by which means the student is enabled to understand the usually abbreviated expressions denoting deals in raw material. It also devotes chapters to the driving and arrangement of spinning machinery, whilst another chapter very briefly discusses waste and waste spinning. We do not think that any of these books cover ground beyond what is already obtainable in more than one standard text-book in a more referable form, and in that light they are scarcely qualified to meet the requirements of anyone reading for the sake of knowledge only. On the other hand, there are large numbers who, in addition to knowledge gained, wish to show some result in the form of certificate and prize, and for these the book has been written and is specially adapted. By a study of any one of these books those working with a main view to examination requirements will have their attention concentrated on that year's course, while the constant companionship of systematically-answered queries should go a long way in enabling them to express their knowledge in a like manner.

Reduction Tables. By Gustavus Voigt, Merseburg-on-Saale, Germany. 3s.

This book, which is of convenient pocket size, is a collection of conversion tables printed in English, German, and French, and treating with the measures, weights, moneys, and other standards of these countries in relation to each other. It, however, goes further than the usual conversion tables by taking a more comprehensive area and translating such matters as price per yard in English money to price per metre in marks, kronen, or francs, as also price per yard in American money. The same thing is done with the price per pound in shillings and pence in relation to price per kilogram, etc., in Continental moneys. Liquid measures are treated in the same way, and the whole is arranged in a manner which can be readily understood and referred to.

Banks and Their Customers. By H. Warren. London: Effingham Wilson. 1s.

This is the fifth edition of a useful little book which gives a good deal of interesting information on bankers' methods. It is written in a popular rather than a technical style, and gives in a racy manner many hints of value to the small depositor or business man—hints which should put money in his pocket. After describing the principles of banking, the book deals with advances, credit accounts, deposits, checking charges, bills, coupons, drafts, cheques, and the other auxiliaries to a banking connection.

We have also received:—The Chief Engineer's Report for 1900 of the Engine, Boiler, and Employers' Liability Insurance Company Limited, which we regret to find has been cut down so as to omit much of the usual information, which was not only unique in its way, but unobtainable from any other reliable source. Results of the inspection and accidents to steam, gas, and oil engines are given, but detailed examples are reduced to three cases. Rather more attention has been given to electrical machinery, its rating, and the nature of many of the breakdowns, but the bulk of the report refers to boiler matters, and reproduces abstracts from the Board of Trade reports.—"Trade Marks," by Ernest Salaman (London: The Mercantile Publishing Syndicate Limited. 1s. net.), a reprint of articles on trade-mark legislation which have appeared in trade papers, and which have been thought of sufficient interest to put into a more permanent form. —Second Abstract of Foreign Labour Statistics, issued by the Board of Trade (Labour Department. 1s. 4½d.), a continuation of the abstract published in 1899, and containing voluminous data and statistics relating to the wages, hours of labour, trade disputes, and co-operation in Continental countries and the United States.—The first issue of the "New System," a monthly paper dealing with the most up-to-date commercial methods, and discussing commercial economy from the standpoint of the present and future.

QUERIES AND REPLIES.

J. S. (Longridge).—See reply to "F. B. and C. M."

J. E. T. (Ramsbottom).—"Mechanism of Weaving" (Fox), 7s. 6d. net.

T. Foulkes (Glyn).—Messrs. Fleming, Birkby and Goodall Limited, West Grove Mill, Halifax.

F. R. (Lansitz).—"The History and Principles of Weaving" (Barlow) is the best book we know covering the subject you mention

F. B. and C. M. (Atlanta).—"Size and Sizing Ingredients" (Monie), 2s. A larger and more scientific work is "Sizing of Cotton Goods" (Thomson), 10s. net.

Thomson, Shepherd and Co. Limited (Dundee).—The name and address of the inventor, and a full description of the loom, will be found in the January, 1901, issue of The Textile Manufacturer, page 17.

W. Whiston and Son (Langley).—The immedial colouring matters are manufactured by Messrs. Leopold Cassella and Co., Franfort-on-Maine. Manchester agents, Brown and Forth, 32, Queen-street, Albert-square.

S. S. Bleaching and Dyeing Company (Providence, R. I.).—The series has not yet appeared in book form, and, so far, no steps are being taken in the matter. Our review columns will promptly show the fact if ever publication takes place.

S. A. T. (Gand).—All the loom makers who advertise in our advertisement pages make a simple leno motion such as you inquire about. If you are referring to the "bead" method described on page 149 of The Textile Manufacturer of this year, this requires no additional apparatus to the ordinary plain loom, but is limited in its scope.

F. G. (Lodz).—The patent specification of the Crossley loom is No. 23,925, November 14, 1898. You will be able to obtain a copy by sending eightpence and foreign postage to the Patent Office, 25, Southampton Buildings, Chancery-lane, London. The mechanism of the loom was described in The Textile Manufacturer of December, 1899.

W. W.—The simplest test is that of burning the fibres, when to a practical eye the presence of cotton in woollen goods is at once detected. Another way is to carbonise the woollen with sulphuric acid at 5° Bé., and then bake it in the oven, when the cotton falls out as dust with a little shaking. A weighing before and after the process will show the proportion of cotton.

THE TEXTILE MACHINIST:

Devoted to Machinery, Apparatus, Tools, Etc.

New Hopper Bale Breaker.

MESSRS. ASA LEES AND CO. LIMITED, OLDHAM.

AT the present time there seems to be a difference of opinion amongst cotton spinners as to the relative merits of the ordinary roller breaker and the hopper bale breaker. Many prefer the roller type—perhaps because they are more used to it; and there is no doubt that for certain classes of work the roller bale breaker does all that is required without costing much in repairs. There is, however, a marked and general tendency towards the use of hopper bale breakers, for although these breakers are not quite so simple as the roller type, they open the cotton more effectually, and without such rough handling of the fibres.

With a view to meeting the latest requirements of the industry, the above makers have recently added a hopper bale breaker to their numerous other machines, and it is needless to say that the same care in workmanship and design is as evident as in their better known machines. A hopper bale breaker, even if not so simple as the older type, is still a machine of few parts, and so it is impossible to expect any revolutionary features in such a machine, although everything has been done in the matter of massive framework, planed edges, and general finish, to make the machine strong, fast-running, and economical in upkeep. There is, however, one important feature specially worthy of mention, and that is the method of building the front end of the machine, which is arranged so that when the occasion arises, part of it can be taken off and the spiked lattice removed without having to almost dismantle the machine, as is so often the case. This feature is a great advantage, even for the very few occasions when it is necessary to remove the spiked lattice.

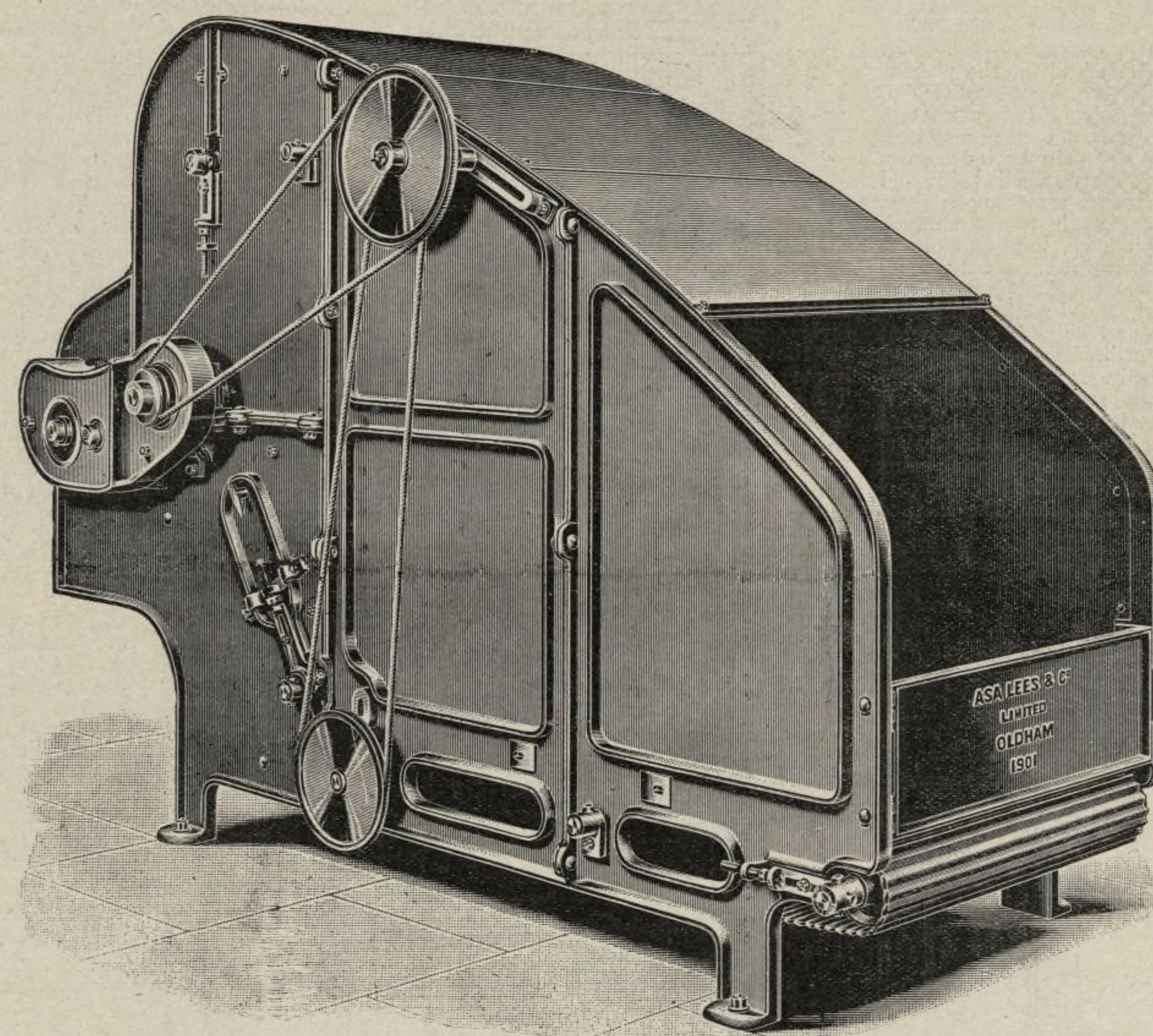


Fig. 1.

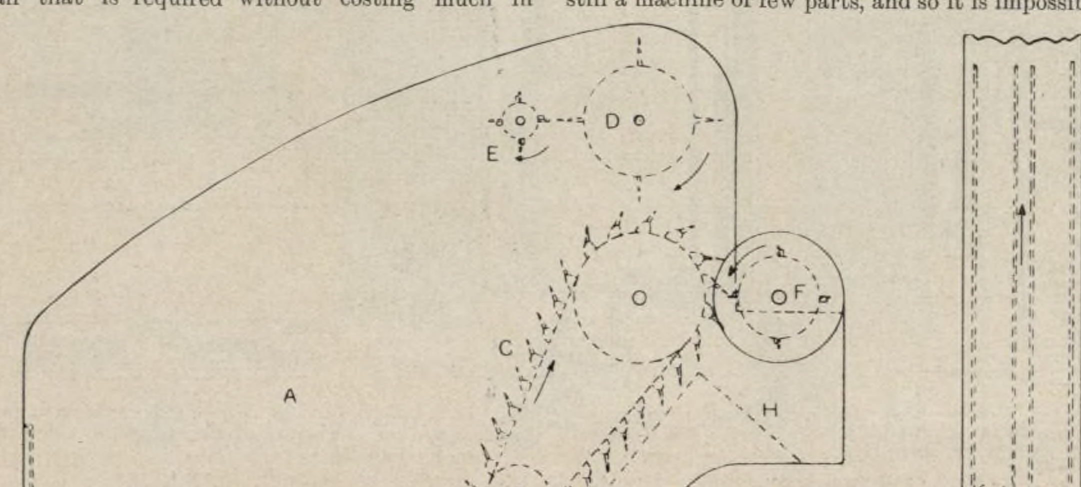


Fig. 2.

The machine is illustrated in Fig. 1, from which drawing its general build can be seen. It is, in a sense, an enlargement of the firm's well-known hopper feeder, but much heavier and stronger, and varied to meet its new requirements. Rope driving is used to transmit power to most of the movements, and all toothed gearing and other dangerous parts are effectually guarded. The hopper is made of sufficient size to hold a large quantity of cotton, so that it only requires periodical attention, and after a filling up the attendant can spare time for other duties. Arrangements are made for the application of an exhaust fan for conveying dust away from the top of the machine, if this is considered necessary.

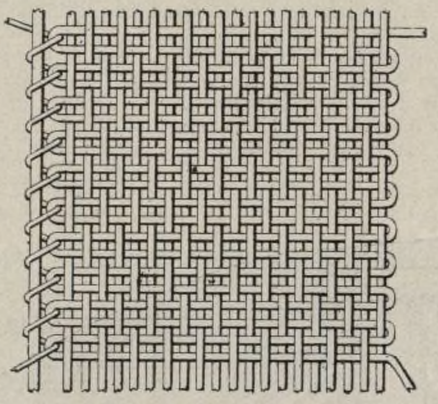
The internal working of the machine is shown in Fig. 2. Cotton is fed into the hopper A and falls upon the lattice B, which carries it forward to the spiked lattice C. This lattice is provided with long spikes set at a fair distance from each other, and so secured to their travelling apron that no dust or dirt can find an open joint in which to lodge. Travelling up the spiked lattice, the cotton comes to the evener D, which returns all surplus cotton to the hopper, and only allows a regular supply to pass over the machine. The evener D is in turn cleaned by the beater E, but it is only occasionally that this roller is called upon to be of any service; it is more an emergency attachment than anything else. When the cotton reaches the top of the spiked lattice it is doffed by the beater F and falls in a well-opened condition on to the lattice G, from whence it is conveyed away to the scutcher or opener. As it falls towards the lattice G it passes over the grid H, through which the loose dirt and straws fall, enabling the cotton to pass forward in a much cleaner state than would otherwise be the case, for the beater F, evener D, and the motion of the lattice when opening out the cotton, release a quantity of loose refuse material which would otherwise pass on to the next machine. This machine is built to open about six bales of cotton per hour on the average—that is, allowing for all reasonable delays in a mill working full time.

A New Type of Ribbon Loom.

MR. WM. FISCHER, JASPER-STREET, PATERSON, U.S.A.

As an English industry, the manufacture of ribbons is almost a thing of the past, and the comparatively small quantities of ribbons used for the present fashions make it scarcely worth while attempting a revival. That, however, is how the matter stands at the present day. But as fashions are erratic, in addition to being despotic, it is impossible to say how matters may progress in coming years, and there may be a time when the industry will gain by its lengthy lethargy, and wake up, untrammelled by old methods and customs. Such a remote possibility, however, would not be enough to cause much interest in a new ribbon loom, but some of the features of one which has been recently introduced are such as to interest makers and users of weaving machinery by the novel method of weaving which it introduces, and which in a somewhat modified form might be utilised for broader goods.

In the new loom the real weft plays a very insignificant part in the actual structure of the cloth, being replaced by what is really a special warp thread, which takes its place as regards the latitudinal threads in the cloth, the shuttle weft being used more as a mechanical aid to the weaving process than as part of the fabric. The method temporary, and may also match or contrast with the main body of the ribbon as regards either colour or material. The whip thread which stitches the thick end to the ribbon proper is really the weft, whilst what appears to be the weft threads—that is, the threads traversing the ribbon from edge to edge—are drawn from a special warp end at the extreme right of the warp. For purposes of description, however, this thread will be described as weft, which it really becomes in the cloth.



A New Type of Ribbon Loom.—Fig. 1.

The loom is shown in Fig. 2, from which it will be seen that as a whole the machine is built on similar lines to the usual ribbon loom, for only such changes as are necessary for weaving the new style of fabric have been made The loom is driven by the belt pulley S, which is geared down to impart motion to the crankshaft operating the lay. The lay in turn imparts the requisite movements to the take-up motion, as shown in Fig. 2, whilst the crankshaft transmits motion to the tappet or low shaft in the usual manner. The weft thread is wound upon a large bobbin or spool G placed at the back of the loom, and the yarn is motion is provided by which a suitable length of yarn is released at each movement of the lay. This is performed by a lever, whose V-shaped front end is operated upon by a pin on the batten D, and at each backward and forward beat of the lay releases the gripping jaw at the back of the loom through which the weft passes. This jaw has facings of rubber, so that it can hold the thread in a reliable manner without injuring it. A strong helical spring holds the jaws in a tightly-closed condition except when they are required to open at the necessary times.

The shuttle mechanism which inserts the whip or binding thread is identical with the usual rack swivel type, and is seen best in Figs. 4 and 5. The shuttle boxes J are provided with the usual shuttle races on the batten D. The shuttle or swivel is provided with a tension spring for taking up any slack in the thread, and possesses the usual arrangement for holding the bobbin in place. It is operated by a rack and pinion, one pinion being placed under each shuttle box, the arrangement being given in Fig. 4, where two positions of the driving parts are shown, whilst Fig. 5 represents in front elevation and plan the swivelling equipment of one ribbon. The rack N rotates the pinions M, which in turn drive the shuttles K, and as seen in Fig. 4 the rack N in turn derives its motion from the pinion O at the end of the loom. The locking of the shuttle, which prevents the shuttle being moved at times other than when required, is accomplished by means of the locking pin Q, which projects horizontally from the frame of the loom at the end of the shuttle box. In front of the reed and between the two outermost dents (the outermost containing the weft thread) is placed a finger R, which is secured just above the reed, and projecting downwards gives a surface for the weft to be drawn against as it is paid out, and also helps in the formation of a good round selvage when beating up.

Taking the movements in their rotation, the shuttle moves across the shed during the backward movement of the lay, and the mechanism is timed so that the oscillation of the rack is reversed when the lay is half-way back. At this point the

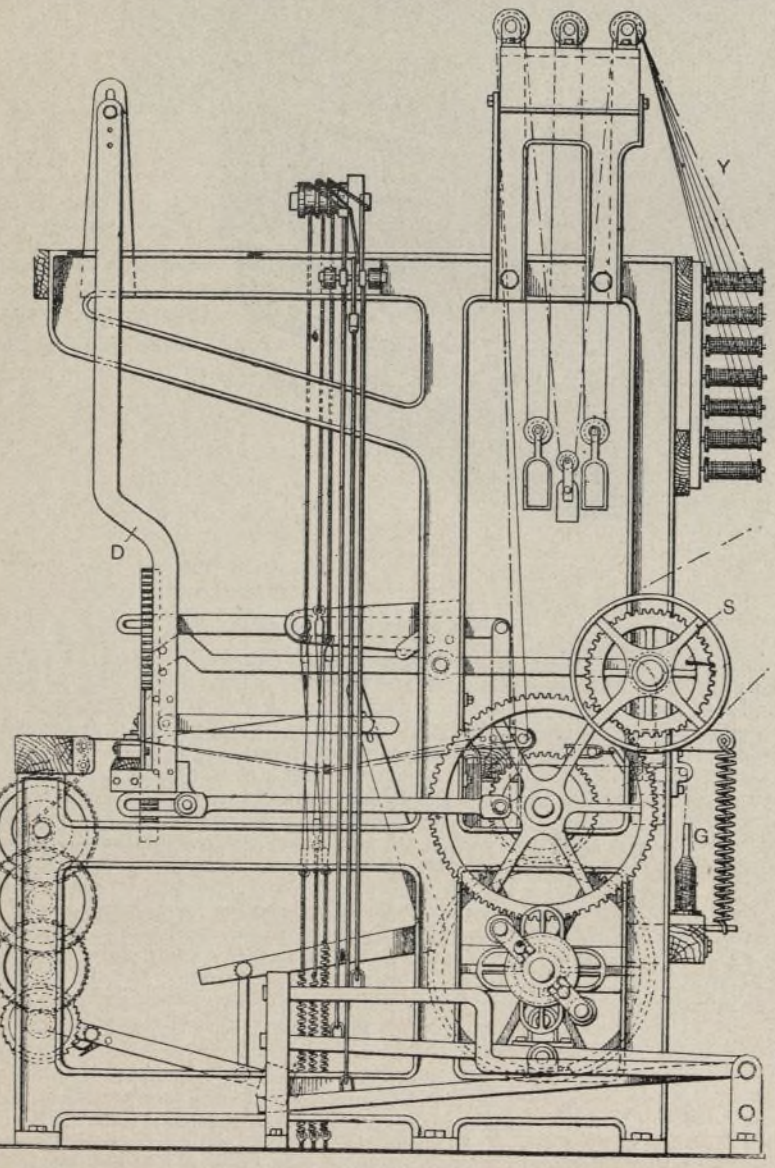


Fig. 2.

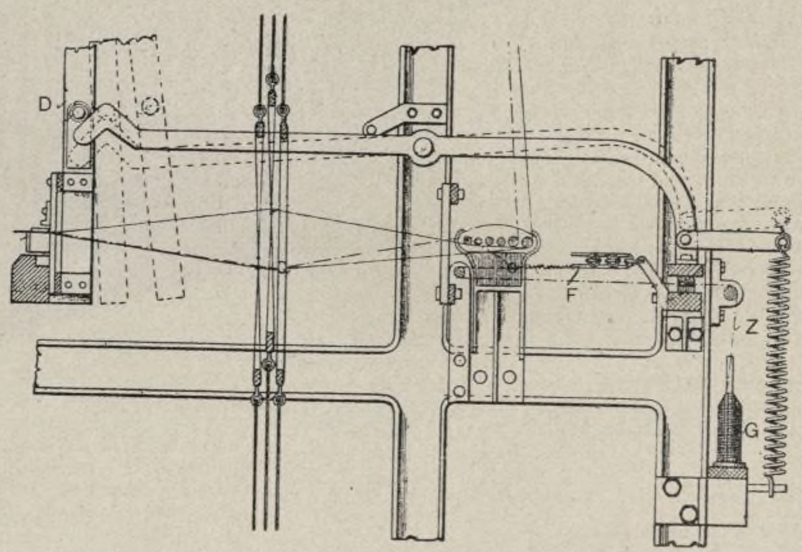
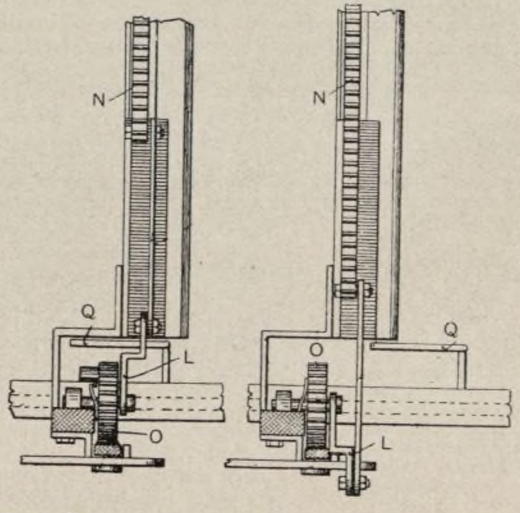


Fig. 3.



A New Type of Ribbon Loom. Fig. 4.

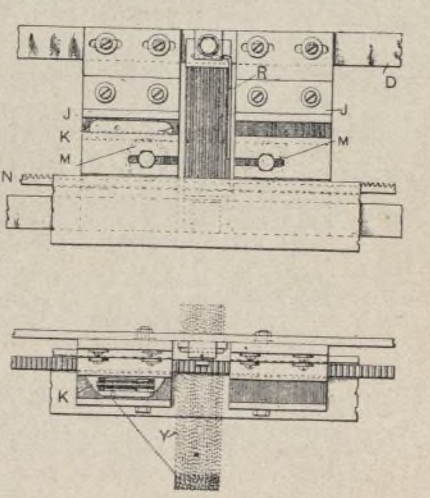


Fig. 5.

enables a novel border to be worked at one side of the ribbon, and, as will be seen later, enables the weaver to "pull back"—that is, pull defective woven portions out for re-weaving, in a simple and easy manner, which does not leave the usual rough-and-tumbled appearance common to such a procedure. Fig. 1 illustrates a short length of ribbon woven on the new machine, from which the novel portions of its structure will be readily seen. The thick warp thread at the left-hand selvage may be either permanent or brought forward and through the reed as a warp thread, passing through suitable tension devices en route. These tension devices are shown best in Fig. 3, where the thread passes over a guide rod, through a gripping jaw, round another rod, and then back through a glass eye which is held by the helical spring F, the other end of the spring being attached to a hanger which is pivoted on the loom frame.

To allow the weft to be drawn into the shed as required, but to be held tight at other times, a let-off positions are the same as shown in the diagram to the right of Fig. 4, and this is the starting point for each rotation of the pinion O, which turns one revolution and shoots the shuttle across the shed from the position shown in plan in Fig. 6 to that shown in Fig. 7. During this shot the weft thread Z and the selvage threads Y are at the bottom of the shed, as shown in the side elevation of Fig. 6; but as soon as the shuttle has passed through the shed, the requisite healds lift the weft thread Z and the selvage threads Y only, and so throw the whip thread into the position shown in the side elevation of Fig. 7.

When the pinion O has made half-a-revolution the lay will be full back, and as both lay and pinion proceed in their movements—the latter causing the rack to reciprocate in the opposite direction—the shuttle will be returned across the shed, and its whip thread will pull the weft thread Z after it, as shown in the position to the left of Fig. 8. The weft is held in this position while beating up takes place, which brings the threads into the position shown to the right of Fig. 8. The parts of the loom are so timed that at the moment the shuttle is shot back to the position shown to the left of Fig. 8, the lay depresses the grip lever (Fig. 3) and opens its gripping jaws so as to allow the whip thread to easily draw in a sufficient length of the weft thread Z into the shed, and as the lay moves back, the spring inside the shuttle allows some of the whip thread to be drawn out—sufficient to cover the movement from the fell of the cloth, this being taken up by the shuttle spring as soon as the lay comes forward.

It will readily be seen that in cases where there is a defect in the fabric the ribbon can be pulled back almost as easily as a knit fabric, by first drawing out the whip thread as far as it is required to pull out the weft. The chief interest, however, lies in the novel method of weaving and the new field it opens up for obtaining neat but fancy and effective selvages, for it will be readily seen that many and diverse patterns can be obtained by very simple changes in the shedding and colouring. The one disadvantage is that it is necessary to put a double pick into every opening of the shed, and this feature, although immaterial in the making of most ribbon goods, would be a decided disadvantage when wider material was being considered. However, it is an open question whether the method just described would not clash with, or even be inferior to, that introduced in the Bradford district about four years ago, where the weft is drawn from a large cheese at the side of the loom, and the far side of the double pick stitched by a miniature temple shuttle.

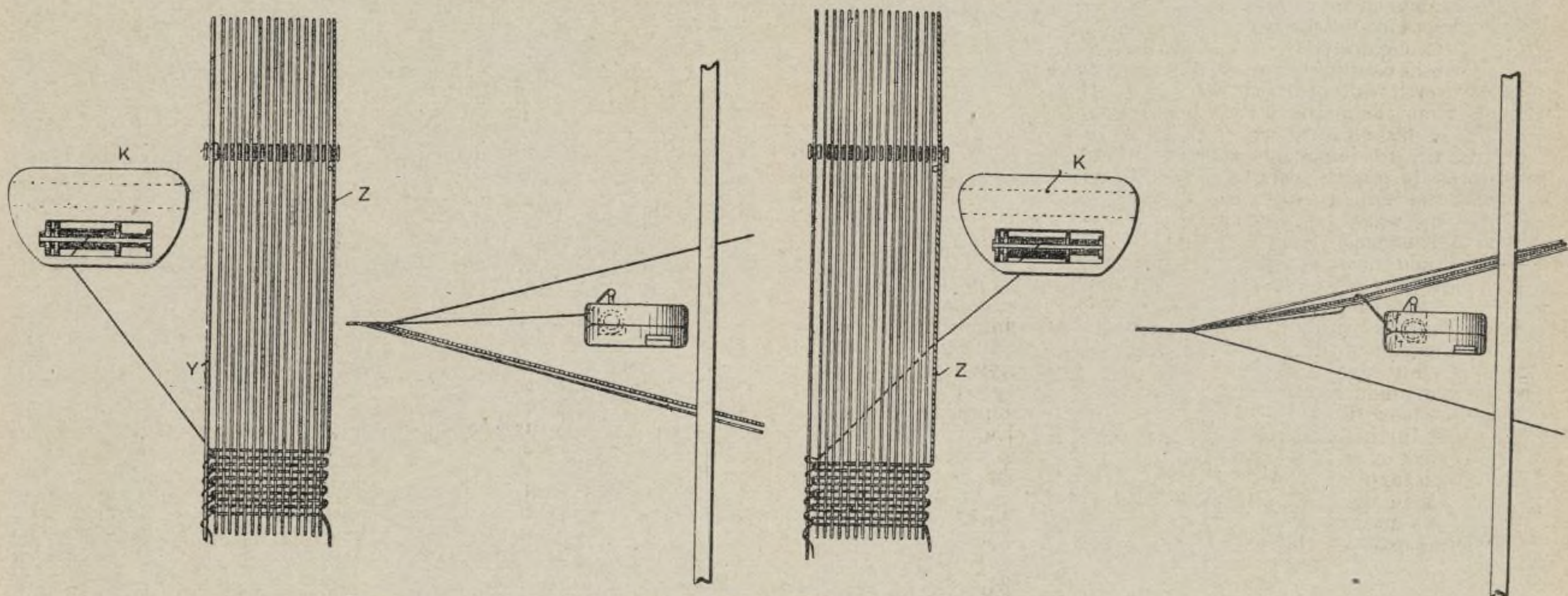
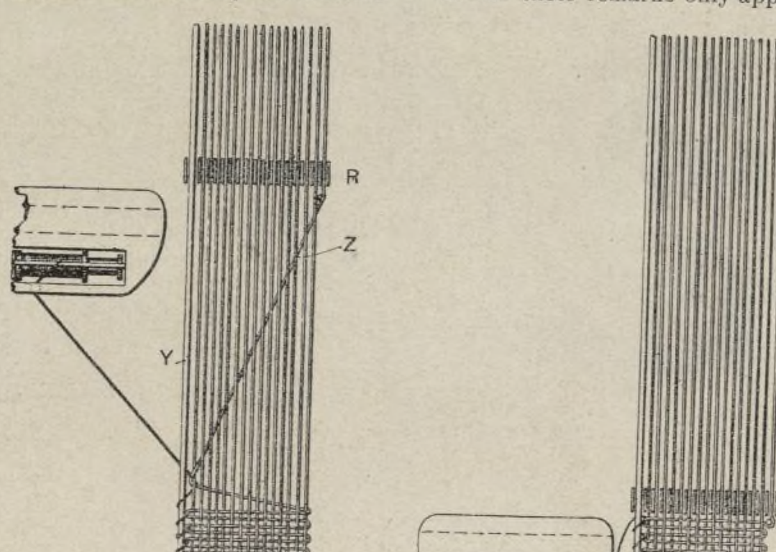


Fig. 6. A New Type of Ribbon Loom. Fig. 7.



A New Type of Ribbon Loom.—Fig. 8.

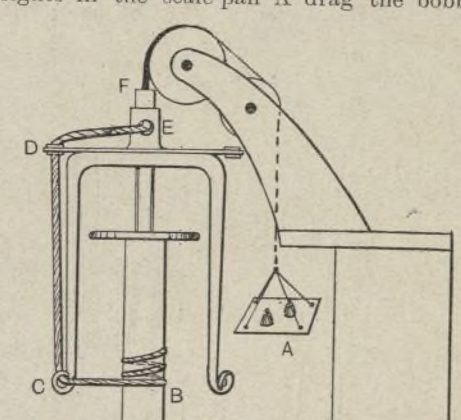
Some Experiments on Drag.

(*Concluded from page* 308.)

