THE

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WITH WHICH IS INCORPORATED

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

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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.

The City and Guilds Examinations.

THE annual report of the City and Guilds of London Institute, which has just been published, does not give a favourable impression as to the energy and perseverance of the rising generation of textile workers and specialists. The results of the examinations of this institute may be taken as a fair criterion of the progress made in textile educational matters, although perhaps not so definitely as a few years ago. Textile and other technical literature has so increased during recent years that it is now possible to study many subjects at home, and students of more advanced years, who have a certain amount of diffidence as to attending classes in company with youths, take advantage of the wide selection of books which can usually be now obtained. On the other hand, many young men make these books serve as a pretence for irregular and almost useless study, and so excuse themselves from the hard work accompanying a regular routine of education. Whatever the cause, however, the results to hand show a decided falling off in the textile sections when the figures of 1900 (those last published) are compared with those of the preceding year. Perhaps the common scapegoat—the war—may be the cause to a certain extent, but it can scarcely be responsible for a retrograde movement in twelve out of the seventeen textile subjects, two others remaining stationary, and only three showing an increase in the number of passes. Taking Cotton first, it may be said that most progress has been shown in this branch, although it is far from noteworthy. Cotton Spinning shows a slight decrease in the number of candidates, but a substantial increase in the passes. Cotton Weaving shows an increase in the number of candidates, but a serious decrease in the passes. The examiners complain of students taking second year's papers before having passed the first; that the knowledge of cloth structure is weak, and the designing of simple figures only partially understood. Cotton Dyeing also shows an increase of candidates as against a decrease of passes, whilst Cotton and Linen Bleaching and Calico and Linen Printing show a decrease in both candidates and passes, although the names on the register were in excess of the previous year. In spite of the bad results shown by the returns, the examiners confess themselves gratified to find that the papers denote there are some serious and deep-thinking students, who display a sound knowledge of both theory and practice. This is scarcely a matter for gratification: the worst class always has its hard workers, and the worst teacher generally has some student whose abilities and industry overcome some of the teacher's deficiencies. Wool and Worsted Spinning shows a decrease—in fact, a tremendous decrease—in students, candidates, and passes. Here, as usual, were a few papers of exceptional ability, but in general, answers were vague, and a decided ignorance was displayed regarding up-to-date machinery. The examiner thinks that *some* of the teachers are behind the times. If he had said *many* we could have better agreed with him, for the disinclination of teachers to go beyond their own practical experiences of a few years ago is specially marked in Wool and Worsted Spinning, a branch of the industry whose machinery is being perpetually revised. Wool and Worsted Weaving, like its predecessor, shows a decline in students, candidates, and passes, although far from being so marked. One examiner says colour has not been studied enough, while the other sees some improvement in it. Colour is a most difficult subject in which to examine a student. A written description of a colouring range conveys no definite idea, while in practical work the limited supply of shades in a technical school places the student in a position which better men would find trying. The examiner in Division I. finds fault, as in previous years, with the want of system displayed by students, and from this it may be inferred that teachers are not systematic and orderly, and also that the students' knowledge is most likely laid on a far from substantial basis. We are inclined to think that teachers fall into the habit of showing students how to work out designs without taking the trouble to properly explain why each step is necessary. Wool Dyeing shows a slight decrease in the number of both candidates and passes, as also do Silk Throwing and Spinning, the quality of the papers in the latter also showing a falling off. Silk Weaving has an increase of one candidate, but three passes less than in the previous year. The work shows average merit, but this lies more in designing and a good knowledge of the jacquard, all other practical knowledge being seemingly at a discount. Not one of the candidates was able to analyse the examination pattern properly, and the practical work in the Honours grade was disappointing, the designs poor, and the colouring bad. Silk Dyeing remains about stationary, the passes being the same as in the previous year, with one candidate more. Flax Spinning has exactly the same candidates and passes as in the year before, and the examiner reports no improvement. There is an absence of practical knowledge, the papers giving an impression of book learning rather than practical experience, suggestive of inadequate mechanical appliances in connection with the classes. Linen Weaving is the only subject besides Cotton Spinning which shows a substantial advance. The number of candidates is almost treble, and the passes more than double the previous year's results. Jute Spinning and Weaving both show a decline in numbers, and many presented themselves for examination who were utterly incompetent. In the higher branches of Jute Weaving there were very few candidates, but their work shows a marked advance, particularly in practical work. Lace Manufacture seems at a low ebb. There were only twenty students in attendance, and as none of these presented themselves for examination, the visible results are *nil*. Framework Knitting shows an advance in passes, but as a whole the results might have been better. The examiner thinks that the students have benefited by their studies, but have yet much to learn. Reading through these reports one after the other gives a further impression that very little energy is being expended by the students in our technical schools, and the worst of it is that the careless, slovenly work, devoid of system or interest, is only a forerunner of the coming man. Then come the questions, Are the students to blame? Do the teachers at present in office instil interest and energy into the work? Do they set an example of neatness and method to their pupils? From a wide observation, perhaps not constant and at close quarters, but sufficiently so to give a definite impression, we believe that although there are hard-working, systematic, and able teachers, the majority would not be tolerated in any up to-date place of business, except in a most menial capacity. Such men cannot produce good results, and we are inclined to feel that many a promising and observant student feels the hopelessness of the position, and throws up his classes in disgust, lowering the class results for the time, and increasing the number who scoff at technical education as frivolous and impracticable.

Housing Mill Operatives.

MANY of our larger millowners have gone to no little trouble and expense in providing suitable houses in suitable districts for their workpeople. All that is required is capital, benevolence and philanthropy being unnecessary, although sometimes present, for the outlay brings in a good return, in some instances at a higher rate of interest than in the case of the mill itself. Other firms would like to provide houses for their workpeople, not for the benefit of the hands exactly, but so that they themselves can be ensured an efficient supply of labour ready at hand as required. They are, however—especially in the case of smaller firms,—barred by want of capital, all their funds being required in the business turn-over. One way of solving the difficulty is being suggested in Bombay, a way which might also be tried in English towns and villages, although many of the conditions are very much different. In Bombay there is an Improvement Trust which is responsible for the streets and public buildings being kept in proper repair; it is also to a large extent responsible for houses and factories being in a proper sanitary and otherwise suitable condition. Then also in Bombay there is a Millowners' Association, anxious to possess a supply of labour near at hand, but without the capital necessary for building suitable houses in the vicinity of their various works. The Improvement Trust has power to borrow large sums of money on the responsibility of the rates, and they are also largely responsible for the housing of the masses. What is being suggested is that the Trust should build suitable houses near the various mills, the number being stipulated by the millowners, whilst the sanitary arrangements should be made by the Improvement Trust. The Trust is to act somewhat in the manner of our English building societies, and the Millowners' Association pay 4 per cent. interest on the outlay and an additional 6 per cent. as a sinking fund. This means that for 6 per cent. per annum the houses will be redeemed in twenty-eight years and become the property of the millowners, a method which is very convenient for them, while in a sense the Improvement Trust is only carrying out designs conforming with its own duty. There is one question, however, likely to appeal to an ordinary observer, which will sooner or later be raised in Bombay if the pending negotiations come to a satisfactory termination, and which would be much sooner raised in an English industrial town. That is, as to whether an operative should be compelled to leave his house should he be dismissed from the mill or leave his situation. This is a question having two sides—the millowner requires the house for his new workman, whilst the ex-workman may have thoroughly established himself there, have his family settled in situations in the neighbourhood, and for other reasons object to change his home. To be turned out is considered a hardship, although such is usually the case when the houses are directly owned by the millowner; and where houses are built by municipal money and are yet unredeemed by the millowner, the professed right, either legally or morally, to turn out tenants would provoke some little discussion. Still, if the millowner made the arrangement and paid his interest with the view of obtaining labour within easy reach of his mill, he should have power to use the houses with that aim from the time he first enters into the contract by which they were built.

Motor Vehicles for Heavy Traffic.

THE essentially practical tests of motor vehicles which have been carried out during the last few days have unmistakably shown that considerable progress has been made in the design and construction of motor lurries, and that this means of transit is becoming increasingly deserving of the attention of manufacturers, and particularly those who are at present inadequately provided with transit facilities by railway or canal. Of the trials referred to, considerable interest centred in the transport of merchandise from Liverpool to Manchester. Nine laden lurries started from Liverpool. The lighter loads were those carried by two lurries, on the first of which was a ton and a half of leather, besides the weight of several passengers and of some miscellaneous baggage The second had a load of spirit in cases consigned to an oil firm. Driven by petrol, these lurries made progress at quite a good speed. Each, by means of its speed-changing gear, could be regulated, according to the necessities of the gradients, to $1\frac{1}{2}$, $2\frac{1}{2}$, 4, and 6 miles per hour. The other vehicles were of a heavier type, and the load in one case reached $6\frac{1}{2}$ tons. Three of the lurries shared the carriage of a consignment of 67 bags of flour, another carried 6 tons of soap, another 60 bags of sugar, another 45 bags of cement, and so on. To these loads there were in every case added the weight of two days' fuel and of several passengers—representing increases varying from half-a-ton to a ton. That the wagons were under perfect control was demonstrated by the easy manner in which, while travelling at a fair speed, they were brought to a standstill within the space of a few yards, even on the steepest part of a hill. In general the results were quite satisfactory, but it is evident that for the realisation of the full benefits of this mode of goods transit the present limit of three tons tare must be raised; for it is reasonable to suppose that a relaxation of the present restriction would lead to the establishing of a considerable service of heavy motor traffic between manufacturing towns. In regard to the question of cost, Mr. Shrapnel Smith estimates that a self-contained four-ton motor wagon, working 30 miles a day on bumpy and badly-paved roads, will cost 2s. 7d. per net ton mile carrying a full load. Working on average granite setts 35 miles per day, the cost is reduced to 2s. 3d. per net ton mile, and on good macadam 45 miles a day to 1s. 8d. per ton mile.

American Cotton Industry.

OUR American cousins excel in many things, but there is nothing a certain class of Americans can do more thoroughly than the advertising of their own greatness, a feat they perform with the skill of specialists, they having now had some years' practice. Amongst all the countries of the world none appreciates America's greatness more than Great Britain. We sometimes get a little tired of the repetition of such a well-learned lesson, and probably the more practical-minded Americans feel the same, while a few pessimistic Britons gloat over it as pointing in the direction of their own prophecies—shadows of dyspepsia more than foresight. For many years America has been a long way ahead of any other country as a raw-cotton producer, but it is within comparatively recent years that she has manufactured the staple in any great quantity. Last year, after a few years of rapid progress, she came out at the top in this department, consuming more raw cotton than any other country in the world, and 500,000 bales more than Great Britain. This is an achievement to be proud of, and the Department of Agriculture have taken the opportunity to issue a monograph in honour of the occasion. It must be remembered that during last year the price of cotton rose above a legitimate business limit, that English mills were closed for the better part of two months as a check on this abnormal rise, and that two months would represent somewhat roughly a sixth of 3,298,000 bales, our total consumption of last season's cotton, which figure exceeds the 500,000 bales claimed ahead of us. It is only fair to say that during the same season a very large number of American mills had to shut down owing to over-production, and had these kept running the number of bales consumed in America would have been increased. As a counter-statement, it might be added that these mills were only shut down after a period of overtime, some running all night for a time, and others a few hours extra daily, until the market was glutted. In England, stocks of yarn and cloth have been kept very low, spinners refraining from buying at the forced prices in vogue, thus having little money running to waste and locked up in huge stocks. If anything, English tactics have come out with the best results in last year's deal, but American statistics lead as regards the quantity of raw cotton consumed, although this represents a far shorter yardage of yarn spun than the English total. It is only fair to say that the American position would rest on what would be a very substantial basis if only the gambling speculators would leave the industry alone and allow it to grow in something like a natural manner. The greatest expansion has taken place in the Southern States, which now have 500 spinning mills at work, representing 5,000,000 spindles, while 139 new mills are either building or definitely projected.

Superheated Steam.

AMONG the many expedients advocated from time to time with a view to improving the economy of the steam engine, the use of superheated steam has long been recognised as the method which offers the greatest opportunity for increasing the efficiency, if only the practical difficulties could be overcome. Some half-century ago considerable attention was given to the superheating project, but after extensive trials it was abandoned, largely by reason of the difficulty of regulating the amount of superheat, although the inability of the lubricants then used to withstand high temperatures, and the rapid deterioration of the superheating apparatus, were in themselves defects sufficiently serious to have prevented the practical success of a scheme which had otherwise so much to recommend its adoption. Foiled in their endeavour to impart heat directly to the steam, engineers turned their attention to other methods of effecting improvements, and steam jacketing, with its very limited capacity for effecting improvements, came again into favour, to be soon followed by the compound engine and its subsequent developments. In this way attention was diverted from the advantage derivable from a practical system of superheating until during the last decade or so, when renewed endeavours were made to overcome the difficulties which had formerly proved so insuperable. Fortunately advances had been made in other directions which largely assisted to this end. Mineral oils which will stand high temperatures are readily obtainable; metallic gland and other packings ensure steam-tightness under high temperatures and without undue friction; while the more efficient insulating materials for preventing radiation and consequent heat loss, the provision of balanced valves, and a higher grade of workmanship throughout, are all factors which have contributed to the success of the latter-day superheating methods. Of the reality of this success there can be no question, and it is now not uncommon for engine builders to guarantee a gain of some 10 or 12 per cent. in the weight of steam used per indicated horse-power per hour if superheated steam is used. In many cases larger gains are promised—especially by makers of the apparatus,—and although the extent of the ultimate advantage will depend upon circumstances which are more or less of a variable character, it may be safely said that some benefit may be realised in every case. Hence it is not surprising to find steam users giving the matter the consideration which its importance merits, particularly at a period when the cost of coal has become so serious an item of the running expenses.

ARTICLES.

Cotton and Silk Viscose Prints.

WITH prints as a fashionable material it is rather difficult to satisfy the insatiable demand for novelty. The designs may be novel and the colours new, but the print appearance remains, and has only been broken to any extent by the effects produced with warp

FIG. 1.

printing. As an effort in the direction of novelty in printed goods, viscose prints were tried some time ago by English printers, the attempt being extended to silk goods by the Lyonese printers, in goods for the present season. The latter, unfortunately, can scarcely be called a success, but it is probable that many of the mistakes made will be remedied by the next spring season.

The hand-painted silks which were much in vogue last year amongst the high-priced goods are

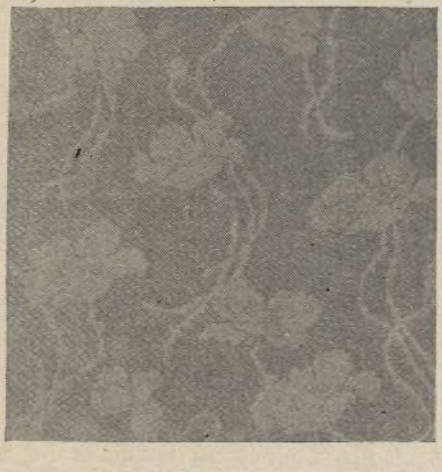


FIG. 2.

really the cause of viscose printed goods coming into fashion, for such fabrics have an appearance almost identical with the hand-painted tissues, and, printed by machinery, are decidedly cheaper. This year, therefore, we find the hand-painted sateens, muslins, faille, etc., imitated in viscose printing. The idea is far from new, for about forty-five years ago an Alsatian firm produced very similar effects

FIG. 3.

with zinc white; but although these were the fashion for a time, it was gradually realised that they were unserviceable and would not wash well. Viscose is a solution of cellulose, and very nearly related to the other cellulose combinations, celluloid, artificial silk, pegamoid, etc.

It is impossible to properly reproduce here the effect given by viscose printing; but the

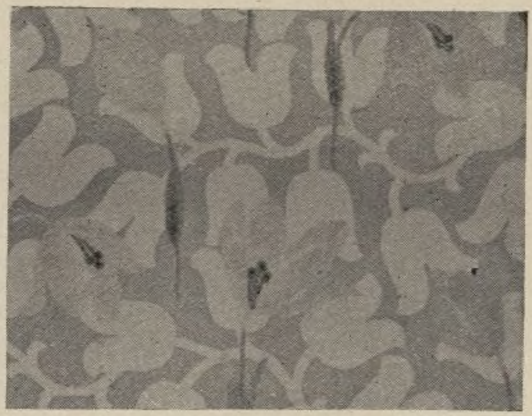


FIG. 4.

accompanying illustrations show some of the designs which are running this season, and which are

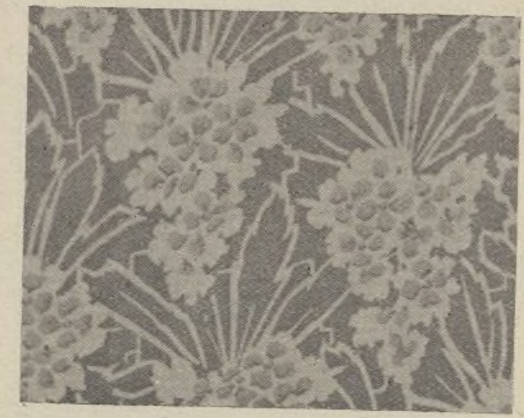


FIG. 5.

beautiful imitations of hand-painted work. Fig. 1 is a Lyonese cloth with a silk warp, sateen face,

FIG. 8.

and cotton weft. The inside flowers and running stems are viscose, printed on a white inner ground. In Figs. 2 and 3 the flowers and stems are printed viscose on a piece-dyed ground, both cloths being silk warp sateens of Lyonese make.

So much is heard of the superiority of French designs that it is interesting to turn to Figs. 4 and 5, which are the work of English printers, and are far more tasteful in colour and execution than the previously-mentioned patterns. The cloths are mercerised cotton with an eight-end weft sateen face, and in each case the ground is viscose printed, although in Fig. 5 the inner flowers are also printed by that method.

Figs. 6 and 7 are sketches of designs taken from two rich damanes silks, which would be very suitable for utilising for viscose printing. As an example of adapting them for this process, a

FIG. 6.

FIG. 7.

Parisian designer, M. U. Perret, has specially worked out for this article the design shown in Fig. 8, which is suggested by Fig. 7. It is a style suitable for sateen, plain muslin, or other ground in mercerised cotton; the white portions and lines should be printed viscose, as also the dark lines around the white leaf. These latter lines should be of a shade similar, but darker than the ground, both of which should be a sombre colour. Life is given to the pattern by the spray of flowers inside the white leaf, which should be printed in the ordinary manner with bright, full, and rich colours.

Silk Spinning.—II.

BY FILSOIE.

THE SILKWORM (*Continued*). — Another genus belonging to the *Antherea* family, and one which is valued very much in Japan, is the *Yama mai*. Fig. 4 shows the worm A, the cocoon B, the male moth C, and the female moth D. It is an oak-feeding variety, and spins a quality of silk which is much appreciated on account of its strength, but the colour is not so good as that of the silk of the *Bombyx mori*, the cocoon having a greenish appearance. The *Yama mai* can be reared very well in England, and out of fifty eggs sent to an expert in the first year of introduction to this country, forty-nine were hatched, the worms reared, spun their cocoons, forty-nine perfect specimens of moths emerged, and their progeny still exist.

The *Pernyi* is another variety of the *Antherea* group which can easily be reared in this country. It produces a good silk, very similar to the *Mori*. It is an oak-feeding worm and is indigenous to North China, where of late years much attention has been paid to the rearing of this variety for commerce.

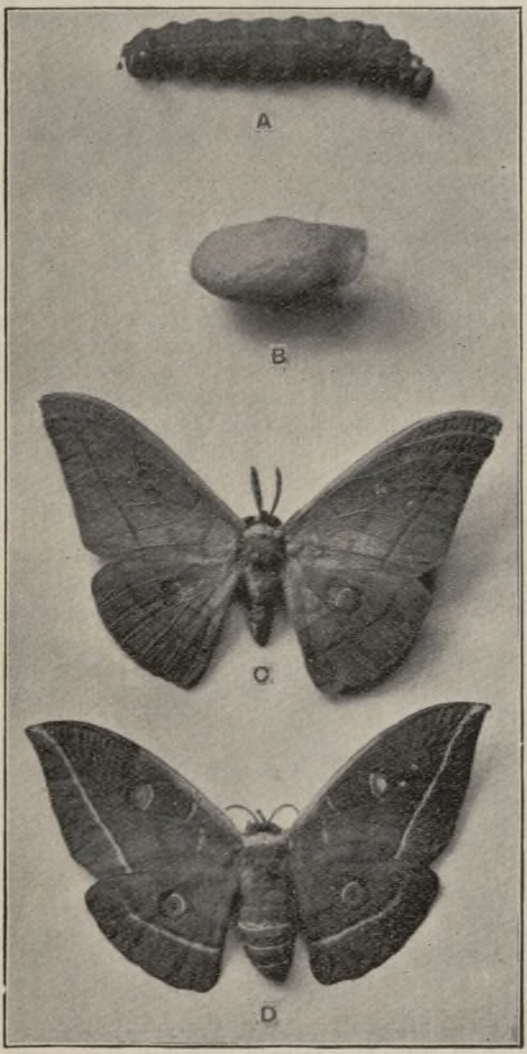


FIG. 4.

Of the *Citernia* family the *Attacus Cynthia* is shown in Fig. 5—the worm at A, the cocoon at B, the male moth at C, and the female moth at D. It also is a valuable silk producer, and thrives in North China and Japan, feeding on the *Arlanthus glandulosa*, which is very similar to our ash. It produces a long greyish cocoon. The *Ricini* is the *Cynthia* introduced into India, where it feeds on the castor-oil plant and produces the silk known as Bengals.

Wild Worms.—As reference has occasionally been made to wild silkworms, it is well to here state that the description applies to those varieties which are hatched out in the open without any attempt being made to cultivate them or keep them under cover, except, perhaps, in a very primitive way. Many of the cocoons of the wild worms are probably collected and the pupa killed to prevent the moth developing, and such cocoons will be reeled; but naturally the silk is not so good as that of the worm which has been carefully tended and shielded from climatic changes of temperature. In many of these wild species the moths are allowed to burst from the cocoons, thus rendering them useless for reeling purposes. They are exported to Europe as "pierced cocoons," suitable only for waste spinning purposes. Pierced cocoons are far more preferable to the silk waste spinner than perfect cocoons with the lifeless chrysalis inside, as in the latter case it is a troublesome process to separate the wormy matter from the silk, to say nothing of the extra weight of useless matter purchased. There are many wild varieties of silkworms in China and Japan.

On the other hand, the *Bombyx mori* and other valuable producers of silk are most carefully and elaborately tended either by the peasantry of the various countries in their own homes or by large producers in establishments erected for the purpose, and employing numbers of attendants. The silk industry of the East is divided into two sections —viz., (1) the rearing of the worms, and (2) the reeling of the cocoons. To give some idea of the amount of tending which must be necessary in rearing the domesticated worms, it is calculated that the worms from 1oz. of "graine" eat during the thirty-one days which elapse from the day the eggs are hatched to the day when they commence spinning, something like 1590lb. of leaves. After

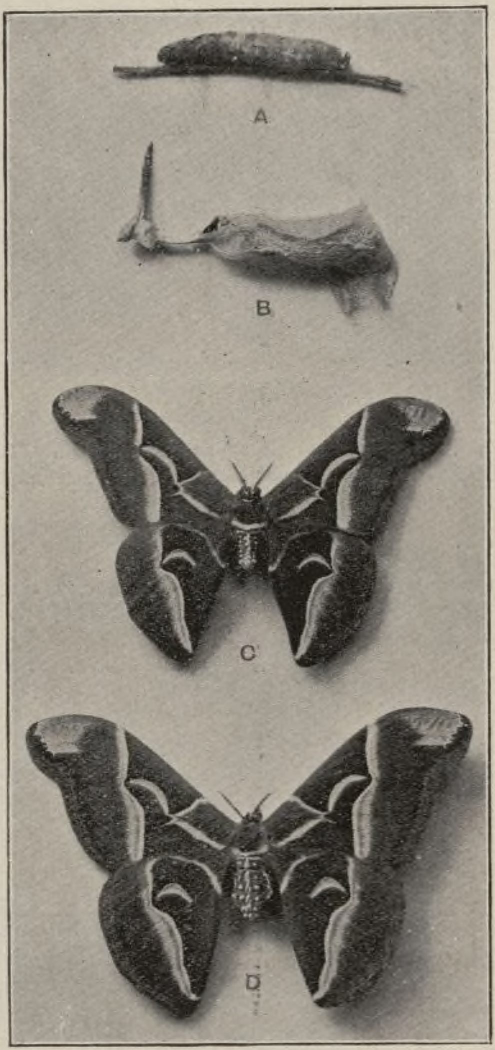


FIG. 5.

the worms in the rearing establishments have completed spinning, the cocoons are carefully examined and sorted, the most perfect are set aside for breeding purposes, and the remainder are baked or steamed in order to destroy the life of the pupæ. The average production of 1oz. of eggs is from 87 to 88lb. of cocoons—that is, of course, unpierced cocoons,—which includes the weight of the pupæ or chrysalis. The cocoons set aside for reeling are next sorted into grades—good, bad, and indifferent.

Reeling.—Reeling is a very simple but tedious process, and on account of the silk fibre being so very fine, it takes a long time to reel 1lb. of silk. One authority has stated that it takes from 2000 to 2500 silkworms to produce 1lb. of silk. There is no very elaborate or expensive machinery required. Fig. 6 represents a reeling machine, whose parts are as follows:—A, the basin into which the cocoons B are placed; C, a small circular plate through which the cocoon ends are passed to gather them into one end, which is conveyed over the small wheel D, then under the small wheel E, to the point F, where the thread is twisted round itself to weld the cocoon ends together before it passes on to the swift G.

The water in the basin is kept at a uniform temperature by means of steam. Into this water a number of cocoons are placed, and the operator whisks them about with a small stick or bunch of twigs until the natural gum with which the fibre is covered, softens, and so allows the thread to adhere to the stick; when the outer coating of the cocoon, being coarse and uneven, is stripped off and put aside as waste, for the spinner of waste silk yarns. After this coating has been removed the reeler finds the end of the true or reelable thread, when four, five, or more of such ends are taken up and passed through the guide C to make one thread. The number of ends amalgamated varies according to the quality of the silk and the size or count required. Only the middle portion of a cocoon is reeled; the outer coating first spun by the worm is too coarse and uneven, the inner portion or last part spun by the worm is too fine, and hardly strong enough to bear even the weight of the cocoon. This unevenness in thread, varying from coarse to fine according as the silk is near the outside or near the inside of the cocoon, makes its necessary that great care be exercised by the reeler in running the different threads together to maintain the resulting thread of uniform size; and as on this uniformity the quality and value of the raw silk greatly depends, it will be seen that some skill and judgment is essential to a good reeler, it being necessary at times to vary the number of filaments.

In China silks there are three different reelings—viz., tsatlee reel, re-reeled tsatlees, and filature reels. The tsatlee reel is the commonest and oldest form in which the China silks come over

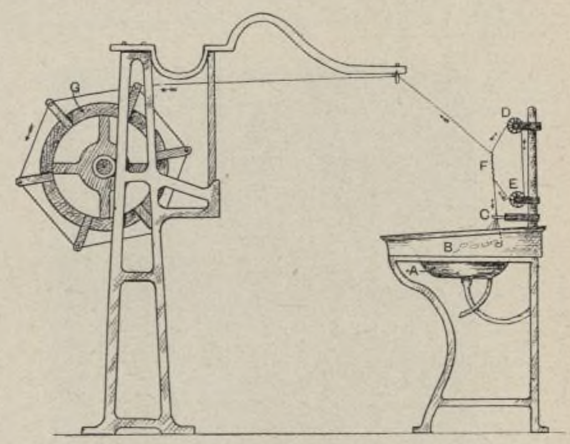


FIG. 6.

from the East, but is fast falling out of favour, re-reels and filatures taking its place. The reeling machine is a very primitive affair, and generally speaking not much care is taken by the reelers to see that the number of filaments running together to make one thread is kept the same. Sometimes there may be ten or eleven running together to start with, but as the cocoons fall off or the ends break they are not replaced immediately. In fact, judging from the silk at times, it would appear that they are sometimes let run down until there are only about two running together. Then the correct number of cocoons or threads are pieced up and the reeling restarted; and so the process goes on, the thread naturally varying in thickness according to the number of filaments or cocoons kept up. The more uniform the thread the higher the value of the silk, hence better attention is now paid to the question of reeling than used to be the case. In the tsatlee reel there is no attempt to make the hanks or skeins one even continuous thread or uniform in length, and many times where the piecings of broken ends have been made there are faulty places which were better left undone. The tsatlee reels come over to Europe in the form of "books," 12 of which make up a bale of from 100 to 104lb. These books are made up of 12 "mosses," which are again divisible into "slips." The length and size of these slips vary according to the quality of the silk. The books are bound together by bands of raw silk, which are generally very coarse and unsuitable for throwing. The ends of the books are covered by a kind of flossy silk called "caps" to keep them clean. These silk caps are used for waste spinning purposes.

The different qualities of tsatlees are divided into grades from No. 2½ to 5¾, but there is no general classification under these grades, different shippers styling them according to their own recognised standard. The different qualities are known under a "chop" mark. Of the best-known qualities the following might be taken as standards for the grades :—

No. 1	No. 1. Black lion.
,, 2	,, 2. Black lion.
,, 3	,, 3. Black lion. ,, 1. Buffalo.
,, 3½	,, 3½. Black lion.
,, 4	,, 4. Black lion. ,, 2. Buffalo. Red elephant.
,, 4½	No. 3. Red pagoda. ,, 3. Buffalo.
,, 5	Blue elephant. Bird fongling.
,, 5½	Yellow elephant. No. 3. Mountain.
,, 5¾ (best)	Green elephant. No. 4. Mountain. Gold lion kintze.
,, 5¾ (good)	No. 5. Mountain. Double silver elephant.
No. 5¾	No. 1. Almond flower. Gold kilin. Blue phœnix lanfung. M. Mandarin duck S.S.S. dollar.
,, 5¾ (marketable)	Green peacock seeling. No. 2. Almond flowers. Triple pagodas. Choey kilins. Bamboo No. 2. Mandarin duck M.M. Kinfong gold pheasant. No. 2. Beautiful woman.
,, 5¾ (inferior)	X. Running deer. Red stork. Red kilin. III. Train chop.

Re-reels.—As the name implies, these are the tsatlees re-reeled by the natives into smaller hanks, each of which is made up separately. In this process of re-reeling some of the foul threads and bad piecings are taken out, and the thread is subjected to a cleaning process. The hanks are sorted, and the fine sizes run together, as also the coarse sizes, and this is the reason re-reels are so much more uniform in size than ordinary tsatlees. Each skein being tied up separately and the hanks being so much straighter, makes them less expensive working for the throwster, and does not need the same amount of soap that tsatlees do to make them wind easily. Like tsatlees, re-reels are also divided into grades, and are shipped under a chop mark. There are :—

EXTRA.
Buffalo extra.
Pegasus extra.
Black horse extra.

No. 1.
Buffalo A.
Pegasus No. 1.
Black horse No. 1.
Fan chop extra.
Gold pheasant No. 1.

No. 2 BEST.
Buffalo B.
Pegasus No. 2.
Black horse No. 2.
Chrysanthemum No. 1.
Gold flying dragon No. 2.
Gold pheasant No. 2.
Fan chop No. 1.

No. 3 BEST.
Pegasus No. 3.
Black horse No. 3.
Chrysanthemum No. 2.
Fan chop No. 2.
Gold pheasant No. 3.

No. 4 BEST.
Pegasus No. 4.
Black horse No. 4.
Chrysanthemum No. 3.

MARKET No. 1.
Flag chop No. 1.
Cabbage No. 1.
Gold peony flower No. 1.

MARKET No. 2.
Flag chop No. 2.
Gold peony flower No. 2.
Cabbage No. 2.
Small buffalo No. 1.

MARKET No. 3.
Flag chop No. 3.
Gold peony No. 3.
Cabbage No. 3.
Small buffalo No. 2.

MARKET No. 4.
Cabbage No. 4.
Small buffalo No. 3.

Steam Filatures.—These are the finest and most expensive silks produced. Only good silk is reeled thus, and filatures are more even and reliable for size than either re-reels or tsatlees. Formerly all silks used to be reeled in the cottages by the peasant and his family, and the water in which the cocoons were steeped preparatory to reeling was kept hot by a fire underneath the basin. By this means of obtaining heat it is impossible to keep the water at a uniform temperature, and the result consequently was uncertain, and bad reeling and tangled hanks were rather the rule than the exception. To overcome this difficulty, and with the general improvement of the industry and greater demand for silks from Europe, machines were adopted and the water heated by steam as per Fig. 6, and so kept at one temperature. These machines are gathered into factories called "steam filatures," and the cocoons, which had either been spun by worms bred on the premises or brought from up country by the peasantry, are reeled under skilled supervision. In these "steam filatures" great care is taken to keep the thread uniform in size or count and length of skein, the reeler being attentive to replace cocoons which have broken down, and so to keep the number of filaments comprising the thread always the same. China filatures are also divided into grades according to chop, the best known being :—

EXTRA.
Soylun gold anchor extra.

BEST No. 1.
Soylun silver anchor No. 1.
Keecheong No. 1.

No. 1.
Soylun red anchor No. 2.
Keecheong No. 2.
Gold dragon No. 1.
Soyching gold eagle No. 1.

BEST No. 2.
Sans pareil No. 2.
Double gold dragon No. 2.

Tsuncheong gold double anchor No. 1.
Excelsior No. 2.
Gold globe No. 2.

No. 3 BEST.
Double anchor No. 2.
Excelsior No. 2.
Sans pareil No. 3.
Gold globe No. 3.
Double dragon and flag No. 2.

No. 3.
Double anchor No. 3.
Double dragon and flag No. 3.

(To be continued.)

MESSRS. J. AND T. BROCKLEHURST AND SONS, Hurdsfield Mills, Macclesfield, have this year secured the whole of the annual Government order for black silk handkerchiefs for the Navy, which amounts to 90,000. The execution of the order will be extended throughout the whole of the year, and employment will be found for a large number of hands during that period.

Jute and Linen Weaving.—XVIII.

BY THOMAS WOODHOUSE AND THOMAS MILNE
(Head and Assistant Textile Masters, Dundee Technical Institute).

DOUBLE-LIFT SINGLE-CYLINDER JACQUARD.—In all single-lift machines the shedding of the warp must necessarily be of that type described as bottom shedding, in which the warp travels twice the depth of the shed for each pick. This fact practically prohibits high speeds being attained with single-lift machines, and has led to the introduction of the double-lift jacquard. This machine gives a shed of the semi-open type, in the formation of which the moving threads travel through only half the distance covered by those actuated in a single-lift machine. The shed may thus be formed in theoretically half the time, and the strain and friction on the yarn greatly reduced. Fig. 107 is a sectional elevation of a double-lift jacquard. All double-lifts differ from single-lifts, in the fact that they contain double the number of hooks for the same capacity of machine. Thus a 408 machine has 816 hooks. Each needle B governs two hooks A and A¹, which are actuated alternately and respectively by the griffes F and F¹. To each pair of hooks is attached one neck band J by means of cords K and L. It will thus be seen that each pair of hooks governed by one needle actuates the same thread or threads in the warp. The griffe F is now in its highest position, supporting all threads through the medium of hooks A and cords K ; while the griffe F¹ is in its lowest position with all hooks A¹ resting on the grate H, and all cords L slack. As both griffes are driven by a double-throw crank, it follows that as F descends, F¹ will rise in a corresponding degree. As F descends, the hooks A and cords K will fall, while a corresponding upward movement will be given to the hooks A¹ and the cords L until F and F¹ are level, when the cords K and L will both be in equal tension, and all threads in motion will be at the centre of the shed. From this point the cords K will slacken until F reaches the lowest position, while the cords L, through the hooks A¹ and griffe F¹, will carry the threads to the top. The amount of lifting to be done by each cord will vary according to the weave employed. Thus, in a perfectly plain cloth, all the work would be thrown on one or other of the cords and hooks, but where a thread requires to be up for two or more successive picks, the weight will be borne alternately by cords K and L.

Fig. 108 gives a general view of the method of driving a double-lift single-cylinder machine. The griffes F and F¹ are shown in sectional elevation, and also in plan. In the elevation the framework

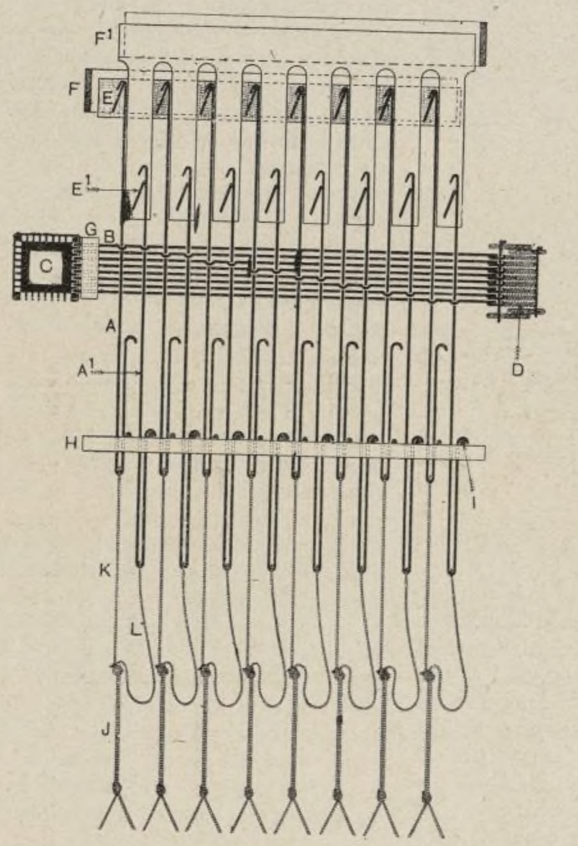


FIG. 107.