NOW that the question of tension in the sliver or end is raised, it may be asked to what extent this tension varies. It has been shown how the pull or drag increases as the bobbin increases in weight, and how its diameter increases as the weight of the bobbin increases. Now both these variations tend to produce effects on the sliver of opposite character, and probably the greatest tendency to twit the thread, due to drag, while the bobbin is in motion, is when the length of sliver between the flyer and the bobbin is longest, because the thread then has a minimum number of fibres, which stretch from the twizzle to the barrel of the bobbin, hence its strength is lessened. As the drag becomes greater, due to increase in the bobbin's weight, the distance between the twizzle and the bobbin becomes shorter, hence the shorter fibres of the thread now begin to bridge the distance between the twizzle and the bobbin, and so share in the pull required to drag the bobbin round. This accession of strength enables the thread to resist being stretched beyond its elastic limit, and thus avoids twitting.

So far these remarks only apply to the bobbin while in motion. However, there is another factor which has a very great effect on twitting the yarn —viz., the inertia of the bobbin, or its sluggishness to move when suddenly pulled by the yarn or sliver. It is impossible to show the exact amount of extra pull due to inertia, because that depends upon the speed at which the bobbin starts. For instance, if the hook of a spring balance is passed through the ring of a 2lb. weight while resting on an iron plate, and slowly pulled, the force required to move it is small, as shown by the short distance the pointer has moved. If the experiment is repeated a few times, pulling quicker each time, the pull registered is seen to be greater when the weight is started quickly. Exactly the same kind of pull is required to start a bobbin that is required to start this weight; and this will be more readily appreciated when it is remembered that the work spent in getting up speed in a bobbin is the same in amount whether started quickly or slowly, and that the force which produces this effect must be great if it acts for a shrt time, and small if it acts for a long time. In practice, some time is allowed to overcome the inertia of the bobbin by putting the machine belt on slowly by means of a screw, and the slower the belt is put on, the less will be the chance of twitting the thread.

The stress, and consequent strain in the sliver due to the drag, does not alone come on that portion between the bobbin and the twizzle of the flyer, especially when the thread is not twisted round the flyer arm. It is felt in a diminishing degree along its length up to the rollers. It is a well-known fact that the stress on the sliver can be reduced by twisting it once or twice round the flyer arm. However, it is not such an easy matter to measure this reduction in stress in a direct manner, consequently an indirect method has been adopted, as shown in Fig. 3. The weights in the scale-pan A drag the bobbin B



Some Experiments on Drag.—Fig. 5.

round, consequently the load A not only measures the drag, but the tension in the sliver all along its length. If friction is neglected at C, D, and E, the sliver from B to F is thus under the same tension all along its length, which may be looked upon as being produced by the pressure of the twizzle on the sliver.

The results obtained in Experiment I., column 1, of Table VIII., show the tension in the sliver from the bobbin to the rollers when the sliver is not twisted round the flyer arm.

Column 3 in Experiment II. shows the tension from F to A, and since we know that the tension from C to B is that due to drag alone, the difference between the tension in C B and F A is equal to the difference between columns 1 and 3, and this difference represents the loss in tension due to friction along the flyer arm. The difference between columns 1 and 5 represents the friction due to the two laps round the flyer arm. It will be observed that the maximum pull comes on the eye E of the spindle in these experiments with one or two laps; but in actual work the maximum pull comes at the twizzle, and the minimum at the eye E of the spindle, which is the object aimed at by lapping the sliver round the flyer arm.

It will be observed that the friction due to lapping once or twice round the spindle seems excessive, and very much more than really exists in practice. This is quite true, for in our experimental case there is the tension due to the drag pressing the sliver to the flyer arm, and in the real working case there is very little pressure at the eye of the spindle forcing the sliver to slide heavily on the flyer arm. Such a difference in pressure will alter the actual results, but not the ratios.

TABLE VIII.

THE TENSION ON A SLIVER BETWEEN THE FLYER EYE AND THE BOBBIN UNDER DIFFERENT CONDITIONS OF WORKING ON A FOUR-SPINDLE DRAWING-BOX.

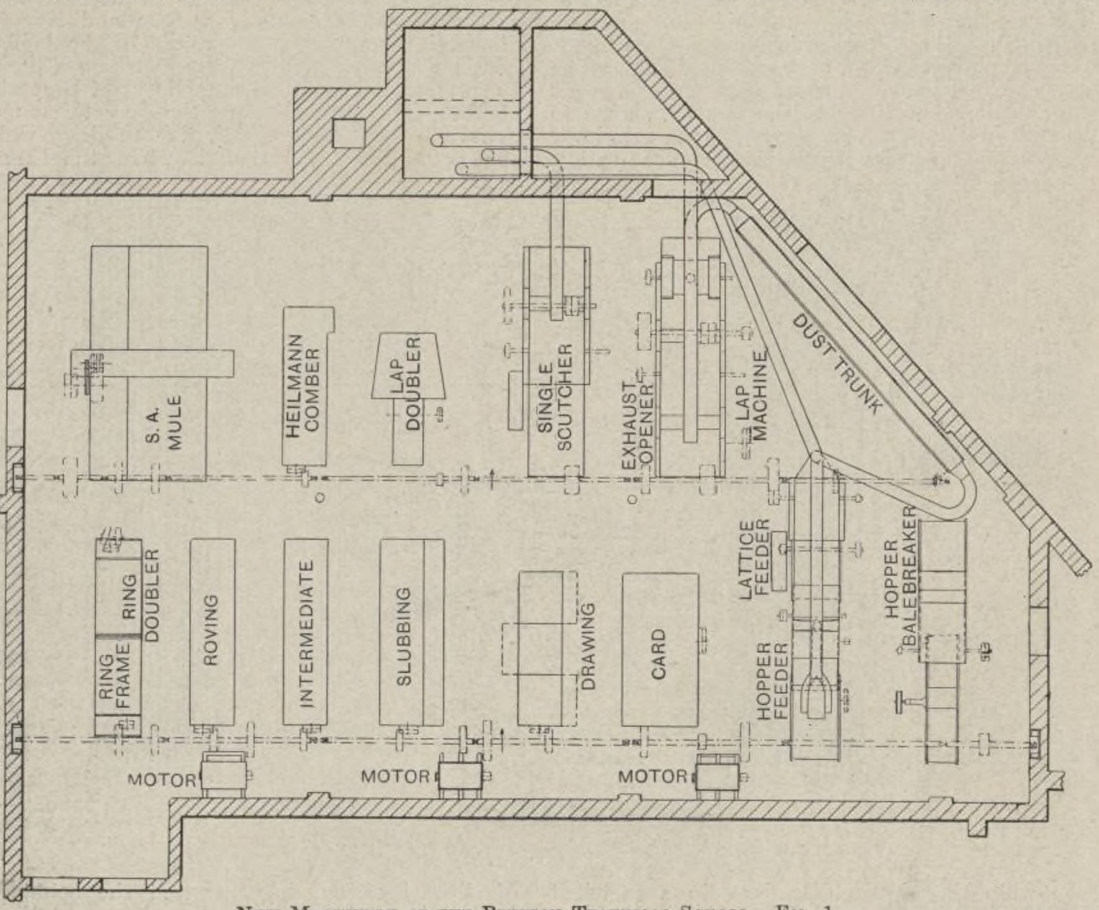
Experiment I. No Lap Round Spindle.		Experiment II. One Lap Round Spindle.		Experiment III. Two Laps Round Spindle.	
Pull in Sliver in Lb. Weight.	Weight of Bobbin in Lb. Weight.	Pull in Sliver in Lb. Weight.	Weight of Bobbin in Lb. Weight.	Pull in Sliver in Lb. Weight.	Weight of Bobbin in Lb. Weight.
2·75	2·75	4·0	2·75	5·13	2·75
3·8	3·75	4·75	3·75	7·13	3·75
4·75	4·75	5·83	4·75	9·5	4·75
5·2	5·75	6·9	5·75	11·0	5·75
7·0	6·75	8·25	6·75	11·8	6·75

6in. single and 6in. double washers give about the same results.

The "Drum" Rotary Pump.

THE DRUM ENGINEERING COMPANY, 27, CHARLES-STREET, BRADFORD.

ALTHOUGH a number of forms of rotary piston pumps have been placed on the market from time to time, they have not generally proved successful. One of the exceptions to this rule is found in the well-known "Drum" pump, made by the Drum Engineering Company. The sectional view Fig. 1 will enable the construction to be understood by those to whom it is not already familiar, it being only necessary to explain that the pump has only one rotary working portion, thus dispensing with gear wheels and their attendant disadvantages at high speed. As will be seen, the working piston is provided with blades which enter into spaces in the revolving valve or drum shown in the upper part of the casing, these spaces being so arranged as to allow the piston to pass without slip, back pressure, or undue friction. A continuous flow in one direction is one of the advantages which may be claimed for this simple arrangement, to which there may be added the absence of valves and air vessels, the ability to work at high or low speeds and in either direction. Variously-arranged pumps on this principle are supplied by the makers, a recent development being that shown in Fig. 2, representing two No. 4 size "Drum" pumps connected by friction clutches to a 12 by 12in. vertical engine. This pump is capable of lifting 12,000gals. per hour to a height of 80ft. The friction clutches are arranged so that the pumps may work quite independently of each other or together, as required.



NEW MACHINERY AT THE PRESTON TECHNICAL SCHOOL.—FIG. 1.

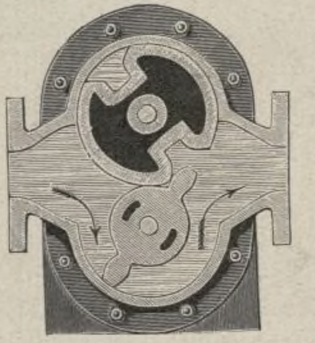
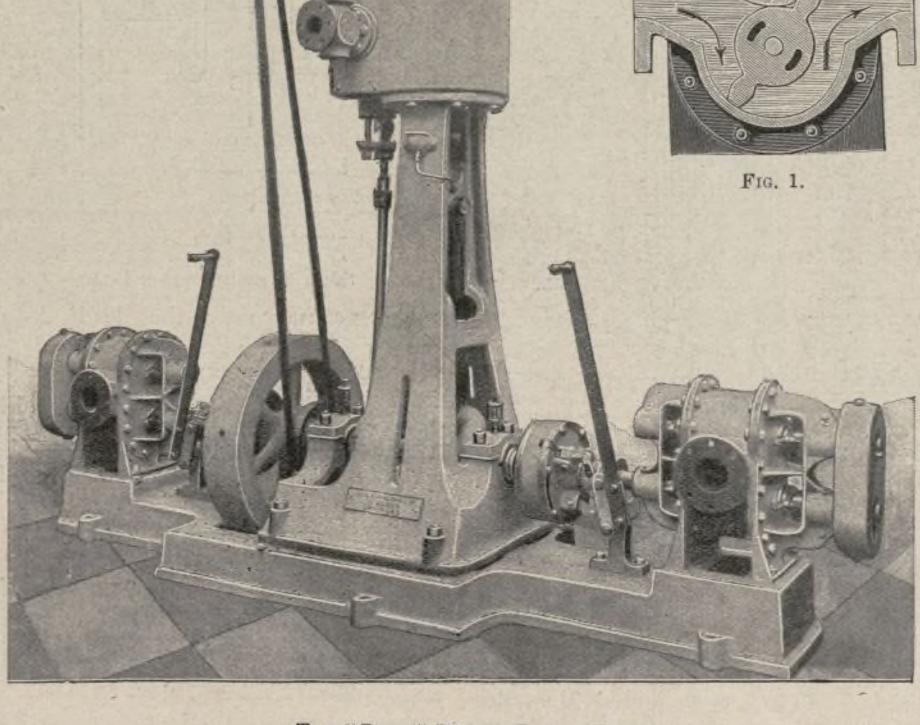


FIG. 1.



THE "DRUM" ROTARY PUMP.—FIG. 2.

One of the features of this class of pump is its adaptability to the pumping of semi-fluids, chemicals, etc., a number being in very successful use for such purposes.

New Machinery at the Preston Technical School.

THE Victoria Jubilee Technical School of Preston is a branch of the Harris Institute of that town, and was opened in 1897 to relieve the parent institute of the various technological classes, of which the textile branches were the most important. It was built at a cost of about £11,000, but such was the shrewdness shown in its general arrangement and architecture, and such was the common-sense of those officials connected with the undertaking, that a building has been erected which under ordinary conditions would have cost a great deal more money. The exterior has an appearance of which the town is justly proud, while the interior at once suggests convenience without unnecessary luxury. Every part is well lighted and thoroughly ventilated, this latter being effected on the Tobin system, where fresh air is allowed to enter through gratings under the windows. This air passes into radiators and then into the rooms, while the impure air is drawn off by Blackman electric fans, which are placed in different parts of the building just above the ceiling level. Electric light is used throughout the building, and is generated on the premises, although the town supply is also available when required.

Although the technical school has been opened about four years, it reopens this session with a new equipment of textile machinery. For some time past the committee have been endeavouring to put their school on a level with the best of its kind, and their labours, directed by their enterprising and untiring chairman, have at last resulted in a spinning plant being obtained which, excepting for size, has probably no equal in any other school, and for which, for its purpose, it would be difficult to suggest improvements. The weaving plant is also made up of a varied assortment of up-to-date machinery, although the spinning school holds the first place.

Mainly for convenience, but partly with the view to illustrating the latest method of driving, electric motors are used for the motive power. The spinning-room is driven by three motors—one of 12H.P. for the breaker, feeder, opener, and card; one of 8H.P. for the scutching, drawing, doubling, and slubbing; and one of 12H.P. for the comb, mule, and for the intermediate, roving, spinning, and doubling frames. The various shafts can be connected in case of a breakdown of one of the motors, and the arrangement of both motors and machines can be seen on reference to Fig. 1, which is a plan of the spinning shed. The entire spinning plant has been made by Messrs. Platt Brothers and Co. Limited, of Oldham, and is a duplicate of their Paris exhibit of last year, being made from the same patterns and finished in the same manner. This ensures the plant containing the latest types of machines and the most recent improvements, while in addition the superior fittings and finish of the machines are noticeable on first entering the shed. Oil-dripping pans are supplied on all the machines, standing about a foot outwards underneath all gearing. These have polished brass edgings, and in addition to keeping the floor clean, give a finished appearance to the room.

The spinning plant, which is illustrated by the photographs taken from opposite ends of the shed shown in Figs. 2 and 3, consists of the following machines:—A hopper bale breaker, which has been considered preferable to a roller bale breaker for the trade of the district; a hopper feeder; an exhaust opener lap machine, to which the cotton passes from the hopper feeder by way of a dust trunk; a single scutcher, taking four laps, with improved beater bars and piano-pedal arrangement; a single revolving flat carding engine, 45in. on the wire, 50in. cylinder, and 27in. doffer, with the necessary grinding apparatus; and a drawing frame with three heads.

In addition to the usual machinery for American cotton, there are also a lap doubler of twenty cans for 10½in. laps, and a Heilmann's comber with four boxes, so that it is possible to practically show the working of every class of cotton, combed or otherwise. Continuing the ordinary spinning machinery, there are a 24-spindle slubbing frame; a 38-spindle intermediate frame; a 52-spindle roving frame; a ring frame of 2¼in. pitch, spinning warp on one side and weft on the other; a ring doubler of 2¾in. pitch; and an S.A. mule with a 64in. stretch, carrying fifty-six spindles of 1⅛in. pitch at each side of the head. It is unnecessary to state that suitable arrangements for keeping the room at the requisite temperature have been made—a feature which is frequently overlooked in technical schools. The mixings are supplied by a firm of spinners in the neighbourhood, as it is scarcely practicable to arrange for such being made in the school buildings, but with that exception, there is everything in the shed necessary for producing 32's ring and 46's to 50's mule yarns from the raw material.

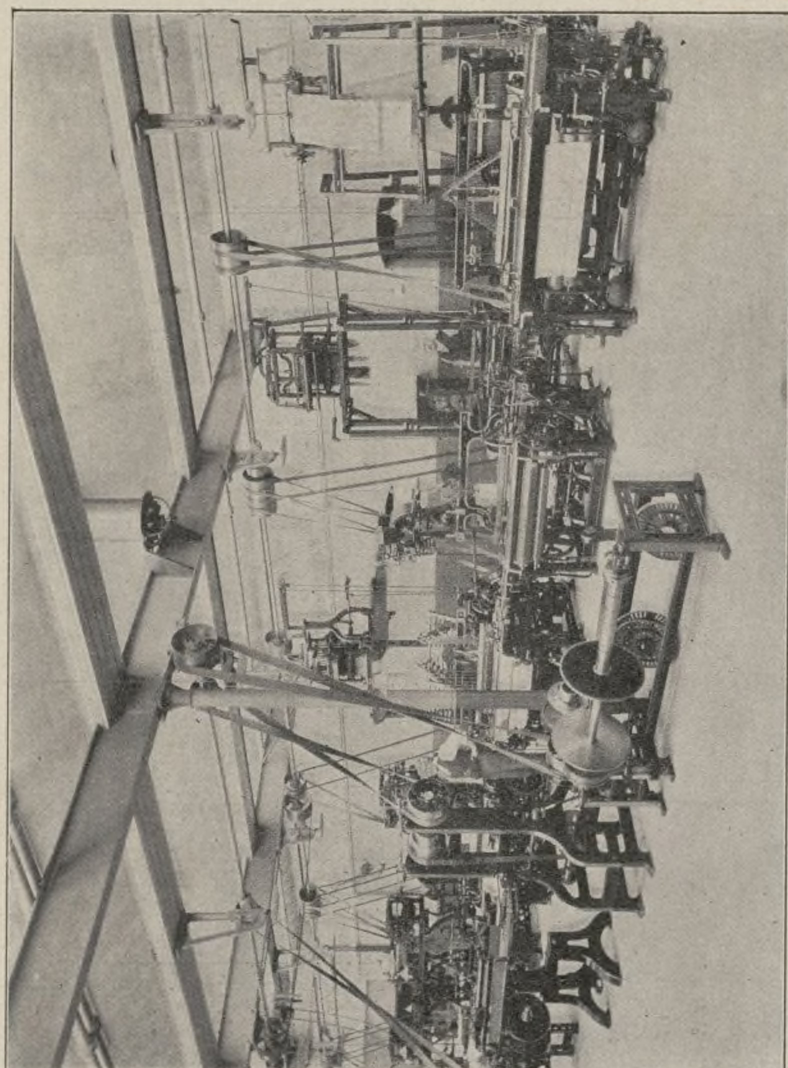


Fig. 4.

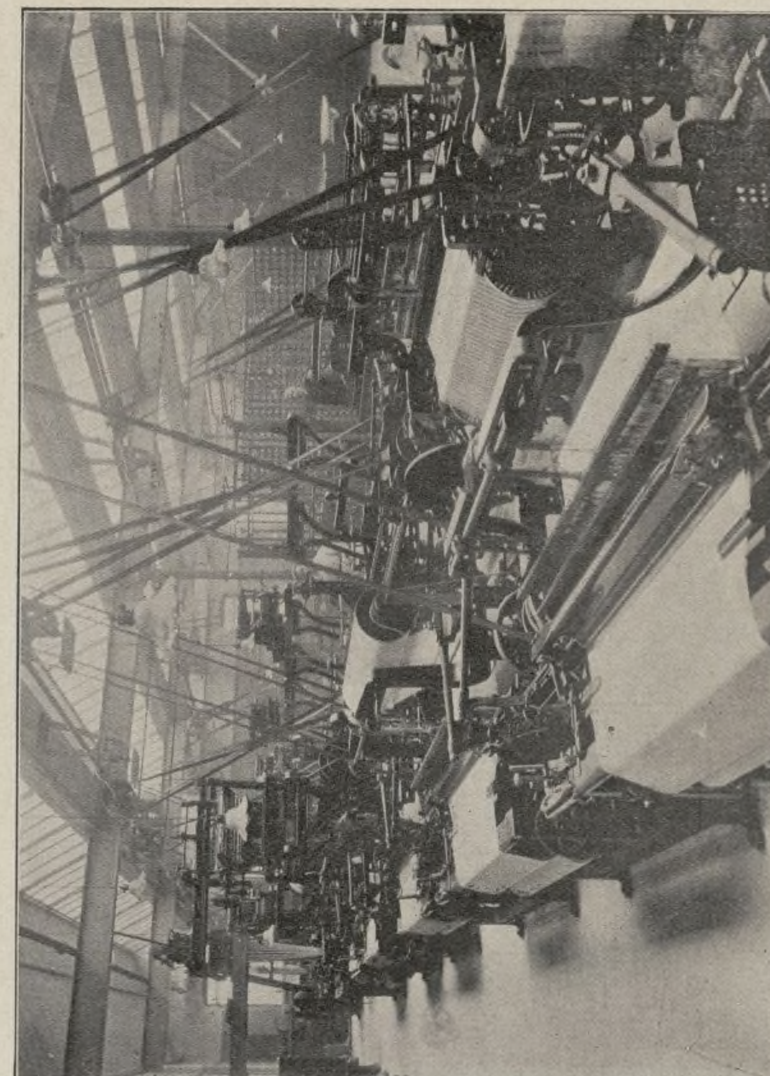


Fig. 5.

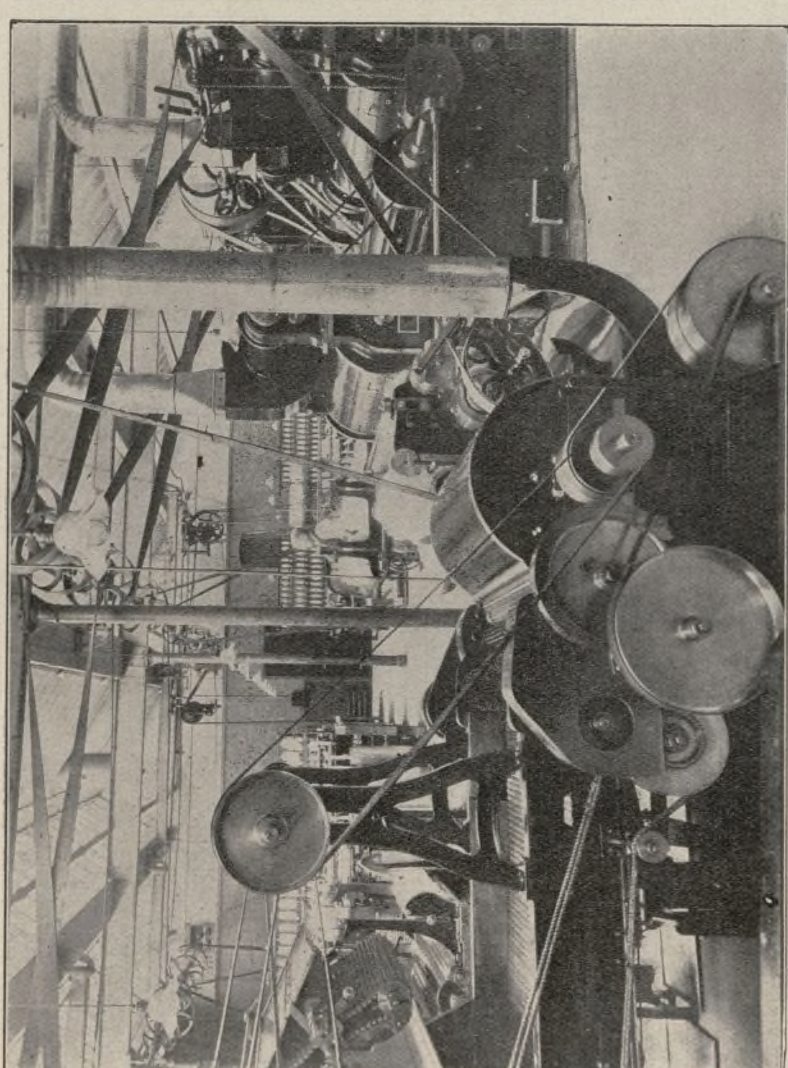


Fig. 2.

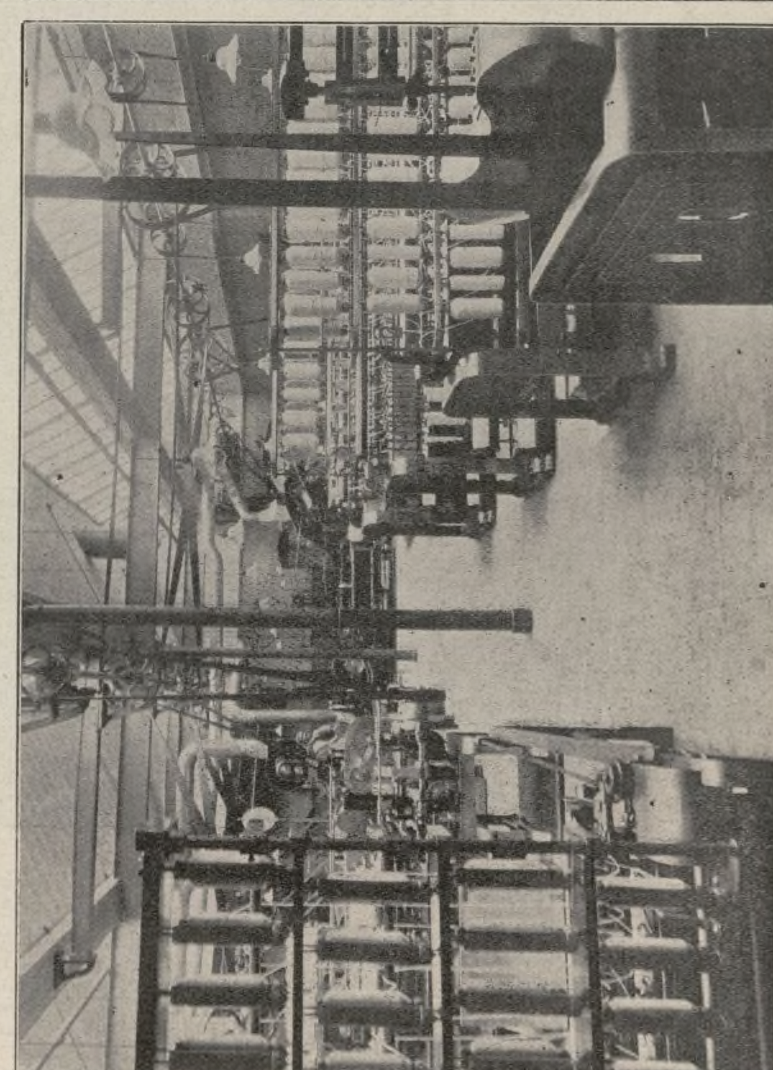


Fig. 3.

New Machinery at the Preston Technical School.

In the weaving shed are 17 power-looms of various types, and 20 hand-looms, the weaving shed being shown in Figs. 4 and 5, which are views from each end. The power-looms consist of a 40in. plain loom; a 40in. crimp loom; a 40in. loom with jack dobby and dhooty-border motion; a 40in. tappet loom; a 40in. terry loom; a 40in. loom with double boxes and double-lift jacquard; a 40in. loom with leno jacquard; a 40in. loom with single-lift jacquard; a 45in. loom with oscillating tappets; a 40in. loom with Eccles box motion (four boxes) and a 16-jack dobby; a 40in. circular box loom; three 40in. looms with 20-jack dobbies; a 40in. loom with a 40-jack dobby and vibrating carriers for leno work; a 40in. 5-shaft roller top loom; and a 40in. 8-shaft light fustian loom. These power looms were made by Messrs Robert Hall and Sons (Bury) Limited, of Bury; Messrs. Butterworth and Dickinson, of Burnley; and Messrs. Wm. Dickinson and Sons, of Blackburn; and the hand-looms by Messrs. Atherton Brothers, of Preston. Working models are also arranged round the room, one especially noticeable being that of a dobby by Messrs. Ward Brothers, Blackburn, which is arranged so as to explain all its movements in a lucid and novel manner.

New Cotton Mill in Caucasia.

DURING the last few years many countries of which little has been known have come forward to take an important place in the commercial world. It is not long ago since Caucasia, the mountainous country lying to the South of Russia, between the Black Sea and the Caspian Sea, was chiefly peopled by a mixed assortment of tribes, hardy mountaineers with revolutionary tendencies, who, although nominally submissive to Russian military authority, were only partially kept under restraint. Then came the time when the district was found to be rich in mineral resources. The Russian Government showed great energy and creditable tact in opening up the country, pacifying the native tribes, and giving reliable security to the enterprising companies who first worked for minerals and petroleum. It is needless to say that the earlier efforts brought little returns, but since that time it has been definitely ascertained that the country holds a large store of wealth, and both Russian and foreign capital is trying to obtain further shares in working the land.

Bakou, on the western shore of the Caspian Sea and the eastern terminus of the Trans-Caucasian Railway, has rapidly grown in importance during the changes wrought in the country, and it was chosen as the most suitable site for a cotton mill by Mr. G. Z. A. Tagieff, who wished to find work for the poorer section of the population. The enterprise was partially philanthropic, but was carried out in such an energetic, enterprising, and business-like manner that commercial success has also been obtained. It was, however, a very risky speculation, for after building had got well under way, it was temporarily stopped by the Government, owing to some misunderstanding. It was resumed later, and, when completed, Messrs. Dobson and Barlow Limited, of Bolton, were entrusted with the order for 18,300 ring spindles and all the necessary preparing machinery for 650 looms and weaving plant, and also for the mill gearing and steam-heating installation.

A ready market was found for the manufactured goods, both in Caucasia and the adjoining kingdom of Persia, as well as in other neighbouring districts, whilst the cotton grown in plantations in close proximity to the works also turned out a success. This progress decided Mr. Tagieff to enlarge his premises, and the firm, now known as the Caucasian

NEW COTTON MILL IN CAUCASIA.—FIG. 1.

Staple Manufacturing Company, has recently been doubled in size, and the second order for machinery entrusted to Messrs. Dobson and Barlow Limited.

The mill has been built and equipped on the most modern lines, and the driving is by electric motors. These are placed in a corridor which divides the mill into two halves, as shown in Fig. 1, which places the drive right in the centre of the machinery. Fig. 2 shows the preparing machinery in the spinning shed, whilst Fig. 3 is an illustration of the weaving department.

The Use of Highly Superheated Steam in Engines.*

By R. Lenke.

In no branch of heat-engine building has such an amount of study been spent as in steam engines, from Watt's time up till to-day. The economy of the steam engine is, in spite of all efforts, not the best, and the steam engine in its highest perfection attainable at present cannot claim the first place in comparison with other heat engines. And so the problem of generating and using superheated steam has become a question from the solution of which a considerable stride in improving economy has been expected and really made.

Superheated steam is generated by the addition of heat to saturated steam. The behaviour of superheated steam is similar to that of gases ; it is a very bad conductor of heat, and has the special peculiarity of being able to lose a certain amount of heat without becoming saturated or wet steam. The thermal capacity of steam is only 0·48, therefore very little heat is required to superheat steam ; but as the steam loses the heat as quickly as it acquires it, every passage conveying superheated steam must be well covered with non-conducting material. Although there are some losses when using superheated steam on account of the heat radiation, they are very much smaller, because the loss of heat from superheated steam has lower calorific value than the latent heat of saturated steam.

Superheated steam has a greater volume per unit of weight than saturated steam at the same pressure, hence one advantage, and the higher the temperature the greater this advantage. At various pressures and temperatures the increase of volume may be taken from the following table :—

TABLE I.

Pressure.	390° F.	570° F.	750° F.
70	1·1	1·33	1·57
115	1·06	1·29	1·52
170	1·02	1·24	1·46

Table I. shows that the higher the pressure is, the smaller the increase of volume ; and it is proved from practice that the advantage with lower pressure is indeed greater in proportion than with higher pressures.

The question may arise whether the increase of volume does not require more additional heat than the benefit derived from it is worth. To show this clearly, Table II. has been prepared, expressing how many B.T.U. less are required to produce 1 cub. ft. of superheated steam than of saturated steam at the same pressure. For various pressures and temperatures the total heat per cubic foot is as follows :—

TABLE II.

Pressure.	Saturated.	390° F.	570° F.	750° F.
70	233	219	192	175
115	350	337	297	267
170	492	485	432	398

—*i.e.*, to produce, for example, 1 cub. ft. of steam at 115lb. pressure and a temperature of 570° F.,

$$\frac{350 - 297}{350} = 15 \text{ per cent.,}$$

less heat is required than to produce 1 cub. ft. of saturated steam at the same pressure. With saturated steam engines, from 20 to 25 per cent. of admitted steam is condensed during the admission period, consequently the practical steam consumption is very much in excess of the theoretical. Superheated steam does not condense during this period if sufficiently superheated, hence another advantage.

The economy effected by using superheated steam in engines is very remarkable, and acknowledging this fact, a great number of steam users all over the world superheat the steam, although in many cases only a few degrees, yet a considerable saving in steam and coal is always the result. To obtain the full benefit, the required temperature of steam is from 660 to 700° F., and to stand this temperature the engines must be specially designed. It is not sufficient to use mineral oil with a very high flash point, and anyone who tries to supply an existing engine of any kind with steam at that temperature, will have a very unpleasant experience, even when using the above-mentioned oil.

The introduction of superheated steam into engines largely influences the expansion of the heated parts. Engines always gave great trouble when the distribution of metal in the cylinders was not uniform, as parts with more metal expanded most, and forced the cylinder walls towards the inside and made the cylinder out of shape. When using liners in the cylinders, they were squeezed in at the ends, decreasing the diameter, and jamming the piston body if sufficient clearance was not provided. With steam jackets heated with steam of 500° F., the lubrication ceased as the cylinder walls became too much heated, consequently it was found necessary to do away with jackets, or if jackets were already provided, not to pass steam through them. Pistons constructed on the Ramsbottom type always worked satisfactorily, except in the case of pistons fitted with steel springs, when they were in contact with highly-superheated steam. Any kind of gun metal gets brittle after a very short time, therefore valves, seats, and all parts in direct contact with superheated steam must be made of cast iron or other suitable mixture. Copper also loses about 40 per cent. of its strength at that temperature, consequently copper bends in pipes are not practicable. The best material for piping has proved to be wrought iron and steel, each pipe being as long as possible, to have the least number of flanges. For long, straight pipe connections, provision must be made to meet the expansion, which is, at 770° F., 0·0037 of the length, so that, for example, 100ft. of pipe extends 0·37 of a foot, or nearly 4½in.

New Cotton Mill in Caucasia.—Fig. 2.

* Paper read at the International Engineering Congress, Glasgow.

Glands and stuffing boxes at first frightened users, so the engines were constructed single-acting to avoid the use of glands, but no serious difficulties have arisen on that account. It is advisable to place the stuffing box as far as possible from the cylinder end to keep it well away from the hottest parts, and to allow of as much radiation as possible. Sufficient clearance in the neck bush should be made to allow for the expansion of the piston rod, and no metal with a melting temperature below that of the steam should be used.

Valves and valve gears are influenced in the same way by superheated steam. Valves containing many ribs of different thicknesses of metal (in section), such as plain slide valves or Corliss valves of the usual construction, are not suitable for high temperatures. A Corliss valve of medium size will stand from 480 to 500° F., but no more, and the latter temperature very seldom. The smaller the plain slide valves are, the higher temperature will they stand; large slide valves will hardly stand even slightly-superheated steam if no provision is made for forced lubrication of the valve face.

this is best done by stepping the liners and seats, and using narrow asbestos rings for each step. The liner is then forced on to the small seats by set-screws in the cover, these asbestos rings making a lasting joint. Long valves cast in one piece become scored, whether they are cooled from the inside with exhaust steam or not; consequently all valves should be made as short as possible. Rings and springs in valves cannot be recommended, as the steam comes behind the rings and increases the pressure, causing friction, and therefore increased oil consumption. As it is impossible to rely on tightness of piston valves, they must be made as small in diameter as possible. It may be stated here that superheated steam can travel at from 30 to 40 per cent. higher speed through steam ports than saturated steam, and this fact has to be considered during construction.

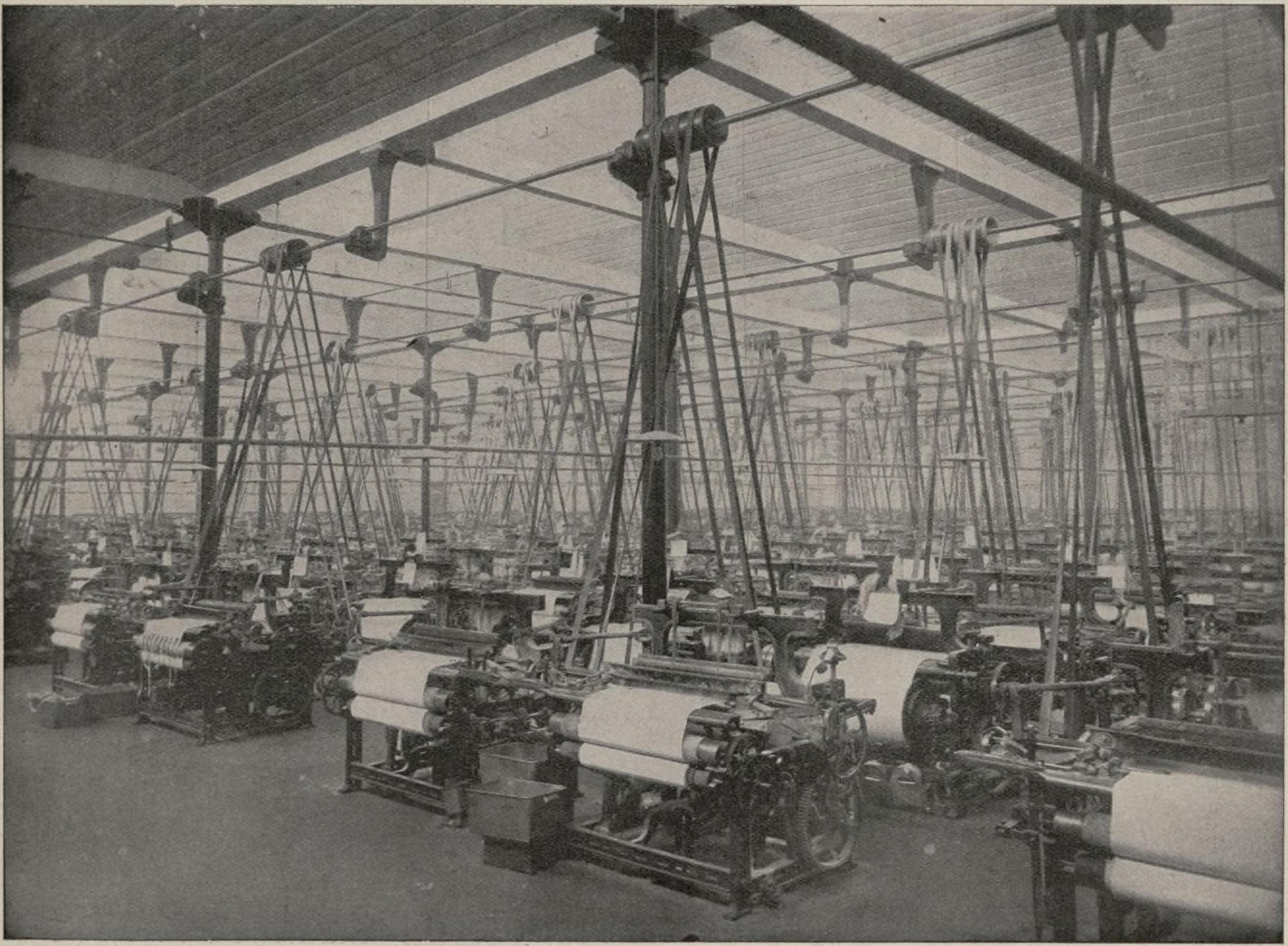
Two piston valves working one in the other, as the Rider or Meyer valves, are impracticable for superheated steam. If engines of that type are intended to be worked with superheated steam, each valve must work in a separate chamber.

of heat transmitted from the steam to cylinder walls, and *vice versâ*, is much lower with superheated steam than with saturated steam, the whole range of temperature from boiler pressure to vacuum can take place in one or two cylinders, so that the use of a triple-expansion engine does not make the slightest improvement in economy. It is not intended to be understood that the author proposes to do away with all triple-expansion engines; for very large plants their use will be necessary for constructive purposes.

With regard to economy obtained from engines working with superheated steam, the gain is derived from the larger volume of the steam and the doing away with initial condensation.

Generally the steam consumption of modern engines working under good conditions may be taken as follows:—

Single-cylinder condensing engines with saturated steam and a pressure of from 90 to 100lb. per square inch use from 19 to 25lb. of steam per indicated horse-power per hour, corresponding to from 375 to 490 B.T.U. per minute. The great difference in temperature between admission and exhaust



New Cotton Mill in Caucasia.—Fig. 3.

steam causes much waste by initial condensation, and consequently this type of engine especially favours the use of superheated steam. With superheated steam the consumption has been lowered to from 13½ to 15lb., corresponding to from 290 to 335 B.T.U.

Piston valves have proved to be most suitable for the highest temperature, owing to their uniform distribution of metal; but even with this sort of valve certain experience is necessary to get them in good working order. With ground valves the ribs holding the boss for the valve spindle must not begin with the working surface of the valve, but must be placed beyond that, because they expand and make the valve polygonal. The valves must be ground in other liners from those in which they are to work in the engine; the former liners have to be smaller in diameter to secure more clearance to provide for the expansion of the valves; all ribs must be placed beyond the working surfaces of the valve. The cylinder expands in length more or less than the steamchest, causing thereby deformation of the latter, which must be carefully considered in design. It is best to work the valves in liners fixed to the cylinder, and with a small clearance, sufficient to allow for the deformation of the steamchest. With this construction it is of course necessary to make steam-tight joints between the several ports, and

Double-beat valves can also be recommended as being safe, but they require a special arrangement, which is not always obtainable with every gear. Very often it happens when warming up the engines that the valve spindles get hotter than the gland boxes, and on starting the engine the friction between spindle and stuffing box is greater than the power of the spring, and if the valves are not positively driven they remain open during the full stroke.

Besides the economy, the use of highly-superheated steam has some other advantages which are also important. It makes the steam consumption nearly independent of the size of engine, as a small engine has about the same steam consumption as a large one—as, for example, an 80H.P. compound condensing engine uses 10·45lb. of steam at 160lb. pressure, and a 1000H.P. engine uses 9lb. of steam per indicated horse-power per hour. The use of highly-superheated steam does not require high boiler pressures; 160lb. is the highest to be recommended, as no advantage can be derived by exceeding this. As the amount

Non-condensing single-cylinder engines gave consumptions of from 15 to 18lb. of steam per indicated horse-power per hour, which is about the same consumption as an average compound condensing engine with saturated steam. The non-condensing compound engine decreases the consumption to from 14 to 16lb. per indicated horse-power per hour. The compound condensing engine is the most economical, and the economy obtained can hardly be reached by a quadruple-expansion engine working at a pressure of 300lb. The steam consumption of such an engine, either compound or tandem, at 140lb. pressure only, never exceeds 10lb. per indicated horse-power per hour, and usually remains below, many tests having proved 8·5 and 8·8lb. consumption per indicated horse-power.

RAW MATERIALS, PROCESSES, FABRICS, &c.

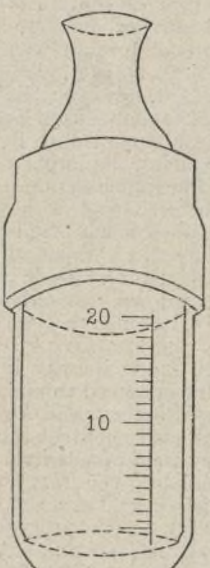
Air Testing in Factories.

By A. G. Woodman and E. H. Richards.

THE increased amount of carbon dioxide above the normal is usually relied upon as an indication of the extent of vitiation of atmospheric air. Hence sanitary engineers and inspectors who have occasion to test the efficiency of ventilating systems are often required to make numerous approximately quantitative determinations of atmospheric carbon dioxide. For this purpose the usual laboratory methods for the exact estimation of carbon dioxide in the air are not suited. Such methods require the passage of a considerable volume of air for a long time through the absorbing solution, or else the collection of definite volumes of air for subsequent examination, and the use of carefully standardised solutions which must be preserved out of contact with the air, and must be accurately measured. The analytical process demands a high degree of skill on the part of the operator, the value of the results obtained being in direct ratio to the care exercised in the collection and examination of the samples. For a comparatively small number of tests made in or near the laboratory where the highest degree of accuracy is desired, these methods are of great value; but for the demands of practice, where, in the course of a few hours, from fifty to one hundred tests are to be made, and where comparative results rather than great accuracy are required, some simpler form of apparatus is desirable.

Such an apparatus to be satisfactory should meet, so far as possible, the following requirements:—

1. It should be sufficiently compact and portable to be carried in the hand from place to place, and should contain within itself everything required for the complete determination of the carbon dioxide.



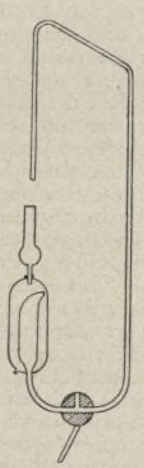


Fig. 2.

Fig. 1.—Air Testing in Factories.

2. It should be as simple in construction as possible, and its use should not involve delicate measurements. If automatic in its action, so much the better.

3. If possible, the apparatus should be made entirely of glass, avoiding prolonged contact of corks or of rubber connectors with any dilute solution which may be used.

4. It should be so constructed as to protect the solution at all times from the carbon dioxide of the air, especially while the determination is being made, because of necessity such an apparatus must be used within the area of contamination.

5. The complete apparatus should be sufficient for fifty or more determinations.

6. It must be capable of giving results of a reasonable degree of accuracy, say within 0·5 part of carbon dioxide in 10,000 parts of air, in the hands of persons having little or no chemical knowledge and minimum skill in manipulation.

7. If a solution be used in the apparatus, it should be one which can be prepared easily from chemicals readily obtained; the solution must maintain its efficiency for a reasonable length of time, if protected from external influences; and the solution should be one which it is not at all dangerous or obnoxious to use.

Experience with several forms of simple apparatus which have been proposed has shown that none of them answer perfectly to the above requirements. Methods which were satisfactory a few years ago are no longer reliable. The question at present is not whether the air contains 15 or 20 parts of carbon dioxide per 10,000, but whether it contains five or eight. Simplicity of apparatus is much to be desired, but it should not be gained at too great a sacrifice of accuracy. Even when no greater precision is required than is necessary to meet the demands of practical work, it is out of the question to measure the test solution by means of an ordinary pipette, or to preserve it for any length of time in stoppered vials; the strength of the solution is almost certain to be reduced by contamination with the breath, and by contact with rubber or cork. In the directions given for the use of these simple forms of apparatus, not enough stress is laid upon the necessity for extreme care in the use of these very dilute solutions, the strict observance of conditions which might well be neglected in ordinary analytical procedures being here an essential factor of success.

Of the various simple methods which have been tried, perhaps the most generally satisfactory is that proposed by Dr. G. W. Fitz, and next the method of Cohen and Appleyard. A brief description of these two methods in their original form may not be out of place here.

The Fitz method is carried out by shaking a small quantity of dilute lime-water, coloured pink by phenolphthaleïn, with successive portions of air until the solution is decolourised. The greater the amount of carbon dioxide in the air, the less will be the volume of air required to neutralise the lime-water, and *vice versâ*—that is, the amount of lime-water remaining constant, the amount of carbon dioxide will vary in a certain inverse ratio to the volume of air. The solutions used are a 1 per cent. solution of phenolphthaleïn in alcohol, diluted with four parts of water, and a "saturated" solution of lime, made by shaking an excess of unslaked lime with water. The essential parts of the apparatus are several small homeopathic vials, holding about 10cc. each, and a "shaker." This consists of a tube of about 30cc. capacity, closed at one end, and graduated for a distance of 20cc. from the closed end. In this tube, by means of a rubber collar, slides a smaller tube which is contracted at the outer end, so as to be more readily closed by the finger. The apparatus is shown in Fig. 1.

Before making a test of the air, 10cc. of dilute lime-water, prepared by diluting the "saturated lime-water" to $\frac{1}{100}$ of its strength, is placed in each of the vials. When ready to make the test, this solution is poured from the vial into the shaker, and shaken with successive portions of air until the colour disappears. The first test will give the approximate amount of carbon dioxide, and succeeding tests, made by using the solutions in the other vials, will aid in approaching the correct result. After thus determining the amount of air required to produce decolourisation, reference is made to the accompanying table:—

Air in cc. Used.	CO_2 in 10,000.	Air in cc. Used.	CO_2 in 10,000.
30	28	91	9 bad
36	22	103	8
46	18	117	7 fair
58	14 very bad	138	6
69	12	165	5 good
82	10	207	4

This apparatus is certainly sufficiently simple and portable, but a thorough trial of it has shown that it is open to several serious sources of error. One of these is in the preparation of the test solution. One cubic centimetre of "saturated lime-water" is a rather small quantity to be measured accurately by unskilled persons, and there can hardly be any question concerning the danger of reducing the strength of the solution through repeated transfers of 10cc. of it to the vials by means of an ordinary pipette. Further, the dilute solution must remain in contact with the rubber stopper of the vial until it is used; and while this may not be detrimental in all instances, cases are not infrequent in which the strength of the solution is so greatly diminished that the pink colour nearly disappears in a day. In regard to the manner of using the shaker, the directions are decidedly vague upon a most important point. It is stated that the instrument is to be "shaken vigorously twenty-five or more times." A trial of the instrument in outdoor air will plainly show that it makes considerable difference whether the apparatus be shaken twenty-five or *more* times. When testing air which is low in carbon dioxide, if the instrument be shaken only twenty-five times, the result will be much below the actual amount. By shaking it a greater number of times, seventy-five or a hundred, it is possible to obtain results more nearly correct; but this procedure implies a previous knowledge of the condition of the air which is being tested, besides requiring the test to extend over a considerably longer time.

Another objectionable feature of the method lies in the table which gives the relation of the amount of carbon dioxide to the number of cubic centimetres of air used. It is not stated just how this table was constructed, but from the constant relation of the values it is evidently based on theoretical values of carbon dioxide corresponding to a definite strength of lime-water. The value of such a table must necessarily depend on the degree of correspondence between the values actually obtained by the use of the apparatus and the theoretical values. It will be shown later that in this particular case the correspondence is not a very close one in all parts of the table.

The second method, that of Cohen and Appleyard, depends upon the fact that if dilute lime-water, coloured with phenolphthaleïn, containing insufficient lime to combine with the carbon dioxide present, is shaken with the sample of air, the rate of absorption of the gas will vary with its volume. The time required to decolourise the indicator will therefore give the quantity of dioxide present. The following apparatus and chemicals are required:—

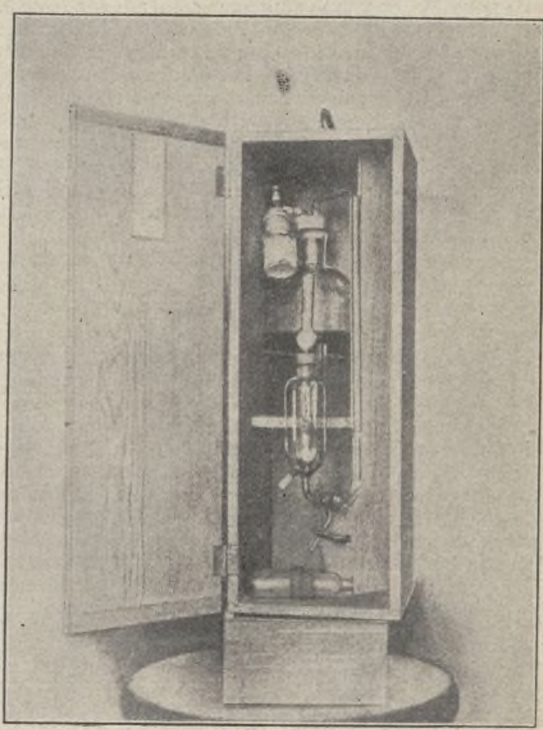
1. A clear glass-stoppered bottle of 22oz. capacity.

2. A solution of phenolphthaleïn prepared by dissolving 0·2grm. in 100cc. of equal volumes of alcohol and water.

3. A standard lime solution prepared by diluting 10cc. of saturated lime-water to one litre.

4. Hand bellows for aspirating the sample of air.

The process is conducted as follows:—The bottle is rinsed out with water and drained for a minute, and the sample of air is then aspirated by means of the bellows. One-third cubic centimetre of indicator solution and 10cc. of dilute lime-water are added, and the bottle stoppered and well shaken with both hands until the pink colour vanishes. The time required will indicate the condition of the atmosphere. A table is given in which the method has been compared with Pettenkofer's method. The method is scientific in principle because it recognises the fact that the absorption of carbon dioxide by lime-water is a *time* reaction. The necessary apparatus occupies somewhat more space than the Fitz method, but possesses the special advantage over the latter of showing the condition of the air at a definite moment. The present work has been carried out in order to adapt these methods more particularly to practical requirements; to eliminate if possible some of the objections to the Fitz method; to adapt the Cohen method to the use of litre bottles, which are more readily obtained and materially shorten the time of shaking; and to make the two methods interchangeable for the same solution. A special form of apparatus has been devised which seems to offer certain distinct advantages. The best methods of procedure have been determined by careful experiment over a wide range of conditions, and the exact interpretation to be placed upon the results has been ascertained by direct comparison with the more exact Pettenkofer method.



Air Testing in Factories.—Fig. 3.

The essential feature of this special apparatus which has been devised consists of an automatic pipette for measuring the test solution. This is a modified form of the pipette first proposed by G. P. Vanier, and which has been in use for a number of years. A general idea of it may be had from Fig. 2. The manner of using it is extremely simple. The test solution is preserved in a 1-litre bottle of hard glass, provided with a doubly-perforated rubber stopper. Through one opening passes the syphon tube of the pipette, which is sufficiently long to reach to the bottom of the bottle; through the other passes a glass tube ending just below the stopper and connected with a small bottle containing fresh soda lime. By means of the three-way cock the solution is allowed to flow into the small inside pipette until it overflows. The stopcock is then turned, and the solution allowed to flow out at the lowest point. The pipette is made of such a size as to deliver exactly 10cc. The entrance of atmospheric carbon dioxide as the solution flows out is prevented by the small tube containing soda-lime. The excess of liquid which accumulates in the overflow reservoir may be drawn off when desired. The bottle and pipette are contained in a wooden case about 20 by 8 by 7in., outside dimensions, and with the solution weigh about 8lb. The case is furnished with a handle at the top so that it may be carried readily in the hand from place to place. The complete apparatus is shown in Fig. 3. The bottle is fastened to the case, and the lower end of the pipette is clamped to a wooden support to keep it from swinging. The bottle should be thoroughly cleaned and washed with potassium bichromate and sulphuric acid, and it is best also to steam it for half-an-hour or so. As a further measure of precaution, the rubber stopper is boiled with dilute caustic potash and thoroughly washed, although the solution can come in contact with it only through splashing while the case is being carried.

The advantages of this arrangement will be obvious. The apparatus, while sufficiently light to be portable, contains sufficient solution for from 90 to 100 tests. There is no danger of it being broken with ordinary care in using it, and it is practically automatic in its action. The solution is protected perfectly from the carbon dioxide of the air, and never comes in contact with anything but glass. The method of preparation of the solutions and the manner of making tests which have been found to give the best results will be described in detail, since experience has shown that these directions cannot be too minute.

(To be continued.)

Bead Weaving.

RIBBONS ornamented with beads woven in the fabric constitute a staple article of manufacture at St. Etienne. These beads can be introduced into the cloth on a dobby loom, but it is more frequently done in connection with a jacquard attachment on account of the great variety of design possible with the latter loom. Ordinary glass or metal beads, varying in size, are introduced along the edge of the goods or in squares, lozenges, trefoils, or other designs in the body of the ribbon; they are strung on threads which are wound around bobbins placed behind the

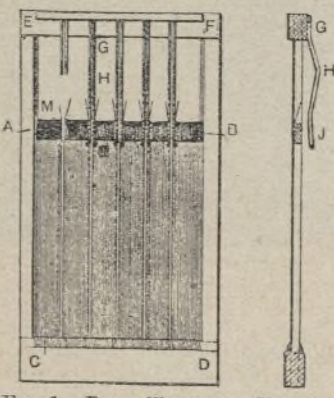
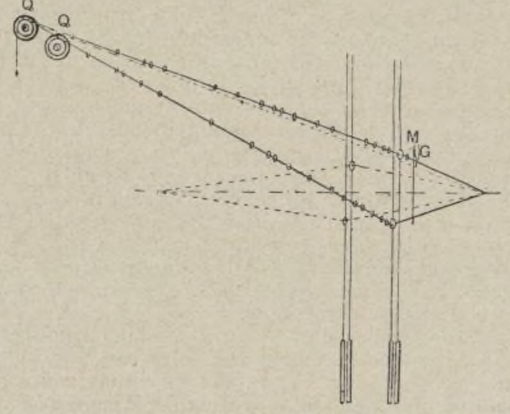


Fig. 1.—Bead Weaving.—Fig. 2.

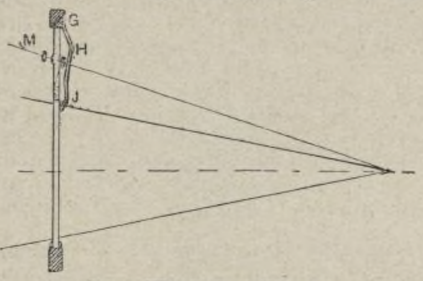
loom and raised above the other warp threads. These bead threads are drawn in through large glass mails, and then drawn through a special reed so arranged that a bead is allowed to pass the reed at the desired places. This reed (Fig. 1) consists of the usual part found in all reeds A, B, C, D; above this is a vacant space A, B, E, F; the wires in the reed are soldered together, except at the dents that are to hold the bead threads; the wires at these last-named dents are extended and spread out as shown at M; in this way the bead threads can be raised out of the dents and carried into this vacant space.

Directly in front of each open dent, at a distance slightly greater than the thickness of a bead, are placed two wires G, H, J, soldered to the upper part of the reed at A, and forming a supplementary dent; these wires are bent in the form shown in the sectional drawing Fig. 2, and serve both as a check to hold the beads and as a guide for the bead thread when they are raised into the open space in the reed. The bobbins Q, Fig. 3, on which the bead threads are wound are elevated so that the beads will slide down to the reeds evenly; the threads are raised by the heald or harness to the highest



Bead Weaving.—Fig. 3.

position of the reed. When it is not required to place beads in the fabric, the bead threads are operated in the same way as the other warp threads, and do not rise into the open space of the reed. When, however, a bead is to be introduced into the cloth, a special mechanism raises the healds carrying the bead threads into the open space, as shown in Fig. 4, where a bead is represented as having slipped through this open space in the reed



Bead Weaving.—Fig. 4.

and being held by the wires G, H, J. When the thread M is lowered, the bead is brought in front of the reed, and the next forward movement of the lay carries it past G, H, J, and up to the fell of the cloth. The wire G, H, J is adjusted so that only one bead can pass at a time, and according to the "Textile World" is generally known as a "counter."

The Cotton Industry in Japan.*

DURING the last thirty years the progress of Japan towards the civilisation of the Occident and toward assimilation to the Christian nations has been absolutely without precedent or parallel. Forty-five millions of people during half-a-century have changed in everything: in government, in education, in customs, in commerce and industry, and in army and navy. Among all industrial developments in modern Japan, that of the cotton industry ranks first. It has made wonderful progress in the last twenty years.

About the middle of last century some foreign vessel came to the Riu-chu Island, which was controlled by Seihin Shimatsu, the famous Daimyo (feudal lord). At that time all Japan was divided among about 300 lords; of these Seihin was the most powerful chief, and was head of the largest province, called Kagoshima. The foreign merchant who came to Riu-chu Island had cotton yarns made in England, which attracted the attention of the far-seeing feudal lord, and led him to appreciate the advantage of power machinery. Seihin Shimatsu, the heroic Daimyo, reformed the civil government of his State, established an arsenal, disciplined the people with a military education, and encouraged the navigation of steamships. After he saw the yarn he was anxious to establish a cotton mill in his State, but unfortunately before he could put into effect his great idea he died. In 1862, Yoshimitsu, the son of this Daimyo, who succeeded to the idea of his father, had 6000 spindles imported from England, and near the sea coast he established the first cotton mill in his native province. There was hesitation among his vassals because of the extensive equipment and vast amount of money that would be required. Patriotic Daimyo, however, persevered, despite all opposition and discouragement. He made great efforts, and finally began to enjoy an unrivalled reputation for his product, which was known as "Iso-Kase," "the yarn of the beach," throughout the country.

In 1869 Mr. Kashima, the ambitious manufacturer, bought a mill site near the Takino river, a suburb of Tokio, under the auspices of the Government. He hired an English engineer to operate the machinery, but on account of the engineer being inexperienced and the equipment not being complete, the mill did not succeed. This was the first established by a private individual; it commenced operations in 1870. A few years later the "Nagasaki Cotton Mill" was incorporated. In 1879 the first public mill was established at Himegi by the Prefecture. Following this the "Shubuya Cotton Mill" was established in Osaka, which subsequently became the centre of the cotton industry of all Japan.

Ten years after the Restoration, civil war, the so-called "South west War," broke out. At the close of the war paper money was very much depreciated, as the Government had issued too much paper money. Consequently gold coin had begun to flow out of the country, leaving only silver. To remedy this, Count Masayoshi Matsukata, the famous Minister of Finance, attempted to encourage the establishment of cotton mills near the cotton-goods markets, as well as near the cotton-producing districts, for the purpose of securing the balance of trade, with the aid of the substantial subsidy of the Government. It is said that the total capital invested in the various forms of business in those few years amounted to £4,300,000, of which £1,500,000 was invested in the cotton industry. In 1889 the total number of mills in operation was twenty-eight, and the number of spindles amounted to 213,000. These mills, producing yarn up to 10's from mixed domestic and China cotton, displaced a vast proportion of the hand-made and foreign yarn, promising long prosperity to the millowners.

After a few years the manufacture of cotton was undertaken at Shanghai, which had the effect of offsetting the great hope of the Japanese cotton mills. When mills started in China, the Chinese cotton which the Japanese mills entirely depended upon began to be consumed in that country, and the importation of the cotton decreased year by year, and the prices rose so high that the Japanese mills could not profitably compete with Manchester and Bombay in the manufacture of the yarns which were consumed in the American market, and at the same time vast amounts of foreign yarn again made its way to the American market, from which it had been retiring. In 1891, however, the Japan Mail Steamship Company (Nippon Yusen Kwaisha) started navigation between Japan and Bombay, which had the effect of reducing the importation of Bombay cotton, at which the Japanese mills started to make finer yarn than before (16's to 20's counts), for which there was ample consumption in the American market, as well as in China. By-and-bye the Japanese mills revived, and their product began to excel the Bombay yarn, not only in the American domestic market, but also to some extent in the Chinese market.

Later, American cotton made its way into the country. Then the mills commenced to make yarn over 20's, mixing Chinese, Bombay, and American cotton, and make great efforts to control the home market, which used to buy the imported yarn. In 1894 the Government took off the tariff on the exportation of yarn and goods, and also the import duty on raw cotton in order to encourage the exportation of the manufactured cotton. A compilation was made showing in 1890 79 mills, with 1,320,988 spindles, having a production of 256,867,000lb.

In 1886 the first weaving factory, named the "Konagigawa Cotton Manufacturing Company," was incorporated at Ozi by the capitalists of Tokio; and the new mill, with 200 looms, began operations in August, 1887. This has been followed by another corporation at Osaka, which operates 330 looms, and intends to add 400 more.

To illustrate the progress made in the manufacturing of cotton, the following list shows the names of each concern, with the number of looms:—Osaka Cotton Mills, 700 looms; Mye Cotton Mills, 560; Wakayama Cotton Mills, 200; Onagi Cotton Mills, 414; Kioto Flannel Mills, 303; Okayama Mills, 246; Tenma Mills, 423; Nippon Mills, 253; Kanakin Mills, 506. In 1899 the annual dividends of weaving mills reached from 20 to 30 per cent. yearly, which attracted the attention of the yarn mills. In 1900 many millowners who were suffering from over-production, encouraged by the bright prospect of the cotton-weaving business, went over to America to buy new looms, and ordered more than 1300 looms from the Draper Company and two or three others. Later the cotton corporations intend to increase the number of their looms; if they complete their plans, the weaving capacity will be 7500 looms.