JUTE AND LINEN WEAVING

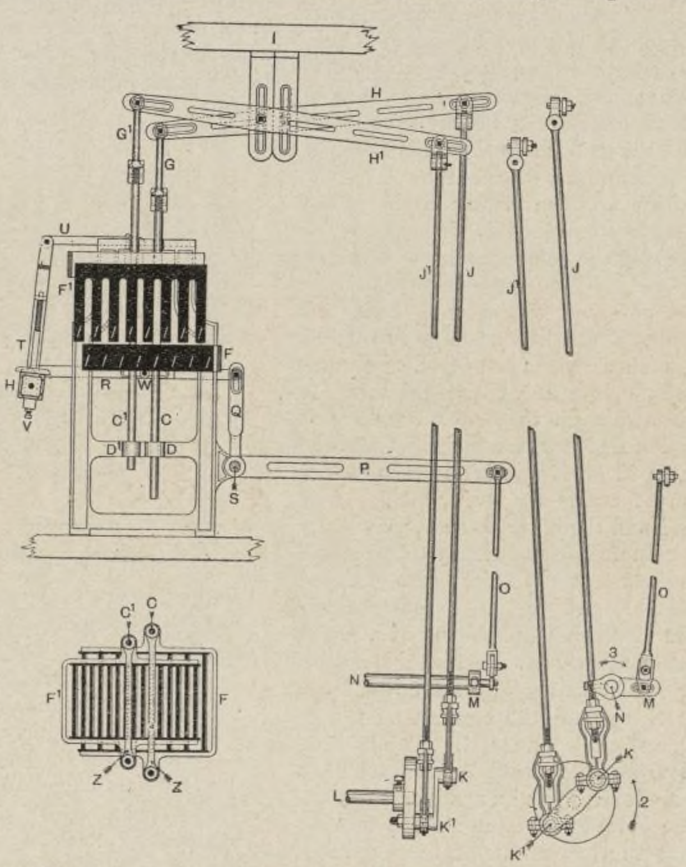


FIG. 108.

only is shown with the lifting knives removed, but in the plan the knives are in position. The construction of the griffe F is in all respects similar to that of a griffe of a single-lift machine, consisting of a cast-iron frame to which is bolted two wrought-iron plates, slotted as shown to receive the lifting knives. A similar cast-iron frame is used in the griffe F^1, but the wrought-iron plates have pendant arms about 6½in. long, slotted near their lower ends to receive the ends of the knives. The griffe F^1 occupies the inside position, and the pendant arms move up and down between the knives of griffe F, these latter moving vertically in the spaces between the arms. Connections between the griffes F and F^1 and the spindles C and C^1 to the pendant connecting rods G and G^1 are similar to those already described for the single-lift machine, Fig. 106. The levers H and H^1 and the connecting rods J and J^1 are shown completing the connection to the double throw crank fixed on the bottom or wyper shaft L. As will be seen, the throws of the crank are diametrically opposite to each other at K and K^1; they will therefore impart an equal and opposite movement to the griffes F and F^1. The levers H and H^1 are fulcrumed in a bracket bolted to the beam I about the roof of the weaving shed to ensure freedom from vibration; and for the same reason it is advisable to support the jacquard machine independently of the loom framework. This may be done by means of wooden beams or light iron girders carried on brackets cast upon the columns supporting the roof of the weaving shed.

The chief advantages obtained through the use of the double-lift machine over that of the single-lift lies in the fact that for the same number of picks per minute the griffes travel at only half the speed. In the double-lift a shed is formed by the rising of one griffe and the falling of the other, while in the single-lift a shed is formed by the rising and falling of the same griffe. It is, however, not to be deduced from these statements that a double-lift machine may be driven at twice the speed of a similar single-lift machine, as other considerations, such as the speed of the cylinder and the speed of the loom itself, prevent this. It must also be remembered that no advantage is obtained in the double-lift with respect to the speed of the cylinder, as in all single-cylinder machines the cylinder must strike for every pick. Any increase of speed will therefore be accompanied by a corresponding increasing tendency to puncture the cards and to cause them to leave the cylinder.

All independent single-cylinder motions are driven from the crankshaft by means of a crank or an eccentric on the same. In Fig. 108, motion to the cylinder H is imparted by the crank M on the crankshaft N, through the connecting rod O, levers P and Q, and the spanner R. The rocking shaft S extends from side to side of the machine, with a duplicate lever Q and a spanner R at the other side. The cylinder H is supported in suitable bearings at the lower end of the batten T, which swings freely on a screwed centre stud in the bracket U. Lateral adjustment of the cylinder may be obtained by means of this centre stud, and vertical adjustment by screw V. The pressure of the cylinder H upon the needles is regulated by the slot W in the spanner R. The arrows 2 and 3 in the end elevation indicate the direction of movement of the cranks on the wyper and crankshafts respectively.

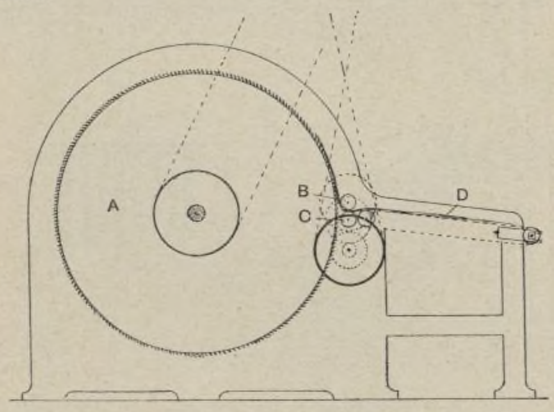
(To be continued.)

The Mechanism of Spinning.—XIV.

By H. R. Carter.

SPINNING VEGETABLE STALK FIBRES (*Continued*).—In order to spin yarns finer than those of which we have just been treating—say from 500 to 90,000yds. per pound,—fibre of superior spinning quality must be chosen. Spinning quality—divisibility of the fibres—is almost invariably connected with an oiliness or "nature." Fibres surrounding the stems of plants are, as previously explained, bound together by a varnish of gummy consistency. In the separation of the fibre from the woody core of the stem this varnish is partly removed. A considerable quantity still generally remains, however, binding the *individual* fibres together. It is obvious that the sectional area of the fibre from which a thread is made cannot be greater than that of the thread itself, and it will be found in practice that the smaller the fibres are in comparison with the thread, or the greater the number of fibres required to make a thread of given diameter, the more level and regular will that thread be. Considerations of this sort have led to the use of machinery to hackle or separate the fibres. We will first illustrate what is termed a "knifing" machine, destined to split up or remove the hard flat ends often found on the various species of hemp, and in this way to render the fibre more suitable for spinning a level yarn. Fig. 33 is such a machine, consisting of a toothed cylinder A running at a speed of about 200 revolutions, in bearings in the side gables which support it.

In its rear, and horizontal with the centre, are a pair of fluted feed rollers B and C, driven independently from the toothed cylinder by a separate belt, as shown. By a suitable arrangement of three pulleys—one of them being a loose one—and a long handle for shifting the belt from one to the other, the feed rollers may be stopped or driven at will in either direction. In this way the operative is enabled to spread a "strick" of fibre upon the endless feed sheet D, introduce the bad end between the feed rollers as far as required, retain it there while the cylinder acts upon it sufficiently long, and then withdraw it again, without danger to himself. The flat ends and fibre cut away are thrown down below the cylinder, forming "tow," which may be prepared for spinning inferior yarns in a way to be described later.



The Mechanism of Spinning.—Fig. 33.

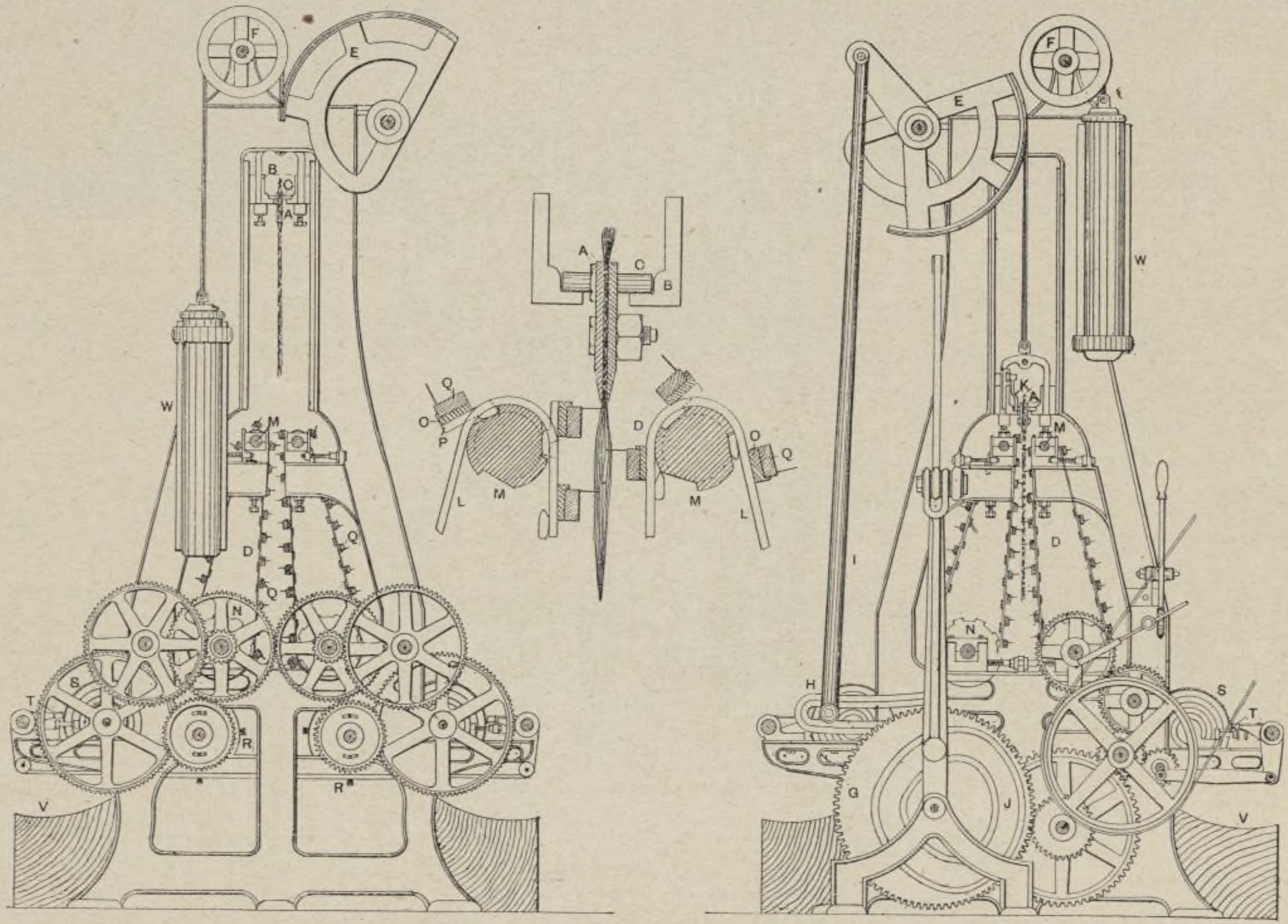
Valuable fibre for spinning fine yarns is split up or "hackled" upon a machine termed a hackling machine (Fig. 34). This machine, in order that it may cut or split the fibre thoroughly, and at the same time give the maximum yield of long fibre or "line," must be properly constructed and carefully set. The machine shown represents the type almost universally employed to-day, and is described as a vertical sheet, brush, and doffer machine. Older machines for hackling had a single sheet upon which the fibre lay, or a pair of hackling rollers, while some of more recent date differed from that illustrated only in the method of removing the tow from the hackles, or in the two pairs of sheets required to hackle both ends of the piece, being united in a double or "duplex" machine, instead of being supported by separate framework. In Fig. 34 the fibre to be operated upon is tightened between two wrought-iron or steel plates A forming what is technically known as a "holder." These holders are placed between the two angular bars B forming the sides of the "channel" or "head," in which the holder slides along upon the projections C, C. The "channel" extends the full length of the machine, which is now frequently 23ft. long. It is suspended vertically over and between the hackling sheets D by means of straps connected at one end to the bridge piece of the "channel" by means of a loop and pin, and at the other end to the lever E, to which is also suspended a balance weight W by means of a strap passing over the guide pulley F. This weight should be sufficient to balance the channel with the holders which it usually contains. The head is given a regular up-and-down motion by various mechanical arrangements, the one illustrated being a camwheel G, which, by means of an eccentric upon its reverse side, raises and depresses the lever H, which in turn communicates an up-and-down motion to the head through the connecting rod I. The height of the lift, or the distance required to raise the head to lift the fibre from the hackles, may be altered by changing the effective length of the lever H or the point of its connection with the rod I. The holders are shifted along the channel while at the top of its lift by a catch-bar arrangement actuated by another eccentric channel J upon the camwheel G. K shows one of the catches or "dogs" which shift the holders. The channel has almost always a period of rest given to it while in its lowest position and while the hackles are operating upon the fibre. In the machine illustrated, this period of rest is constant for any given lifts of the head per minute, but in the machines of some other makers it may be varied to suit the requirements of the fibre being worked. In the camwheel head lift shown, a short rest is generally given to the head when raised and during the shifting of the holders, while with Cotton's head wheel, for instance, there is no "rest" at the top.

The hackling sheets D are formed upon a foundation of endless straps or "leathers" L running round the top and bottom sheet rollers M and N, which keep them fairly tight, the latter being the driver. Upon these leathers the bars and hackles are directly or indirectly fastened by means of screws, rivets, or expanded eyelets. In the construction of a hackle sheet there are two most important points to be aimed at—viz., the direct penetration of the fibre by the hackle pins, and that at a point as close as possible to the nip of the holder. In striving to attain this result—which affects in a marked degree the yield of long line, since it determines the length of "shift" required in changing the fibre in the holder,—various makers have employed different means. In the machine illustrated the bars O are attached by screws to wing pieces P, the bodies of which are fastened to the leathers. In this way, as the hackles are passing round the top roller, the wings stand out at a tangent to the latter, which is also recessed to receive the body plate of the wings, thus decreasing its effective diameter and enabling the hackle to strike close to the holder without the wings being unnecessarily long, and consequently weak. The bosses N upon the bottom sheet rollers are notched as shown to receive the body pieces of the wings, and a means is thus afforded for carrying the sheet round without slipping. In another well-known make of hackling machine the sheet is carried round by means of small conical projections on the bottom rollers, working into brass eyelets, which also serve to rivet the bars to the leathers. The hackles are fixed to wings which are riveted to the bars, so that almost the whole sheet is closed. The pitch of the bar is from 2⅛ to 2¾in., according to the coarseness of the machine, and there are from 24 to 32 bars and rows of hackles in the round of the sheet.

The hackles Q consist of stocks of wood from 10 to 12in. long, about 1in. broad, and ⅜in. thick, studded with steel pins usually 1in. long over all, and set in either one or two rows. The closeness of the pin in the row to each other is from ¼ pin per inch, or one pin in 4in., to 60 pins per inch in the finer hackles. Hackles with only one row of pins are fast coming into general use, since they are more easily kept clean and free from gum by the brush. The brush R, which clears the hackles from tow after they have passed through the fibre, consists of an iron shaft the whole length of the machine, having bosses about 9in. in diameter keyed to it at regular intervals. To these bosses are screwed staves of wood, shaped so as to form segments of a circle. In these staves, or in laths attached to the staves, are set the brushes, formed of bunches of hogs' bristles set in holes in the wood. The speed of the brush is made to conform with the number of rows of hair, the speed of the sheet, and the number of bars, so that each row of hair strikes a hackle as it comes round, and strips the tow off it. The position of the brush is below the bottom sheet roller, as shown, and it can be moved in and out to a position corresponding to the length of the hair, and such that the brush strikes the pin at its root and gives it a clear wipe without touching the stock.

The doffer S is a wooden roller rather longer than the brush, and covered with leather filleting set with pins. It revolves at a slower speed, and in a direction opposite to that of the brush. The latter beats the tow into the teeth of the doffers, which carry it round until struck off by the doffing knife T, which is set quite close to the face of the doffer, and has an oscillating motion given to it by an eccentric or crank and connecting rod. The tow falls into the tow boxes V, which may be divided into compartments to classify the tows, which increase in fineness and quality towards the fine end of the machine. In what is known as a stripping-rod machine, the tow is doffed from the hackles by means of wooden laths with iron ends or cocks, which work loose inside a chamber made to receive and hold them in the bottom roller bosses. The rods are sprung in and are quite free to move in and out from the centre without falling out. As the roller moves round, these rods fall outward when they pass the horizontal diameter of the roller on its lower side, passing in their fall close to the pins of the hackle, and taking with them any tow which the latter may carry. This tow is scraped off, as the rods move round, by the tow catchers, which are broad laths working at one edge on pivots, the other edge being armed with pins. The tow, having collected upon the tow catcher, is thrown down into the tow box, when the head splitting. The way to effect this result will be best shown by an example. Suppose that in a 30-barred machine we wish to group the first 4 rounds of hackles, which are respectively $\frac{1}{4}$, $\frac{1}{2}$, 1, and $1\frac{1}{2}$ per inch. It is clear that the round of 30 hackles may be either one group of 30, 2 groups of 15, 3 groups of 10, or 5 groups of 6 hackles. We will group the first round in 30, the second in 15, the third in 10, and the fourth in 6.

To find the correct position of the first pin in each of the thirty hackle stocks forming the group for the first round: take thirty-one blank hackle stocks and place them side-by-side, with their ends square, and forming a rectangle. Place the first pin in the first hackle stock, as near one end as is consistent with strength, and mark a point on the thirty-first stock 4in. farther from the end than is the first pin in the first stock. If a pin be placed in each of the thirty stocks on the line joining these two points, and the other pins set from this pin at 4in. pitch, the group will be correctly formed. In a similar manner the groups for the other rounds may be arranged by taking 16, 11, or 7 stocks respectively, and proceeding as before. In screwing them upon the bars of the sheet, place all the No. 1 hackles of each group upon the same bar upon one sheet, and the middle numbers of the group—viz., 15, 8, 5, and 3—upon the same bar upon the other sheet. Gear the two sheets in



THE MECHANISM OF SPINNING.—FIG. 34.

ascends by means of a cam and connecting rod. The method of working the machine, briefly described, is as follows:—Handsful of fibre are spread and tightened between the plates of the holder, the ends extending to about equal lengths on either side. The holder, with the root end of the fibre hanging downwards, should be passed into the channel of the first machine. That end being hackled when the holder reaches the other end of the machine, the holder is unscrewed, and the piece turned and screwed into another holder, which is put into the channel of the second machine, after passing through which the piece is completely hackled and split up from end to end. In addition to direct penetration and the short "shift" before mentioned, the setting of the hackles and the sheets to one another and to the centre line of the holder bears a most important relation to the yield of line obtained from any machine. "Grouping" of the hackles, not generally understood even in the trade, is the arrangement of the pins in the stock and the relative sequence of the hackles upon the two sheets in such a way that each pin may strike the bunch of fibre in a different place, giving regular and effective

such a way that these bars follow each other round, and that each bar on one sheet is half-way between two other bars on the other sheet.

The two top rollers of the machine may be brought closer together by means of screws, giving the hackles more or less intersection; but since the sheets are geared as described, the hackles cannot strike and injure one another.

The following are the particulars of hackles for a coarse 8-tooled machine for hemp or jute, also for a fine 20-tooled machine for the best Courtrai flax:—

Tools.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.
No. of wire (B.W.G.)	10	12	14	15	15	16	17	18
Pins per inch	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$	2	3	4	6

Tools.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.
Pins per inch	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{6}{8}$	1	$1\frac{1}{2}$	2	3
No. of wire (B.W.G.)	14	14	14	15	15	16	17

Tools.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
Pins per inch	4	6	8	11	14	18	22
No. of wire (B.W.G.)	18	19	20	21	22	23	24

Tools.	15th.	16th.	17th.	18th.	19th.	20th.
Pins per inch	27	32	38	44	50	56
No. of wire (B.W.G.)	25	26	27	28	29	30

The sheets make from six to twenty revolutions per minute, according to the number of bars and the amount of work required. The head makes from three to seven lifts per minute, casting a like number of holders, according to the number of attendants employed and the facilities—*i.e.*, railways, etc.—provided for carrying the holders from one machine to the other. We have no space to do more than mention such adjuncts to the machine as the various "casting motions," whose object is to pass the fibre over one or more of the finer hackles when a fine cut is not required, or the various improvements which have made their appearance within the last few months. Of the latter, the most important is the attempt to close the holders upon the fibre by pneumatic pressure, which is removed as they issue from the machine, enabling the flax, etc., to be removed or turned with an ease hitherto unknown.