From the general view of the history of the cotton industry, it is sufficient to say that the Japanese cotton industry has so far improved remarkably, and that the millowners are devoting themselves to making a finer yarn and a higher grade of goods for domestic purposes, just as Bombay manufacturers are undertaking. But it will be a long time before they are able to manufacture satisfactorily exclusively for Japan. The Japanese

* A paper read by H. H. Fukuhara before the New England Cotton Manufacturers' Association.

cotton mills which sprang up under the protection and encouragement of the Government were in consequence located quite near the cotton fields. When they started the mills they consumed chiefly domestic cotton, with a little Chinese, as there was no navigation to bring Bombay and American cotton, and as they had no experience in making fine yarns. At the present time, however, they import raw material from China, India, Egypt, and the United States, and the domestic cotton has practically no use in the mills which are operated by power. It is only spun by primitive methods by farmers.

(To be continued.)

The Preparation of Ramie.

THE many different methods of preparing ramie and China grass have recently had an additional process added to their number by a French firm manufacturing those fibres. The process is said to be adaptable for either raw, green, or dried ramie, and to convert it into a condition ready for spinning. An alkaline bath of potash or soda is prepared, giving by titration from 4 to 5° Bé. The dried or green ramie or like stems are then plunged into this bath so that they are quite immersed. An autoclave or other vessel will serve for this purpose. This bath must be brought to boiling temperature, and maintained at this point from 15 to 20 minutes. The operation is terminated when, on passing the finger over the stems, the outer skin or pellicle becomes easily detached. The stems must then be removed from the bath and dried in the air or in a drying machine in order to free them as much as possible from the alkaline bath. The bath is not exhausted, and can serve indefinitely, care being taken, however, to slightly strengthen it after each operation.

The stems or material thus freed from excess of liquid are then steeped in a bath, which must not be either too liquid or too thick, but of a creamy consistency, and consisting preferably of

Water	675	parts.
Alkaline carbonate (soda or potash)	50	,,
Ordinary soap	50	,,
Carbonate of calcium	25	,,
Silicate of magnesia	50	,,
Feculent or amylaceous substance, such as rice starch, corn starch, etc.	150	,,
	1000	

The carbonate of soda and the soap can be replaced by either an alkaline-silicate or by a solution of chloride of potassium or chloride of soda, in the proportion of about one-tenth part; but this preparation gives a little hardness to the fibre, and the pulverulent mixture produced is less easily detached from the fibre. The products composing the second bath in which the material is steeped for about 30 minutes at a temperature of about 25° C. or below aim at intimately penetrating the parts rendered gelatinous by the first bath, and in forming with them a finely-granulated mixture, which prevents them from again adhering together. All new agglutination is thus prevented, and the dried fibre is easily detached from this mixture, which takes away all foreign materials, the outer skin included, the fibre alone remaining intact. In the second bath the pectic and other materials leave the fibre and adhere to the powder, forming with it a pulverulent mass which is easily detached, leaving the fibre completely intact and clean. The second bath also acts to facilitate reactions between the alkaline base and the hydrocarbonated and pectic substances, or the gumming resinous materials in the stems.

After the stems have been well impregnated with the semi-liquid mass, they are taken out and dried in a rapid current of air, and are then passed between rollers to remove the excess of powder and the waste. In this manner a material is obtained having the appearance of hemp or stripped flax with pliant fibres completely separated one from the other, retaining their parallelism and free from all residues, and only retaining their useful parts.

Knitting Mill Management.

A PAPER was read by A. Deabill before the New England Cotton Manufacturers' Association, in the course of which the author said:—I presume there is at the present time no branch of the textile industry with a wider variety of fabrics than the knitting industry, for nearly every kind of wearing apparel can be produced on knitting machines, and with the rapid progress in mechanical improvements, energy, and capital, I have no doubt that American knitted goods will take the lead in the race for business in the markets of the world. The knitting machines of to-day are so well constructed that if correctly set and properly cared for, there will be few delays caused by mechanism failing to work. Most of the troubles arise from causes which cannot be charged to structural weakness or faults of the machine, such as poor yarns, incompetency of the operator, or inattention in allowing parts of the machine to get undue wear and out of order. The greatest source of trouble that comes to a knitter is poor yarns; and whether caused in the cardroom, spinning-room, combing, or winding, he finds the greatest difficulties that he meets are knitting yarns of poor quality into perfect goods, which is almost an impossibility. Perhaps there is no fault in manufacturing yarns which will cause so much of it to find its way into the waste-house as poor cones, as the careless operator in combing does not take pains to piece up the ends in a proper manner, but will lap on to the cone while it is in motion, thus avoiding stopping the cone, and thereby increasing his pay a few cents per week. This careless work will not be discovered until the knitter gets it on to his machine.

An experiment made recently, under my observation, with No. 16 white carded hosiery yarn, resulted in 96½ per cent. perfect goods, 2 per cent. seconds, and 1½ per cent. of waste, with an average breakage of one needle to 4·58 dozen of goods knit; and another lot of yarn, received from the same mill, same quality, worked on same machines, with same operator, which through poor cones caused a breakage of one needle to 2·20 dozen knit, and only 80 per cent. perfect goods, 12½ per cent. seconds, and 7½ per cent. waste, found its way into the waste-house on account of loose ends on cones.

First, the knitting-room should be laid out in such a way that the operator is near to his machines to stop them in case of their getting out of order and failing to make perfect work, as the knitting machinery is constructed with so many delicate parts that are easily put out of proper action through a coarse place in the yarn, bunches, or through poorly-tied knots getting into the needles and breaking them—not only breaking needles, but in many cases sinkers, cylinder walls, and other small parts, such as cams, screws, etc., which will put the machine out of commission from one hour to several days, according to the amount of damage done. Machines should not be crowded together, as it is then impossible for a fixer to make any repairs on a machine without stopping several others, in order that he may get around the one on which he wishes to make necessary repairs. There should be alleys wide enough to admit of a cab being taken through them to pick up the day's work, and there should also be boxes provided and placed at the ends of each alley for the operator to put his knitted goods into, and they should be so constructed as to cover the exposed ends of the driving shafts.

The winding-room, if on the same floor as the knitting-room, should be partitioned off, so that no flyings will find their way into the knitting-room. There should be properly constructed racks, marked for each number of yarn, so that when the yarn is weighed from the winder it can be put into its proper place with the least possible handling, thus making very little waste from this cause. There should be a steam box provided in close proximity to the winding-room, so that all cops or skein yarns can be steamed before winding, to take out all kink and set the twist before the yarn is wound, as this is very essential in both winding and knitting rooms.

Power Tests for Spinning Frames.

POWER TESTS are necessary for various purposes. In the first place it is often necessary to find out how much power is required for a spinning room without regard to the spindle itself. It is sometimes possible to determine this factor by indicating the engine when running the spinning department alone, or by attaching a power scale to the main driving shaft of the room. It is, of course, impossible to get an accurate result by merely testing one frame, as the frames themselves vary considerably, owing to variation in tension of their driving belts, and the friction in many of the bearings. Another reason for power testing is to determine whether power can be saved by making certain changes in the spindles or the methods of using them. There is a great practical advantage in such tests, as we have always found when testing frames that it was possible to save a considerable fraction of power by simply putting the frame in what we consider proper condition for testing.

The simple methods of reaching these conditions could be easily enforced in any spinning room at slight expense, with great saving. Very few use a proper oil. Many never take advantage of the adjusting fit which may be present in their spindles, thereby allowing them to correct bad running and loosen tight bearings. As before stated, hardly any mill pays any attention to the removal of dirt from the spindle bearings. Then there are the evils of too heavy roll weighting, frames out of level, rings out of centre, accumulation of dirt, etc.

The following plan of making a power test is suggested by the Draper Company as having been used on recent important experiments with highly satisfactory results. If a test is made on a frame in a mill, first find the power consumed as it stands, by the following method. It is understood, of course, that the person making the test thoroughly understands the uses of dynamometer or power scale. Unless this knowledge has been acquired the test will have no value.

First, take the power consumed by the frame spinning just before doffing. Then take the power directly after doffing. Take all readings at the centre of the traverse. This gives the two extremes of spinning, and by adding together and dividing by two, the average power of the frame will be given as accurately as possible without involving a large amount of figuring. It is more satisfactory than taking the power when the spinning first starts, and then waiting for the bobbins to fill before determining the average power taken, as the necessary length of time may introduce great changes in the atmosphere, thereby vitiating the test. After the empty bobbins have had about fifteen minutes' delivery of yarn on them, break the ends all won, keeping the rolls running, and carefully determine the power. Then throw the rolls out of gear and run the spindles with the small bobbins on them. The difference between these two power records will show the actual power consumed by the rolls and traverse motion. Then take these small bobbins off, replacing with the full bobbins, running the spindles without the rolls as before. By adding this record together with the record of the small bobbins without rolls and dividing by two, the power taken by the average weight of the yarn load and spindle is known. Then take the bobbins off and run the spindles bare. Subtracting this record from the former one will show the actual power taken by the average yarn load with its bobbin. After having repeated this series several times to get the proper average, weigh the band pull carefully, and then cut the bands entirely off. Now the entire actual power of the cylinder can be taken. With these records the power is sufficiently divided for practical purposes. By adding the power of the spindle, the weight and the roll together, and subtracting from the power taken by the average of spinning, the result will give the average power taken by the traveller pull.

Having these records, it is possible to find out how much power can be saved by getting the frame in better condition. First, see that it is accurately levelled, and then carefully clean and oil every running part. Then go over the guide wires and see that they are all centred, removing any wires that are badly worn. Take the spindles apart and clean the bearings thoroughly in naphtha or with a steam jet, removing the old oil from the base with a suction pump and swab. If the spindles have adjustable bearings, see that the fit is made uniform. Then apply new bands, running them long enough to take out the first stretch. Next carefully weigh the band pull, and by cutting tight and loose bands get the average down to as near 2lb. as possible. When this tension is reached properly, it must be maintained as constantly as possible, even if the band pull has to be taken as often as twice a day, as otherwise the comparisons in the tests will be largely a comparison of bands. In figuring the test results make proper allowance for any fraction of tension above or below the standard.

Now run the spindles bare until it is evident they have reached a uniform consumption of power. From this on, tests can be made without waiting for the intermediate filling of bobbins by simply putting the large bobbins on, piecing up, running about fifteen minutes, and then doffing. By counting the number of layers of yarn applied meanwhile, it is easy before the next test to wind off this amount, thereby having the conditions uniform for all tests. Of course, if the bobbins get snarled or damaged, spin fresh ones. If it is found during the testing that certain elements which should be constant vary excessively, continue the records until the error is eliminated.

Tests should be made at a uniform time of day, if it is possible, as the bands contract over night, affecting the power consumed in the first few hours. On rainy or damp days, if tests are taken it will be necessary to make allowances for the change in band pull and other conditions, as the power will necessarily be greater. Moisture affects bands in other ways than the mere contraction. A band may have small tension and yet consume power by not being pliable. If making comparative tests, it is safer not to run on such days. The general stickiness affects the general conditions in many annoying ways. If the tests include comparison on different spindles it is essential either to have them taken from new lots that have not run or to have two lots that have had equal wear. If comparing adjustable taper bearing spindles with the straight bearing spindle, the looseness of fit in the taper bearing must be made as uniform as possible with the looseness allowed the other.

The Revolving Flat Card.

AT this time, when Americans generally are boasting of the great strides the United States have been making in the commercial world, and are laying particular stress upon the victories over England in this way, a movement is taking place in American cotton mills which is just the reverse of the movement boasted of, says the "American Wool and Cotton Reporter." An English machine is rapidly displacing an American one, and in addition is incidentally changing a system more or less. We refer to the way in which the American stationary flat card is giving way to the revolving flat card of English invention, and to the fact that with this movement has come the use of a set of three drawing frames, instead of two drawing frames and a railway head. Of the new mills, 95 per cent. do not buy the railway head. In the old mills its use is undoubtedly coming to an end. As for the revolving flat card, its popularity and ever-increasing use cannot be gainsaid.

The cause of the adoption of the revolving flat card is worth a considerable study. It consists mainly in the accuracy of the work done, in the smaller percentage of waste, in the greater ease with which grinding, setting, and stripping are done, and in the decrease of labour cost. In short, the adoption of the English card has been due to the fact that by its use there is brought about a decrease in cost and an increase in quantity produced. That there is an improvement in quality many good overseers would deny. But why has this change from the American card to the English card brought with it a change from the American system of drawing to the English, the displacement of an American machine—the railway head—by another drawing frame, the American mills thereby adopting the plan England has followed always?

The railway head, where used, is ordinarily placed at the end of a line of cards. The sliver formed at each card is fed, not to a can, but to the so-called railway belt, running along at the delivery end of each card, and terminating at the railway head. As all the cards in the line fed to the same belt, there was always a number of slivers feeding to the railway head from the belt. In this case the evening motion of the railway head was an advantage, because if one card of the line should cease running, the evening trumpet would immediately adapt the draft to the decreased number of slivers, and the work could go on without interruption. The use of the railway belt meant a decrease in cost of handling, for this automatic feeding of the breaker drawing (that is, the railway head) made handling unnecessary from the time the lap was fed to the card to the time the cans were removed from the breaker drawing.

Where the railway belt is not used, and the drawing is fed from cans, the feeding to the railway head does not depend upon keeping full cans at the back—a much easier task. Thus the advantage of the evening motion in cases of idle cards is obviated. Its sole value lies in its action upon lightweight or overweight slivers, and upon lumps or light spots in slivers. There is a new school of mill men who defend the railway head because they believe that more evening than that brought about by the various doublings and by the eveners on the pickers is advisable. Those who do not use the railway head claim, first, that it is not necessary, and secondly, that it is not sufficiently effective.

The second argument is strongest when lumps or underweight places occur in the sliver. This is where the head could be particularly useful, but as a matter of fact quite a little of the lump or light part will have passed before the evening motion will have an effect upon the sliver, for the work is done at the rolls; the first end of any underweight or overweight has to pass through the rolls and hence beyond the reach of any evening device before it reaches the trumpet and sets it properly. Hence a part of the sliver will be beyond redemption by any evening device before the evening work begins. And similarly, the evening will be reducing or increasing the draft upon a sliver for a little distance after the sliver is of normal size. Hence, upon lumps and underweight parts of a sliver the railway head is only partly effective. Upon slivers thick or thin for some length the railway head is of advantage in so adapting the drafts as to make the delivered slivers of proper weight. But even under these circumstances there are many overseers who believe this evening device of very little value. They believe that evenness is best obtained by having the weight of the laps fed to the card uniform and by the various doubling processes.

The railway head usually delivers but one sliver, although a double head is built. The ordinary drawing frame has six heads. Hence, to do the work of a drawing frame, six railway heads or three double heads are necessary. The question of the cost of three or six heads as compared with the cost of one drawing frame, and again the question of the space occupied by one drawing frame as compared with that occupied by three or six railway heads, are of vital importance. The answers to these two questions might determine any mill in its policy regarding the railway head. But the discussion above has shown that there are arguments for both sides on effectiveness and value of the machine itself, aside from questions of cost and mill space.

Overworking Cotton in the Cardroom.*

THIS subject is one of all-importance to the cotton-mill manufacturer, and ought to be given far more consideration than it has yet received. Confining ourselves strictly to the carding and roving processes, as well as to the opening, we must start with certain well-authenticated facts, one of which is this, that cotton yarn possesses when spun only about 25 per cent. of the strength that the individual fibres have before being operated upon at all. What percentage of this loss of strength ought to be charged to the opening, carding, and roving processes, and what to the spinning, I do not think has been fully determined, but it is safe to assume the larger share of the loss in strength is from the working of the opening and cardroom operations.

There are three specific objects to be obtained before the spinning process, and they are to thoroughly clean the cotton, to attenuate from the lap to the fine roving, and to produce evenness of work. The openers and cards are allied to the first and second elements as specified, and the drawing frame processes of to day are more for the process of evening than for attenuation, as was the case years ago. Roving machinery is clearly an attenuation process. Now in which of these processes is the greater harm done to the cotton in its transit from bale to roving? Taking first the opening machinery, we do not pay heed enough to the proper fitting up of our opener rooms, as to the number of machines to be used. Now there seems to be no just reason for this, for it is a department where the most unskilled and poorest paid people are employed, and I think it is safe to assume that where too few machines and too low a labour cost per pound for the opener room are found, following this will be found increased cost of labour on cards and more extensive repairs in the way of clothing; and that when you find a mill whose opening cost is high, you will find that item more than offset by less labour cost and a better running condition of the cards.

I will acknowledge that our builders of opener machinery are giving us machinery of superior workmanship. Still, we are unable to obtain perfectly uniform weights of laps, nor do we obtain laps of uniform density when comparison is made between the various square inches in a yard of lap. It may be asked what this has to do with overworking of cotton in the cardroom. The answer is this: that as a result of the unevenness of the card sliver we try to overcome it by increased processes in the cardroom, making additional operations and sets of weighted rolls through which the cotton is passed, and each and every succeeding operation weakens the fibre.

Do we overwork cotton in the cards? The answer to this depends much on circumstances. On ordinary cottons I think the finisher opener lap ought to weigh between 11 and 13oz. per yard. I believe a heavier lap than 13oz. tends to fill the clothing, and cannot be taken from the feed by the licker-in with uniformity. For a good many years a large and prosperous mill in New England has been making practically fine yarns for weaving, where there were no drawing frames in use. The question is, Are drawing frames essential? If practically we could obtain even card sliver, and if we could do without drawing frames, would our yarn not be stronger under these conditions? I do not think there is any doubt about it.

It is stated that some fine spinners on hard twisted yarns have already abandoned the third process of drawing, and are producing more even and stronger yarn. I believe to obtain the best results in a mill and to retain as much of the original strength of the staple is to remodel picking machinery: to obtain a more uniform lap in density; to have an evener on the card to correct such uneven weights as may be taken from doffer; to eliminate drawing processes; reduce doublings on roving machinery so far as possible.

* A paper read by E. W. Thomas before the New England Cotton Manufacturers' Association.

Gleanings from Consular Reports.

MEXICO.—The importation of raw cotton during the year 1900 showed an increase of 30,000cwt. over that of the preceding year. In 1899 the amount imported was lower by 35,000cwt. than the figure for 1898, which was 162,246cwt., and was obviously due to the failure of the crops in the Southern States of the Northern Republic in that year; but the increase in 1900 was caused by a larger demand for the raw material (as the amount of native cotton exported is too small to be taken into consideration) required for the increasing number of factories throughout the Republic. Unfortunately it was quite impossible to obtain any figures as to the amount of cotton produced in the country, as, though such statistics appear in the Year Book published by the Department of Fomento, they are always some two or more years behind the date, and are not always correct. The last of the books published was that for the year 1898, and consequently the figures contained therein are too far back to be of any service in making any comparisons for 1900.

The cultivation of cotton is, however, being greatly extended, especially in the districts of Laguna, and other portions of the States of Coahuila and Durango, but more so on and around the banks of the Nazas River, whose waters by an extensive modern system of irrigation have converted a large tract, formerly of no value, into a very fertile and productive region. The Tlahualilo Company have also large tracts under cultivation, and the example given by this and other companies should induce others to cultivate this plant in other parts of the Republic. Formerly cotton was grown in other districts, especially the belt situated between the shore and the mountain range on the Pacific slope; but its cultivation could be renewed in those districts in the near future, especially as the railway now in course of construction to Acapulco, or Zihuatanejo, will furnish quicker and easier means of transportation than in years gone by.

The imported cotton comes entirely from the neighbouring Republic, and is brought down principally over the two main lines of railway connecting at the northern frontier, though a small quantity is also imported through the ports of Vera Cruz and Tampico, especially from American ports where sea freights are less than the cost of connection with some of those points where a junction could be made with the Mexican lines.

The value of raw cotton imported in 1900 was £341,130, as against £170,864 in 1899.

The imports of cotton piece goods showed a very great falling-off, both in quantity and value.

In the year 1900 the quantity of square yards was 42,599,263, as against 49,029,863 in 1899, while the value was £728,867, as against £741,556 in the preceding year.

The decrease, which is so very remarkable, appears to be mostly in cotton prints under 30 threads, as in the year under consideration the number of square yards imported only reached a total of 15,374,634, as against 21,459,474 in the year 1899, and 17,202,118 square yards in 1898.

It is in this particular section of the cotton industry that the United Kingdom has the greatest competition, not only from the produce of the factories in this Republic, but also from the United States.

The production of cotton goods in piece in the Republic in the year 1900 was 11,802,986 pieces, as against 10,782,349 pieces in 1899, and represents an increase of nearly 9½ per cent. over the production of 1899.

In the returns published for December 31, 1900, the number of cotton mills paying taxes to the Government is given at 149, of which 15 were not working, while on the same date in 1899 the number was 137, of which 10 were closed for repairs or improvements. This increase in the number of the mills, and consequent increase in the output, has had its effect upon the market, and has produced a stagnation in the operations connected with this industry. The stocks on hand, whether imported or of home manufacture, are beyond the demand, and the result is that several factories have had to work shorter time, or have entirely closed. This state of things will continue until the surplus has been consumed, and the probable result will be that the imports this year will be very much less, and will decline in proportion to the output of the mills in this country, especially if more factories for making cheap cotton goods and prints are established.

The system now adopted by many of the factories is to have the piece folded in the same manner as the foreign, and by using a label in English it is very difficult for a person, not an expert, to distinguish between them, especially so as the patterns are very similar. The retail prices range from 8 to about 15 cents (2d. to 3½d.) per metre.

In addition to the piece goods the factories produced 4,256,529lb. of cotton yarn, used almost entirely in the making of the cotton "rebozos," or shawls, used by women of all classes, and varying in price according to the quality from 1 dollar 25 cents to 50 dollars each.

The localities that, for certain reasons, are most noted for the manufacture of these "rebozos" are Tenancingo, Santa Maria, and the Valle de Santiago; the latter is most famous for those of a blue colour which does not fade, owing to some special quality attributed to the waters (natural) in which the yarn is first steeped for about 1½ hour.

Notwithstanding that fifteen factories were reported as being stopped, the number of operatives was much greater than in 1899, being 25,761 in 1899 and 28,617 in 1900, many of whom have dwellings near the factories.

Lyons (France).—The silk goods exported showed a slight reduction for the year 1900, the figures being as follows :—

Year.	Quality.	Value.
	Lb.	£
1898	9,480,000	10,023,680
1899	9,966,000	11,133,440
1900	9,500,000	10,518,120

These figures show a practically stationary position from one year to another, and this is also shown by comparing with all the preceding years. For instance, ten years ago (1891) the weight was almost identical, 9,546,000lb., valued at £9,828,480, and as the value for 1900 will undoubtedly be reduced when the Committee on Values have fixed the price per pound at which the exportations for the past year are to be calculated, it will also be very nearly the same.

At present the values per pound of the different articles are taken at the same rate as in 1899, but all authorities agree that for 1900 the prices will undergo a notable reduction, and fix the correct amount for the year 1900 at £9,500,000.

These are the official figures, but the Lyons authorities also all agree in saying that each year they become more and more inferior to the real figures for the following reasons :—Each year the quantity of postal parcels increases, having attained 31,700,000lb., against 27,900,000lb. in 1899, and the Lyons manufacturers and exporters, especially since the parcel post limit has been raised from 11 to 22lb., frequently find it more convenient to divide their goods up into a number of postal parcels, instead of packing the same in a case or cases.

These postal parcels escape all control as to the value and nature of their contents, as the statistical authorities block them all under one heading, and at one price.

It is certain, however, that a very large proportion of this exportation is silk goods, and that the amount, which should be added to the official estimate, attains a very considerable figure.

Dahomey (France).—Imports of threads and cotton goods :—

Country.	Value.		
	1898.	1899.	1900.
	£	£	£
France and colonies	2,004	2,710	2,429
United Kingdom	43,827	31,822	74,092
Lagos	35,061	24,235	35,867
Germany and colonies	5,106	24,644	32,404
Other countries	1,774	708	471
Total	87,772	84,119	145,263

In dealing with threads and cotton goods, in taking those which are imported viâ Lagos, it may safely be assumed that two-thirds come from the United Kingdom and one-third from Germany.

The British trade, although it remains by far the most important, has declined in the last three years in proportion to the total; in 1898 the United Kingdom supplied 77 per cent. of the threads and cotton goods imported; in 1899 there was a large drop of 20 per cent., to 57 per cent.; but in 1900 it increased 11 per cent., to 68 per cent. Germany's trade has also been fluctuating, but on the whole shows an increase, as in 1898 she provided 19 per cent., which rose up to 39 per cent. for 1899; but for 1900 there was a drop of 9 per cent., to 30 per cent.

There is not much left, therefore, for the other countries, including France. In 1898 and 1899 their share amounted to 4 per cent., but even this small amount fell to 2 per cent. in 1900.

Tweed and fancy caps, felt and straw hats also sell well, varying in price, according to the quality, from 6d. to 10s.

With regard to the cotton goods, there is a sale for the cheap qualities, but not nearly so much as for the better qualities. The natives, especially those who have out-of-door work, require a good, strong article, and also one which has a certain amount of warmth in it, and will protect them from the cold.

From Germany are imported prints and flannels, and the French houses do a small trade in silks and handkerchiefs, but it is Manchester goods which are chiefly in demand; and so far the blue cloth which is imported from France, and is universally worn in Senegal, is not yet known in Dahomey.

Bangkok (Siam).—Cotton goods showed a slight falling-off for the year 1900, from £424,352 to £409,058, the decrease being £15,299.

The imports for the last ten years have been as follows :—

Year.	Value. £	Year.	Value. £
1891	319,581	1896	230,541
1892	292,601	1897	237,208
1893	308,385	1898	228,844
1894	307,722	1899	424,357
1895	324,170	1900	409,058

According to the entries given to the Custom house, more than half of the import came from Singapore. There is, of course, no means of ascertaining the origin of these goods. The following table shows roughly the proportionate shares of the various countries (according to the Customs entries) in the import of 1900:—

Country.	Per cent.
Singapore	52·30
United Kingdom	14·00
India	12·00
Switzerland	7·85
Germany	5·25
Holland	1·75
Other countries	6·85
Total	100·00

Baghdad (Turkey).—The clip of Arab wool for the year 1900 was of fair average quality, but rather short in quantity. Prices opened at about 14s. per maund of 12½ Constantinople okes (35lb.), but fell to about 12s. per maund at the end of the year.

The Awassi wool was of average quality and quantity. The price realised was from 10s. 6d. to 12s. 6d. per maund of 12½ Constantinople okes (35lb.), the lower level being touched at the close of the year. The Kurdish wool was full in quantity, but a great part of this wool was in a very poor and dirty condition. This told against its sale, and prices were much lower than usual, the bulk of the wool changing hands at about 9s. 6d. per maund of 12½ Constantinople okes (35lb).

Chile.—The shipment of wool from Arica in 1900 amounted to 208 tons, which all went to the United Kingdom; wool to the value of 55,175dols. (£4138) was also sent from Valdivia to France.

The export of wool from Punta Arenas will be found in Mr. Vice-Consul West's report. The total trade in wool amounted to 1479½ tons, valued at 659,783dols., and that of merino wool to 727 tons, valued at 145,549dols. This shows a considerable decrease of 1492 tons in the former, but this deficit is in some way compensated for by an increase of 1149 tons in the latter.

United States.—The export of manufactured cotton goods for the year ending June 30, 1901, has fallen off 16 per cent., chiefly owing to the Chinese crisis. Eliminating the amounts sent to the Chinese Empire, Porto Rico, and Hawaii, the two latter not being included in this year's foreign exports, there is an increase of 7 per cent. The United Kingdom has taken 38 per cent more than the previous year; the West Indies, 4 per cent. more; South America, 59 per cent. more; British Australasia, 11 per cent. more, in all of which places British goods ought to have been able to keep down the increase.

The total amount of manufactured cotton goods and cloths imported was valued at 6,116,605dols., a reduction of 29 per cent. on the previous year. The United Kingdom sent 4,288,668dols., a reduction of 36 per cent. Switzerland sent goods valued at 491,249dols., an increase of 19 per cent. compared with 1900.

The total amount of women's and children's woollen dress goods imported was valued at 5,378,396dols. The value of those imported from the United Kingdom was 1,922,431dols., and from France 2 250,025dols. The former is 23 per cent. less than in 1900, and the latter is 6 per cent. more.

Moscow (Russia).—Nearly all the machinery for the flax and cotton mills still comes from the United Kingdom, but the orders this year have only been about one-tenth of what they usually are.

Germany and the United States are now competing keenly, but so far British machinery is holding its own well. German machines are offered somewhat cheaper than British, and are made to look as attractive as possible—more so than British; still, the latter are in request, even though slightly more expensive. This is owing partly to the fact that the United Kingdom was the first in the field, and originally supplied all the machinery, to which Russians have got accustomed, and in which they have faith; partly that they were largely originally taught by British engineers; and partly to the good local representatives of British firms, who thoroughly understand the wants and conditions of the local market and of Russian trade, and also to the fact that the heads of great British firms—which have been, many of them for generations, supplying the Moscow market with machinery—themselves come out annually and look round the various mills to see how things are going on and what is wanted, which creates a most excellent impression.

As regards the dyeing and finishing machinery, Germany has a larger share than in the other branches, all her machinery being good and up to date. Switzerland also is trying to come in a little. Russian mills are well up to date in machinery and excellently appointed, so there is only an opening for really first-class machinery.

St. Petersburg (Russia).—The flax crop of 1900 proved unsatisfactory, and therefore a comparatively smaller quantity of it was exported from Russia during the flax trading season. In all only 170,500 tons were exported from the whole of Russia, as compared with 224,591 tons in 1899. To the United Kingdom the quantity of Russian flax exported amounted in 1900 to 43,887 tons, or 25·7 per cent. of the total export, and 20,451 tons less than in 1899. In point of value the total export of flax to all countries during the past year amounted to £4,656,831, and to the United Kingdom to £1,153,131, or 24·8 per cent. of the whole value of this article.

The quantity of flax shipped from St. Petersburg during the past flax export season, from November 1, 1899, to October 31, 1900, is returned at 45,429 tons, a quantity below the average for the years 1894-99. The following were the quantities exported from this port during the above quinquennial period :—

	Quantity. Tons.
From November 1, 1898, to October 31, 1899	56,571
,, 1897, ,, 1898	54,299
,, 1896, ,, 1897	55,577
,, 1895, ,, 1896	42,535
,, 1894, ,, 1895	43,262
Average	50,444

After the United Kingdom the largest demand for Russian flax comes from the North of France, a small quantity being exported also to Belgium.

Riga (Russia).—The flax crop of 1900 was one of the worst the country has seen for many years past, not only in the Baltic provinces, but also in the extensive Slanetz districts in the interior. At the outset it promised to be fairly good, but turned out to be a failure, a large proportion of the material produced having been rendered almost useless for spinning purposes by the continued drought. Unfortunately this was not discovered in time, and large quantities had already been sold abroad when the truth became known. This led to a rapid rise in prices for good, sound flax, and a consequent loss to the exporters. From first to last the season's trade was most unsatisfactory. The demand was good — in fact, it was larger than usual,—but there were no corresponding supplies Much fresh flax, in a hurriedly-prepared condition, was forced on the market at an early date, and this being sold at a high price, undue excitement was created. Growers held out for unheard-of prices for stuff which, in ordinary seasons, would hardly be looked at a second time. It is generally acknowledged that the crop was poor in every sense of the word, and quantities of flax were sent to market in a badly-worked condition. And yet, in spite of everything, the figures realised were nearly double those of the previous year, the prices for Livonian crown during the period from August to Christmas ruling between £30 and £39 per ton, basis K.

The total shipments of flax in 1900 amounted to 47,932 tons, against 107,175 tons in 1899, a decrease of 59,243 tons.

Beirut.—Owing to a meagre crop of mulberry leaves the silkworms were not sufficiently nourished, and as a natural result the cocoons were generally of an inferior quality and the yield below average. The silk merchants, however, encouraged by previous successes, paid at the beginning of the season a price for cocoons averaging 17s. per pound of silk. Unfortunately they had not foreseen the events which caused a fall in prices about the second half of the year to an average of 14s. per pound of silk. The loss in general for each bale of silk of 220lb. weight is reckoned at not less than £15 17s. 6d., and as nearly 2500 bales were exported, the total loss is computed at £48,000, which tells heavily on the feeble resources of the country.