Another idea which may have a good effect in increasing the yield of line from the machine is to modify the speed of the hackle sheets while the head is rising, with the object of equalising the strain upon the fibre.

(*To be continued.*)

Cotton Velveteens.

THE different kinds of cotton velvets may be divided into the following three classes:—Plain velveteens, corded velveteens, and figured or fancy velveteens.

Plain Velveteens.—These are plain or twilled according to the drafting of the ground weave—plain or three-shaft twill. The pile threads are drafted on the basis of the three-shaft twill (A, Fig. 1), this arrangement, however, being confined to one-half of the warps, as shown at B, in order to admit the passage of the cutter. The draft of a plain velveteen is given at C, there being one ground thread to every three pile threads. In Fig. 2, D represents a twilled velveteen with a 3-shaft twill E as the ground weave. By reason of the contexture, the back of this fabric is a 3-shaft warp twill, with a left-to-right slant. If the drafting shown at E were arranged as a left-to-right twill, the velveteen would present a less uniform appearance, and would be somewhat aslant. A long-pile velveteen, with the pile threads on a 6-shaft twill basis, is shown at F in Fig. 2. These long-pile fabrics are generally obtained by the drafts shown at C in Fig. 1, or D in Fig. 2, but with the threads less closely set.

Corded Velveteens.—Fig 3 shows the type known as ordinary semi-cord, or Raglan cord. In this velveteen the loops are cut along the thick vertical lines, and the largest loops float over 8 threads.

All corded velveteens are classified by the length of these floating threads. In some cases the drafting of the pile threads is carried out as shown in Fig. 4 at G and H—that is to say, the pile loops float over 3 or 4 threads. The velveteens with pile loops floating over 5 threads are shown at J, those with 6 at K, and those with 7 at L. The ordinary semi-cords have loops floating over 8, 9 or 10 threads, as shown at M, N, and O. Full

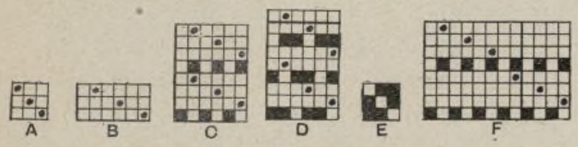
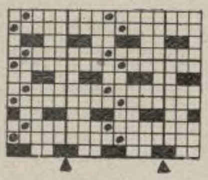


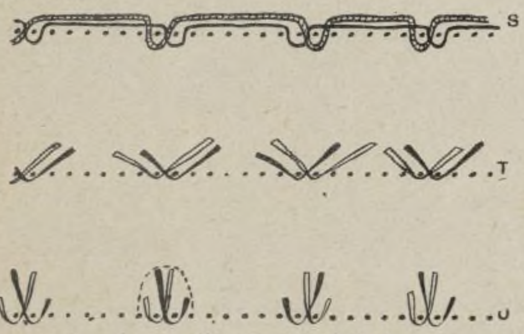
FIG. 1.—COTTON VELVETEENS.—FIG. 2.

cords have somewhat longer loops than the foregoing, P, Q, and R showing loops floating over 11, 12, and 13 threads respectively. Fig. 5 shows a cross section of two threads of the semi-cord in Fig. 3, at S, the dots showing the threads and the wavy lines the loops. After cutting, the section appears as at T, and the face of the goods is then



COTTON VELVETEENS.—FIG. 3.

gassed in a gassing machine. To obtain rounded cords like those represented at U, the piece must be brushed transversely in the brushing machine, this rounding-off the pile. As velvets are dressed with very stiff gum dressing, they have to be broken or softened in a machine so as to leave only just the degree of stiffness considered suitable by the cutter.



COTTON VELVETEENS.—FIG. 5.

Velveteens are also put through the same finishing processes. The smooth kinds, intended to imitate silk, are passed through the lustring machine, where they are treated with a wax dressing, and are then brushed energetically, both lengthways and across. On issuing from this machine the velveteen has the appearance and sheen of real silk. The cord represented at V in Fig. 6 is one wherein each alternate pile thread has two binding threads. W is a semi-cord with triple binding. The standard varieties of cotton-velvet goods are: Plain velveteen, twilled velveteen, "cannele" velveteen, semi-cord (Fig. 3), and cord, all the other draftings being of merely occasional interest. Another type of plain velveteen is shown in Fig. 7 at Z, the pile threads being woven as a 5-thread satin, as shown at X, with the bindings arranged on the even-numbered threads,

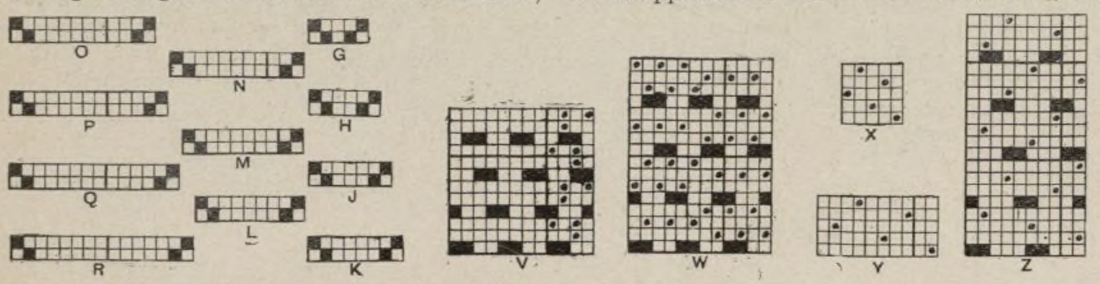


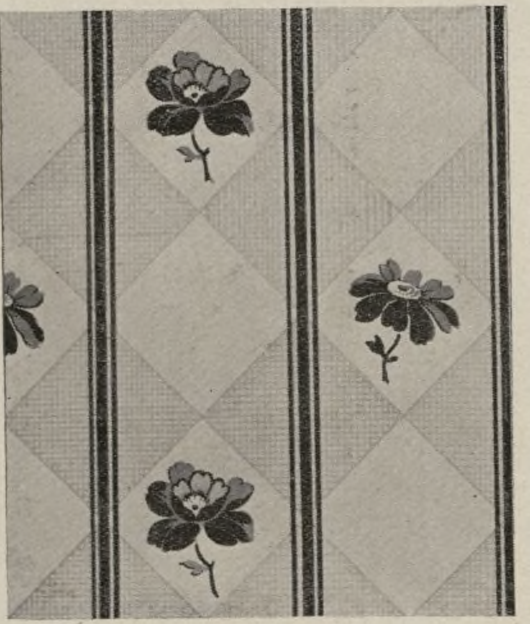
FIG. 4. COTTON VELVETEENS.—FIG. 6. FIG. 7.

as shown at Y. The ground weave is a compound ribbed 5-shaft twill, and the warping has one ground thread to every three pile threads.

Velveteens are sold on a basis of weight, the usual run being from 5 to 17½oz. per yard, and the width 33½in. in the reed, to come out from 27½ to 28in. when dyed. The warp setting being low (from 50 to 75 ends per inch), the wefts are set very close (from 225 to 325 picks per inch). Velveteens are mostly used for suitings, and only occasionally for upholstery. Sometimes they are printed instead of being dyed; and upholstery velveteens may be embossed or stamped, the last-named process being performed

COTTON DESIGNS.—FIG. 1.

by passing the piece between two cylinders. The upper cylinder is of iron with an engraved or otherwise sunk pattern, and is heated from the inside, whilst the lower cylinder is of hard wood. The pile is compressed by the metallic cylinder except at the sunk parts of the pattern, so that the



COTTON DESIGNS.—FIG. 2.

latter stand out in relief from a flat ground. The so called English cut for plain velveteens has also been applied to cords, under the name of Puebla cut, each row being cut with the knife inclined to the right and left alternately, thus producing a velveteen appreciably differing from those already described. When done by hand, this necessitates two cuts, all the odd rows being cut first with the cutter inclined to the left, and the even rows then cut with the cutter inclined to the right. Some cutters do the two sets together, with twin cutters set in opposite directions. In such case the guides are soldered together at a distance corresponding to the width of the rows, and one of the knives is of the usual length, the other being much shorter (only about 4in. long). This arrangement accelerates the cutting. The Puebla cut can also be performed in the machine, the desired result being obtained, in the case of the disc machine, by the use of guides with branches of unequal width. In addition, panel and stripe decorations can be produced on velveteens by cutting a raised pattern on an uncut ground, or *vice versâ*, by pyrogravure or by painting. In the two first cases the design is traced in pencil on the fabric, and the loops are then cut in accordance therewith, the result being to develop a raised pattern on a flat ground, or to

COTTON DESIGNS.—FIG. 3.

leave the design sunk and the pattern standing out in pile. This is rather a tedious operation on plain velveteen weaves, but very practicable for cords. The application of pyrogravure to fabrics is only of recent date. The pattern being traced beforehand, the operator burns out the pile along the lines thus indicated by the aid of a platinum stylus heated to redness, and as the cotton leaves only a very small amount of ash, the resulting pattern is very clear. With practice it is even possible to produce two or three shades of colour by varying the degree of cauterisation employed. The platinum

COTTON DESIGNS.—FIG. 4.

stylus is mounted on a pantograph, thus obviating the necessity for tracing the pattern on the material itself. Painting on velveteen is an occupation that ranks more with painting on porcelain or on silk. The colours used must be free from oil or fatty matters, since these substances leave round the edges of the outlines a narrow aureole which spoils the purity of the design.—"L'Industrie Textile."

(*To be continued.*)

Designs for Cotton Fabrics.

SPECIALLY CONTRIBUTED.

PATTERN No. 187* is a neat zephyr check with the stiffness taken off by the manner in which the checking threads cross each other. It will be noticed that at this point the green threads come up to the face of the cloth, while the ground threads fall to the back, a double cloth being practically present just at the juncture of the checking. The picks forming the centre spots are single-spun silk, and give a much richer appearance to the fabric.

Pattern No. 188* is a style which has been a favourite with designers this season. These wavy mercerised centre stripes have appeared in many different forms, and whilst easy and cheap to make, have a tasteful appearance. Care is required in properly weighting the mercerised cotton beam, or the appearance of the cloth suffers. If the warp is too tight, the lustre suffers; and if too slack, a ragged appearance is given to the cloth.

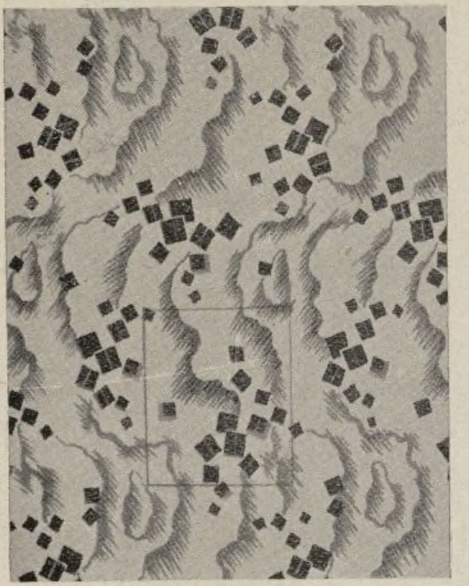
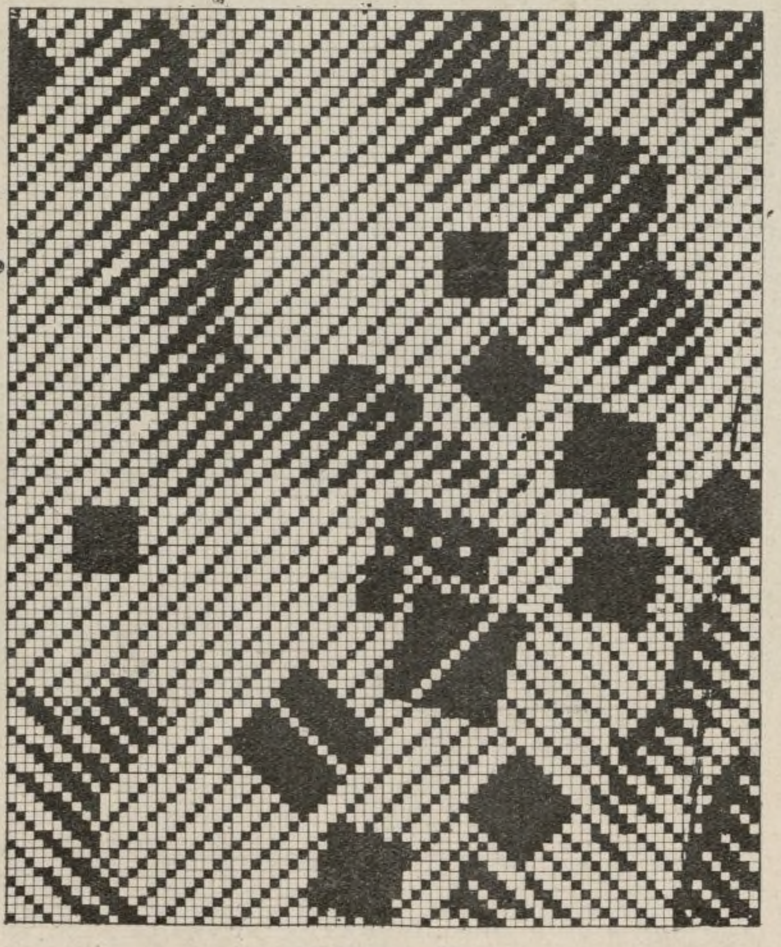


FIG. 5.

COTTON DESIGNS. FIG. 7.



COTTON DESIGNS.—FIG. 6.

Fig. 1 is a sketch for a cotton allover, and should be made in an 80-reed harness, and shot 90 picks to the inch. The black figuring should be made with weft, and plenty of float left when binding; the grey should be warp, and the ground tabby.

Fig. 2 is a design for a leno brocade in a 96-reed warp, shot 80 picks to the inch. The black in the flowers should be weft, and the grey warp, lying on a tabby ground. The stripes should be warp, bound with 4-and-1 satin, and if warped in with coloured yarn will have a pleasing effect. A couple of tabby threads should be put on each side, to keep off the leno.

Fig. 3 is an idea for a stripe. The warp should be in a 76 reed, and shot 84 picks to the inch. The black figure should be weft, with the grey effect a weft oatmeal, and the ground tabby. The stripe should be warp, entered fuller in the reed, and the ground between may be 2-and-1 warp twill.

Fig. 4 is a design for a stripe cloth made in a 56 reed and shot 66 picks to the inch The black should be weft, with the grey warp, and on a tabby ground. The ground in the smaller stripe may be varied, either 2-and-1 or 3-and-1 weft twill.

Fig. 5 is a sketch for a cotton allover, and should be made in a 96 reed, and shot about 100 picks to the inch. The figure should be weft, and the grey shaded effect 3-and-1 weft twill, with the edges floated to about 7-and-1 twill or satin. The ground should be 3-and-1 warp twill. The marked portion of this sketch is worked out in Fig. 6.

SILK DESIGNS.—FIG. 1.

Fig. 7 is a design for cotton brocade. The warp should be in a 96 reed, and shot 120 picks to the inch. The black figure should be worked up from the warp and nearly all floated; the grey ground work should be warp also, but bound down with 3-and-1 twill. The ground should be 4-and-1 weft satin.

Designs for Silk Fabrics.

SPECIALLY CONTRIBUTED.

FIG. 1 is a sketch for a silk brocade, and should be made with a good heavy net silk warp, about a 2400/2, and shot 110 picks of tram to the inch. The black should be floated weft; the grey figure should be made 2-pick, and the white in the figure 4-and-1 warp satin. The ground of the design should be 7-and-1 warp satin. This will give a very pretty effect, as the bright weft on the 2-pick figure is very marked, and with a good warp the ground satin has a very rich appearance.

SILK DESIGNS.—FIG. 2.

Fig. 2 is a design for a blouse cloth. The warp should be an 1800/2 spun silk, shot with 96 picks of tram to the inch. The black figure should be weft, with as few binders on as possible, except those

* See facing page 210.

figures marked with grey, which should have 3-and-1 twill on. The grey effect inside the figure should be 2-and-1 weft twill, and the ground should be 3-and-1 warp twill.

Fig. 3 is a good pattern for a silk stripe cloth, and is very suitable for trimmings, etc. The warp

Fig. 3.

should be a 2200/2 net silk, shot with 120 picks of tram to the inch. The black figuring should be weft, and the grey warp, which should be bound with satin about 10 or 13 shaft. The pattern should be on a 3-and-1 warp twill ground.

Fig. 4 is a design suitable for a cheap class of blouse cloth made with an 1800/2 mercerised cotton warp, and shot 90 picks of silk to the inch. The figuring must all be made from the weft on a 3-and-1 warp twill ground.

Silk Designs.—Fig. 4.

Fig. 5 is a sketch for a dress cloth made with a 2400/2 net silk warp, and shot 100 picks of tram to the inch The black should be weft worked up in graduated storm effect; the grey figure should be 7-and-1 warp satin, and the ground 3-and-1 warp twill Fig. 6 gives a portion of the sketch worked out on draft paper.

Fig. 7 is a sketch for piece goods made with a 2000/2 net silk warp, and shot with 90 picks of tram. The figure should be made from the weft, and on a 4-and-1 warp satin ground. The shaded effect should be run from the 4-and-1 warp satin to 4-and-1 weft satin.

Fig. 8 is a design for silk damask. The warp should be an 1800/2 net silk, and shot 110 picks of tram to the inch. The figure should be weft, on a 3-and-1 warp twill ground. The ground inside the figure should be 4-and-1 warp satin, which will give a change to the ground and stand a little above it.

Worsted Spinning.

By M. M. Buckley

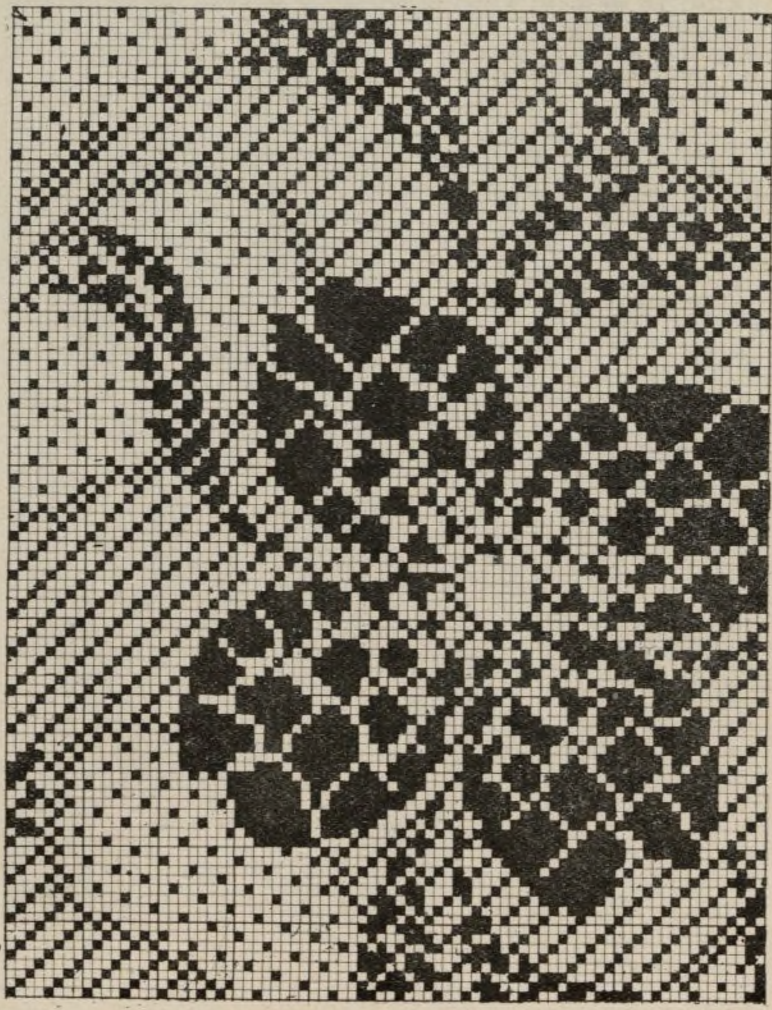
(Lecturer on Worsted Spinning at Halifax Technical School).