2250 bags of cocoons, weighing each 176lb., were shipped to Marseilles. The export in cocoons was larger than in the previous year, as a considerable portion of the silk merchants were compelled to send the article in its raw state, not having sufficient money to produce the silk themselves. They had also to cover at once their accounts with creditors in France. The average price paid for each bag was £28 11s.

The rise in price of cotton textiles continued until it attained towards the end of the year an increase of 30 per cent. in comparison with 1899. This sudden rise, occasioned by reports of floods in the Mississippi and Texas plantations, was the means of stopping further importation of the article, and enabled merchants who held stocks at low prices to realise them at a large profit. The net profit per bale is reckoned at an average of £10, and the total profits at about £80,000.

There were altogether 1500 bales of yarn imports: 500 bales from the United Kingdom, 750 bales from Italy, and 250 bales between Germany and Switzerland. The British bale, however, weighs 1540lb. and contains 150 bundles of yarn, while the Italian and German weigh each 528lb. of 50 bundles.

The price per bale of British yarn was £50, and for the other £20. Most of the German, Italian, and Swiss yarns are coloured, red being the prevalent hue.

The importation of this article is decreasing to the advantage of the smaller seaports, where prices are not affected by the heavy quay duties levied at Beirut.

THE GAZETTE.

ENGLAND.

Partnerships Dissolved.

Berridge and Hearth, hosiery manufacturers, 11, Rutland-street, Leicester.

Twigg and Lowe, wool and waste dealers, Nottingham.

Johanna Rosenheim, F. Rosenheim, and J. Kaufmann, Exchange Buildings, Liverpool, cotton and commission merchants, trading as L. Rosenheim and Sons; as regards J. Rosenheim.

Hargreaves Butterworth, Robert Butterworth, Fred Mills, and James Mills, buffalo-picker manufacturers, etc., Broadfield Mill, Smithy Bridge, near Rochdale, as Butterworth and Mills.

Henry Boyre Brentnall and James Oswald Fulton, merchants, manufacturers, and shippers, 71, George-street, Manchester, as H. Boyre Brentnall and Co., by effluxion of time.

Mark Wood, George Wood, and Alfred Walton Wood, cloth merchants, 22, Brown-street, Manchester.

Lye, Webb and Sargeant, woollen merchants, Fore-street Avenue, London.

George Henry and Co., worsted serge and vicuna manufacturers, at Black Rock Mills, Linthwaite, and Market-street, Huddersfield; as regards Henry Lockwood, Josiah Lockwood, Arthur Lockwood, and Hiram Herbert Lockwood.

Edward John Wells and Arthur Sheldon, the younger, brokers and dealers in raw and thrown silks, silk and other piece goods, Bishopsgate-street Without, London, as Henry W. Eaton and Co.

Thomas Titterington Sutcliffe and Edward Johnson, cloth agents and merchants, Greek-street, Manchester, as Johnson and Sutcliffe.

Rose Ellen Mary Shelley and George Winn Shelley, hosiery manufacturers, Borough High-street, Southwark, as Rose Shelley and Co.

William A. Middleton and Albert H. Bunn, muslin and fancy cotton goods merchants, 50, Fountain-street, Manchester.

Voluntary Windings-up.

Gandy Belt Manufacturing Company Limited, Seacombe, Cheshire, on the sale of the business to the Gandy Belt Manufacturing Company (1901) Limited. Mr. C. A. F. Dimoline, of Wheatland Works, Seacombe, and Mr. R. R. Daly, 5, Fenwick-street, Liverpool, liquidators.

Automatic Revolving Humidifier Company Limited; meetings held at 7, Marsden-street, Manchester; Mr. Joseph Ward, Lune-street, Preston, liquidator.

The Bankruptcy Acts, 1883 and 1890.

Adjudications.

Aaron George Leon Bernstein (as L. Bernstein), rag and fent merchant, Grove-terrace and Crompton-street, Bradford, Yorkshire.

Alfred Morton, woollen manufacturer, Canal Mills, Armley-road, Leeds.

Hugh Grimshaw, George Grimshaw, and Frederick Grimshaw (as Grimshaw Brothers), silk manufacturers, Waterloo-street and Great King-street, Macclesfield.

NEW COMPANIES.

J. H. Riley and Co. Limited.

Registered September 19, with a capital of £20,000, in £10 shares, to adopt an agreement with J. H. Riley, and to carry on the business of ironfounders, mechanical engineers, manufacturers of agricultural implements and machinery, toolmakers, brassfounders, metal-workers, boilermakers, millwrights, machinists, iron and steel converters, smiths, woodworkers, builders, painters, electrical engineers, etc. No initial public issue. J. H. Riley is the governing director; qualification, £3000. Registered by Waterlow Brothers and Layton Limited, Birchin-lane, London, E.C.

John Saxby Limited.

Registered September 20, with a capital of £2,000 in £1 shares, to adopt an agreement with J. Saxby, of North Court, Hassocks, for the acquirement of the business now carried on by him at Creil, France, and to carry on the business of railway and other signal manufacturers, electrical engineers, contractors for public works, iron-founders, tool manufacturers, brassfounders, steel converters, wood workers, metal workers, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are J. Saxby, sen. (governing director), J. Saxby, jun., James Saxby, and W. E. Brook; qualification of J. Saxby, sen., 500 shares; remuneration, £100 per annum; remuneration of ordinary directors, £50 per annum, divisible. Registered office, 14, South-square, Gray's Inn, London, W.C.

Garden-street Mill Company Limited.

Registered September 7, with a capital of £10,000, in £100 shares, to acquire the cotton-weaving shed known as Garden-street Mill, situated at Wensley Fold, Blackburn, and to carry on the business of cotton spinners and doublers, manufacturers of cotton goods, flax, hemp, and jute spinners, linen manufacturers, wool merchants and combers, worsted and woollen spinners, yarn merchants, bleachers, dyers, etc. No initial public issue. Table A mainly applies. Registered by Carter and Crellin, Blackburn.

Hood, Morton and Co. Limited.

Registered at Edinburgh, September 4, with a capital of £50,000, in £1 shares, to acquire the business carried on under the name of Hood, Morton and Co., at Newmilns, Ayrshire, and the whole property and assets thereof, and to carry on the business of manufacturers of and dealers in lace, Madras, Chenille, and tapestry. The number of directors is not to be less than three nor more than eight; the first are Alex. Goldie, A. Mair, W. Morton, W. Murray, and J. Young; qualification, £500; remuneration, as fixed by the company. Registered by Oswald and Son, Edinburgh.

Avon Mill Limited.

Registered September 12, with a capital of £25,000, in £5 shares, to carry on the business of doublers, weavers, bleachers, dyers, printers, and manipulators of cotton, flax, wool, jute, silk, and other fibrous substances, buyers and sellers of such substances in their raw (unmanufactured) state, traders in the products of the company's mills, and dealers in the yarns, fabrics, and manufactures of other firms dealing in similar goods; also the business of brick and tile makers, but only to the extent of using up any clay found on the company's land. No initial public issue. The number of directors is not to be less than five nor more than seven; the first are to be appointed by the subscribers; qualification, 100 shares; remuneration, as fixed by the company. Registered by Waterlow Bros. and Layton Limited, Birchin-lane, London, E.C.

Frederick Ripley and Co. Limited.

Registered September 11, with a capital of £125,070, in 8347 preference, 2080 "A" ordinary, and 2080 "B" ordinary shares of £10 each, to acquire the business of worsted and woollen spinners and manufacturers now carried on at Bradford and Stanningley, Yorkshire, under the style of Frederick Ripley and Co., to adopt an agreement between Sir F. Ripley, Bart., and J. H. Robinson, as vendors, and the company as purchaser, for the purpose of such acquisition, and to carry on the business of woollen, worsted, mohair, cotton, and silk spinners, linen manufacturers, flax, hemp, jute, and wool merchants, wool combers, commission spinners, commission wool combers, top makers, yarn merchants, bleachers, dyers, makers of dyeing materials, and manufacturers of and dealers in linen cloth and textile fabrics generally. No initial public issue. The number of directors is not to be less than two nor more than five; the first are Sir F. Ripley and J. H. Robinson, each of whom may retain office so long as he holds 1000 shares; ordinary qualification, 100 shares; remuneration (except managing directors), as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, 15, Spring Mill-street, Bradford, Yorkshire.

Haslam and Great Lever Company Limited.

Registered September 16, with a capital of £500,000, in £1 shares, to acquire the business carried on by John Haslam and Co. Limited, so far as the same is carried on at the Halliwell Cotton Works, Bolton, the undertaking of the Wingates Spinning Company Limited (the registered office of which is at the Victoria Mill, Westhoughton, Bolton), and the undertaking of the Great Lever Spinning Company Limited (the registered office of which is in Settle-street, Great Lever, Bolton), and to carry on the business of cotton spinners and doublers, preparers, reelers, winders, warpers, weavers, and manufacturers of cotton and other fibrous substances, manufacturers of and dealers in spun and doubled cotton, cotton goods and other materials, and manufacturers, dyers, printers, buyers and sellers of textile fabrics of all kinds. Minimum cash subscription, 10 per cent. of any shares offered to the public. The number of directors is not to be less than two nor more than twelve; qualification, 500 shares; remuneration, 10 per cent. of the balance of profit remaining after providing for depreciation, interest on debenture stock and preferential dividend. Registered office, Halliwell Cotton Works, Bolton.

Kilner Croft Dyeing Company Limited.

Registered September 18, with a capital of £5000, in £1 shares, to adopt an agreement between T. A. Jones and Co. Limited, of the one part, and E. Stocker (for this company) of the other part, and a second agreement between E. Stocker (for this company) of the one part, and W. H. Wagstaffe of the other part, and to carry on the business of dyers, bleachers, and finishers of wool, cotton, silk, flax, and other fibrous substances, spinners, etc. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are E. Stocker, J. Hammond, J. Smale, N. Melland, and A. D. S. Stocker; qualification, £100; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, The Kilner Croft Works, Hollins-lane, Unsworth, Lancashire.

Zerkowitz Inventions Limited.

Registered September 25, with a capital of £1000, in £1 shares, to adopt an agreement made September 3, 1901, between O. Zerkowitz of the one part, G. Clay and J. Atkinson of the second part, and this company of the third part, in relation to patents and patent rights and shares thereof respectively, and to carry on the business of makers, buyers and dealers of and in machines for the production of jacquard cards and machines for cutting and repeating jacquard cards, etc. No initial public issue. Registered without articles of association by Waterlow Brothers and Layton Limited, Birchin-lane, London, E.C.

JOTTINGS.

Mr. Henry Isitt, Bradford, has received a repeat order for his patent waste-cleaning machines from the Société Linière, Lille, the largest flax mill in France.

The British Thomson-Houston Company Limited inform us that their head offices and works are transferred to Rugby, Warwickshire, where all communications should in future be addressed. The premises situated at 83, Cannon-street, London, E.C., will be retained as branch offices.

Mr. T. O. Edwards, the Government Inspector of Factories, Cardiff, has made the suggestion that Welsh mountain streams should be utilised for generating electricity. The various District Councils have the power of doing this, and if it were done it would be an easy matter to supply cottages with power to drive their looms.

The Welsh Industries Exhibition at Cardiff was formally opened on the 25th ult. Lord Windsor announced that the objects of the Industries Association were to foster and assist the particular industries of the Principality. The Mayor of Cardiff expressed the hope that the time would come when Wales would be able to compete with the West of England cloth trade and the Scotch and Irish trade. The exhibition remained open for two days.

Within the district of Ancona, Italy, the crop of cocoons during the current year exceeded those of the last ten years. The total crop amounted to 760,492kilos., whereas the production for the season of the year 1900 amounted to 671,364kilos. Prices averaged lire 3·07 per kilogramme (about 1s. per pound), against lire 3·52 per kilogramme (about 1s. 3d. per pound) for the preceding year. The total value of the cocoons disposed of amounted to £89,970.

A good way to remove oil stains from cotton is to boil the goods in sal soda or caustic soda. They can be scoured out spot by spot; but that is an expensive method, and does not entirely remove the mineral oil; they are apt to show even after a regular bleach. It is found best to use lard oil for lubricating; it is readily saponified, and consequently oil spots caused by this oil are more easily removed. It will be found that to keep the machine and bearings clean the greatest care will be required in handling oil.

A publication by the Silk Association of America, just about to be issued, contains some very complete statistics furnished by the last census in America. From this is gathered that the silk industry has 32,000 power-looms for broad stuffs, 1550 power-looms for velvets and plush, 285 power-looms for upholstery, 7000 power-looms for ribbons, and in the throwing or hard silk industry 1,000,000 swifts and 1,000,000 spindles. Handloom weaving is of very little account—675 broad looms and 130 narrow looms, of which 50 per cent. are employed in the lace trade.

Experiments have been made in France in scouring wool by ozone, and are said to have given very satisfactory results. The wool is placed on screens in an air-tight receptacle, and the ozone is forced through the wool by pumps. The grease is converted into a liquid, and readily carried off, leaving the wool in good condition and the fibre soft and elastic. It is said that 1lb. of ozone is required for scouring 2000lb. of wool. The process leaves the fibre white, so that but a small quantity of sulphurous acid is required to bleach it a clear white after it has been scoured by this method.

The death took place at Bradford, on the 3rd inst., of Mr. Julius Friedrich Wilhelm Delius, head of the firm of Messrs. Delius and Co., wool merchants, of Bradford. Mr. Delius, who was 79 years old, was the oldest member of the German community in Bradford. Mr. Delius spent his first years in England with the merchant firm of Messrs. De Jersey and Co., in Manchester, afterwards becoming a member of the firm of Messrs. Speyer and Delius at Bradford. Mr. Speyer went to Paris, and Mr. Delius took into partnership in Delius and Co. two brothers, whom he survived.

Messrs. Marks and Gayle, Montgomery, Ala., writing on the 19th ult., say that since their last letter, under date of August 31, the crop in that State has deteriorated appreciably. In fact the views of equally reputable and competent parties of identical crops or localities differ so materially that it is difficult to form an estimate. If, however, pressed to express an opinion, they should say, after making due allowance for the natural tendency to exaggerate existing conditions, that the cotton crop in Alabama now promises about the same total yield as last year. The grade, staple, and style are excellent—better than for some seasons past. After all is said, owing to the lateness of the crop, the date of killing frosts will largely determine the final yield.

According to the Board of Trade returns for September and the nine months ended September 30, the declared value of goods imported during the month amounted to £38,208,791, against £41,232,852 in 1900 and £38,721,079 in 1899; and during the nine months to £384,460,711, against £379,187,642 in 1900 and £356,019,390 in 1899. Of foreign and Colonial merchandise exported in the month the value was £4,768,235, against £4,430,284 in 1900 and £4,660,557 in 1899; and in the nine months to £50,543,899, against £48,042,998 in 1900 and £48,663,295 in 1899. The value of British and Irish produce and manufactures exported in the month was £21,971,302, against £24,559,811 in 1900 and £22,374,807 in 1899; and in the nine months £209,359,040, against £218,471,755 in 1900 and £199,351,197 in 1899.

The experiments undertaken in the central provinces of India to grow Egyptian cotton have proved much more successful than the trials at the Bombay experimental farms. After careful experiments carried on for a number of years, the Bombay agricultural authorities have come to the conclusion that, except perhaps in Dharwar, the conditions in the Presidency are entirely unsuited to exotic varieties of cotton. At the Nagpur Government farm the experienced were most encouraging. Two varieties of Egyptian cotton, mitafifi and abassi, were raised as rabi crops, and samples sent to Alexandria for appraisement. The mitafifi was valued at Rs.171-2-5 per boja of 345lb., and the abassi at Rs.207-8-7. This is a great advance over the prices commanded by jari, the kind commonly grown at Nagpur, which does not bring more than Rs.75, and indicates that in the central provinces there is a considerable field for the growth of long-stapled cotton. The provincial authorities betray a commendable enterprise in pushing on the experiments, and the "Times of India" says that a trial of the Egyptian seed will be made in Betul and Nimar. A resolute attempt is also being made to stimulate the production of cotton in Rajnandgaon, Khanagarh, and Chattisgarh.

THE TEXTILE COLOURIST:

DEVOTED TO

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

Bleaching Vegetable Fibres.

By E. Tassel.

(Continued from page 282.)

SECOND LYE TREATMENT.—After souring, the goods are, as we have seen, washed and subjected to a second lye treatment. In the case of full white bleaching, on fine fabrics especially, caustic soda must be used for this second treatment, since here it is not merely a question of attacking the pectic substances which sodium carbonate could remove, but also the adipocelluloses that are not attacked by this latter reagent, and, in fact, require repeated treatment, even with caustic soda, to ensure their removal. The operation is then performed under the same conditions as the first lye boiling. In the case of stronger fabrics and table linen, for which an inferior though still good quality white is required, use is made of sodium carbonate more or less causticised. The neutral carbonate (Solvay soda) has not of itself the requisite saponifying property, and is therefore reserved for the operations subsequent to chemicking.

Sodium carbonate may be causticised in several ways: In the first place, one may use the carbonate known as "sel de soude" (St. Gobain carbonate 80—82, Descroilles 20 per cent.), which is prepared by the old process and is rather impure, containing up to 20 per cent. of free soda. This is a useful salt, because a causticised sodium carbonate is obtained by simple solution; but its price, impurity, and, above all, the discovery of the ammonia-soda process, have led to its discontinuance, especially where experienced workmen are available.

Another plan is to add to a solution of the carbonate a certain quantity of caustic soda, so as to obtain a solution containing about 20 per cent. of free soda. It is, however, preferable to causticise a certain quantity of the sodium carbonate forming Solvay soda, which may be done by simply adding ordinary quicklime to the dissolved carbonate, the lime being thereby converted into chalk, and liberating caustic soda. After leaving at rest for several hours the chalk will settle down, and the supernatant liquid is ready for use as soon as poured off. A very favourable proportion is to add to the carbonate one-sixth of its weight of lime; the resulting liquid will then contain 20 per cent. (by weight) of caustic soda.

The caustic-soda treatment may be performed in various kinds of apparatus, one of the most widely-used being the Irish "pot." This consists of a large sheet-iron vessel from 100 to 120in. in diameter and 72 to 100in. high, closed by a sheet-iron lid of equal diameter fixed in position by hinged screws and tightened at the joint with hemp or rubber packing. Inside it is fitted with a hollow central column between 4 and 5in. in diameter, having at the base an injector for inducing circulation in the liquid. Thanks to the large cover, this vessel is very convenient to work; but, on the other hand, it suffers from defective circulation, the latter ceasing altogether unless the difference between the boiler and the vat be maintained in sufficient strength. Moreover, it is impossible to keep the temperature at a given level without stopping the circulation, this latter being produced entirely by the steam used for heating the liquor. It is more satisfactory to produce the circulation by means of a rotary pump, and to heat the liquor direct in a stirring apparatus, with a perforated coil to raise the temperature without diluting the bath.

A special type of this class of apparatus has been devised by Dehaitre, of Paris, the whole consisting of two boilers mounted on a cast-iron pillar and coupled by a system of pipes which connects them with the pump. The piping is fitted with branches and taps to enable the two boilers to be used either together or separately. The vertical portion of the piping is covered with a copper casing, forming a double bottom; it is also fitted with a steampipe and discharger. The reheater serves to keep up the temperature without diluting the liquor. Direct heating is effected by the aid of an injector placed in an enlargement above the pump.

Several interesting improvements in injector vats have been introduced by James Farmer, of Manchester, notably in the provision of an air valve which opens automatically and allows the steam to escape when the circulation stops on account of excessive pressure. For this purpose the jet of liquor on re-entering the vat strikes a kind of cup pierced with holes and suspended at the end of a lever. The latter, acting upon a horizontal shaft passing through a stuffing gland, governs an external lever kept in place by a spring. Under the influence of the movement of the liquor, the cup (grid bonnet) is depressed, thus raising the external lever, the position of which registers the force of the circulation. This lever is also connected with the safety valve, which it opens in descending, and thus allows the steam to escape when the circulation decreases. The arrangement of the piping is exceedingly well devised, and enables all the operations of lye boiling and washing to be performed. The second lye boiling may be succeeded either by grassing or by souring. The effect of the former will be discussed later on. As for the souring process, this is similar in action to that of the first and second, already described, though, owing to the disappearance of the greater part of the extraneous substances, it is of less importance.

Third, Fourth, etc., Lye Boilings.—The alkali treatment is still far from completion when the second lye boiling is past, the treatment having to be repeated a number of times before all the colouring matters are eliminated. The reason of this has been already explained: we have to deal, not with matters deposited on the fibre, but with intimate combinations between cellulose and the bodies it is desired to remove, their nature being such as to necessitate gradual decomposition, the sub-products formed—which act as a kind of glaze protecting the fabric—being removed by washing. Hence the necessity of repeating the alkaline treatment, and interposing a series of acid treatments to attack the products thereby formed.

As a rule, however, the entire removal of these extraneous substances is not desired, and five or six lye boilings will be sufficient to produce a good white. Oftentimes the bleacher is satisfied with two or three, in order to avoid unduly reducing the weight of the fabric. Why, we shall see in the chemicking stage.

The Use of Soap in Lye Boiling.—The effect of the lye is considerably heightened by an addition of soap. No convincing explanation has yet been given of this easily-demonstrated phenomenon. True, it has been opined that soap acts as a solvent of the resinous matters present; but as these are in small proportion, some other explanation must be sought. The assumption that soap acts mechanically by rendering the surface smoother, and thus facilitating the expulsion of the impurities, is untenable; and the most plausible reason that can be given for its efficacy is that it dissolves the alkali oleates and manganates. In fact, it is well known that these salts are readily decomposed and converted into acid salts, which latter are insoluble in water, soda, etc., but soluble in fatty bodies, and especially in water containing soap. One thing, at anyrate, is certain—namely, the efficacy of soap as a solvent for adipocelluloses. These consist of combinations of fats, oils, and resins with cellulose, and dissolve by emulsifying. All kinds of soap are suitable for this purpose. Resin soap, which plays a very important part in the bleaching of cotton, has a very energetic action in dissolving substances that withstand the influence of soda; it is particularly recommended for treating fabrics intended for printing, inasmuch as it removes all the fats that act as mordants.

To prepare a good resin soap Tailfer recommends the following method:—Dissolve ½cwt. of caustic soda in 220gals. of water in a sheet-iron pan heated by steam. After skimming off the impurities, powdered resin is gradually strewn in during five or six hours. The difficulty is to obtain complete saponification of the resin, an important matter, since any resin left unsaponified would stain the fabric. The resulting resin soap is a syrupy liquid, and should be perfectly transparent. Without going further into the question of soap making, which is a well-known industry and really of slight interest here, it may be mentioned that resin soap is generally recommended for use in pressure kiers, ordinary black soft soap for open kiers, and Marseilles (olive oil) soap for the concluding operations. The proportion of soap to use in pressure kiers is generally from 3 to 5 parts per 1000 of liquor.

(To be continued.)

The death occurred on the 3rd inst. at Blackpool of Mr. James Kemp, J.P., in his sixty-second year. He was a member of the firm of Messrs. James D. Kemp and Co., owners of the Read and Friendship cotton mills at Read, near Blackburn, and the Prospect Mills, Great Harwood.

Recent Mercerising Methods.

IN a mercerising machine for treating yarn, provision must be made to keep the cotton continually turning over, so that every part of it comes into contact with the mercerising liquid. This is more difficult with piece goods, for they must be stretched both lengthways and breadthways, yarn only needing to be stretched in one direction. As a result mercerising has not been such a success with piece goods as it has been with yarn. It would be impracticable to describe every machine that has been made for mercerising cotton in the yarn and in the piece, for many of them, although ingenious enough, are impracticable, and hence have been failures. In many it is evident that the inventor did not understand the principles of Mercer's discovery. The "Leipziger Färber Zeitung" makes a selection of the best and more recent machines, and describes them as below.

The simplest form of a yarn machine is one that any joiner can construct. It consists of a vertical wooden beam, on the lower end of which is a block of wood carrying from four to six radiating arms. An exactly similar block with the same number of arms slides up and down the beam, and can be fixed at any desired height. The yarns are stretched between the blocks, and the whole arrangement is immersed in the caustic lye. The machine is then transferred to a rinsing vessel, then to a neutralising vat of dilute acid, back to the rinsing vat, and the yarns are finally centrifuged and dried. Many drawbacks attend this simple form of machine: the action of the lye is not uniform to begin with; the cotton on the nearest arms is less acted on than the rest; and again, there is far too much alkali used, and much is wasted in the rinsing.

The Dolder yarn mercerising machine is said to mercerise from 550 to 600lb. of yarn in ten hours, in the charge of a single workman. The amount of lye used is given as 83lb. (32° Bé.) for covering 100lb. of yarn. Hanbold's machine is not unlike the simple form described above, but takes a larger number of hanks. Two iron rods are joined at one end by a horizontal piece, from which project ten rotatable arms on each side. There is a corresponding sliding piece for stretching the hanks; the arms are made to turn in the lye, so that the yarn is continually moving in the bath. This secures uniform mercerisation. The machine acts well and gives an excellent lustre. It can treat from 400 to 500lb. of yarn daily.

Kleinewefer and Sons' machine is a clever adaptation of the centrifugal principle to mercerising machinery. The yarn is laid as uniformly as possible on to arms projecting from a wheel, which is then set in motion. Caustic lye is sprinkled uniformly over the yarn from a perforated tube, and is driven through the cotton by the centrifugal force, finally flowing into a reservoir. The rotation is continued after the stream of lye is stopped so as to get rid, as much as possible, of that wetting the yarn. Rinsing water is then turned on through the perforated tube, then dilute acid, and then wash water again, so that all the processes are carried out in the same machine without moving the yarn. The output is about 400lb. of mercerised yarn daily, and the machine turns out a most excellent quality of goods.

In Thomas and Prevost's machine the yarn is borne by pairs of arms which are rotated by an endless screw, and carry the yarn with them. The yarns are hung on the arms, treated in lye, and then removed and centrifuged. They are then replaced on the machine for rinsing and scouring. The necessity for removing the yarns makes the machine inconvenient, and compels the use of indiarubber gloves by the workmen. Schneider's yarn-mercerising machine is of a somewhat primitive form. It consists of a long straight iron rod standing upright on a foot. Four arms project from it radially near the base. At the upper end of the rod is a framing, consisting of two pulleys connected by rods. The upper pulley carries a screw bearing four radial spindles, upon which and the lower arms the yarns are stretched. The whole concern is dipped in turn into the various liquids, lye, acid, etc.

A very good yarn mercerising machine is that of B. Cohnen. It is somewhat complicated in construction, but easy enough to use. At each side is a pulley-like frame, and a number of pairs of rollers can be turned round them as well as rotated. The action of the machine is intermittent only. At the outset one pair of rollers is in front of the machine. The workman puts on the yarns, and the machine carries them down into the lye, where they remain a few minutes in a stretched condition. The hanks pass from the lye to the upper part of the machine, where they are rinsed, and so back to the front, where they are taken off and replaced by fresh yarn. There are six pairs of rollers in the machine, so that while one pair is being supplied with yarn the next pair is in the lye, the third is wringing, the fourth is rinsing, and the fifth wringing again, while the sixth receives the finished yarn. The machine is simple and easy to use, and the workman is not compelled to handle lye-soaked cotton. The output of the machine may be estimated at from 500 to 600lb. daily.

Crepy's machine is more ingenious than practical. It consists of a horizontal trough containing a pair of rollers, which carry the yarn. Over the trough are two tanks, one for lye and the other for water. Perforated pipes provide for the sprinkling of the yarn moving in the trough with lye or water. David's yarn-mercerising machine consists of a foot supporting four pillars, which carry above two perforated rollers. Water or lye can be admitted to the inside of the rollers. Two unperforated rollers slide up and down below, and the yarn passes over both sets of rollers, and is stretched according to the height at which the lower pair is fixed.

Spencer and Sons' machine consists of two sets of parallel arms, nine in each set, and proceeding radially in a central vertical shaft. The position of the upper row can be adjusted according to the tension required to be given to the yarn. As the shaft rotates, the yarn is mercerised, rinsed, and soured, and when it is brought back to the place where it was put on it is ready to be removed and replaced by more. The normal rate of rotation of the shaft is nine minutes to each rotation, but means are provided whereby that rate can be altered if necessary. Each pair of arms carries 1lb. of yarn, and the day's work of the machine is about 600lb. The working of the machine is very simple, and it requires little supervision.

In David's piece-mercerising machine, both lye and wash water are driven through the cotton by atmospheric pressure, which also serves to drive out the excess of lye before the rinsing. This vacuum apparatus reduces the consumption of lye to a minimum. The machine mercerises pieces from 20 to 72in. wide, and is made in various sizes, treating from 2200 to 5500yds. a day. The fabric passes first to a lengthways stretching arrangement, and is then led on to another, which adds a stretching in the direction of the width. A vacuum apparatus is used, as in David's machine, for the successive liquids employed in the process. As the fabric moves from the mercerising to the rinsing part of the machine, the stretching gets greater and greater by a special contrivance. Jeanmaire's machine is for piece mercerisation. The goods are passed upon rollers through a mercerising trough, and then over a stretching arrangement of rollers, and then under rinsing sprinklers, and then to a washing tank.

In Bold's yarn-mercerising machine the same trough holds the various liquids in turn. Over it is a shaft holding fixed and loose pulleys. The latter can be fixed in any desired position. The yarn is stretched upon one of the loose and one of the fixed pulleys, and the rotation of the shaft takes the yarn through whatever liquid may happen to be in the trough. Miller's yarn-mercerising machine has a pair of endless chains passing over sprocket wheels. The links of the chains carry pegs, and the yarns are stretched from one chain to the other. The motion of the chain then carries the cotton through the different liquids. In Holland and Jackson's machine for mercerising yarn, the yarn-carrying rollers run on rails which can be raised or lowered. When the yarn is on the rollers they are moved apart to give the required tension, and the rails are then lowered so as to immerse the cotton in lye, dilute acid, etc., according to the stage which the operation has reached, the rails being lifted to change tanks.

Robinson's piece-mercerising machine consists of a pair of endless chains upon which the piece is stretched on hooks, which carry it through the various mercerising and other troughs. A special feature of this machine is that at one stage of the operation the goods are subjected to the action of a stream of compressed air, which is said to make the final results considerably better.

The Action of Caustic Soda on Wool.

By C. E. Washburn.

(*Concluded from page* 319.)

We proceeded to experiment with other grades and sizes of yarn to see if the same is true of all fibres. Below in the first column is given the original strength of forty strands of yarn, and in the second column the tensile strength of the same yarn after-treated with caustic soda under the best conditions, as above determined :—

Original. lb.	After-treated. lb.
25·5	32
29	39·5
30·5	41
42	57
50	65·5
54·5	74

From the above results it will be seen that the action of caustic soda under the best conditions is true of all kinds of woollen and worsted yarns. In all the previous investigations it was found that the yarn would not be freed entirely from the caustic soda by merely washing with water. Even after boiling, traces of caustic soda were found, and after drying the yarn was very stiff and brittle. It was found necessary to entirely remove all traces of NaOH, and to this end the yarn was treated in a weak acid bath. The following experiments were made :—

After raising from the caustic-soda bath the yarn was washed thoroughly in warm water, then quickly run through a bath of a 1 per cent. solution of nitric acid, and then again washed in water. The yarn was left in a lustrous condition, but had a yellow tint. The above experiment was repeated, only using a 1 per cent. solution of hydrochloric acid instead of the nitric, but the yarn again had a yellow tint. Using sulphuric acid in place of hydrochloric, the result was different. After first washing in water as before, the yarn was run through a bath containing 1 per cent. sulphuric acid; the yarn, as soon as it was immersed in the above acid, became a pure white with the evolution of hydrogen sulphide, which showed that there was a loss of the sulphur in the wool. A discussion of the above fact will be made later on. Of the three acids used for an afterwash, sulphuric acid was found to be the best, because it left the yarn colourless. Ammonia was used in place of acid, and was found to give very good results, but a much longer time for washing was required. The ammonia made the caustic soda more soluble, and it was thus more easily removed. It will be noted that no salts are formed between the caustic soda and the ammonia, but when sulphuric acid was used sodium sulphate was formed on the fibre, which, in dyeing, would be of advantage. The choice in the selection of sulphuric acid over ammonia lies in the fact that much time is saved, although in the end the yarn was left in the same condition by both, as far as physical properties were concerned. Yarn that was treated in the manner described above with sulphuric acid had a high lustre, a soft silky feel, and when rubbed together had a rustle similar to silk, and was not matted or felted. Yarn which was not treated with an acid or ammonia wash was found to quickly disintegrate after drying, and become harsh and brittle. Therefore the above afterwash is necessary for the success of the caustic-soda process of treating wool.