(Continued from page 155.)

When dealing with the parts of the spindle and their effect upon the tension and winding, we observed that the stationary spindle and cap were responsible for several defects.

Silk Designs.—Fig. 5.

Numerous efforts have from time to time been made to remedy this, but have only been attended with a certain measure of success. Probably the

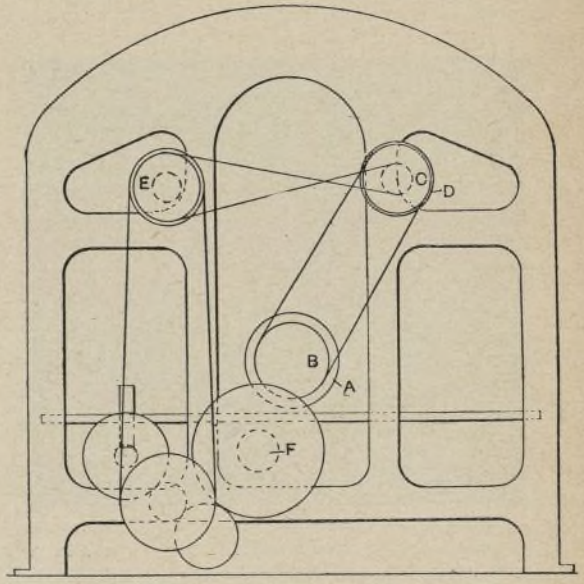


Silk Designs.—Fig. 6.

best of these is one in which the spindle is modified somewhat upon the flyer principle, and given a rotary motion which is governed by the lifter motion, so that its speed is dependent upon the position of the traverse or the size of the bobbin. It has been shown that with a small barrel and a large stationary cap the tension is so great that it is necessary to run at a slow speed, and consequently, if the friction set up between the moving end and the cap edge were overcome, it would be possible to increase the turnoff materially. The conditions which obtain render it necessary that the spindles and caps shall have a differential speed so as to neutralise the variation caused by the different diameters of the bobbin and secure uniformity in the tension. In the case of ordinary spools a somewhat different relation exists from that where double-ended bobbins are

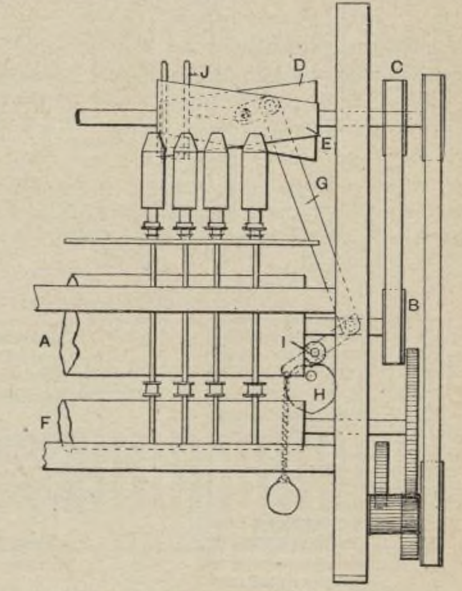
Fig. 7.

made. In a single traverse the end is transferred from one extreme diameter to the other, each succeeding layer, after the head is formed, being precisely similar to the previous one in its requirements until the bobbin is full. In double-headed bobbins the tension varies with each traverse, gradually decreasing as the bobbins increase in size. Similar conditions exist in the cap frame to those in cone drawing—viz., the end is rotated at a differential velocity around the cap, hence a similar mechanism can be used. Figs. 77, 78, and 79 show the end elevation, the front elevation, and plan respectively. An additional cylinder is used to drive the spindles, being turned from a pair of cones. The traverse of the cone strap is obtained by a crank lever carrying a pulley which runs on the heart. The arrangement of the tubes and lifter plate is similar to the ordinary frame, as is also their driving, but the spindles are lengthened, their base resting in a footstep bearing in the bottom rail, similar to the flyer spindle. A is the main or driving cylinder, and upon the same shaft a pulley B is fixed which drives by a belt the cone pulley C on the cone D. E is driven by a belt from D, and by a strap and train of wheels actuates the spindle cylinder F. Since the cones are set opposite each other, any alteration in the position of the cone strap will change the speed of F. The arrangement is such that the spindles are given their greatest speed when the yarn is being wrapped on the smallest diameter, and gradually decreased as the opposite end of the traverse is reached. H is the ordinary heart; but here is another modification in the driving of the lifter, it being driven from the cone which turns the spindle cylinder, and therefore having a similar variation. I is the loose pulley attached to the lever G, which is kept in contact with H by a chain and weight, consequently I, following H, actuates G, which through the link K causes the strap forks J to move backward and forward with each traverse along the rod S (Fig. 79). In making double-ended bobbins, only a simple end-to-end traverse is required, so that the motion must be stopped by sliding the worm out of gear and securing the shaft by means of two set screws, which ought to pass through the bracket. The rack must also be fastened, and unless this is carefully attended to the bobbins will run over the tops, clog the tubes, and may spoil the twist in some of the other bobbins. The chief points requiring attention are:—(1.) A proper setting of the traverse, so that there is no overbuilding, for where this occurs it invariably results in much waste and knots. (2) Accurate adjustment of the lifter plate, so that it is level throughout the length of the side. (3.) The setting of the caps so as to allow for any individual variation in the tube or caps. For this purpose the lifter must be brought to one extremity of the traverse, and each cap examined with the bobbin on the tube, to ascertain that the edge does not overlap the flange, or *vice versâ*. (4.) The tubes, where the bobbins rest, must be kept perfectly free from waste, and ought to be picked at each doffing, so that the bobbins occupy their proper position. Many spinners, owing to the trouble which often arises and the expense in skeps, carriage, and variation in weights, will not make spools. Still, they represent an important part of the trade, and every spinner should, if required, be able to make them.

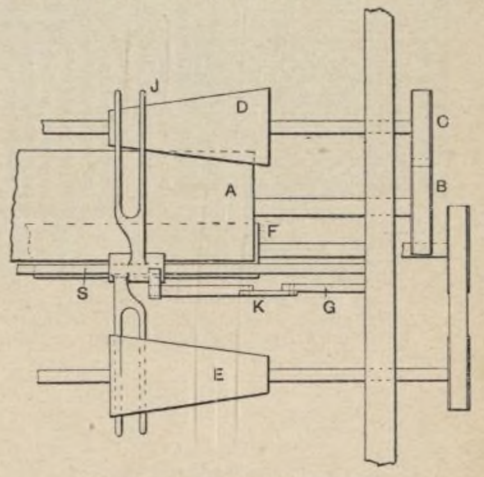


Worsted Spinning.—Fig. 77.

Assuming it is required to change from warp bobbins on to spools, the following features should be observed, because unless the bobbin be properly built it gives trouble to the weaver, who simply takes it out of the shuttle, throws it back into the skep for waste, and if this occurs frequently often refuses to use the weft. First, a suitable heart is necessary, $1\frac{1}{4}$ or $1\frac{1}{2}$ traverse, as considered best. It must be properly secured on the shaft, and if necessary packed to prevent slipping. Next, the loose pulley in the swing lever is altered, bringing it nearer the heart to allow both to run against each other. After this the rack is released. A long screw will be found at its base (which passes through an eye fixed to the long lever), on each side of which is a nut. These must be so set that the full effect of the rack is obtained. The importance of this is not generally understood, and consequently a small or soft head results, which does not weave well. The rack wheel winds up the rack in one revolution, and the nuts on the screw



Worsted Spinning.—Fig. 78.



Worsted Spinning.—Fig. 79.

Silk Designs.—Fig. 8.

must be set so as to ensure that a complete revolution is made—that is to say, if the bottom nut is too high, the rack cannot be wound up to the top, and is consequently out before the proper length to form the head is obtained. The motion must next be put into gear in order to lower the level of the lifter plate. If necessary, the caps should be changed and the spindles afterwards carefully set to the flange of the bobbin.

(To be continued.)

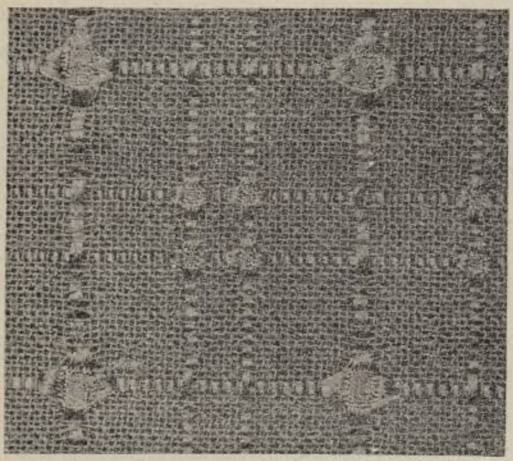


Fig. 177.

Fancy Dress Fabrics.

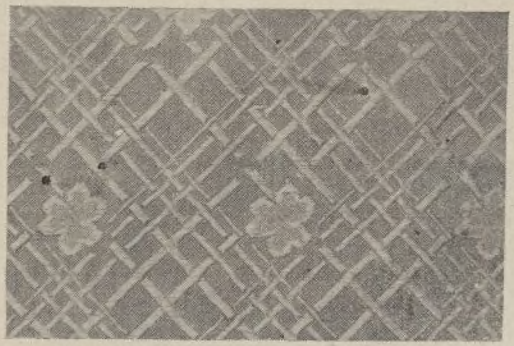


Fig. 179.

Fancy Dress Fabrics.—XVIII.

By G. Washington.

In the fabric illustrated by Figs. 177 and 178 advantage is taken of the great difference in the setting required for cord and plain weaves, to produce a fancy effect. The cords draw the silk threads and picks into compact masses, which occupy very little space. The plain weave forces them apart. The silk yarn floats over several threads and picks of the worsted fabric before weaving plain. This allows it to spread out over some of the worsted threads and picks, causing the square of plain silk to stand up prominently on the surface :—

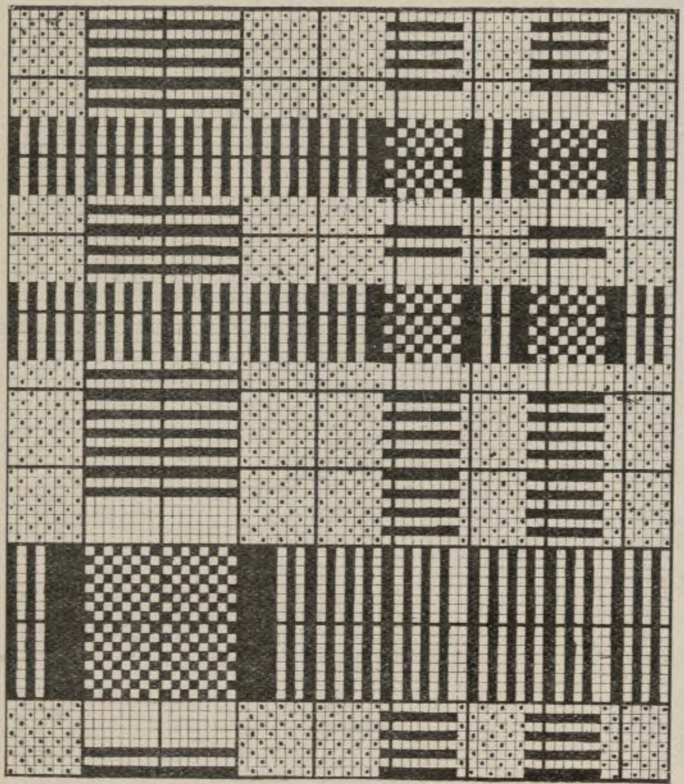


Fig. 178.

Fancy Dress Fabrics.

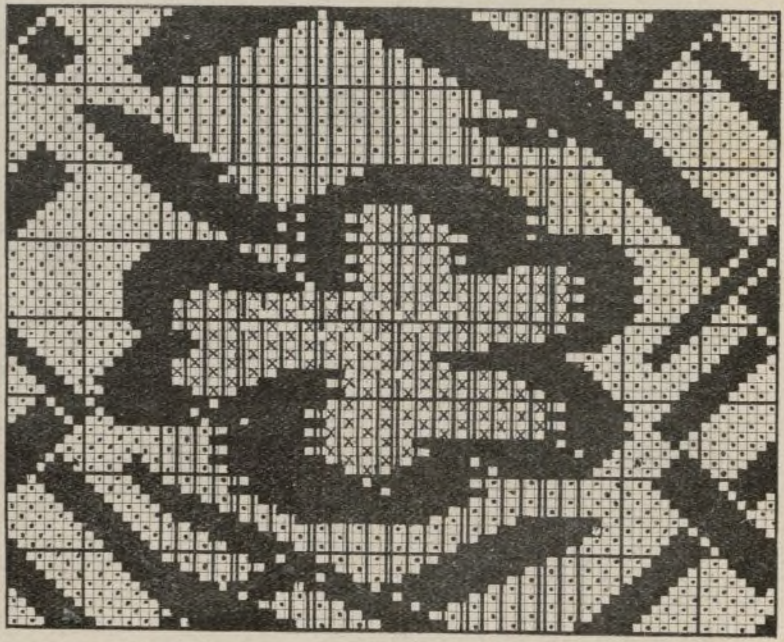


Fig. 180.

Warp.	*Weft.*
15 ends 2/48's worsted.	19 picks 24's worsted.
16 „ 60/2 silk.	16 „ 60/2 silk.
15 „ 2/48's worsted.	19 „ 24's worsted.
8 „ 60/2 silk.	8 „ 60/2 silk.
7 „ 2/48's worsted.	9 „ 24's worsted.
8 „ 60/2 silk.	8 „ 60/2 silk.
Worsted 2 in reed.	Worsted 36 picks per inch.
Silk 8 in reed.	
18 reeds per inch.	

Figs. 179 and 180 show the appearance and structure of a cotton fabric containing stripes of extra warp. The crosses in the design indicate where the extra white warp is weaving plain with the white weft to form the centre of the flowers; the round dots show where the cream warp is part of the plain fabric; the flowers are solid white on a cream and white ground; the long floats of weft form a smoother reflecting surface, and therefore appear more lustrous than the plain portions. The white warp is stitched to the back at the edge of the large twills, and the stitching of the cream warp is utilised to form veins in the centre of the flowers. The difference in width of the interlaced twills imparts variety to the trellis effect, and prevents it from looking stiff and formal :—

Warp.

21 times { 1 end 40's white cotton.
1 end 40's cream cotton. }
1 end 40's white cotton.
31 ends 40's cream cotton.
Cream warp 80 ends per inch.
White warp extra.

Weft.

40's white mercerised cotton.
72 picks per inch.

The cord fabric, Figs. 181 and 182, contains 8 solid weft spots in one repeat of the design, which is complete on 100 threads; another novel feature is the waved character of the cords :—

Warp.	*Weft.*
40's worsted.	40's worsted.
105 ends per inch.	80 picks per inch.

The repp fabric, Figs. 183 and 184, illustrates the effect of gradation and contrast in the size of the spots; the grouping of the figures into series of straight and curved lines, and the skilful manner in which the distances apart are proportioned to the size of the spots, all combine to make an effective design :—

Warp.	*Weft.*
70/2 silk.	30's worsted.
150 ends per inch.	55 picks per inch.

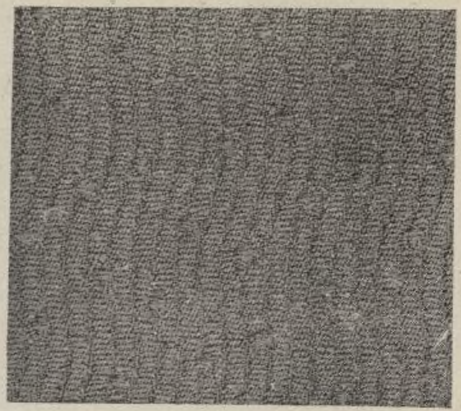
(To be continued.)

We learn that Mr. A. G. Green, the discoverer of primuline and various other dyestuffs, has retired from the chemical management of the colour works of the Clayton Aniline Company, with which he has been connected for the past seven years. He has had a long and intimate acquaintance with the textile industries, and has now established himself as a consulting chemist and expert upon colouring matters and their application.

Cotton Fibres in Spinning and Manufacturing.—V.

By W. I. Hannan.

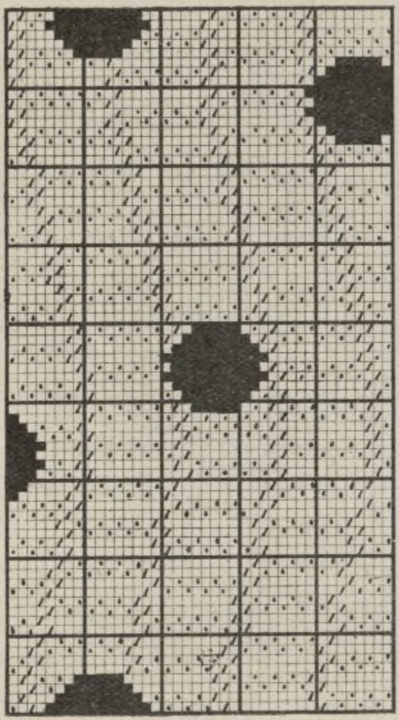
Fibrous defects in a piece of cloth are often accompanied by impurities in the twist or weft which have not been removed in the processes of spinning. These are sources of imperfections in the structure of the back and face of the goods which show up conspicuously on the surface of the weft or warp, whichever may predominate in the build of the cloth. Of all varieties of cotton goods, perhaps none show up these defects more plainly than sateens. In a weft-faced sateen cloth the covering must depend upon the structure and build of the weft, any interruptions on the face, such as slubs, motes,



Fancy Dress Fabrics.—Fig. 181.

snarls, cloudiness, or a want of ooziness in the weft material, showing distinctly. Slubs show up as soft, woolly, bead-like prominences, but differ from motes in being of the same colour as the weft. They arise from shorter fibres than the bulk of the weft mixing. Snarliness in sateen yarns is a serious defect to the face covering. A looped snarl will at first stand erect on the face. If the cloth is pressed it may lie down, but the elasticity at the base of the snarl causes the loops to again rise, and so the defect is once more prominent. A very short chase in the build of the weft cop is often the cause of snarls in the cloth, and these are often composed of several loops, which by a little more drag or a longer cop chase might be obviated. Impurities in the wefts are detrimental to the structure and appearance of sateen goods. In many cases the motes are skilfully picked out, but often a small fragment is left. This, although small, will sometimes cause a little spot to penetrate the weft that may be awkward to dye at a later stage. When a sateen cloth is spotted with bearded motes from brown weft fibres, it is very difficult to pass it, even when a dexterous hand has touched it up. In such cases the treatment of the cotton has been faulty, and the onus of such defects ought to be brought home to the spinner, who has not only made a bad selection in buying, but has allowed the machines to be badly adapted to the cotton passing through them.