From samples prepared it was seen that the yarn treated with caustic soda had a much greater affinity for dyes than the untreated yarn. Experiments were made with acid, basic, mordant substantive and natural dyes. The greatest increase in affinity for dyestuffs appears to be with indigo, and the least with basic dyes as a class. A skein of treated and one of untreated yarn were placed in a bath containing ½ per cent. of dyestuff and 20 per cent. salt. After ten minutes the treated skein was taken out, and it was found that it required ¼ per cent. more dyestuff to bring the untreated skein up to the same shade after having been in the bath ten minutes longer. From the foregoing experiment we see that ¼ per cent. of dyestuff was saved, and 50 per cent. of time with substantive dyes.

Mordant dyes: Dyestuff saved, ⅓ per cent.; time saved 40 per cent.

Basic dyes: Dyestuff saved, ⅛ per cent.; time saved, 10 per cent.

Acid dyes: Dyestuff saved, ⅕ per cent.; time saved, 30 per cent.

An analysis of the wool fibre, according to Hummel, is as follows :—

Carbon	49·25	per cent.
Nitrogen	15·86	,,
Hydrogen	7·57	,,
Sulphur	3·66	,,
Oxygen	23·66	,,
	100·00	

It has long been known that the presence of sulphur is characteristic of wool, and often causes difficulties in mordanting and dyeing. Numerous methods have been suggested for removing the sulphur from the fibre, but many authorities claim that as the sulphur is extracted the tensile strength grows less. In experimenting with worsted and woollen yarn treated with caustic soda under the best conditions, observations were made which led us to determine whether or not the treated fibre had lost part or all of its sulphur. Lead acetate was added to a solution of caustic soda at 82° Tw. and 15° C., in which no yarn had been treated, and there took place no characteristic reaction. A skein of yarn was immersed in the caustic soda for five minutes, and then raised; the lead acetate was now added to the bath, when a black precipitate of lead sulphide was formed. This was a qualitative test to see if any sulphur had been given up by the wool. Again, when the treated skein was passed through the acid bath, an evolution of H_2S was noticed, showing that sulphur was being liberated; and as there was no sulphur present in any of the chemicals used that could be liberated in this manner, it is to be presumed that it came from the wool fibre.

A skein of yarn weighing about 3·5grms., after being thoroughly scoured and washed, was dissolved by heating in a solution of caustic soda at 82° Tw. in the presence of bromine water. When solution was complete, the solution was neutralised with hydrochloric acid. After standing for about ten minutes the solution was filtered, and the precipitate thoroughly washed until the drainings showed no presence of sulphates. To the filtrate was added barium chloride; this solution was filtered, and the precipitate, which consisted of barium sulphate, was washed, ignited, and weighed. The result of the analysis of untreated yarn was :—Weight of yarn taken, 4·0063grms.; weight of $BaSO_4$ found, 0·9975grms. (equivalent to 3·42 per cent. of sulphur). The result of the analysis of treated yarn was :—Weight of yarn taken, 3·7554grms; weight of $BaSO_4$ found, 0·0195grms. (equivalent to 0·53 per cent. of sulphur). Thus 84·45 per cent. of sulphur had been lost by treating the yarn with caustic soda. It has already been shown that the tensile strength was greatly increased by the above treatment with caustic soda. From these observations and results it has been shown that even after the sulphur has been removed, the fibre had been greatly increased in tensile strength. It is claimed by some authorities that the presence of sulphur in wool is detrimental to its dyeing properties and its affinity for dyestuffs. Here it has been shown that wool treated with caustic soda has a much greater affinity for dyestuffs, and hence we presume this latter property is due to the loss of sulphur.

In determining the best temperature, it was found that when the bath was cooled to 5° C. the caustic soda began to separate, thus reducing the strength of the bath about 5° Tw. Also at 0° C. it had fallen about 8° Tw. This explains the fact that the yarn at these two temperatures (5 and 0° C.) had begun to lose in strength. If it had been possible to maintain a strength of 82° Tw. at 0°, no doubt the tensile strength would have been increased even more than at 15° C. In order to obtain the best results and to assure even dyeing, it is necessary that the yarn be thoroughly scoured and wet out before working in the caustic-soda bath. It was found that when five 5grm. skeins were worked in the caustic soda solution for five minutes the bath had decreased 2·5° in strength, so when large amounts of yarn are to be treated it will be found necessary to add caustic soda after each treatment until the bath stands at 82° Tw. On the other hand, if the yarn was immersed in the bath in the dry condition, no depreciation in strength was noticed; so the decrease in strength was due to the bath taking up the water from the previously wet-out skeins.

When glycerine was added to the bath the weakening action of the caustic soda was reduced. Caustic soda standing at 82° Tw., when mixed with an equal quantity of glycerine, gave in five minutes woollen yarn breaking under a strain of 63·5lb.; in ten minutes, 61lb.; in thirty minutes, 55·5lb.; and in sixty minutes, 43lb. The addition of glycerine to more dilute baths was likewise effective, causing the wool to be less energetically affected.

An experiment was made with formaldehyde to see if its combined action with caustic soda would increase the tensile strength of the fibre; but it was found that wool breaking under a strain of 43·5lb., when treated with the above in equal proportions, broke under a strain of 39·8lb.

In these days, when competition counts for so much in the success of the various textile industries, any saving of time and materials is a great advantage. As has been shown, the action of caustic soda is the same on all grades and sizes of woollen and worsted yarns. Supposing that a manufacturer had made a contract for a certain grade at a set price, and after the contract had been made the stock that he was to use in making the goods was raised in price: he could take a poorer grade of yarn of the same size, treat it with caustic soda, and increase its tensile strength, at the same time bringing its lustre up to the standard of the original yarn to be used. By this treatment it will be readily seen that he could save money. The yarn so treated could also be dyed more cheaply.

Various colour effects can be made by weaving the treated and untreated yarn together in the same fabric in suitable patterns and then dyeing, the treated yarn showing up much darker. Here a great deal of time would be saved, as it has been shown that yarn can be treated with caustic soda much more quickly than it can be dyed. Weaving the treated and untreated yarns together, and then dyeing them, are accomplished much sooner than dyeing two lots of yarn and then weaving.

The caustic-soda process is also made use of in printing. A paste of the caustic-soda solution and gum tragacanth is made and printed on the cloth; after dyeing, the parts of the cloth upon which the caustic soda has been printed will appear darker than those untreated. The above was tried by actual experiment, and was found to work very well.

The elasticity of the fibre was found to increase in direct proportion to the increase of tensile strength—*e.g.*, at 82° the yarn had increased in elasticity to about 62½ per cent., while in the untreated wool it was only 35 per cent.

The process of treating woollen or worsted yarn with caustic soda requires three different baths, whether the process is carried out by hand or by machinery. In case the ordinary dye kettles are used, the ones which contain the soda and acid should be lined with copper. The one containing the water would, of course, be the same as any ordinary dye kettle. The yarn should be completely immersed in the caustic soda, so that it will be necessary for the person while working the yarn to wear rubber gloves.

A machine for carrying out the process is described below. It should consist of three compartments. The first, containing the caustic soda, of regulation width and depth, should be copper lined. The next adjoining compartment, containing lukewarm water, should be of the same size as the first, and be built of iron or wood. Between the first and second compartments there should be a squeeze roll, so as to remove as much of the caustic as possible from the yarn before it is passed into the water. The third compartment should be copper lined, as was the first, and contain the acid wash. After passing from the acid bath, the yarn could be either washed by hand, or it could be passed into a fourth compartment. The skeins of yarn should be linked together so as to form a continuous chain. The speed of the machine should be so regulated that it will take the yarn exactly five minutes to pass through the caustic-soda bath. In the above machine the entire process would require about twenty minutes.

The material to be treated should be thoroughly scoured and wet out, then passed into the caustic soda bath at 82° Tw. for five minutes at 15° C. Raise, squeeze, and wash for five minutes in lukewarm water; pass through a bath of 1 per cent. sulphuric acid; wash again in water, and dry or dye in the usual manner. In conclusion, we can say that the tensile strength of the wool has increased, has a greater affinity for dyestuffs, a better lustre, and in all ways is superior to the untreated material.—"Textile World."

Wool Incapable of Absorbing Dye.

When wool is first treated with tannin substances in a hot bath, and then with certain metallic salts in the same or in a second equally hot bath, it loses almost entirely the property of absorbing dyestuffs, so far as they are not capable of being fixed by mordants. Of the metallic salts serving to fix the tannin substances, antimony and chromium salts are found to be the most appropriate. Chromium may be employed in the form of chromates or chromium oxide salts. Aluminium and zinc salts have little fixing power, and therefore insufficient discharging action. Stannous salts, however, give under certain circumstances satisfactory results, especially when chromium and antimony are used for fixing, to strengthen the discharging action towards azo dyestuffs. Iron and copper salts are less advantageous, as their dark-coloured lakes influence mostly the beauty of the shades to be obtained. Titanium compounds yield a yellow lake, which is also not of advantage in all cases.

The tannin substance is generally applied by immersing the wool at or near the boiling point, but it may be applied by printing or padding and subsequent steaming. By printing the tannin substances, the incapability of absorbing dyestuffs can be effected, of course, only on certain places of the goods to be treated, whereby different peculiar effects are produced. The rendering of the fibre incapable of absorbing dyestuffs can also be effected on wool already dyed or printed with dyestuffs by treating it subsequently with tannin substances and then with metallic salts. If dyestuffs fast to acids be employed for preliminary dyeing, and if the previously dyed wool be made incapable of absorbing dyestuffs and then made up with unprepared white wool, woollen goods are produced which may be dyed on subsequent treatment with strongly contrasting colours, such as olive green and scarlet, dark navy blue, and orange-red brown and bright green. Still stronger contrasts are obtained by preliminary dyeing of the treated wool with basic dyestuffs fast to acids and boiling, and by dyeing afterwards the goods produced from these coloured and untreated wools with dyestuffs for wool.

The technical importance of this process is easily conceived, although capable of various applications. The process may be applied to the wool fibre at every stage of the manufacture, beginning from loose wool to finished piece goods, etc., both by way of preliminary boiling, padding, or printing of the tannin substances. Loose wool is generally previously treated by a preliminary boiling, and then made up by itself or mixed with ordinary or otherwise previously treated wool, or in mixtures with other fibres in spun goods and fabrics. Slubbings are treated either throughout or superficially by a preliminary boiling or by printing after they have been made up into yarns and piece goods, which show the result of the treatment in mixed thread and weaving effects or in combinations thereof. Yarns may be treated in skeins or in chains by preliminary boiling, padding, or printing after preparation; cops, cross bobbins and warp-beams, however, are treated only by way of preliminary boiling. On making up the piece and woven goods the result of the process is shown by the most varied weaving effects. If, for the preparation, yarns previously dyed with dyestuffs fast to acids and boiling be used, or if they be dyed after the preparation with basic dyestuffs fast to acids and boiling, then yarns will be obtained which may be employed as pattern or selvage yarns for wool or half-woollen goods.

For piece goods the process is specially important for producing printing effects. Here there is a great technical progress, for in many cases the usual preliminary treatment of the wool for printing is avoided, especially the chlorination. In a great many cases the tannin substance preparation alone is printed, steamed, and fixed with metallic salts, but the application of the dyestuffs in any desired bi-coloured effect is by the usual dyeing, thus rendering the chlorination of the wool superfluous. For obtaining many-coloured effects, differently-coloured tannin dyestuffs are printed, steamed, fixed, and the ground colour finally applied by dyeing. According to choice, the discharge may be applied in any desired pattern, also in form of thin lines, dots, and strokes, for imitation of weaving and mixed effects. To manufacture a so-called double-face article only one side of the goods is uniformly printed with the tannin colour. In the dyeing of half-woollen goods the process is also important; for by depriving the wool partly only of its capability of absorption by means of less energetic tannin substances and metallic salts, and thus making it more like cotton in tinctorial properties, the simultaneous dyeing of both fibres is facilitated. Wool treated according to the new process loses its capability of absorbing dyestuffs of all classes of colours, except basic dyestuffs, for which the affinity of the treated wool becomes greatly increased by the tannin substances.

On finally dyeing spun goods and fabrics containing wool treated by the new process and untreated wool, contrasts in colour from light to dark, colour to white, and colour to colour may be obtained, such as can be produced only by separate dyeing operations and subsequent making up of the wool dyed differently. The bi-coloured goods obtained, for instance, with basic and acid dyestuffs are more beautiful and varied in their colour effects than would be goods of two different kinds of material, such as wool or cotton. A still greater variety of effects may be obtained by the use of previously dyed wool rendered incapable of absorbing dyestuffs with untreated wool, or by using, besides wool, chlorinated wool or wool otherwise mordanted, and other fibres, such as cotton, silk, etc., with still more deviating capacity for being dyed. The most beautiful contrasts in colours may be obtained if the treated wool is dyed near boiling point with basic dyestuffs, especially with azines, oxazines, safranines, and thiazines, in an acetic-acid bath, while the untreated wool is dyed at from 80 to 85° C. with addition of Glauber's salt and acetic acid, with higher sulphonated acid, dyestuffs, azo dyestuffs, or dyestuffs developed by chromium. As already mentioned, the degree of incapability for absorbing dyestuffs depends for ordinary wool dyestuffs on the quantity of the tannin substances applied; if, therefore, in fabrics, untreated wool is made up with wool treated with different quantities of tannin, then on finally dyeing piece goods of suitable weaving pattern, shades may be obtained varying from dark to light or from colour to colour. A similar variety of shades may be obtained by printing differently strong tannin colours on piece goods or yarns. The process may be illustrated by the following examples:—

100kilos. of yarn are boiled and handled for one hour in a bath of about 3000 litres of water, containing 25kilos. of tannin, and are further handled for half-an-hour in a second bath made up with about 3000kilos. of water and 15kilos. of tartar emetic, and then the yarn is rinsed. It is preferable to add a solution of 3kilos. of sodium stannate and 3kilos. of concentrated hydrochloric acid to the rinsing bath, and to handle for some time afterwards. If the woollen yarn thus previously treated is woven in various designs with white unprepared woollen yarn, goods are obtained which may be dyed in the shades desired, for the prepared wool absorbs azo-dyestuffs, acid dyestuffs, dyestuffs developed by chromium, and mordant dyestuffs less, but basic dyestuffs much more, than does unprepared wool.

100kilos. of loose washed wool are mordanted in the usual manner with potassium bichromate and tartar emetic, and then dyed as usual in a freshly-prepared bath of 10kilos. of cœrulein A paste in the presence of 5kilos. of acetic acid. After thoroughly exhausting the dyebath a decoction of 25kilos. of sumach leaves is added, and the whole is boiled for another hour. The wool is then treated for another half-hour in a fresh bath of 5kilos. of tartar emetic and then rinsed, or the tartar emetic is added to the same bath and the boiling continued for half-an-hour. If the wool thus treated is mixed with the same quantity of white wool, then spun and woven, for instance, to rough cloth, goods are obtained which may be dyed with acid dyestuffs, mordant dyestuffs, or dyestuffs developed by chromium, in different contrasts in two shades. If the goods are dyed, for instance, with Victoria Scarlet 3 R in an acetic acid bath nearly boiling, a scarlet and olive shaded material is obtained. On dyeing with Flavozine S, a yellow and green-olive, and on employing Orange G, orange and olive, etc., are obtained.

A printing colour is prepared containing per litre 200grms. of tannin and 100grms. of acetic acid of 8° Bé. specific gravity, as well as the requisite quantity of an appropriate thickening agent. This dye is printed on the goods to be treated—for instance, woollen plush or slubbings. They are then steamed for one hour without pressure in moist steam; then treated for half-an-hour in a hot bath containing 5 per cent. of tartar emetic, calculated on the weight of the goods, and well rinsed. If the wool thus previously treated is dyed with acid dyestuffs, light and dark shades are obtained at will. On dyeing first with suitable basic dyestuffs in an acetic acid bath and then with wool dyestuffs, the most varied bi-coloured effects may be obtained. According to the printing pattern various effects may be produced, which may be more varied still by using the printing colour dyestuffs fast to acid and boiling.

Defects in Dyed Fabrics.

There is no doubt that every dyer, no matter how great or extensive his practical experience may have been, is capable of recalling within his own experience instances of defective results which, in the light of later work, might have been averted. There are dyers, skilled men, too, who could cite instances, even in their current work, when what at the time seemed to be trivial omissions afterwards developed into matters of considerable importance. Of course, it will be almost impossible to cover, within the limits of this article, all causes which might lead to serious defects, but it is hoped that the few which we shall review will be of sufficient importance to serve in pointing out others to the dyer, who perhaps is a young man. eager to be piloted safely around dangerous places. One of the most serious defects in dyed goods is where one colour runs into another, commonly called "bleeding," and it is primarily due to the fact that the colour dyed on one part of the fabric is more soluble in wash water than the colour dyed on another part, and consequently runs or "bleeds" into the adjacent part of the goods.

In cases of cotton goods consisting of white and coloured stripes or checks, the coloured part of which is dyed with basic or mordant dyes, bleeding may be, in nearly all instances, traced directly to a lack of proper washing at one or more stages of the dyeing process. As a general rule, the dyed cotton part of such goods is either dyed in the warps or skeins, or both, by first preparing with sumac decoction, solution of sumac extract, or tannic acid, afterwards fixing with a salt of antimony, such as tartar emetic or antimony salt, and then dyeing in a dilute solution of the proper colour.

Now according to the usually accepted views of chemists and dyers regarding the actual changes that occur during the process of mordanting, we must accept the following conclusions: Cotton fibres take up from the tannin bath a certain amount of tannic acid, which is held more or less tenaciously, but which would be dissolved and removed from them unless caused to be permanently fixed by some chemical agent, the very best known of which is, no doubt, antimony. If the absorbed tannin was not so fixed, it would be nearly completely removed at the temperature of the dyebath. Consequently the fixation simply amounts to the conversion of the entire amount of tannic acid in the fibres into tannate of antimony, which is insoluble in any usual solution into which the goods may be placed. This tannate of antimony now on the fibres has a strong affinity for the colour bases of the so-called "basic dyestuffs," forming insoluble coloured deposits which are only as permanently fixed on the fibres as the mordant is, and thus we are brought directly back to first principles. If the mordanting has not been done thoroughly, and effectively washed after being worked in the antimony bath, it is somewhat unreasonable to expect that the resulting dyed threads will hold tenaciously the coloured pigment or lake. The secret, if such it may be termed, of non-bleeding basic colours depends wholly upon the thoroughness of the washing after mordanting and after dyeing. If the yarn is not well washed after dyeing, there will also lurk the dangerous possibilities of tinted whites, due to "loose colour" or unfixed dyestuff.

The remark made regarding the fixation of basic colours upon mordanted goods applies with equal force to broad goods printing with basic colours, where the mordant and colour are made up into one paste and then applied to the fabric from a shell or roller. In this case the colour mixer always endeavours to assure himself that he has a moderate excess of mordant over the actual amount necessary to ensure complete fixation of the dyestuff, for if the conditions were reversed, the colour (for which there would be no mordant) would surely run into the adjacent white. In the application of the direct-dyeing colours to cotton the same principle holds good, of course, for very light shades. All, or nearly all, of the dyestuff in the bath is taken up by the yarn, and in some cases only a light rinse will be found to be quite sufficient; but for heavy shades a thorough wash will be necessary. The uses to which dyed cotton goods are to be put will have a considerable influence upon the amount of washing requisite; for upholstery goods less washing will be requisite than for shirtings or dress goods. In the case of woollens dyed with alizarins upon a chrome mordant, a good washing after mordanting will have a marked influence upon obviating any chance of possible rubbing, while washing after dyeing will guard against bleeding.

Wool dyed with acid colours requires thorough washing for two purposes — to remove the remaining traces of dyestuff held mechanically by the fibres, and to ensure complete removal from the fibres of all traces of acids used in dyeing, which might otherwise serve to tender or rot the goods. This is specially important in dyeing carpet yarns, which, if not thoroughly freed from acid, gradually deteriorate and become brittle. Indeed, deficient washing after dyeing is a very fruitful source of trouble in carpet mills; as a rule, a quart of sulphuric acid to each kettle of yarn is the common practice, and amounts to nearly 4½lb. of acid, or 4½ per cent. The dyed yarn is lifted out, rinsed, whizzed, and at once dried, during which operations there is a gradual concentration of acid liquor at the lowest extremities of the skeins, with the result that the acid accumulates at that point, and by the time the moisture has been driven off the vitriol has been concentrated to such an extent as to seriously weaken the threads at that point. The writer's attention was first drawn to this point by a series of complaints coming from one department of the mill, and upon investigation it was noted that the tender spots were at nearly regular recurring intervals. After this was observed, the instructions were then issued covering the thorough washing of all grades of carpet yarns, with the result that no further complaints were heard of. Cotton velvets, which are dyed with salt colours, should be well washed before finishing, as they are mostly dyed heavy shades; it is essential that they should be sent to the finishing-room in as clean a condition as possible. If they are to be discharged before finishing, this thorough washing may be left for the final one, and the best results will then undoubtedly be secured. The final washing after discharging and steaming should be so thorough as to preclude any possibility of traces of the discharge chemicals remaining in the piece, which would surely weaken the fabric; this is particularly true if tin crystals is the discharging agent.

Woollen fabrics that have been dyed good colours with strong bodied dyestuffs are frequently required to be "topped" or otherwise subsequently treated in a separate dyebath of other colours, in order to modify the shade of the ground or body colour. As a general rule, this supplementary colour is of an entirely different character from that originally used. The reason for this is that it is popularly supposed that such different colour will impart "bloom" or "transparency" which could not otherwise be secured. However this may be, it is bad practice, as the fixation of this colour is not entirely possible, and the result will be that the fabric will "rub" — a very undesirable property

Some time ago a series of samples of black dyed silk came under the writer's observation, and it was noticed that they possessed a very pleasing dark-bluish overcast, which was quite difficult to imitate. A preliminary examination showed that the silk had been dyed with logwood upon a heavy iron bottom, but this did not account for the blue shade. A number of trials were made upon large quantities of silk, but no very satisfactory results were secured. However, a test was made which at once indicated that the "topping" was done by a very common dyestuff—alkali or Nicholson's blue. At once tests were made, with the result that very good and satisfactory shades were secured; but even by using this dyestuff certain objections were to be met—one, that the silk would not stand the rubbing test. For some classes of fabrics this style of dyeing, however, is not to be recommended.

The dyeing of cottons with the direct-dyeing colour and the subsequent topping with the basic colours have much in their favour, for the reason that the majority of the direct colours have a rather marked affinity for the basic colours, thereby almost serving as a mordant. This property can be made much greater use of than is usual at the present time. Some reds can be topped with basic reds to very good advantage. Indeed, it has been asserted that some of the direct colours which are acted upon by acids, such as benzopurpurine, may be much improved by the use of safranine. Of course, such modifications of existing and well-known methods of dyeing are not to be taken up without careful experimenting, so that probable defects due to local conditions may be met and overcome. One serious defect in woollen fabrics such as are chromed before dyeing, says the American "Textile Record," can be traced to plaiting, and allowing them to stand or lie in a plaited state. It should be remembered that the salts of chromine, when in the presence of organic matter, are more or less susceptible to the influence of light, and consequently the exposed parts of the folds may take on a greater depth of colour. Diazotised tetrazo dyes should always be developed as soon as washed; they should never be allowed to remain around, but at once put into the developing bath. If this is not done, light will cause a decomposition of the diazotised base of the yarn, with the result that the subsequent shade will be extremely uneven and of no practical value.

Disintegrating Indigo.

INDIGO has to be prepared for use in vat dyeing in the usual way by grinding to a high degree of fineness. For this purpose vegetable indigo has been ground in indigo mills in water, sometimes containing caustic soda. This grinding is very frequently continued for days before a sufficiently fine paste is obtained. Synthetic indigo in the form of paste possesses the advantage that it can be used directly, without any further grinding, in vat dyeing. But such pastes have the disadvantage that, in consequence of the water contained in them, the cost of transport is heavy, and when importing into certain countries duty has to be paid on the entire weight, including that of the water. All attempts to obtain indigo in the form of a dry powder by grinding the indigo in the usual indigo mills in the dry state have not yielded a product that could be at once used in the vat. The particles of indigo obtained apparently get pressed together, and hard flakes, or even small lumps, are formed. Also, if the finely divided indigo as obtained in the process of production be collected and dried, there is always liability to aggregation taking place, resulting in the formation of particles of such size that they are with difficulty soluble in the vat, or are liable to sink to the bottom of the vat, forming a sediment inoperative in the dyeing. This is frequently the case with dry synthetic indigo. In spite of the fine state of division in which synthetic indigo is at first obtained, the dry product has hitherto had to be submitted to wet grinding if intended for use in any other vat than the hydrosulphate vat, which possesses the most powerful reducing action. The Badische Anilin and Soda Fabrik tried a process about two years ago of obtaining indigo in a form readily soluble in the vat by converting it into its sulphate, and decomposing the sulphate with water. Further experience shows that it is preferable to submit the product obtained in this way, after drying, to wet grinding before use.

A later process consists in the conversion of dry indigo into a readily soluble powder by treatment in a disintegrator. This machine, which does not grind by pressure, but which subjects the material under treatment to the shearing stress of blades rapidly passing one another, appears to tear the lumps of indigo apart, and it reduces the indigo to a fine powder which for all practical purposes constitutes a new product of a very light, soft, and voluminous nature. The single particles of indigo appear, by the action of the disintegrator, to be separated from one another by an envelope of air, so that the dry, solid powder (provided, of course, that it is not subjected to pressure), occupies a space about equal to that of a 20 per cent. paste of indigo, containing the same amount of indigo. The new indigo powder thus obtained on mixing with water yields homogeneous pastes which do not deposit a sediment, and the indigo in such pastes is as easily soluble in the vat as is the indigo paste obtained by wet grinding.

Synthetic indigo, and particularly pure brands of plant indigo, can be treated in this manner, and yield the powder described; but the best result of all is obtained by the use of indigo which can be obtained by decomposing the sulphate with water. Impure vegetable indigo containing a large proportion of gummy or other impurities which tend to cement the indigo particles together cannot be used with advantage. The product renders considerable simplification of the process of dyeing with indigo possible, for a considerable saving of time and material is effected in the grinding, and the manipulation of the colouring matter in the preparation of the vat and in keeping it up to strength is rendered easier. Ordinary or any suitable disintegrators can be used for the purpose, and good results have been obtained in machines of from 2 to 2½ft. diameter when rotating at the rate of from seven to eight hundred revolutions per minute.

Fast Prints from Sulphide Colours.

ALTHOUGH the colouring matters known as sulphide or sulphur colours have attained great importance in dyeing, they have met with little success in calico printing. This is not due to their not being suitable for the purpose, nor to any deficiency in fastness in the colours themselves, but to the absence of any satisfactory method for their application. The methods proposed for this purpose have either consisted in the direct printing of the colouring matter in the form of a sulphite compound, with or without the addition of acetate of chromium, or they have been based upon the dyeing process and the colouring matter applied as a leuco compound in the presence of an alkaline reducing agent such as sodium sulphide. By the former method it is not possible to obtain a sufficient depth of colour, especially in printing black. The latter method is open to the grave disadvantages of attack upon the copper rollers and danger of tendering the goods by deposition of free sulphur. A new process, by means of which all the sulphide colours can be satisfactorily employed in calico printing, without any of the old disadvantages, has been recently introduced, and it is claimed that by its adoption the colours are remarkably fast against the action of soap and alkalies. Whites are not stained, and the black prints compare in fastness to aniline black.

A printing paste is prepared containing caustic soda or a strongly alkaline compound, such as sodium silicate, the presence of a reducing agent in the printing paste being unnecessary. The colouring matter is freed from admixed sulphur and sulphides, and either as the insoluble free acid or as a strong solution in sodium sulphite is mixed with an excess of caustic soda and any suitable thickening agent—such, for example, as starch, dextrine, gum, or silicate of soda. Silicate of soda may be used in place of, or in addition to, the caustic soda. After printing, the goods are dried, and are then steamed, washed, and, for greater fastness, passed through a hot fixing bath containing a chromate, a salt of copper, or of iron, zinc, chromium, or other suitable metallic compound, or mixtures of such compounds can be used. Finally the goods are washed, soaped, rinsed, and dried. When the steaming operation is of short duration —for instance, when the Mather-Platt apparatus is employed,—it is advantageous to pad the goods previously to printing in a solution of glucose (preferably containing from 5 to 20 per cent.), and then to dry. The following examples illustrate methods of procedure:—

1. A mixture is prepared from 2½lb. of Clayton Fast Black B conc., ½gal. of caustic-soda solution (30 per cent. NaOH), and ⅝gal. of silicate-of-soda solution (102° Tw.). After printing, the cloth is steamed for half-an-hour, washed, and passed through a hot solution containing sodium bichromate and copper sulphate, rinsed, soaped strongly, and dried. In this example the Clayton Fast Black may be replaced by the same weight of other sulphide blacks, such, for example, as Sulphur Black T (Berlin Aniline), purified Immedial Black (Cassella), and purified Sulphaniline Black (Kallé).

2. 25lb. of one of the blacks mentioned in the previous example, 25lb. of neutral sodium sulphite, and 25lb. of dextrine are dissolved in boiling water and made up to 10gals. A printing paste is prepared by mixing 12lb. of this solution with $\frac{1}{10}$gal. of caustic-soda lye (30 per cent. NaOH), and 1gal. of water. After printing, the goods are steamed, washed, and fixed, as before described.

3. A solution is prepared from 40 parts of Clayton Fast Black B B, 40 parts of crystallised sulphite of sodium, and about 100 parts of water. To this solution from 80 to 100 parts of a 10-per-cent. starch paste and 220 parts of caustic-soda lye of from 60 to 70° Tw. are added. Print the goods, steam, wash, and dry. The result is somewhat improved if the goods, after steaming, be passed

through a hot solution containing in 1000 parts, 6 parts of copper sulphate, 6 parts of acetic acid, and 2 parts of sodium bichromate. By padding the goods previously to printing with a solution containing from 5 to 20 per cent of glucose, the necessary time of steaming may be reduced considerably—say from one to fifteen minutes—and a smaller quantity of caustic-soda lye is sufficient.

Chemical Printing.

THE colours used in chemical or graphic printing are merely body colours, even when they are called by the title of dyes or dye lakes, and are made suitable for printing by a thorough mechanical rubbing down with a greasy thickening substance (linseed oil varnish and the like). They are consequently relatively very expensive, and do not possess the depth, brilliancy, and affinity to the material to be printed, as in the case with the chemically-developed dyes of the cotton industry. Some improvements in colour compositions which have been tried in Switzerland are made by the respective colouring material being first dissolved in a bath — that is to say, a liquid solution of the colour is made similarly to what is generally done with dyes for cotton printing. Then according to the nature of the dyes and the requirements which the printing product is to fulfil, chemical mordants or developing substances are added, directly or in separate solutions, and even in some cases dry, and afterwards the water contained in these solutions is again evaporated to the smallest possible percentage by drying, evaporation, or conversion into a pasty, and eventually saponaceous, condition, by rubbing down with the greasy thickening substance in a thorough mixture (the thickening material being, in fact, the linseed-oil varnish of various consistencies used generally in graphic printing).

As the colouring material, to a certain extent, already exists in a soluble form, a separate thorough mechanical rubbing down, such as is necessary with the body colours of graphic printing, is inadmissible in all cases. In order to bring the dissolved colouring material—and in case a mordant also is added—to fully develop its action, the colour so far produced must be subjected after the printing to a subsidiary treatment. This consists as a rule in the printed article being subjected to a steaming process. Instead, this subsequent treatment may eventually consist of an oxidation in the case of aniline black and similar oxidising colours; in passing them into a wet bath for alizarin red; or a soap bath, according to the properties of the colouring material employed. The method of carrying out the supplementary treatment which is usually adopted—that is to say, the steaming in open steam—may be explained in the following manner:—

If dyes and mordants in solution are to be brought into action one upon the other, this can only take place in a boiling hot condition. Such a boiling—that is to say, the simplest and driest possible—takes place by steaming in open steam which is more or less under pressure. By this steaming a boiling is effected the consequence of which is not only a development of the colour more or less under the co-operation of the mordants, but also a transfer of the same to the fibres or material to be printed. The major part of the colour thickening employed also evaporates and dries up. This so-called dry boiling has a threefold action—the self-development of the colour, the transmission of the dye to the fibres, and finally the drying of the greasy thickening. The method of producing the above colour compositions is illustrated by the following examples:—

Rose Colour for Animal Fibres without Fixing Mordants.—20cc. dilute solution Turkey-red oil, 1 : 1·13grm. Brilliant Rhodulin G (B) dissolved, then 10cc. of water is added with 2grms. Fuchsin G (M), and precipitated with 1cc. of hydrochloric acid of 22° Bé. The paste is filtered off and the soapy residue is then added to 100grms. of linseed oil-varnish Mark III. (medium thick quality).

Chamois Colour with Developing and Fixing Mordants for Vegetable Fibre.—20cc. of water in which 5cc. of common salt have been dissolved, to which ½gr. of acetic acid has been added, and in which 5grms. of Janus yellow is dissolved, are evaporated to the consistency of paste, and then 2grms. of dry crushed tartar are added to 12cc. of water, 4grms. tannin, and 1grm. oxalic acid, which are condensed to a syrup, and then 100grms. of linseed-oil varnish Mark III. (medium thick quality) are used with it.

Alizarin Blue with Aniline Shading in Paste Form.— 60cc. of water in which 12grms. soda of Alizarin Blue S R are dissolved with 6grms. soda and then filtered off, and 20grms. of water in which are dissolved 4grms. of Basle Blue B B (D H) and 1grm. of Victoria Blue B (B), are evaporated down. 60grms. of chrome acetate of 20° Bé. are evaporated and desiccated to a thick gummy consistency, and to the whole are then added 100grms. of linseed oil varnish Mark III. (medium thick quality), 10grms. of the same Mark V. (thinner quality), and 5grms. of pig's grease 1.

Finishing Cotton Cloths.

IN the treatment of dyed and printed cottons in readiness to be placed on the market there are a few points worth notice, about which the finisher must take some care or he may go wrong. One of the most important is to see that the size he uses and the various operations he subjects the cloths to have no impairing action on the brilliancy of the colour or any tendency to change its hue in any way, or, further to cause it, in the case of printed goods, to blend into the white places. Now it must be obvious to any finisher who possesses the gift of observation that the use of such bodies as china-clay, mineral white, or blanc fixe in the size for printed or dyed cottons must have a tendency to reduce the brilliancy of the colours and make them appear dull, or, if present in large amounts, even chalky in appearance. It is not possible always to avoid the use of such bodies, but it is a good rule for the finisher of dyed and printed cottons to use such substances as Irish moss, starch, gelatine, Epsom salts, etc., which give a more or less transparent finish, and have little or no influence on the colour of the cloth. In the case of dyed goods any tendency to the production of dulness or chalkiness may be avoided by tinting the size

One of the commonest finishes applied to coloured cotton cloths of every kind is that known as the salts finish, sulphate of magnesium, in either the form of Epsom salts or in that of keiserite, being used. By varying the strength of salts liquor the character of the finish, and, what is more, the degree of weighting, can be varied. Epsom salts give a nice, firm and crisp feel not attainable by the use of any other material. The crispness may be modified by adding a little chloride of zinc to the finishing liquor. Generally, the salts have little effect on the brightness of the colours on the cloth. It is most important that they should be quite neutral, neither acid nor alkaline, for many of the modern colours—such as benzopurpurine, chrysamine, diamine blues, and sun yellows—are more or less affected by acids or alkalies. The slightest trace of acidity will turn the bright scarlets of Congo red or benzopurpurine to a dirty maroon, while alkalies redden the shade of chrysamine and many of the direct blues.

It is quite a common thing to use a plain starch finish, or sometimes a size made like the following:—3 parts starch, 1 part sago flour, 1½ part mineral white, and 3 parts china-clay. In such cases, with dyed goods, it is advisable to add a little tinting agent, and there is nothing better in this case than to use one or other of the direct colours. For instance, in the case of black cloths, a little diamine black or union black may be added; for reds, Titan red, diamine brilliant scarlet S, benzo fast scarlet 4 B S, or purpuramine DH. These reds have the advantage of not being changed by acids. For blues there may be used diamine sky blue, diamine dark blue, Titan blue, etc. Sizes for greens may be tinted with diamine green or a mixture of thioflavine S and diamine sky blue, and so on with other sizes. By using one of the above and other direct colours the finisher should be able to tint his sizes to match the colour of any cloths he may be finishing. The mere passing through of the size by the cloth and the subsequent drying up are sufficient to fix the colour on the cotton.

There is not a great deal of risk of finishing sizes altering the tints or shades on coloured goods. Few of the materials in common use have any such action, the most likely being the chlorides of zinc and magnesium. The use of acids and alkalies should be avoided, while old and strongly fermented flour paste is best left alone, for it is generally strongly acid and might affect some colours. The prevention of colours running, says the "Boston Journal of Commerce," is by no means easy, and can only be reduced to a minimum by the finisher running the goods through as quickly as possible and drying them up rapidly. The finisher cannot control this feature, for it is really due to the faulty fixation of the colours on the part of the dyer and printer.

NOTES ON DYEING, BLEACHING, FINISHING, &c.

Specially compiled for THE TEXTILE MANUFACTURER.

Level-dyeing Colours on Dress Goods.—A tasteful and largely-assorted range of shades obtained by level-dyeing colours on ladies' dress material has been issued by Messrs. Bayer and Co. for the coming season. The shades are produced by combinations of Alizarin Sapphirole, Azo Crimson S, Azo Fuchsine G, Fast Light Yellow, and other dyes fast to light. In all cases dyeing takes place on unbleached cloth for one hour at the boil with 10 per cent. Glauber's salt, and from 2 to 5 per cent. sulphuric acid or 10 per cent. bisulphate of soda.

Myrticolorin.—The Technical Museum at Sydney has issued a report on a tinctorial product extracted from the leaves of the "red stringy bark gum," a variety of eucalyptus, and to this the name "myrticolorin" has been given. It is said to compare favourably with flavin, to which it is closely allied in constitution. It is evident from the method of preparation that it must be very cheap. It is extracted with extreme simplicity. The leaves are ground to the finest powder; this powder is then boiled with water only, filtered boiling hot, and the filtrate allowed to cool, when myrticolorin crystallises out. The tannin and soluble salts extracted at the same time remain in solution, and when cold these are filtered from the myrticolorin, which can then be washed with cold water if required. This can then be pressed, dried, and ground, when it is ready for market. As no chemicals are required, no decomposition takes place, and the result is that the product is always of a constant nature.

Photographic Designs on Fabrics.— Photography is but little used in obtaining direct designs on fabrics, being chiefly confined to the making of bookmarks and similar smallware, but a process which has been introduced by an American firm is suitable for the production of large designs on tapestries and other wide goods. To prepare 16 litres of the sensitising solution, place 120grms. of dried Irish moss, *chondrus crispus*, in 32 litres of cool water, and gradually heat the water until it boils, which ordinarily takes some fifteen or twenty minutes by the procedure employed. Then stop the application of heat and let the solution stand about five minutes. Then, into a 16-litre vessel in which 160grms. of citric acid have been placed, draw off through a fine sieve or coarse filter about 16 litres of the algea solution or extract, taking it preferably from near the bottom of the vessel, mix this with 160grms. of citric acid, and add 240grms. of chloride of ammonium. The remaining portion of the algea extract is discarded, as it is too thick. Silk is treated with the solution by immersing it for a few minutes in a flat sheet so as to expose all its surfaces evenly to the solution. Then the silk is dried and it is ready for sensitising by immersing it in any suitable sensitising bath. Upon again drying the fabric, it is ready to be photographically printed from a negative, in the usual manner. The photographs so produced on the silk are admirably adapted for colouring. The fabric does not show the presence of any film resembling a gelatin or albumen film; on the contrary, the white portions of the silk in the finished picture look precisely as the silk looked before being treated. Tapestries, particularly thick tapestries, may be wet on one side only in the solution by being laid face down in the shallow tray containing the solution.

Discharge Effects on Dyed Goods.—According to a new process introduced by Messrs. Kallé and Co., of Biebrich-on-Rhine, white discharge effects of great clearness are obtained if the goods, dyed with a suitable colouring matter, be printed with a discharge paste containing aluminium dust and an alkaline bisulphite (preferably potassium bisulphite) as well as a thickening material, and if the goods so printed be steamed. This new discharge paste is said to have the advantage over all the known oxidising or reducing discharge pastes, that it has no injurious influence on either the goods or the rollers and doctors of the printing apparatus. Coloured discharge effects are obtained if a colouring matter which is not dischargeable be added to the paste. The following are examples of the manner in which the process can be carried into effect. The parts are by weight. A silk fabric dyed in the usual manner with 5 per cent. of Cloth Scarlet is printed with a discharge paste made up of 250 parts of British gum thickening previously boiled with 520 parts of water, and mixed after cooling with 200 parts of potassium bisulphite and 30 parts of aluminium dust. The printed goods are steamed for from five to ten minutes and rinsed. In this manner a white pattern is obtained on a red ground. If cotton goods dyed in the usual manner with 2 per cent. of Naphthamin Blue 5 B, Diamin Blue, or Chicago Blue, be printed with the discharge paste and steamed for ten minutes and rinsed, a white pattern is produced on a blue ground. If woollen goods dyed with 3 per cent. of Fast Scarlet B be printed with the discharge paste and steamed and rinsed, a white pattern on a red ground is produced. A yellow pattern on a blue ground is produced if cotton goods dyed with 3 per cent. of Naphtamin Blue, or other of the above-named blue dyes, be printed with a discharge paste made in the following manner: 30 parts of Chromin G are dissolved in 490 parts of water. This solution is then thickened with 250 parts of British gum and mixed with 200 parts of potassium bisulphite and 30 parts aluminium dust. The printed goods are steamed for twenty minutes and rinsed.

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.

2nd September.

17,522 C. L. ARDRON, Huddersfield. Means to be employed in making bored cloth, woollen, heald, or like rugs or mats.
17,533 H. E. MUSGRAVE and G. A. BARNES, London. Means for cutting cloth, leather, and other analogous materials.
17,564 C. D. ABEL, London. Colouring matters directly dyeing cotton. (*Actien-Gesellschaft für Anilin Fabrikation, Germany.*)
17,568 C. D. ABEL, London. Embossing calendering machines.* (*The Firm of J. Kleinewefers Söhne Maschinenfabrik, Germany.*)

3rd September.

17,625 H. H. LAKE, London. Machines for winding thread and the like.* (*J. O. McKean, United States.*)
17,640 R. FLOWER, London. Turkey rugs.

4th September.

17,704 S. AMBLER and J. AMBLER AND SONS LIMITED, Bradford. Spinning machinery.
17,735 J. GEBAUER, London. Machines for stretching and drying fabrics.

5th September.

17,749 G. SOWTER and OTHERS, Stafford. Circular knitting machines.
17,750 G. SOWTER and OTHERS, Stafford. Knitting machines.
17,784 A. M. ZIEGLER, London. Elastic fabrics.*
17,807 H. E. NEWTON, London. New colouring matters and intermediate products thereof. (*The Farbenfabriken vormals Friedrich Bayer and Co., Germany.*)

7th September.

17,902 E. BREADNER and W. RYLANCE, Manchester. Looms for weaving refractory wefts, such as wire and the like.
17,906 E. HOLLINGWORTH, Huddersfield. Reed motions for looms. (*E. H. Ryon, United States.*)
17,907 E. HOLLINGWORTH, Dobcross. Looms for weaving bags and other tubular fabrics. (*G. F. Hutchins, United States.*)
17,908 K. T. SUTHERLAND, Manchester. Degumming or cleansing stalk and leaf fibres.
17,944 M. SHEARER and W. SELOUS, London. Multi-colour printing machine.
17,918 A. A. WHITLEY, London. Stentering machines.

9th September.

17,964 T. ORMEROD, Halifax. Skewers of shuttles for weaving.
17,965 H. DAVIES, Bradford. Method of roller for dyeing, mercerising, and other purposes.
17,974 R. BRIDGE and B. HELM, Manchester. Rollers and bowls for use in dyeing and bleaching machines.
17,987 P. SMITH and S. AMBLER, London. Spinning machinery.
18,026 F. RAUPACH, London. Method of producing imitation inlaid work, tapestry, and the like.
18,033 O. ZIPSER, London. Weft-supplying mechanism for looms.

10th September.

18,043 E. HOLLINGWORTH, Dobcross. Warp stop motions for looms. (*H. Wyman, United States.*)
18,044 E. HOLLINGWORTH, Dobcross. Looms for weaving carpets, plushes, or other pile fabrics. (*G. F. Hutchins, United States.*)
18,067 H. A. THORNTON, London. Knitted articles of wear.
18,097 H. H. LAKE, London. Bobbins for looms.* (*P. H. Bollman and I. Besse, United States.*)
18,108 W. WOOD and G. J. FAKE, London. Hanks.*

11th September.

18,132 W. B. LEE, Bradford. Machines for winding yarn.
18,136 W. LUPTON, Manchester. Temples for looms.
18,143 T. J. GREEVES, Manchester. Looms.

12th September.

18,196 H. JOWETT and OTHERS, Bradford. Machine for dyeing and washing textile materials.
18,208 G. H. MILWARD, Manchester. Machinery for spinning and doubling cotton, wool, and other fibrous substances.

13th September.

18,289 W. M. SMITH, Cupar, Fife. Hand rug-making machines.
18,295 A. H. WOODWARD, Birmingham. Manufacture of certain parts of embroidery needles.

14th September.

18,369 F. W. and J. SYKES, Halifax. Card-setting machines.
18,389 I. LEVINSTEIN and OTHERS, Manchester. Black sulphur colouring matters directly dyeing cotton.
18,397 A. TCHERNIACK, London. Reversing and building motions of flyer frames.
18,412 C. PELHAM, JUN., London. Waterproofing materials.
18,422 L. LIEBES, London. Long collars for spinning machines.

16th September.

18,449 H. H. WALLER and OTHERS, Halifax. Fastening or joint for driving bands, tapes, and the like used in textile machinery.
18,500 J. F. BEARD and R. HAYNE, London. Machines for removing or separating the fibre contained in vegetable leaves.*

17th September.

18,561 H. RYDER, London. Manila rope.*
18,562 H. RYDER, London. Machines for making Manila rope.*
18,563 A. E. WOOD, London. Weight hooks for machinery employed in the preparation, spinning, and doubling of cotton, silk, worsted, etc.

18th September.

18,656 W. R. LAKE, London. Machines for folding or plaiting fabrics. (*G. J. Burns, United States.*)

19th September.

18,687 C. S. MCCONNAN, Liverpool. Spinning, twisting, doubling, winding, balling, and like machinery.
18,728 A. J. BOULT, London. Mercerising of cotton. (*C. O. Reichenbach, Germany.*)
18,748 P. NAEF, London. Treatment of material with liquids and gases or vapours.

20th September.

18,763 T. ENTWISTLE and R. COOKSON, Stalybridge. Easing motion for self-actor mules.
18,777 H. R. ROSS and OTHERS, Manchester. Looms.
18,779 J. C. BARNES, Sheffield. Apparatus for driving the cutter in machine sheep shears and other like machines.
18,835 G. JOSEPHY, London. Carding machines with two or more doffers.

21st September.

18,858 BROOKS AND DOXEY LIMITED and OTHERS, Manchester. Apparatus for winding yarn, thread, and other materials.
18,897 J. Y. JOHNSON, London. The manufacture of black sulphur colouring matter. (*The Badische Anilin and Soda Fabrik, Germany.*)

23rd September.

18,912 I. LEVINSTEIN and OTHERS, Manchester. Black sulphur colouring matters directly dyeing cotton.
18,919 G. W. KING, Glasgow. Boards for folding or lapping cloths.
18,931 J. WASSERTRUDINGER, Germany. Elastic weavings.
18,972 O. IMRAY, London. Process for mercerising vegetable material in a wound-up state. (*M. Becke, Germany.*)
18,977 O. WEISS, London. Machinery for the manufacture of ropes and cables.

24th September.

18,987 H. HOLLINGDRAKE, Stockport. Appliance to be attached to power or other looms for the formation of a twisted or protective edge or selvage to any textile or woven material.
19,010 I. LEVINSTEIN and OTHERS, Manchester. Brown sulphur colouring matters directly dyeing cotton.
19,013 J. WILLIAMS, London. Waterproofing and rot-proofing textile fabrics.
19,020 T. BRIERLEY and D. STUBLEY, London. Shedding motions of looms.
19,051 J. J. ANDERSON, London. Apparatus for use in the treatment of vegetable fibres and other materials.
19,061 J. J. ANDERSON, London. Extraction and preparation of fibres from certain plants of the musa and like orders.
19,034 G. C. FUCHS, London. Looms.
19,069 H. FERGUSON and T. BURROWS, London. Machinery for preparing the stems of hemp, flax, and like fibres for spinning.

25th September.

19,089 T. PRATT, Shipley. Method of mercerising cotton fibres, in hanks, under variable and adjustable tension.
19,104 G. ROSS, Glasgow. Cloth-milling machines.
19,106 A. HITCHON, Accrington. Appliances connected with ring spinning and twisting frames.
19,114 B. KELLETT and H. BARKER, Bradford. Sectional warping and beaming machines.
19,131 J. C. TINKER and J. H. ARRAN, London. Machinery for milling, scouring, and crabbing cloth.
19,144 J. KONING, London. Process for washing wools and other textile materials which enables the substances used for such washing to be recovered, and also for manufacturing a homogeneous ammoniacal soap.

26th September.

19,174 THE BLACKBURN LOOM AND WEAVING MACHINERY MAKING COMPANY LIMITED and OTHERS, Manchester. Automatic shuttle-changing motions of looms.
19,202 J. HORROCKS, Manchester. Mechanism for converting rotary into reciprocating rectilinear motion for use in thread-winding machines.
19,248 J. ANDERSON and ANDERSON, HARDMAN AND CO. LIMITED, London. Machine for coiling metallic wire or strands of hemp on reels or bobbins.*

27th September.

19,267 R. J. URQUHART, Manchester. Cotton dyes containing sulphur. (*The Chemische Fabriken vorm. Weiler-ter Meer, Germany.*)
19,268 H. H. HACKING, Bury. Shuttle-changing motions of looms.
19,293 J. D. TOMLINSON, Manchester. Nap-raising machines for textile fabrics.
19,312 A. W. PLAYNE and L. W. MACDONALD, London. Preparation of substances for indigo vat dyeing.
19,332 G. W. JOHNSON, London. Production of colouring matter and material for use therein. (*Kalle and Co., Germany.*)

28th September.

19,348 E. ASHWORTH, Manchester. Carding engines.
19,357 A. ABEGG, Manchester. Shuttles for weaving.
19,367 J. J. BRADBURY and J. H. CALVERT, Halifax. Pickers for looms.

30th September.

19,425 J. A. INGHAM and W. HEYS, Burnley. Swells of fast reed looms.
19,472 ELKINGTON AND CO. LIMITED and W. LAW, London. Embossing machines.
19,486 R. B. RANSFORD, London. Dyestuffs of the acridine group. (*L. Cassella and Co., Germany.*)

1st October.

19,532 E. G. FERREIRA, Manchester. Finishing plain, dyed, or printed cotton, linen, and other fabrics.
19,555 A. ROMER, Barmen. Improvements in treating textile fibre.*
19,585 O. IMRAY, London. Manufacture of pure cellulose from cotton seeds. (*American By-Products Company, United States.*)
19,587 O. IMRAY, London. Manufacture of dyestuff from cotton seeds. (*American By-Products Company, United States.*)

2nd October.

19,621 J. T. KENYON and OTHERS, Blackburn. Loom shuttles.
19,629 J. GORDON, Glasgow. Weft stop motion and uptake motion of power looms.
19,656 F. RUSHWORTH, London. Apparatus for waterproofing textile fabrics.
19,663 O. IMRAY, London. Process for purifying raw indigo. (*Die Farbwerke vormals Meister, Lucius and Brüning, Germany.*)

3rd October.

19,709 T. ROSTERN, Manchester. Dobbies.
19,721 J. J. M. VILLE, London. Red colouring matters or dyes.

4th October.

19,787 R. J. C. MITCHELL and W. W. SHERIFF, Manchester. Woven fabric.
19,805 J. COWBURN, Manchester. Shuttle-changin mechanism for use in looms.

5th October.

19,866 A. RATCLIFFE, Keighley. Carding, scutching, and like machinery.
19,876 W. T. E. WHEELER, Leicester. Circular knitting machine.
19,896 E. W. KEMNA, Manchester. Reeds for looms.*
19,904 J. B. W. MAUNDER and A. SCHANSCHIEFF, London. Drying, bleaching, or otherwise treating woollen and other fabrics.
19,906 P. SMITH and S. AMBLER, London. Drawing-off rollers for combing machinery.
19,911 J. T. CORSAN, London. Production of guipure insertion on fabrics.
19,912 J. H. ASHWELL, London. Improvements in the treatment of yarn.

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.

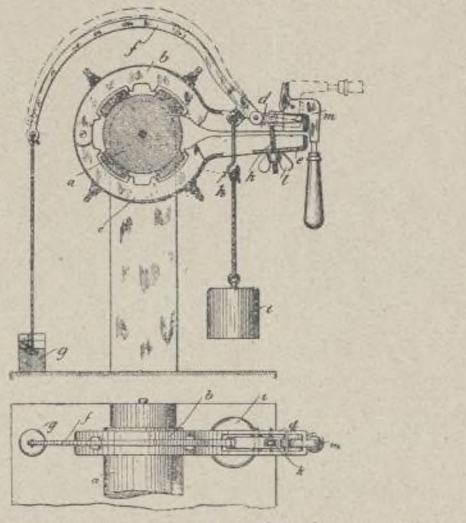
11,077. Mercerising. June 19. W. H. Crompton and W. Horrocks, Water-lane Mill, Radcliffe. Described in THE TEXTILE MANUFACTURER on page 303, October, 1901.—Aug. 19, 1901.

12,691. Cloth-cutting. June 21. R. E. Leve, 60, West 118th Street, Manhattan, New York. Relates to electric cloth-cutting machines, by which a great many layers of cloth may be cut simultaneously.—Aug. 3, 1901.

14,012 Collapsible shaft. July 9. G. C. Marks, London (communicated by the Kidder Press Company, Dover, New Hampshire U.S.A.). Relates to a roll-shaft which has been specially designed for winding or rewinding rolls of fabrics, and the object is to provide a strong, simple, inexpensive, and efficient collapsible roll-shaft, which can be contracted to permit the same to be readily withdrawn from a wound-up or completed web-roll.—Aug. 10, 1901.

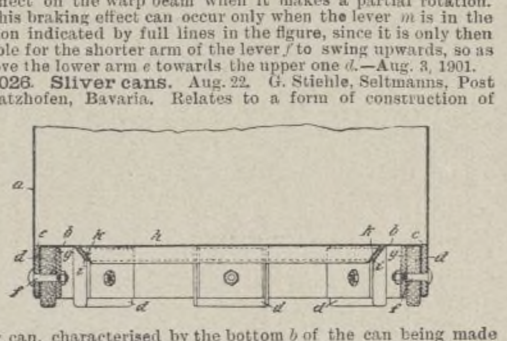
14,932. Singeing. Aug. 21. G. H. Nussey and W. B. Leachman, Excel Works, Leeds. One or more platinum or other wires mounted horizontally between two opposite terminals are used, and on opposite sides of the wires and parallel therewith two rollers or guide bars are provided, being adjustable in height. The cloth to be singed is contained on a roller, and the end is passed over the guide bars and wires before referred to, to a taking-off roller, the speed of which may be regulated as desired. An electric current of suitable intensity is passed between the terminals through the wires, which are thus brought to an incandescent state of heat, and the cloth is brought near to or in contact with the said wires as it is drawn through the apparatus, its distance from or pressure on the wires being regulated by adjusting the guide bars up or down.—June 29, 1901.

14,949. Retarding warp beams. Aug. 21. H. Schwarzenbach, Langnau-à-Albis, Switzerland. One end of a warp beam *a* is surrounded by a band brake, similar to the Prony friction brake, comprising two brake blocks or levers *b* and *c*, connected together by a hinge. These brake levers *b* and *c* terminate respectively in arms *d* and *e*, of which the upper one *d* carries a lever *f* that is pivoted to the arm *d* in a slot therein. The lever *f* has two arms, of which the longer one is connected by means of a cord to a weight *g*, and also to a retarding weight *i* by means of a cord and hook *h* suspended near the point of oscillation of the lever. A bolt *k*, which is loosely mounted on the shorter arm of the lever *f*, passes through a slot in the lower arm *e*, and is provided with a wing nut *l*. A Z-shaped lever *m*, provided with a handle, and



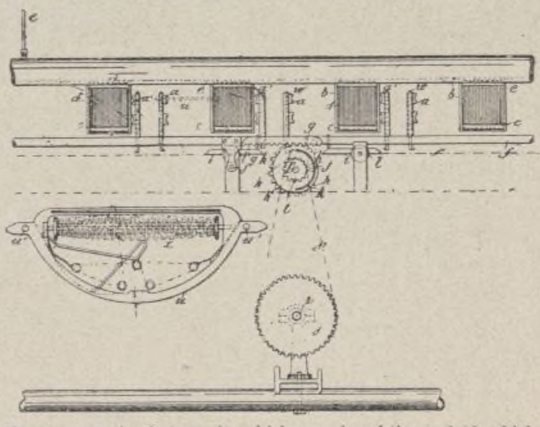
pivoted at the end of the upper arm *d*, is adapted to neutralise the braking action of the brake levers *b* and *c* by pressing down the shorter arm of the lever *f*. When the warp beam is at rest, the retarding weight *i* rests on a support, whilst the weight *g* is raised, and consequently acts on the two arms *d* and *e*, so as to press the lower one *e* upwardly by means of the bolt *k* and the wing nut *l*. The two arms *d* and *e*, and consequently also the two brake levers *b* and *c*, are pressed together in such a way that they have a braking effect on the warp beam when it makes a partial rotation. But this braking effect can occur only when the lever *m* is in the position indicated by full lines in the figure, since it is only then possible for the shorter arm of the lever *f* to swing upwards, so as to move the lower arm *e* towards the upper one *d*.—Aug. 3, 1901.

15,026. Sliver cans. Aug. 22. G. Stiehle, Seltmanns, Post Harbatzhofen, Bavaria. Relates to a form of construction of



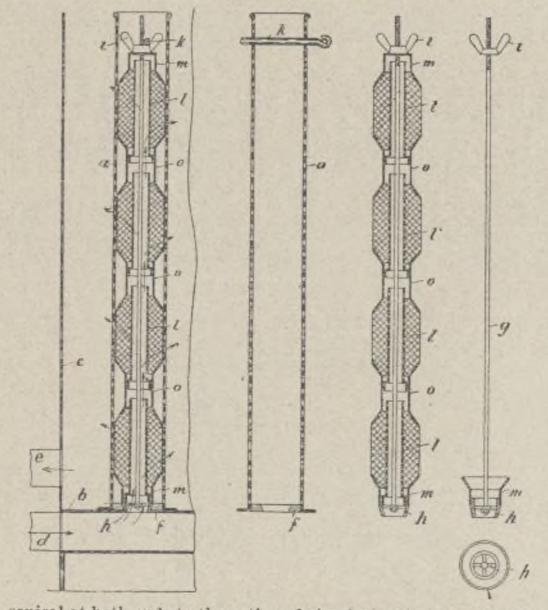
sliver can, characterised by the bottom *b* of the can being made recessed or countersunk, and elastic plates, ribs, or the like *d* being removably attached to the rim or edge thereby formed by means of screws *f* or rivets passed through the inserted pieces and the edge or rim, the plates or ribs projecting beneath beyond the edge or rim, and lying flat against the recessed bottom *b*, so that any shocks given to the can are directly conveyed to these pieces and absorbed by them.—July 20, 1901.

16,799. Weaving ribbons. Sept. 20. J. C. Fell, London (communicated by La Société Chaize Frères, 19, Rue Cambon, Paris). Relates to looms for weaving narrow fabrics, and consists in an improved arrangement of the shuttle-driver mechanism. The reed frames *b* are formed of metallic cages carrying grooves or



slippers *c* at the bottom, in which are placed the reeds *d*, which are held solidly at the top by a band of iron covered with wood. In this band of iron also exists a slide or groove *e* to receive the top of the reeds. The reed frames and their wooden bar are supported by jointed rods e^1 from the top of the loom frame, and may be carried by slides with ball bearings if desired. A grooved cam placed at each side of the machine, driven by any available shaft of the loom, may be utilised to give the beat-up motion to the reed frames *b*, which is a rapid reciprocation after the shuttle has passed the yarn, and a rest during five-sixths of the shuttle movement. The shuttle-holders *a*, a^1 are fixed upon flat rods *f* and f^1 furnished with racks *g* and g^1, each one making half the total travel of the shuttle to and fro through the yarn. Upon one of the said flat rods, say *f*, are fixed all the left-handed shuttle-holders *a*, and upon the other f^1 are fixed all the right-handed shuttle-holders a^1. The racks *g*, g^1 are operated by the wheels *h* and h^1, having teeth upon one part only of the circumference in order to operate *f* and f^1 successively, each for the half travel of the shuttles *u*, one-half of such travel carrying the shuttle into the fabric and the other half carrying the shuttle clear of the yarns and ready to make its return travel. From the top edges of the slots in the piece *w* project downwards metal pins *v* adapted to engage or lock into the holes in the points or noses u^1 of the shuttle. The piece *w* has also a foot at its lower extremity projecting below the frame of the holder, and the piece *w* tends to return always to its lowest position both by its weight and by a recoil spring at the side of the holder. The bars or rods *f*, f^1 are arranged to slide on rollers *l*, and on the same supporting brackets under each ribband are fixed planes *i*, *i* with inclined ends, on to which ride the projecting feet of the sliding pieces *w* in the holders *a*, a^1, so that the former are lifted to release and receive the noses of the shuttles, and are permitted to drop and lock the shuttles in the holders during travel.—Aug. 17, 1901.

15,329. Subjecting rovings to fluids. Aug. 28. J. O. Obermaier, Lamprecht, Rheinpfalz, Germany. Relates to an apparatus for subjecting rovings or the like in the form of bobbins

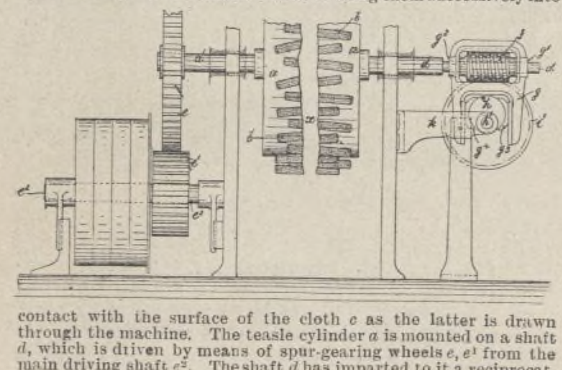


conical at both ends to the action of circulating liquors or vapours, in which perforated bobbin tubes *l*, having rovings wound on to them so as to produce bobbins each conical at both ends, are arranged upon a rod and placed in a perforated tube *a* separated by and provided with distance and end pieces *m* and *o*, the cylindrical parts of the bobbin windings being covered by the tube *o*, and the conical parts by the pieces *m* and *o*, so that the fluid with which the bobbins are treated to pass between the interior of the tubes *l* and the exterior of the tube *a* must pass completely through the rovings on the tubes *b*.—Aug. 28, 1901.