The differences that exist in raw cottons grown from the same species of plant can often be seen or felt by the person who is entrusted with the buying of the cotton. A firm's reputation, although judged by the yarn it produces, is often of more importance than the price at which the cotton can be bought. Some cottons moderately charged with impurities can often be bought more cheaply, but it is a risky transaction when a clean and level yarn is required for a good make of sateen cloths. A round, soft, clean weft will give a good face on the cloth for levelness and glossiness by allowing the light to penetrate the surfaces between the twists; the cloth from such a weft is made much fuller, and any deviation arising from the weft may often be overcome by careful attention to the cotton mixings.



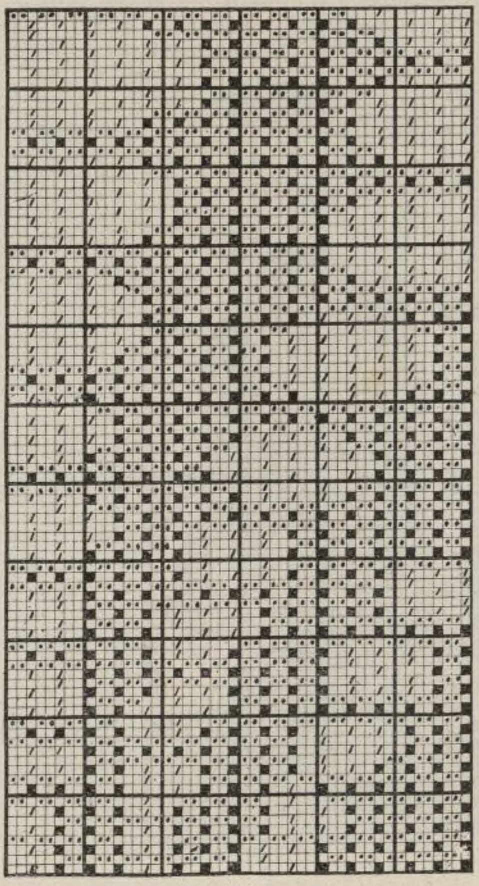
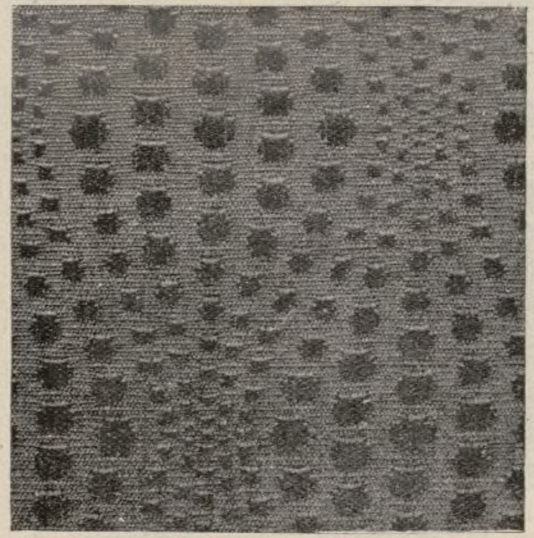


Fig. 182. Fancy Dress Fabrics. Fig. 184.

A want of ooziness in a weft yarn is indicated in the cloth by some of the weft threads being more lightly twisted than others, thus causing a streakiness on the cloth face. These are structural defects which are persistent, due to the fibrous build of the yarns, and which may often be traced to the blending of the cotton staples, which have little or no affinity for mixing together. A good sateen weft ought to be capable of covering the warp threads without a blemish. The faculty to produce such a



Fancy Dress Fabrics.—Fig. 183.

yarn is often centred in the skill of the cotton buyer. Such a duty is best carried out when a man is entrusted with the dual capacity of buyer and spinning manager. The question of inside managership has its good points, but the selection and mixing of cotton for a sateen cloth is perhaps best left to one individual, as the faults and remedy are then more easily understood. Brown wefts are much used in cloths for mercerised goods; the yarns require to be free from fibrous and spinning defects, such as cloudiness and unevenness. Any departure from these qualities, either in spinning or weaving, may result in the finishing of the cloth being defective.

Twist yarns, when used for drillettes, must be round, of good colour, and oozy enough to give a good warp face to the cloth. The size used should give a silky appearance to the face, and the yarns should be spun from cottons of a cohesive staple. The proportion of warp to weft is about two to one.

In the heavy goods trade, the cloth known as imperial or double sateen twill requires to be woven with a very level, round, and fulling weft, in which no diagonal lines of the warp threads are shown on the face. The counts used are from 14's to 30's twist, and from 20's to 30's weft. East Indian may be used for the twist mixing, and American of good colour and staple for the face weft.

It is essential to have an even shedding to cooperate with even wefts, also an even taking-up motion, with the least amount of sticking in the pacing motion. Indeed, too much attention cannot be paid to the shedding, picking, and beating-up of the weft to secure harmonious working of the loom in relation to sateens.

(To be continued.)

REVIEWS OF BOOKS.

Dyeing of Cotton Fabrics. By Franklin Beech. London: Scott, Greenwood and Co. 7s. 6d. net.

When the wide range covered by the cotton-dyeing industry is considered, this book at first strikes one as being of inadequate size, but a perusal of the first few pages dispels the idea, for the different processes are treated in a terse manner and in as few words as possible. The work is essentially more practical than literary, and appears likely to be of more value to the practical man or student than many a more voluminous publication. The structure and chemistry of the cotton fibre, treated in the first chapter, is followed by a description of the scouring and bleaching processes, and this in turn by dyeing machinery and operations. This machinery section has received a large amount of attention, and the different types of machines throughout the various processes are well described. The theory and practice of dyeing follows, direct dyeing, fixation with salts or developers, couplers, tannic and metallic mordants, along with the other methods in vogue, being treated in turn. The latter portion of the book is devoted to the dyeing of cotton in mixed fabrics and the operations following dyeing, winding up with chapters on colour testing and experimental dyeing.

Humidity in Cotton Spinning. By the late Sir Benjamin Dobson. Manchester: John Heywood. 3s. 6d. net.

This publication is a revised and enlarged edition of the original issue, having assumed its present form in the hands of Mr. W. W. Midgley, of the Bolton Meteorological Observatory, who was also responsible for the compilation of some of the statistics of the earlier edition. In its older form the book is well known; and although it met with a certain amount of unfriendly criticism at first, this was of a biassed nature, and due more to the ignorant suspicion of some of the operatives' union leaders. The book, however, is written with the dual aim of furthering the spinning properties of cotton and regulating the moisture in the air, to the advantage and health of the operative. The results, benefits, and limits of humidifying are discussed and amply illustrated, while the various humidifiers, testing instruments, and allied appliances are amply described. The book is not confined to English practice, but includes tests and information relating to almost all parts of the world.

We have also received:—Descriptive circular of the "Clipper" hinge belt fastener, from Mr. F. Mitchell, 55, Washway-road, Sale, describing a method where clips or hooks are inserted into both ends of a belt by a special self-measuring pair of pliers, and locked by a centre nail, making a joint very much like an ordinary hinge.—"Points on the Art of Steam Finishing," a small brochure on the subject of the title, and a companion to "Points on the Art of Finishing," issued by the same firm of finishing machinery makers, Messrs. Birch Bros., Somerville, Mass., U.S.A.—A series of catalogues from Messrs. John Hetherington and Sons Limited, Pollard-street, Manchester, respectively describing the recent developments of their "Self-acting Mules and Twiners," "Speed Frames," "Carding and Spinning Machinery" (for woollen and waste), and "Lap Machines, Heilmann Combers, Derby Doublers, Etc."—A neat leather-covered pocket-book, the fourth edition and 1901 issue of a useful compilation of tables, rules, formulæ, and other information, issued by Messrs. Mather and Platt Limited, Salford Ironworks, Manchester, for the use of all those connected with mechanical, electrical, and hydraulic engineering. The work is very tastefully illustrated, and, being printed on fine paper, brings a large amount of matter into a very small compass.—A descriptive pamphlet of waddings and underlinings from Messrs. Forster and Co., Douglas-place Mills, Annan, N.B.—Report of the Council of the City and Guilds of London Institute, Gresham College, London, E.C.

QUERIES AND REPLIES.

G. G. (Legnano).—"Size and Sizing Ingredients" (Monie) and "Finishing Cotton Goods" (Depierre).

R. S. C. (Glasgow).—We know of no such book, and would advise you to call in someone having a practical experience of such a plant.

E. M. C. (Nottingham).—"Factory Accounts" (Garcke and Fells), 6s., should answer all your queries. If not, write us, and we will try to assist you.

H. M. (Drogheda).—Hosiery dyeing is similar to hank and piece dyeing. See "Dyeing of Textile Fabrics" (Hummel), or "Manual of Dyeing" (Knecht, Rawson, and Lowenthal).

R. L. A. (Preston).—If you want small cuttings, write Messrs. Homo et Cie., 24, Boulevard Poissonnière, Paris; if lengths, call on any large draper; if quantities, Messrs. Rylands Limited, Manchester.

W. I. (Coalisland).—To convert grammes per metre (cloth) to ounces per yard, divide by 31; ounces per yard to grammes per metre, multiply by 31. The above refers to cloths of a common width. To convert grammes per square metre to ounces per square yard, divide by 23·7; ounces per square yard to grammes per square metre, multiply by 23·7.

T. H. B. (Rochdale).—The process for finishing flannels and hosiery to make them unshrinkable is far from satisfactory, it usually being better to mix a little cotton in the wool, or to use a wool of poor felting properties, like South American. The matter is treated on page 214 of the June, 1900, issue of The Textile Manufacturer.

R. E. T. (Roubaix).—We find that Yorkshire spinners seldom care to do a direct foreign trade, so should advise you to write Messrs. Deluis and Co., East Parade; W. and C. Dunlop, Peckover-street; or Edelstein, Moser and Co., Vicar-lane, all of Bradford, any of whom will be able to procure and ship the yarn for you. It is a very common kind of material, the pile being raised after weaving by a Moser or similar raising machine.

W. W. (Shipley).—The English cotton count (840yds. to the hank) is general in the United States, Germany, and Switzerland. In France the metric cotton count is most used (number of times 1000 metres go into 500grms.). The English worsted count (560yds. to the hank) is general in the United States. On the Continent, the international system (the number of times 1000 metres go into 1kilo.) is the most used, but there are other local systems in every country. Woollen has many methods, the run system being by far the one most adopted in the United States, the cut and grain systems being local. On the Continent nearly every district has its own method. Silk is numbered in England and the States chiefly by the dram system, and occasionally by the ounce system. The dernier system is general on the Continent, although the weight of the dernier slightly varies in some localities. Spun silk is usually reckoned as cotton, but in France and Switzerland it is calculated on the number of skeins of 500 metres weighing ½kilo.

THE TEXTILE MACHINIST:

Devoted to Machinery, Apparatus, Tools, Etc.

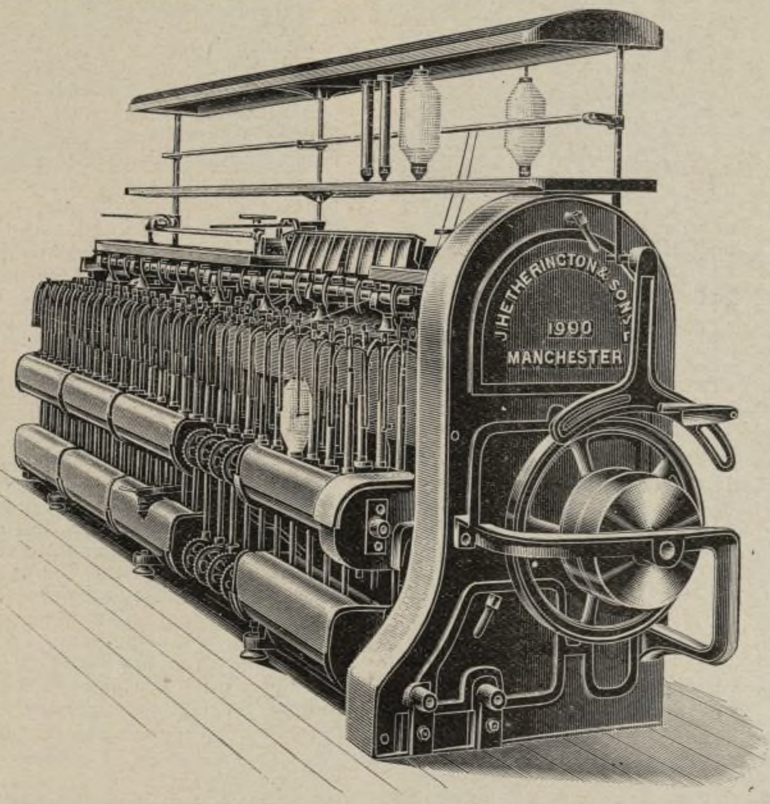
Improved Slubbing and Roving Frames.

MESSRS. JOHN HETHERINGTON AND SONS LIMITED, MANCHESTER.

THE large quantities of spinning machinery which Lancashire exports have led pessimists to prophesy the gradual loss of the industry. This was done years ago in regard to the cotton spinning and weaving industries, yet we have more spindles and looms in Lancashire to-day than ever before. Work is also comparatively regular and wages good—far better than in the same industries in other countries, when the cost of living is considered. The same will probably be the case with textile machinery. The purchasing power of most countries appears to be on the increase, and although machines are being made, and will continue to be made, in still larger quantities by the workshops abroad, there is room for the English machine maker, not only to hold his own, but to extend his output. The most important factor, however, by which the English textile machinist keeps and improves his position is the sterling worth of the machines turned out. Much as other countries have improved, the English makes are still the best, especially in the spinning branch. This position is established, for as time goes on machines are improved, and under the present rate of progress we seem to gain rather than lose in this respect, simply by a continual remodelling of machines and a perpetual application of improved devices.

The slubbing and roving frames shown in Figs. 1 and 2 are cases in point. It is a comparatively short time since similar machines were put upon the market by the makers—machines which appeared to meet every requirement,—yet an entirely remodelled machine has again recently appeared, containing quite a number of new features and improvements. The interchangeable principle which has been in use in some of their other machines has come into vogue here, too, and every part of the machine is stamped or has cast on it some well-defined letter or number by which an exact duplicate can be obtained without taking off the part in question.

The top rail is balanced by levers and weights in the revised machine, in place of the older system of using chains and weights. It was found that these latter threw the rail forward owing to being fastened at one side, causing the guides to bind in the slides, and the spindles to run heavily. In the new method there is a lever lying in the direction of the length of the machine, and pivoted in the spring piece. One end of this lever supports the rail directly under its centre, while the other carries the balance weight, which may be seen in Fig. 2. This arrangement allows the rail to move easily in the slides without any tendency to fall forward, and the spindles are left free. There is only a rolling contact between the lever and the rail, and therefore no appreciable friction; then, as the two arms of the lever are in a constant ratio to one another throughout the whole of the lift, there is no variation in the weight. It is not necessary for the lifter shaft to go between the spindles; it is placed behind them, and in that position allows of the bottom rail being easily kept clean. The top and bottom rails have polished steel covers, shown in Fig. 1, which protect the front, and, curving over at the upper edge, guard the wooden middle covers, also preventing the bobbins which are laid on the rail in anticipation of the next doffing falling off. The back rail covers have a similar edge to prevent the bobbins falling off behind, whilst both front and back covers on the bottom rail reach down to the floor, protecting the rack as well as preventing anything getting underneath.

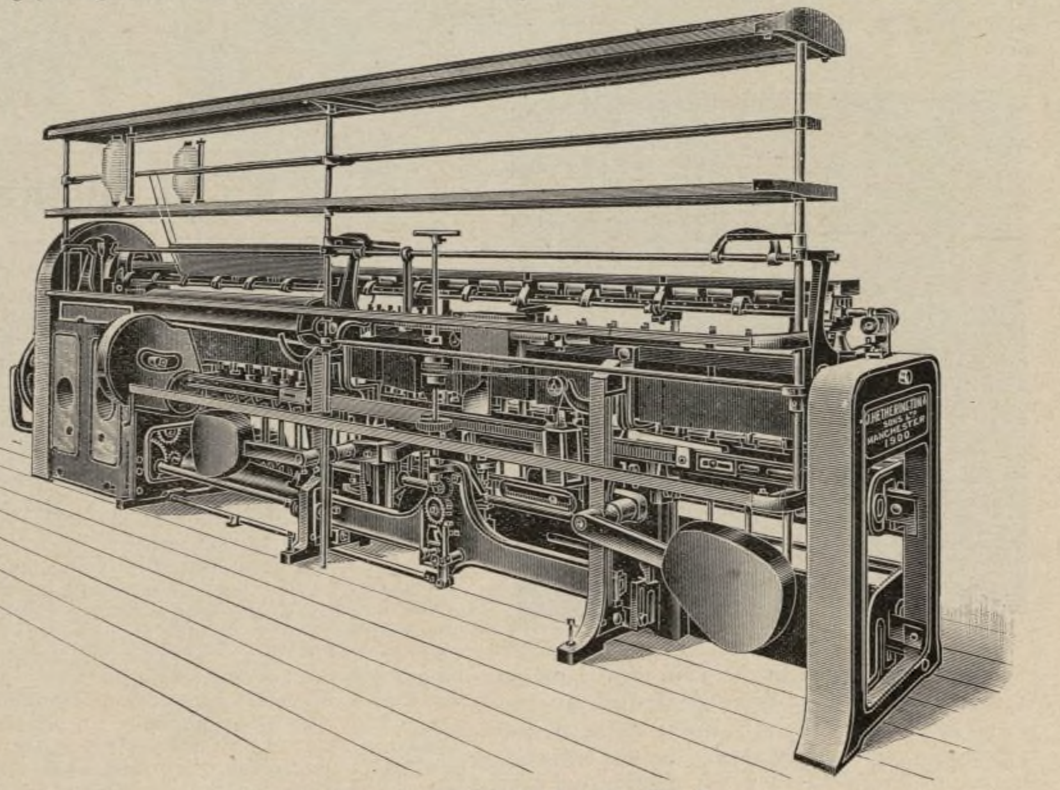


IMPROVED SLUBBING AND ROVING FRAMES.—FIG. 1.

The change wheels and other gearing at the back end of the frame are enclosed behind folding doors, whose fastening catch prevents the machine being started when they are open, and which also prevents them being opened while the machine is running. The arrangement inside is made on two systems—one like the system in the older machine, with the gearing raised and a front plate which also acts as a guard. This arrangement is not necessary with the folding doors, and the other system and the one recommended is where the gearing is built up on a floorplate—a method which gives much more room and greater facility for getting at the different wheels.

In addition to an electric stop motion there is a measuring motion which prevents the winding back of the cones until the proper length has been delivered, and which knocks off when the requisite amount has been spun. The cones have been specially revised, are of unusual length and diameter, run at a high speed, and are placed as far apart as possible to enable a long strap being used. The bottom cone is carried on a swing frame, and is lifted bodily when winding back, this being done by a lever which is in a convenient position in front of the frame, and is provided with a locking motion which securely holds the cone down and the strap tight.

Other motions have been more or less revised and improved, and the general use of machine tools—of which Messrs. Hetherington and Sons are among the largest English makers—has made it possible to finish the parts in a thorough and perfect manner without increase of cost. The more important wheels are cut out of the solid; other wheels are moulded and cleaned by machinery, and the various other portions of the machine are accurately bored, planed, or milled, so as to obtain an exact fit or a true running surface, according to the parts so treated.



IMPROVED SLUBBING AND ROVING FRAMES.—FIG. 2.

The Designograph.

THE DESIGNOGRAPH COMPANY LIMITED, 23, BANK-STREET, BRADFORD.

A COUPLE of years ago the daily papers were full of the possibilities of a Continental designing apparatus, the invention of a schoolmaster-electrician, by which it was prophesied that the human textile designer would soon become exterminated. The revulsion of feeling, when the meagre capabilities of the machine were discovered, and when its ingenious but very specialised powers were better understood, was only a repetition of what usually takes place when a partially matured idea is saddled with untested capabilities. This experience, however, far from proves that more practical aids—not substitutes—for the designer are not possible, and the apparatus about to be described appears to show in no ordinary manner how optical and mechanical ingenuity can be brought to the designer's aid, increasing his range of work, and curtailing the time spent in the more menial branches of the art.

The designograph is an apparatus for aiding in the creation of original designs, for showing up a single repeat of a design as it would appear repeated in the woven cloth, for arranging elements in the most artistic positions, and many other purposes which tend to improve and lighten the work of the designer. It is not claimed in any way as a substitute for the trained human hand, but nevertheless, in a large weaving mill it will greatly reduce the number of the designing-room staff.

The apparatus is shown in Figs. 1 and 2, being in this instance illuminated by electric glow lamps, although oil, gas, or other illuminant can be used according to their convenience. When closed, the apparatus is like a small side-table or desk, the top being either ground or plain glass, according as the operator is arranging as required, and again traced in its next position, until, in a few minutes, the pattern shown in Fig. 3 is produced. If this completed design is now placed in the position vacated by the original flower, and the ground surface glass placed in position, nine repeats of the design are seen, and it can be at once noticed if there is any tendency to stripiness, or if a cross-over or diagonal appearance is visible. Any faults in this direction—faults which the best designers are liable to make—may thus be remedied without waiting until cards are cut, and thus keeping a loom waiting until the fault is remedied.

be managed in the new apparatus by placing some flexible materials, such as pieces of string, thread, or ribbon, on the object glass inside the apparatus, and adjusting these as required. After trying this, it will be soon noticed that these articles will adapt themselves to natural and graceful positions, and that ungainly bends cannot be obtained except by forcibly bending or breaking. Fig. 5 is a simple design obtained on this principle, which in other ways has almost unlimited scope. Effects of a very original nature may be obtained by the arrangement of pieces of straw, wood shavings, metal shearings, paper

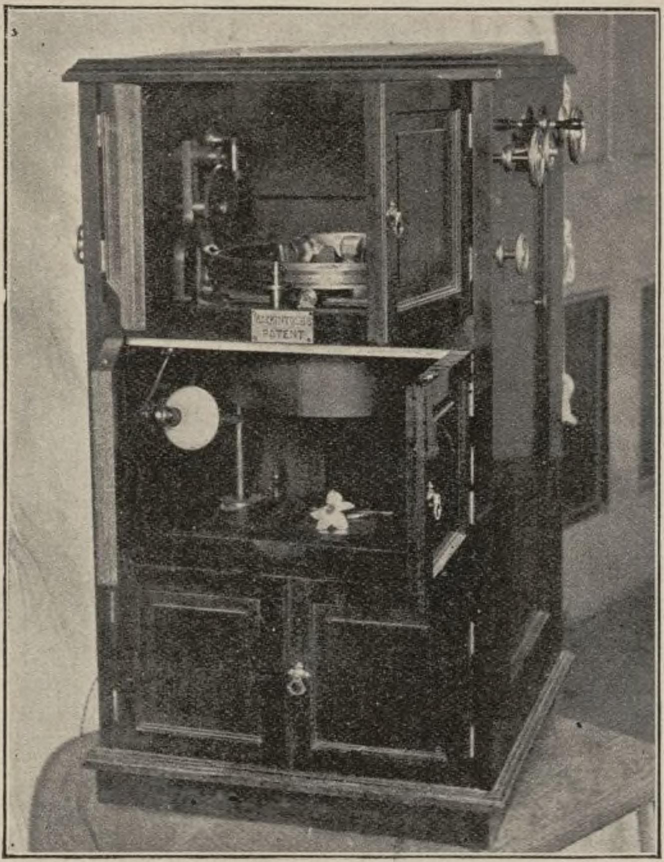


Fig. 1.

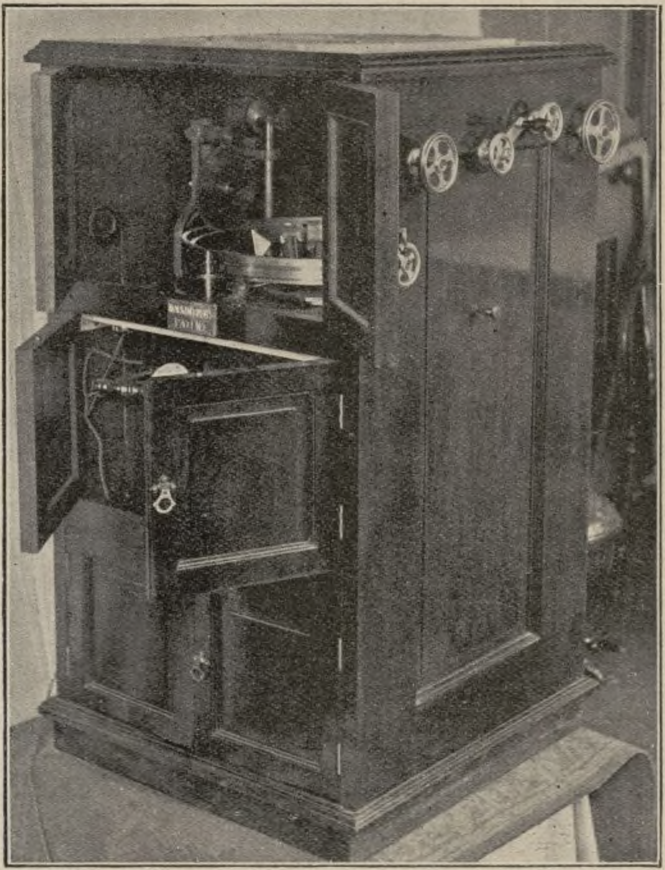


Fig. 2.

designs or tracing them. The centre or working portion of this glass top is movable in four directions in slides, which, provided with marked measurements, allow repetitions of a design being copied at an exact predetermined distance from each other.

The object to be reproduced on the surface glass of the apparatus is placed inside, in the place occupied by the white flower in Fig. 1. Immediately over this flower are nine lenses, which throw up the picture in nine repetitions on the surface glass, and give an exact representation of how nine repeats (3 × 3) would appear in the woven

When objects are viewed by transmitted light, the effect seen on the surface glass is naturally of a shadowgraph character, and this is very often all that is required. The apparatus is, however, also able to transmit the image by reflected light, in which case a lamp in the same compartment as the object being viewed (as shown in Fig. 1) takes the place of the lower light. Naturally, the resultant image is not so strong as by the other method; but a cover, open on one side for the head of the operator, is drawn over the designograph, when the object is seen on the surface glass in all its natural colours, every line and shade

edge trimmings, and all manner of everyday commonplace objects, which make novel designs in themselves, or which can be used as ground or background effects in more elaborate patterns. Of course, it is unnecessary to trace all the parts of each object shown, and broken or sprinkled effects, similar to those illustrated in Fig. 6, may be obtained. Other examples of general work are given in Fig. 7.

One great advantage derived from an apparatus like the one under discussion is the artistic material which may be accumulated in slack times for adaptation in the pattern season. Objects may be

Fig. 3.

Fig. 4.

Fig. 5.

cloth. The mechanical arrangements make it possible to quickly adjust an object to any required size of design, and the flower or other base can be rapidly increased or decreased in size, or turned into any position.

For instance, an ivy flower is used as the unit in a design. It is placed inside the designograph, and its image is thrown on to the surface glass by transmitted light from a lamp inside the lower compartment of the apparatus, the doors of this part being shown closed in Figs. 1 and 2. A five satin arrangement being desired, the tracing paper, faintly ruled into 5 × 5 parts, is placed on the surface glass (plain in this instance), and the figure traced. After one position is so traced, the original flower is turned

being distinguishable. It is by this method of using reflected light that designs like the rose portions in Fig. 4 are obtained, the tracing process being just the same. The leafy portion of this design was added after the roses were drawn in, using either transmitted or reflected light. It will be readily seen that where a design is successful it can be quickly varied without losing its general appearance by using different background figures or other secondary elements

When originating running designs, it is no easy matter in ordinary practice to obtain curves which are graceful in their individual outline, and at the same time artistically placed in their relation to each other. This can easily

traced in various sizes and different positions ready for building up into composite designs. Others may be traced on celluloid or other transparent medium, and then, placed inside the apparatus, retraced in tilted or bent positions. Tracings may be made of flowers and leaves at different periods of development, and these may be put aside for use in seasons when such flowers and leaves are unobtainable.

So far, the design is only in the form of an ordinary sketch or drawing, and what is usually the most laborious part of a textile designer's work has not been commenced. This is the working out on point or design paper, a process which is made much more easy by the simple apparatus shown in

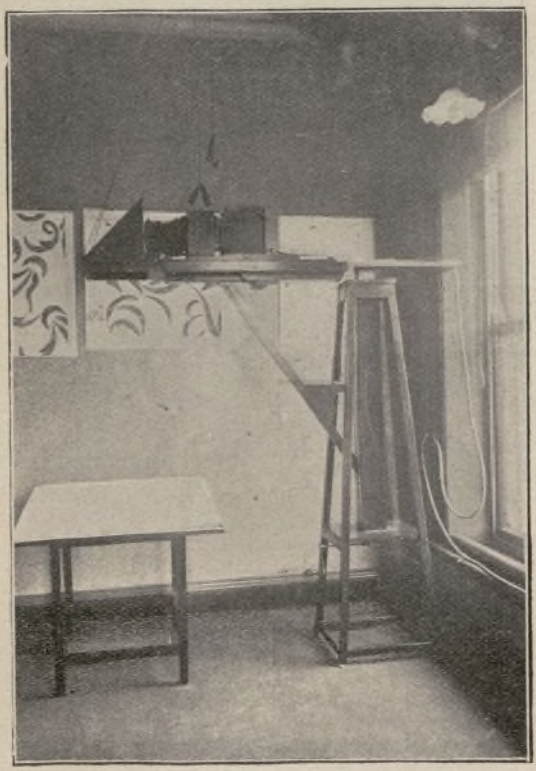
Fig. 8. This is very similar to a photographic enlarging apparatus: the sketch (on tracing paper) is placed in position inside a suitable slide, and the image, transmitted through the lens to a mirror set at an angle of 45°, is reflected down on to the point paper, which is pinned on the table below. Ordinary paper of the usual size is used, and by screwing the apparatus up or down by the handle shown, it is possible to adjust the size of the reflection to the number of squares covered by the design. This adjustment can be so accurately gauged that it would be possible to employ design paper ruled twice as fine as the smallest usually used, and still adjust the reflected image to the exact thread.

This system obviates the large amount of measuring and planning usually necessary when transferring a design to point paper. The image is clearly defined on the paper, and all that is required is to run over the lines with a pencil—work which almost any lad can do. At the same time, shaded portions or inner lines may also be traced, and the design is ready for the paint brush. There is no doubt that this system will be a vast help to the designer and fancy textile manufacturer; there are no revolutionary changes in the processes commonly used, but the advantages are of a definite, useful, and, what is more to the point nowadays, practical nature.

Fig. 6.

Fig. 7.

The Designograph.



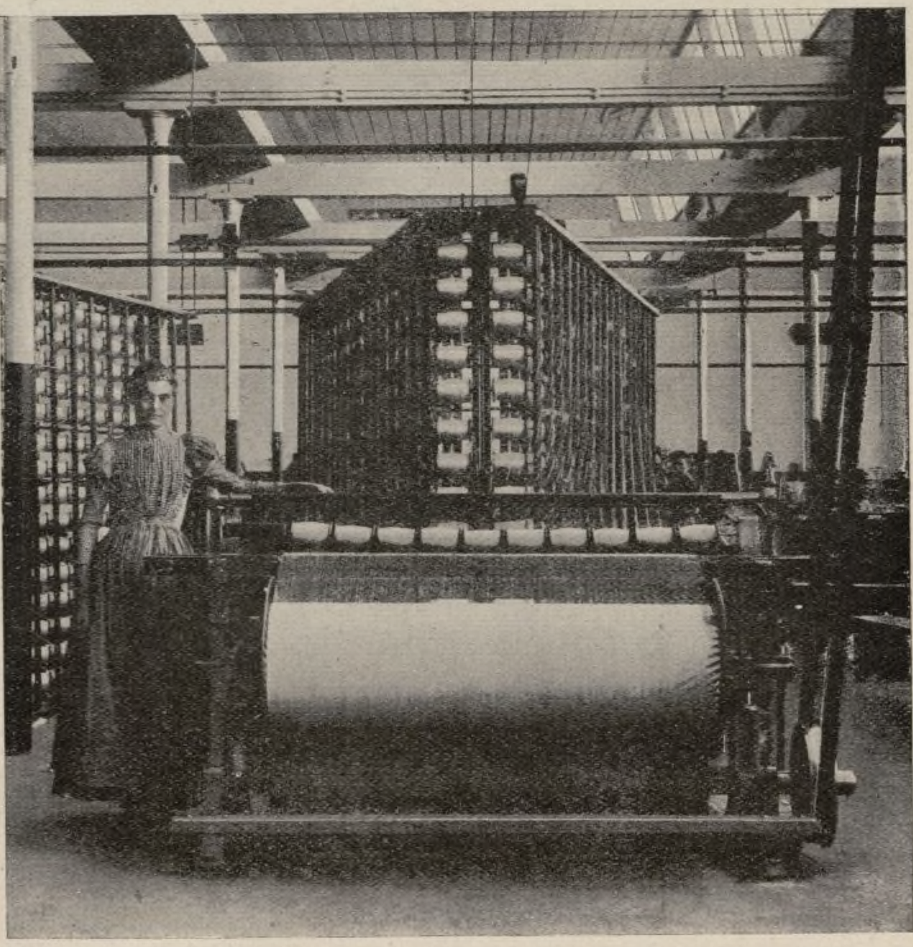
The Designograph.—Fig. 8.

Improved Swivel Bobbin Creel.

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

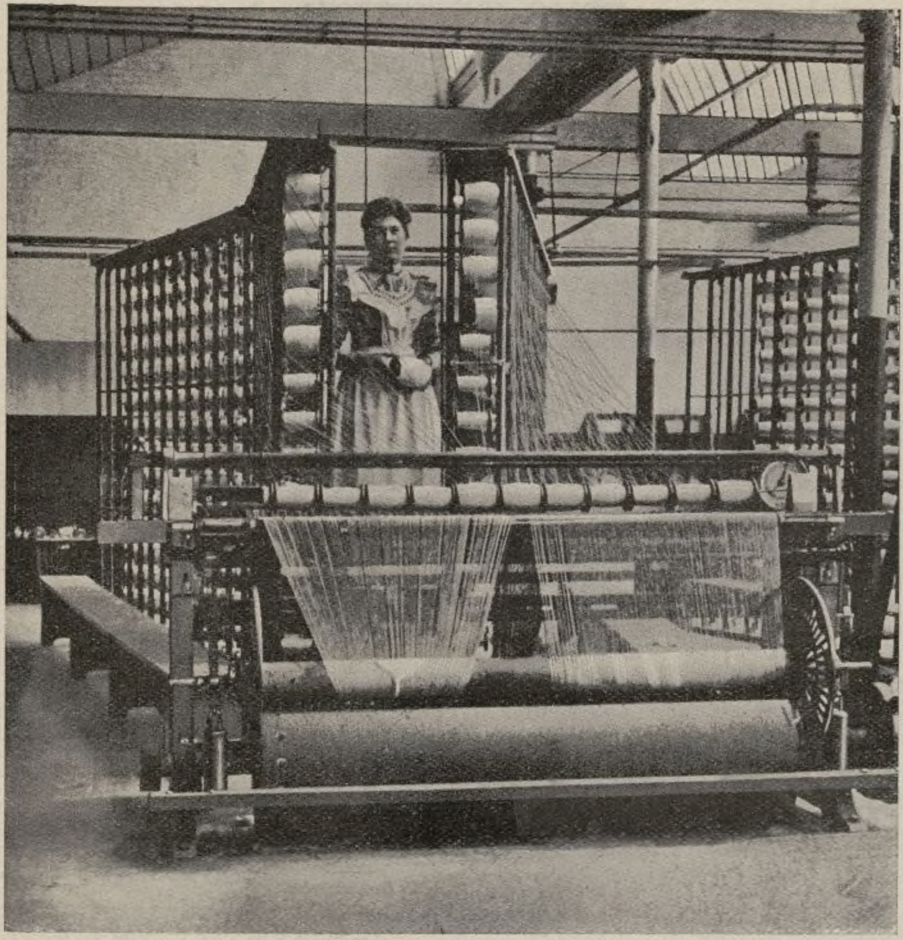
THE ordinary V creel for warping machines has held its own in face of the many inventions which have been advanced to displace it, and for holding a large number of bobbins it appears to have no rival. It has one or two disadvantages, and the chief of these has been the difficulty in charging the bobbins at the narrow part nearest the warping machine, the confined space making it very difficult for the creeler to replenish the bobbins in this part. In addition, the confined space frequently causes the creeler to drop a bobbin, which generally falls through the threads below, breaking them, and thus causing needless loss of time.

To obviate this difficulty a very simple yet effective change has been made in the creel. One of the V-shaped sides is made in two pieces, the larger part fixed as usual to the floor, whilst the smaller part—a portion about a yard long, near the apex—is movable on hinges so as to be opened at will. This action opens out the pointed and narrow end of the creel and gives space sufficient for the creeler to easily and quickly pass inside and change her bobbins; in fact, under the new arrangement the same facility is given for changing bobbins in the narrow end as in the wider one. When the creeler wants to change the bobbins in the closed end of the creel, all that is necessary is to simply lift up the small connecting rod which connects a top and bottom catch lever, and thus release the loose side. The attendant then pushes out the released side by foot or hand, and the released part opens out. To close the creel again, all that is required is to pull the swivel part back again, when the catch levers fall and the creel is again rigidly closed. In front of the movable part of creel is fixed a wire which opens out the yarn



Improved Swivel Bobbin Creel.—Fig. 1.

when the creel is opened. The improvement will be better understood by reference to the accompanying photographs. Fig. 1 shows the creel closed and in a position where the usual difficulty of changing the bobbins at the narrow end is experienced. Fig. 2 shows the improved creel with the hinged portion opened out. This hinged portion is mounted so as to be firmly and rigidly held whilst the machine is at work, and a catch lever is conveniently placed, both to facilitate opening, to restrain the portion from opening too far, and to hold it firmly in position whilst open. When the hinged portion is closed for working, the creel in Fig. 2 assumes the usual position, as shown in Fig. 1.