15,548. Weaving tufted fabrics. Aug. 31. C. Hughes, 43, Angell-road, Brixton, London. Relates to looms for weaving Turkey carpets and tufted fabrics like those described in Patent No. 13101, of 1886, and No. 4260, of 1891. In this invention the same object is accomplished by entirely different mechanism, which enables a much larger number of different coloured yarns to be used for producing the pattern. These colours may be selected automatically or by use of a keyboard, a clutch mechanism being provided which entirely controls the starting and stopping of the knotting mechanism, thereby preventing the feed mechanism from working otherwise than in conjunction with the keyboard or with the automatic selecting attachment.—Aug. 17, 1901.

16,242. Shuttle boxes. Sept. 12. E. Edwards, London (communicated by G. A. Falke and H. Hahn, Oberlangenbielau, Kreis Reichenbach, Silesia). Has for its object improvements in the apparatus used for changing the position of the different shuttle boxes and shuttles in looms, so as to bring any desired shuttle into the proper position to be operated upon, the particular shuttle being selected by means of perforated jacquard cards of the ordinary kind.—Aug. 31, 1901.

17,318. Raising. Sept. 29. J. D. Tomlinson, Soho Ironworks, Rochdale, and A. T. Porritt. Relates to improvements in machines for raising a nap or pile on textile fabrics by means of a revolving cylinder carrying teasles bearing against and into the surface of the fabric which is subjected to their action. The shaft which carries the raising cylinder is given a to-and-fro motion at right angles to the direction of rotation *a* is the revolving cylinder carrying the teasles *b* so as to bring them successively into



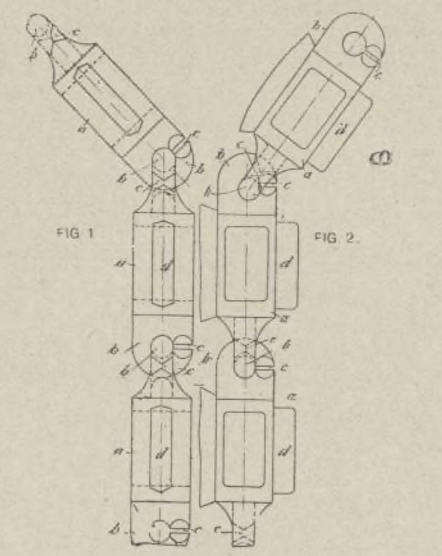
contact with the surface of the cloth *c* as the latter is drawn through the machine. The teasle cylinder *a* is mounted on a shaft *d*, which is driven by means of spur-gearing wheels *e*, e^1 from the main driving shaft e^2. The shaft *d* has imparted to it a reciprocating motion in a longitudinal direction, and in order that the wheels *e*, e^1 may remain continually in gear with each other, one or both of them is or are made of such a width that the wheel *e* does not slide out of engagement with the wheel e^1 as the shaft *d* travels to and fro.—Aug. 31, 1901.

18,366. New azo colouring matters. Oct. 15. B. Willcox, London (communicated by the Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine). It is found that new azo dyes which yield, on dyeing directly, valuable shades of violet are obtained by diazotising 1.8 amido-naphthol-5-7-disulpho acid, or 1.8 amido-naphthol-4-7-disulpho acid, and combining the diazo compound with alpha-naphthylamine.—Aug. 17, 1901.

18,448. New dyestuffs. Oct. 16. H. E. Newton, London (communicated by Freidrich Bayer and Co., Elberfeld). Patent No. 19,062, A.D. 1891, describes a process for producing dyestuffs of the triphenylmethane series, which process consists in treating tetra-alkyldiamidobenzhydrols, such as tetramethyldiamidobenzhydrol, tetra-ethyldiamidobenzhydrol, or the like, with dibenzylanilinedisulphonic acid, and further oxidising the resulting leuco compounds in a suitable manner. It is now found that on replacing the dibenzol-anilinedisulphonic acid by symmetrical dibenzylmeta-xylidine disulphonic acid, valuable new dyestuffs are obtained.—Aug. 17, 1901.

18,533. Sulphur dyes. Oct. 17. H. H. Lake, London (communicated by the Chemical Works, formerly Sandoz, Basle). It is discovered that in the molecule of the 1.4 chlornitronaphthalene, its nitro and sulpho derivatives, the chlorine atoms may easily be substituted by an amido or alphylamido group. By allowing amidophenols, phenylenediamines and their derivatives to react upon 1.4 chlornitronaphthalene bodies, preferably in presence of salts of a weakly alkaline reaction, new alphyl 1.4 nitronaphthylamins compounds are formed, which are most valuable primary products or raw material for the manufacture of direct-dyeing sulphur dyes.—Aug. 31, 1901.

18,701. Stretching and drying. Oct. 19. A. G. Bloxam, London (communicated by J. P. Bemberg, Baumwoll-Industrie-Gesellschaft, Oehde, near Barmen-Rittershausen). The usual chains for stretching and drying machines for textile fabrics, provided with hooks or pins for holding the fabric, are so constructed that they are capable of moving only in a horizontal or a vertical course according as the means by which the links are united, such as hinges on pins, are arranged vertically or horizontally. The present



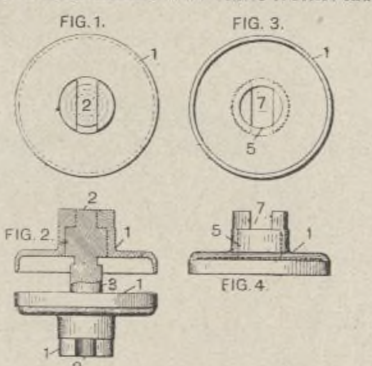
invention relates to a chain which is capable of movement in a horizontal or vertical course, or in one at any angle to these. Fig. 1 is a side elevation and Fig. 2 a front elevation. The links *a* are prismatic, and are reduced at each end to form a hook *b*, the two hooks being in planes at right angles to each other. The bend of the hooks is circular in cross section, and the openings *c* are slits which are coned from the centre outwards. The sides of the links have wings *d* for the attachment of needles or hooks.—Aug. 31, 1901.

18,726. New colouring matters. Oct. 19. B. Willcox, London (communicated by the Badische Aniline and Soda Fabrik, Ludwigshafen-on-Rhine). Relates to the manufacture of derivatives of aromatic amines by treating a phenolic body, capable of forming a sulphurous acid ester, with a fatty mono or dialkyl amine, and the sulphite of the said amine.—Aug. 24, 1901.

18,939. Azo colouring matters. Oct. 23. H. E. Newton, London (communicated by the Farbenfabriken vormals F. Bayer and Co., Elberfeld). Relates to a process for producing new dioxydinaphthylethylenediamines and derivatives thereof, which consists in causing ethylene haloids, such as ethylene chloride or the like, to act on such amidonaphthols or derivatives thereof as do not contain the amido and the hydroxy group either in the so-called ortho position or in the so-called peri position.—Sept. 7, 1901.

19,062. New azo dyestuffs. Oct. 24. H. E. Newton, London (communicated by Friedrich Bayer and Co., Elberfeld). Relates to the discovery of a new group of pyrazolone derivatives containing free hydroxy groups which are valuable intermediate products for the production of azo dyestuffs. The said bodies can be obtained by treating hydrazinonaphtholsulphonic acids, such as beta$_1$-hydrazino-alpha$_1$-naphthol-beta$_4$-sulphonic acid or the like, with certain ketones which are generally in use for the production of pyrazolones, such as aceto-acetic ether, oxalo-acetic ether, dioxy-tartaric acid, or the like. The condensation products thus obtained can be combined with one or with two molecules of diazo compounds, valuable azo dyestuffs being thus produced which are distinguished by the property of dyeing cotton without the aid of mordants.—Aug. 24, 1901.

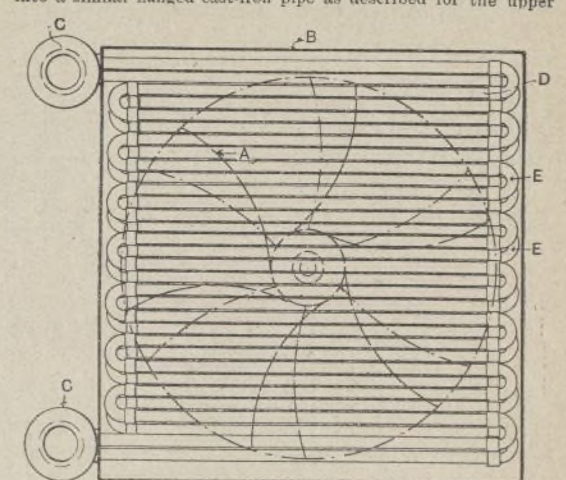
19,152 Roller couplings. Oct. 26. A. Hitchon, Globe Works, Accrington. Relates to improvements in spinning and twisting machine rollers or drums, such lines of rollers or drums that are constructed in section lengths. A large circular hole or recess is bored a short distance in the centre of roller end or drum



block to a sufficient distance for giving a good support at the extreme ends of the rollers to every rotated position of their circumference. A suitably formed coupling shaft fits the aforesaid circular recesses, and for a driving medium to these roller ends and coupling shafts the blank end of the recess is pierced with an elongated hole. Figs. 1 and 2 show in elevation and plan the blocks or ends 1 of two section lengths of drums, joined together with a suitably-formed coupling shaft 2. Figs. 3 and 4 show in elevation and plan the blocks 1 detached.—July 27, 1901.

19,476. Doffing apparatus. Oct. 31. A., G., and J. Stell, Park Works, Keighley. Described in THE TEXTILE MANUFACTURER, April, 1901, page 122.—Aug. 31, 1901.

22,793. Drying yarns and fabrics. Dec. 14. A. Robinson, 17, Queen-street, Belfast; and K. C. McDowell. In an apparatus for heating air to be used in drying linen cloth and yarns and other fabrics and yarns, are used coils of metallic tubes, preferably of 1½in. outside diameter. These are enclosed in a metallic casing B for the purpose of confining the air in its passage through the spaces around the pipes of coils. The casing and the upper longitudinal tube of coil are screwed into a short cast-iron pipe C of larger diameter than the coil pipe. This cast-iron pipe, has cast on its ends, flanges, with bolt holes in the flanges, for the purpose of connecting it to a similar casting, when more than one section of coils is used. Into the cast-iron pipe C the top longitudinal tube D of coil is screwed, and at the opposite end is screwed into a semi-circular bend E, and into the other end of this bend is screwed the second longitudinal pipe, and this arrangement is continued until the bottom of casing is reached, when the last longitudinal pipe or tube terminates by being screwed into a similar flanged cast-iron pipe as described for the upper



end. At one end of the casing containing the coils is placed a fan A to provide the air to be heated.—July 20, 1901.

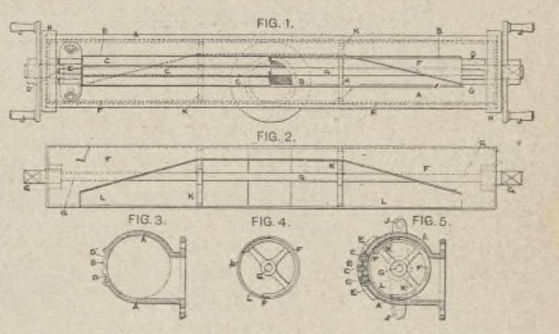
23,294. Spinning and twisting. Dec. 20. J. Dufossez-Allard and J. Simon, Wattrelos, France. Relates to improvements in spinning and twisting machinery, whereby the tension on the material may be easily regulated, thus avoiding any inequality of diameter in the finished material. The machine described regulates the torsion of the thread so as to give it a uniform twist, whether the winding be on a large or small diameter.—Aug. 24, 1901.

1901.

3513 Weaving fashioned fabrics. April 25. E. Nierhaus, 46, Berlinerstrasse, Elberfeld, Germany. Relates to improvements in looms by means of which it will be possible to vary the width of the woven article at will, by changing the spreading of the warp threads, but at the same time varying also automatically the number of weft threads shot in in the same ratio; that is to say, to lay in more weft threads when the width of the web is increased, and diminishing the number of weft threads in the linear width in proportion to the reduction of the width of the weaving.—Aug 3, 1901.

5053. Weft-border patterns. March 9. P. Pendix, Dülmen y W. Germany. Relates to the process of alternating the ground patterns and weft border patterns in weaving with dobby or jacquard machines, and the connection of the device for determining the length of the article being woven with a part of the machine in such a manner that when the fabric being woven has attained the length desired, the ground pattern is automatically changed to weft border pattern, and vice versâ.—Aug. 24, 1901.

9064. Extracting. May 2. J. and J. Miller, 162, Manningham-lane, Bradford. Relates to suction tubes or rollers employed in apparatus for waterproofing fabrics; such tubes may also be used for extracting all superfluous moisture or liquid from textile fabrics of all kinds. The ordinary outer shell A has a longitudinal



slot B within which revolve the anti-friction rollers C, secured in suitable necks D by means of caps E, and in place of the plungers is an inner shell or cylinder F mounted to a longitudinal shaft G traversing the length of the tube A. This shaft passes through the caps H at each end of the tube, and is rotated or moved as desired by means of levers or handles J.—Aug. 17, 1901.

9439. Warp stop motion. May 7. A. G. Brookes, London (communicated by G. O. Draper, Hopedale, Mass., U.S.A.). Relates to that type of warp stop-motion apparatus wherein the operation of the same is governed by controlling detectors normally maintained inoperative by the warp threads, and one of the particular objects of the invention is the production of novel feeling means for co-operating with a released detector.—July 6, 1901.

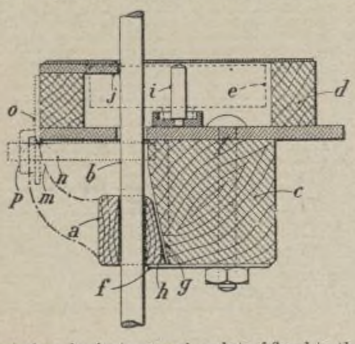
9495. Twisting-in machines. May 7. W. E. Krey, 32, Cotton Exchange, New York; and A. Duppler. Consists in an improved machine for twisting-in new warps on to the ends of the old ones in the operation of weaving.—July 13, 1901.

11,389. Chenille fabrics. June 4. T. Hirst, Vineland, New Jersey, U.S.A. As ordinarily made, Smyrna rugs consist of alternate shots of filler and chenille, tied in by an ordinary two-thread warp. In order to make the body of the rug sufficiently stout, the filler—which is usually jute—is made so thick and heavy that in the cheaper grades of rugs where the chenille is light, such heavy filler, to use the weaver's phrase, "grins through" the face of the fabric. This result is due to two conditions—viz., the size of the filling thread and the straightening of the fur of the chenille when beaten up against such thread. Moreover, as the chenille must be beaten against the crossed threads of the warp lying over such filling thread, there is difficulty in keeping the chenille straight and the pattern clear. By substituting for the single larger filler ordinarily

employed a main filler and a supplementary smaller filler, against which the chenille weft is beaten up, the chenille fur retains its fluffiness and is caused to spread over a greater surface than before, thereby filling out the design in a better manner and enhancing the appearance of the fabric. The amount of filling material used in the main and supplementary fillers may be no more than that of the ordinary single filler—for instance, if in ordinary chenille rugs of this character a 9-ply thread is used, in this improved rug fabric the main filling thread may be 6-ply and the supplementary filling thread 3-ply. As may be readily seen upon reference to the drawing, the chenille being held against the smaller filler thread and tied in the same shed, the chenille is tightly pinched at the centre, and the fur of the same is caused to spread to a greater extent than before.—July 6, 1901.

11,441. Weft-inserting needles. June 4. F. H. Connolly, 3, Nepperhan-street, Yonkers, U.S.A. The object is the saving in a needle loom of much of the lateral space which is required for the working of the weft-carrying needles of the kind heretofore used, which are straight and inflexible, and to this end the improvement consists in a weft-inserting needle which is flexible in such direction that it may be wound upon a drum or wheel when withdrawn from the fabric, but is preferably inflexible in other directions from a straight line so that it will have no tendency to buckle when it has been extended into the shed — July 6, 1901.

11,469. Ring throstles. June 4. J. Imbs, 20, Rue Greuze, Paris. The object is to provide improved arrangements for rendering individual spindles stationary when desired. *a* represents sockets in number in accordance with the number of spindles *b* in the machine. *c* is a beam fixed preferably below the box *d*, which contains the rollers *e* mounted on spindles *i*, and which guide the spindles *b* whilst they are revolving. Each socket *a* can be displaced along the spindle revolving within it, and rests on a suitable



support consisting, for instance, of a plate *f* fixed to the underside of the beam *c*. Both the face *g* of the beam *c* and the face *h* of the socket, which is opposite the face *g*, are inclined, so that by displacing the sockets *a*, the spindles are inclined, or displaced laterally, away from the rollers, and bear against a suitable support, such as the guardplate *j*. When a spindle is thus moved as it is clear of the rollers, it cannot interfere with the rotation of the said rollers.—July 13, 1901.

11,523. Embroidering lace. June 5. R. Scott, 90, Birrell-road, Sherwood Rise, Nottingham. The pattern guiding is effected automatically by means of an improved jacquard arrangement, and by a system of mechanism which enables such jacquard to impart very finely graduated movements either in a horizontal or vertical direction to the frame in which the lace is carried.—Aug. 3, 1901.

12,025. Weft fork. June 12. S. Suwalski, Lodz, Poland. Consists essentially of a shaft *a* firmly attached to the loom, the end of the shaft which is turned towards the lay bearing a sleeve *g*. The upper part of this sleeve is made square, and is pierced by one of the prongs *b*, put through a suitable hole and firmly fixed by means of a screw g^1. The sleeve *g* is fixed to the shaft *a* by means of a screw bolt *f* in such a manner that the sleeve *g* rests on the circular part of the bolt *f*. Farther along the bolt *f* is

FIG. 1

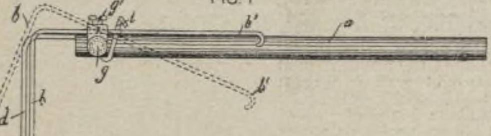
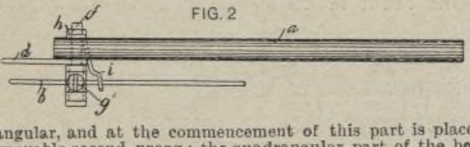
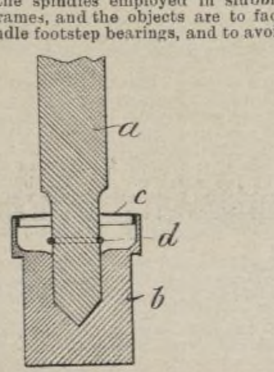


FIG. 2



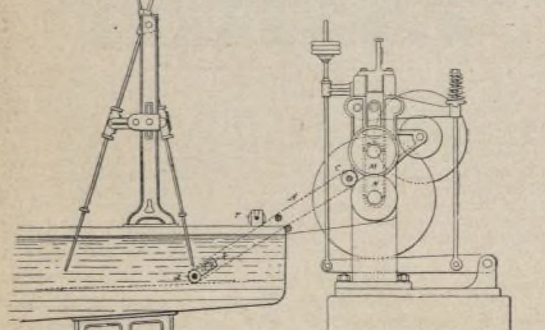
quadrangular, and at the commencement of this part is placed the immovable second prong; the quadrangular part of the bolt is inserted in a corresponding hole of the shaft *a*, and a wire hook *i* placed on the free, threaded end of the bolt, and, with the immovable prong *d*, tightened by means of a nut *h*. When the weft is perfect, the movable prong *b* is brought out of the position of rest shown in dotted lines into the position shown in full lines. If, on the other hand, the weft is broken, the prong *b* remains in the position shown in dotted lines, and with its other hooked end b^1 effects the stoppage of the loom.—Aug. 17, 1901.

12,491. Spindles. June 19. Asa Lees and Co. Limited, Soho Ironworks, Oldham; and R. Taylor, junior. Relates to improvements in the spindles employed in slubbing, intermediate, and roving frames, and the objects are to facilitate the lubricating of the spindle footstep bearings, and to avoid the loss



of the covers of these bearings. *a* represents the lower end of a spindle fitted in a footstep *b*, and with the oil reservoir at the top of the footstep covered by a cap or cover *c* through which the reduced diameter of the spindle is passed. A groove is turned in the spindle below the cover *c*, into which is sprung a split metal ring *d*, or, in place of the ring *d*, a collar could be soldered or otherwise secured upon the spindle. When the parts are fitted together, the operative, in order to oil the spindle, lifts it sufficiently high to raise the cover *c*, and after oiling the spindle it is allowed to fall, when the cover also resumes its normal position.—July 20, 1901.

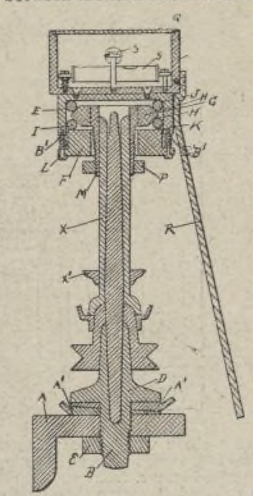
12,523. Wool washing. June 19. W. P. Thompson, Liverpool (communicated by La Société A. Motte et Cie., Roubaix).



The wool placed in the water by forks, etc., moves up to the band A, which raises it and conveys it to the press; it therefore passes out in a continuous manner without being stretched in any way, and forms a regular and untangled sheet. The elevation of the wool is facilitated by the arrangement of a roller *r* on the band. This roller running freely on its axle, presses the wool lightly on the band to keep it there.—July 20, 1901.

12,519. Ring throstles. June 19. J. A. A. Imbs, 20, Rue Greuze, Paris. Enables the traveller to move over the windings at the conical upper part of the cop without overstraining the yarn. This is obtained by slackening the speed of the machine whilst the ring carriage in its upward motion is bringing the travellers level with the apex of the cone, so that the slackening of speed which thus is caused to take place causes the travellers already drawn with a decreasing speed by the yarn during their rising over windings of decreasing diameters to continue in decreasing speed during the corresponding portion of the downward motion of the ring carriage. The travellers thus receive an accelerated speed only when the small diameters of the cone part of the cop have been passed in the said downward motion.—Aug. 3, 1901.

12,938. Spindle plumbs. June 25. W. P. Thompson, Liverpool (communicated by H. Kelly, Biddeford, Maine, U.S.A.). Relates to improvements in spindle plumbs or instruments by which the perpendicularity of spinning spindles may be determined. A represents the spindle supporting rail, B the spindle case set in the rail, being clamped thereto by a nut C adapted to turn against the bottom of the rail in the usual manner, and D the extended base of the spindle case adapted to rest upon the top of the rail. It is customary to plumb the spindle case, and thereby the spindle, by inserting thin discs A^1 of paper or other material between the said rail and the base of the spindle

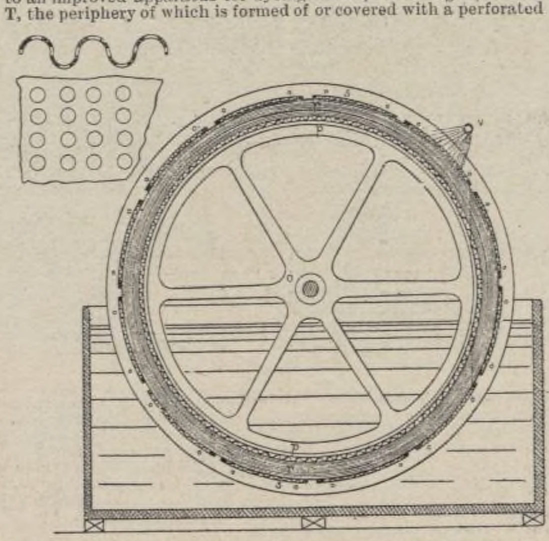


case. E shows a box having for convenience a removable bottom F in which is a revolubly-mounted disc G, and in order that the same may rotate with as little friction as possible the disc is mounted upon ball bearings, which may be arranged in any suitable manner. As shown, both edges of the disc are bevelled as seen at H, H, and the ball bearings travel upon ways formed in the top of the box and in the inner face of the bottom, as seen at J and K respectively. The bobbin X, which fits over the spindle, has the usual disc X^1, the diameter of which should be slightly less than the inside diameter of a spinning ring, not shown, and serves to show when the spindle is in the centre of the ring, as is the usual practice at the present time.—Sept. 7, 1901.

13,014. Scrubbing rags. June 26. C. G. Thomas, Wilthen, Saxony. Relates to a method of manufacturing, scrubbing, or scouring rags of great durability, which consists in strengthening the warp of the middle part of the rag where the same is most subject to wear and strain.—Aug. 24, 1901.

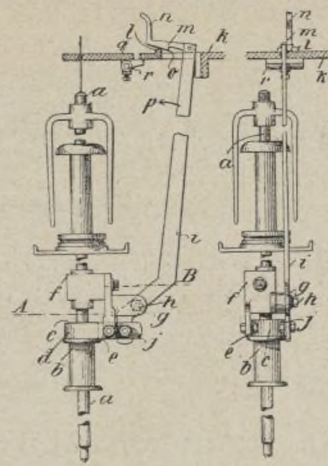
13,433. Replenishing shuttles. July 2. H. W. Wyman, 58, West street, Worcester, Mass., U.S.A. Relates to looms provided with mechanism for automatically replenishing the filling when it has been exhausted in the shuttle to a predetermined extent. In looms of such type wherein the means for controlling the operation of the filling-replenishing mechanism includes a normally-open electric circuit containing an electromagnet, the circuit is closed by contact of its terminals with an electrical conducting surface on the filling carrier exposed by the withdrawal of the yarn or filling therefrom. It has been found that the resistance of the electromagnet to the passage of the current when the circuit is closed is sufficient to so weaken the current at the contacting portions of the terminals with the conducting surface on the filling carrier that the armature of the magnet does not act with certainty in all cases. The present invention has for its object the production of means for overcoming such objections, and to such end is provided an electrically-governed controlling device which is rendered active at the proper time by diminishing the action of the electric current thereupon.—Aug. 24, 1901.

13,894. Dyeing slivers. July 8. H. J. Haddan, London (communicated by F. Desurmont, Tourcoing, France). Relates to an improved apparatus for dyeing slivers, consisting of a roller T, the periphery of which is formed of or covered with a perforated



and corrugated metal plate *p*. On the perforated plate are rolled the slivers *r* to be dyed. On this layer of slivers are placed covering segments, also consisting of perforated and corrugated sheet-metal *s*, said segments being arranged thereon without being tightly fastened, for the sole purpose of preventing the felting of the material.—Aug. 17, 1901.

14,413. Spindle brakes. July 15. C. Scheller, Aussenmühlweg 2, Harburg a/Elbe. On the spindle *a* of the spinning machine is mounted the driving pulley *b* provided with a prolongation *c*, on which the band brake *d* works. The band brake is held at one end to the bearing *f* of the spindle *a*, which is attached in any suitable way to the frame of the machine. The lever arm *i* is pivoted at *h* in the bracket *g*, the longer end of this bent lever *i* passing through an aperture in the thread plate *k*. The plate *k* is provided with a ridge or projection *l*. At the end of the lever *i* is pivoted thereto the catch or pawl *m* with the handle *n*. *m* is provided with a rectangular projection *o*, which serves for holding the lever *i*. The projection *o* comes into operation after the lever *i* has been pulled or drawn in the direction of the arrow *p* and engages with the ridge *l*, having the effect of holding the lever *i* in a fixed position, thereby drawing the band brake tight. The thread plate *k* is divided into a hinged portion *q*, which guides the



thread, and is attached by a hinge *r* to the fixed portion of the plate, so that it may be raised so that the reel can conveniently be taken out.—Sept. 7, 1901.

14,453. Treating textile materials with liquids. July 16. W. E. Heys, Manchester (communicated by E. Plantrou, 19, Rue Cambon, Paris). Fig. 1 represents a longitudinal section through the apparatus; Fig. 2 a plan view of the cover plate; and Fig. 3 a longitudinal section of part of a smaller similar apparatus. The textile materials which are to be treated, in the form of flocks, yarn, ribbons, threads, cloth, and the like, are packed together by hand in the part *o*, and are then compressed by the screw *v*, which is caused to exert pressure upon the perforated cover *c* through the plate *i* and its inferior webs *j*, *j*, or by

FIG. 1

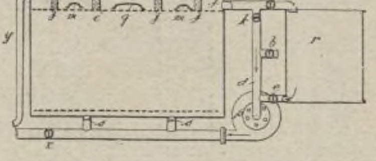
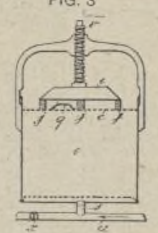


FIG. 2

FIG. 3



other means. The cover *c* is provided with handles *m*, *m*, and has exactly the same form as the false bottom *a*, like which, also, it is perforated. The undersides of the webs *j*, *j* are channelled so as to leave free passage for the bath. The diameters and numbers of the perforations in the cover and false bottoms have no importance. It suffices if the sum of the areas of the perforations in each plate greatly exceeds the area of the pump inlets, so that the textile materials alone offer resistance to the passage of the bath, and thus institute the pressure. The bath prepared for the dyeing, bleaching, or other operation is contained in the reservoir at the side of the apparatus and flows therefrom into the suction pipe *d*, the valve *e* being open. The pump *p*, being started, forces the bath by the pipe *u* and the openings *s* into the space *o* under high pressure. The bath thus rises, chasing out the air, which, being lighter, escapes at the top.—Sept. 7, 1901.

14,745. Mules. July 19. E. R. Sattler, Neukirchen Pleisse, Germany. Relates to a mechanism for self-acting mules for the purpose of making cops thereon, which are wound in cross coils, and can be formed direct on the spindle without employing a spool or core, and which cannot become broken during transport, for instance. The copping rail *a* is slightly hollowed out in front of and behind its vertex; in the recess are inserted two rails *b* and *c* of U-section, which are articulated together by a bolt *d*, one of which rails *c* is pivoted to the copping rail *a* by the bolt *e*. In their normal position these rails exactly fill up the recess in *a*. Downwardly-projecting cams *p* are placed on the rail *c*, the ends of which slide on star wheels *f* arranged on both sides of *a* and on a common axle. The proportions are so calculated that when the rails *b* and *c* lie flat in the recess of *a* the cams *p* stand in the

FIG. 1.

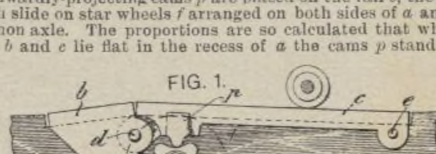


FIG. 2.

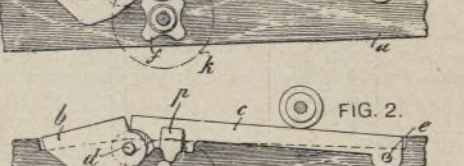


FIG. 3.

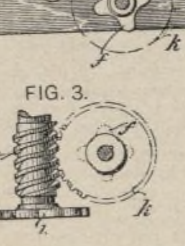
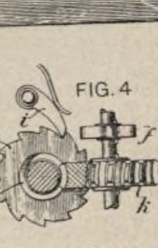


FIG. 4



lowest position between two cogs of the star wheels. The setting of the star wheels *f* in periodic rotation may be effected in manifold ways. For instance, in Figs. 1 to 4 it is assumed that there is a horizontally-placed ratchet wheel *h* on the underside of the copping rail *a*, which is rotated a certain amount by a catch on the spindle carriage with every outward and inward run of the carriage. The turning back of the ratchet wheel during the reverse movement of the spindle carriage is prevented by the spring pawl *i* engaging in the ratchet teeth, the catch springing out. The axle of the ratchet wheel *h* is formed as a worm *j* which engages with a worm wheel *k* on the extension of the axle of the star wheel *f*.—Aug. 24, 1901.