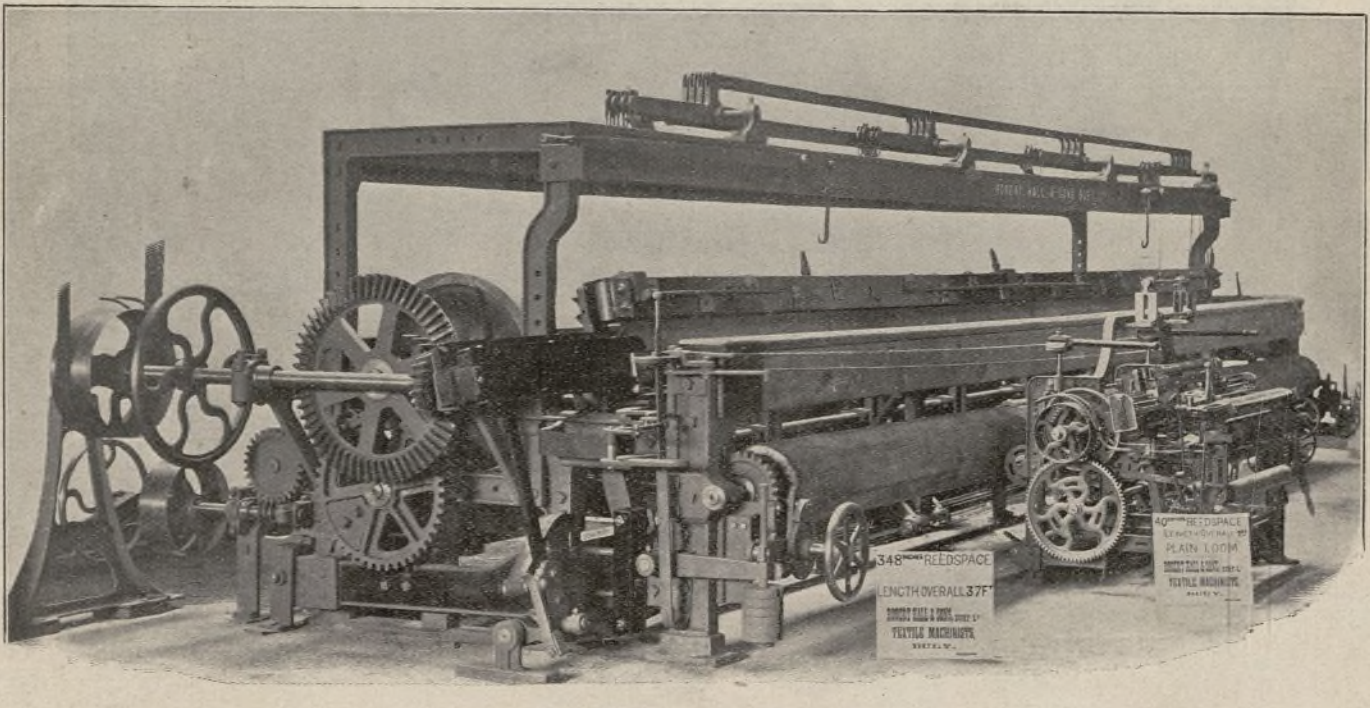
Improved Swivel Bobbin Creel.—Fig. 2.

Apart from the general convenience which the new arrangement gives to the creeler, there is a saving of time every time bobbins are changed in the narrow portion. The time so saved is really the difference between that necessary for the slow cramped motions in the closed creel—the proximity of other bobbins and ends necessitating cautious and slow work—and the free-and-easy work accompanying the improved system. The time saved at every operation may only amount to seconds, but when multiplied by the number of bobbins changed per day, the result is such as to show the economical advantages accompanying the new creel.

The Largest Loom in the World.

MESSRS. ROBERT HALL AND SONS (BURY) LIMITED, BURY.

WHAT is claimed to be the largest loom in the world, and which has just been built at Bury, is a machine which is interesting, not only for its gigantic size, but for the mechanical devices which it has been necessary to adopt for weaving cloth of abnormal width. The reed space is 29ft. (348in.), while the total length of the machine is 37ft., the weight being twenty tons without warp. The width from front to back is 11ft., and all other dimensions are of similar proportions. Its size will be better imagined by a glance at the accompanying illustration, which is a photograph of the loom taken alongside an ordinary calico loom of 40in. reed space.



The Largest Loom in the World.

It is only natural that certain modifications of the ordinary loom are to be expected, and the most important is one which is necessary to allow time for the shuttle to travel from end to end of such a long shuttle-race. For this purpose the usual cranks are omitted, and in their place a special kind of cam is used, which causes the reed to give a sharp blow when beating up, but which holds the lay almost stationary during picking. Of course, a short connecting rod and a low crankshaft usually give similar results in an ordinary broad loom, but the difference is far from being sufficient in a loom of the width of the machine under discussion. The requisite rigidity is given to many of the long parts by means of stays and tie rods. The jacks or levers for lifting the healds are quadruple, being actuated by tappets of unusual size. A special arrangement has been necessary for raising the hand-rail or slay top, and as much as possible has been done to make easy to handle what would otherwise be a cumbersome machine.

The loom has been made for Messrs. Thomas Hardman and Sons Limited, of Bury, to be employed for weaving the woollen dry felts used in paper making. It is only about a foot longer than the loom hitherto considered the largest, which was built by the same makers, and which is now running at Stubbins, in the works of Messrs. Porritt Bros. and Austin. This latter is 28in. reed space, and is followed by other looms in different places, which range from 26ft. reed space downwards.

Machinery at the Glasgow Exhibition.—II.

THE firm of Messrs. Hutchinson, Hollingworth and Co. Limited, of Dobcross, are showing a fast-running loom for weaving tweeds and similar heavy goods. It is the well-known Hollingworth and Knowles open-shed type, with a 90in. reed space, capable of weaving goods up to 82in. wide. There are four boxes at each end. The dobby takes sixteen shafts, and the positive take-up motion is also actuated from the dobby. This loom, which is shown in Fig. 6, has been built under the system adopted at the Dobcross Works about a couple of years ago, which we described recently (September, 1900), and is of special interest as showing a loom built on the same lines, as regards delicate exactitude, as the highest classes of engines or machine tools.

Messrs. G. Hattersley and Sons Limited, of Keighley, who were the first to make power looms for the Bradford trade, and who still hold the premier position in that district, show three looms which are widely representative of the weaving industry. This remark is, however, rather previous, for one of the looms exhibited is yet in its infancy, none of its class having yet been adopted on a commercial scale in this country.

This is the self-shuttling or automatic loom shown in Figs. 7 and 8, and which embodies features which should go a long way towards leading English manufacturers to look with more favour on this class of machine. On the failure of the weft the loom is stopped—that is, the weaving parts of it,—the spent shuttle thrown out, a new one placed in position, and the loom again restarted. All this is done without manual attention by a simple arrangement of a clutch mechanism which requires little, if any, more attention than the parts of an ordinary loom. While the belt is on the loose pulley a pap wheel is brought into action on the low shaft, on which are four tappets. One of these raises the front of the shuttle box, and the others in turn eject the exhausted shuttle, place a full shuttle in the box, and restart the loom. The loom shown has 36in. reed space, and makes 185 picks per minute. It is also provided with a warp stop-motion. This consists of a brush which, extending across the warp, catches the broken thread, operates the stop mechanism, and also indicates the stoppage of the loom, this being necessary to draw the weaver's attention when sixteen looms (the possible number) are being tended by one person.

The heavy loom shown, suitable for tweeds, worsteds, and similar fabrics, is illustrated in Fig. 9. It has four rising boxes at each end, these being capable of moving from the top to the bottom without vibration, and each side working entirely independent of the other. The method of operating the boxes is comparatively new, being only adopted a little more than a year ago. The loom makes about 90 picks per minute, has 90in. reed space, and is worked on the under-pick principle. The shedding is done by a positive-tread open-shed dobby, in which the draw knives traverse parallel with the radius of the swing baulk, thus reducing friction and giving a steady movement to the healds. The dobby is independently operated, and may be timed to lift early or late as the weave in hand may require. The card cylinder can be automatically reversed when necessary. A worm take-up motion is used, and also a worm let-off for the

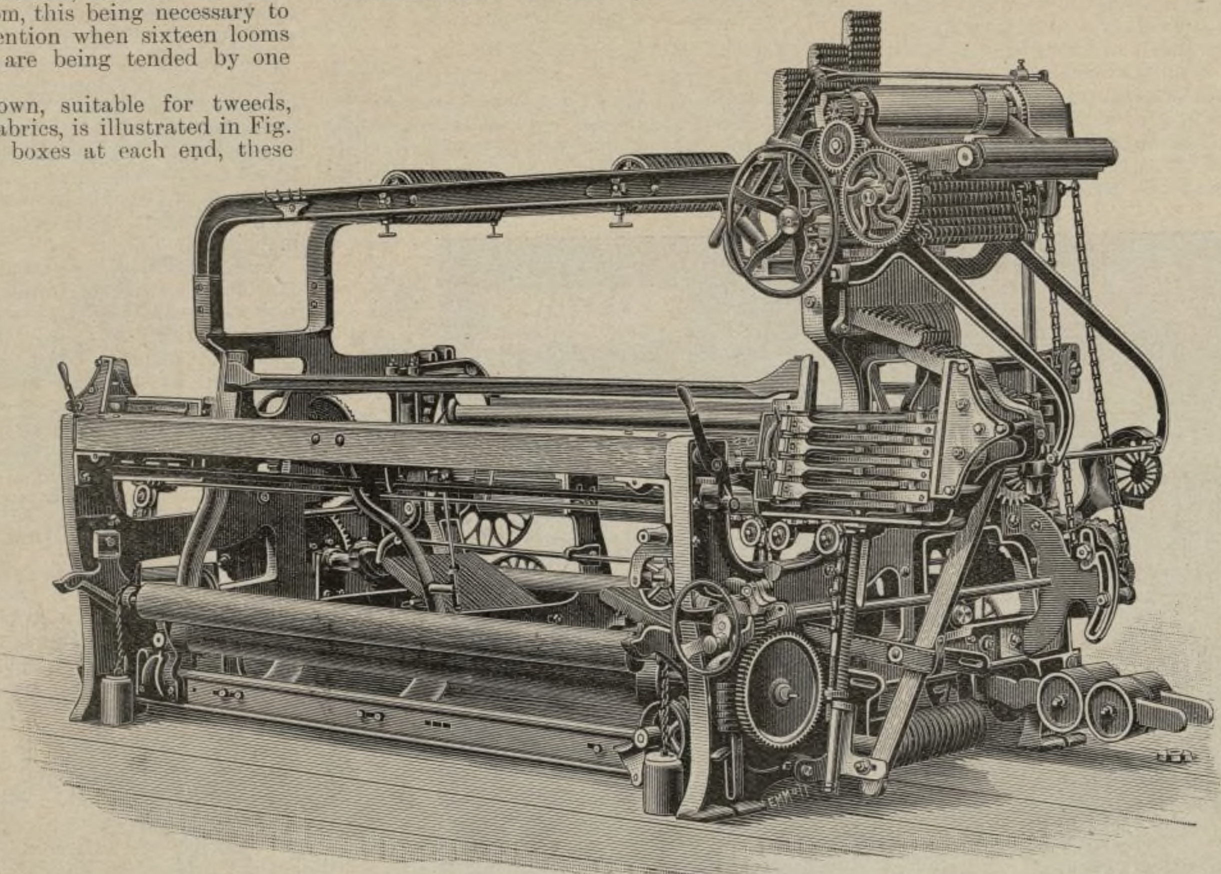


FIG. 6.

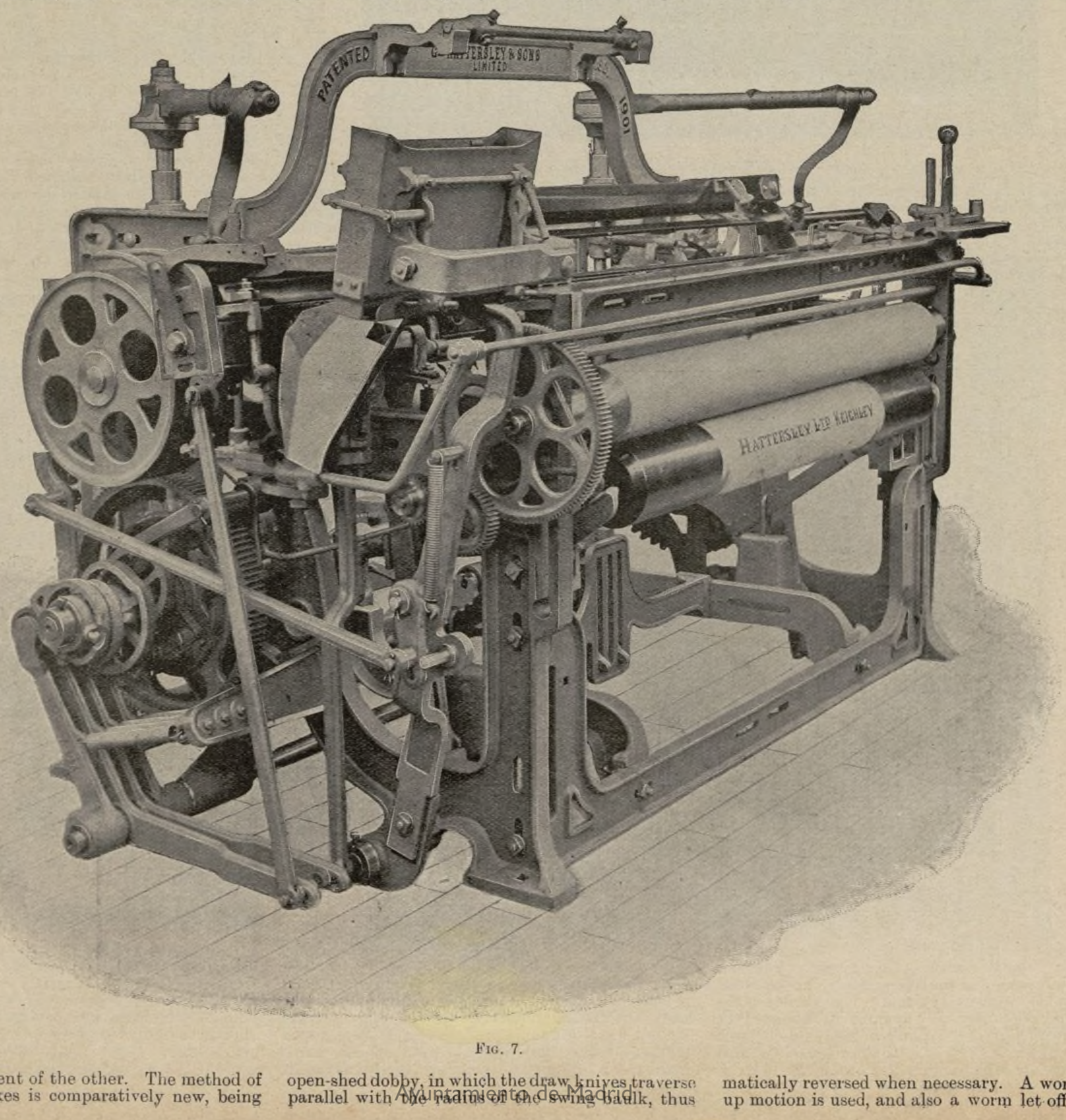
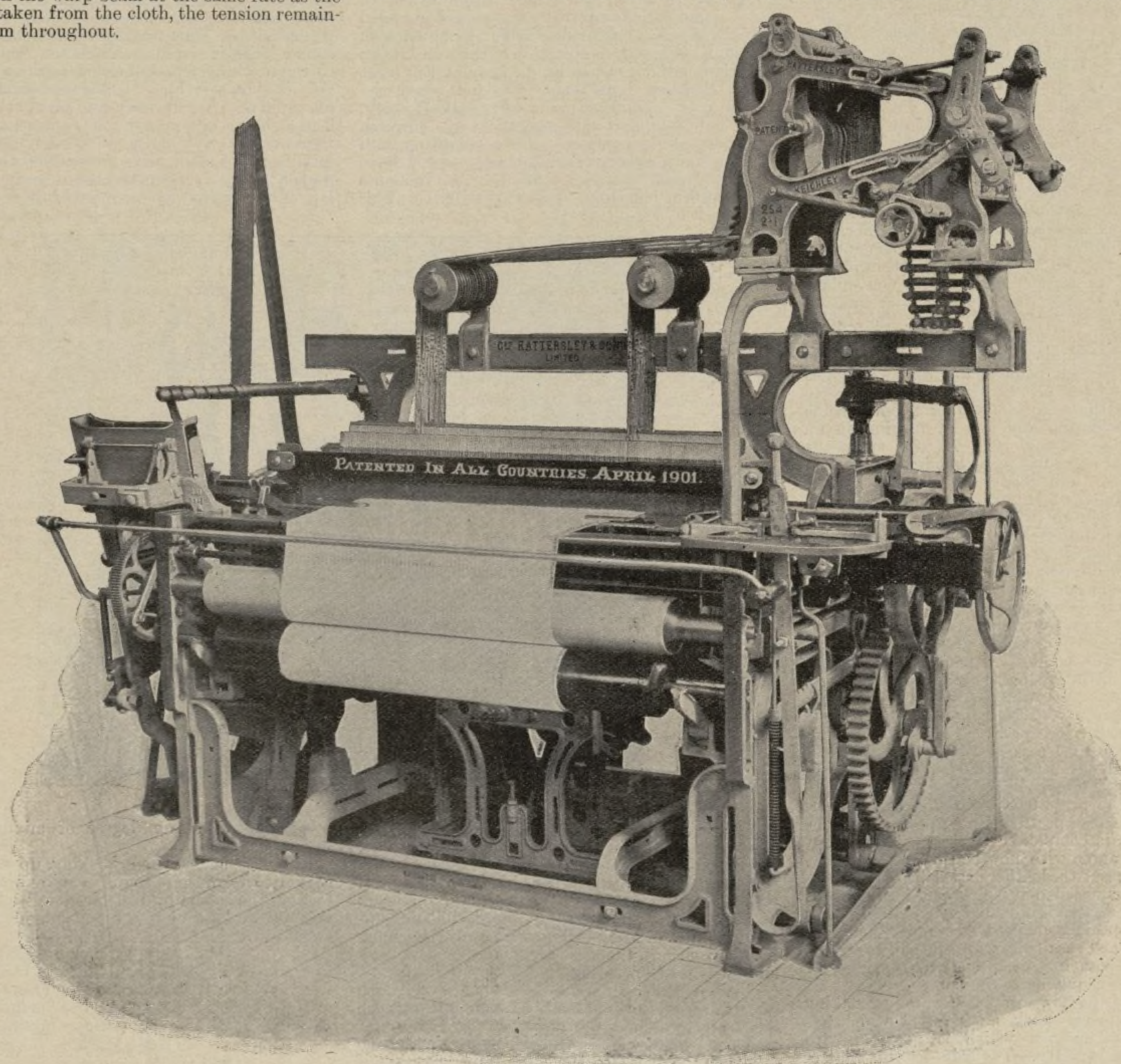


FIG. 7.

two warp beams; both are supplied with a reversing motion. The box, picking, take-up, and let-off motions are controlled by the dobby, so that when it is necessary to pull back with the card cylinder reversed, the shuttles remain stationary in their respective boxes, the cloth is let-off, and the warp rewound on the warp beam at the same rate as the picks are taken from the cloth, the tension remaining uniform throughout.



Machinery at the Glasgow Exhibition.—Fig. 8.

Fig. 10 illustrates the light rising box loom suitable for light and medium checked goods. This machine, which is supplied with a box motion at one end similar to the one just described, has 40in.

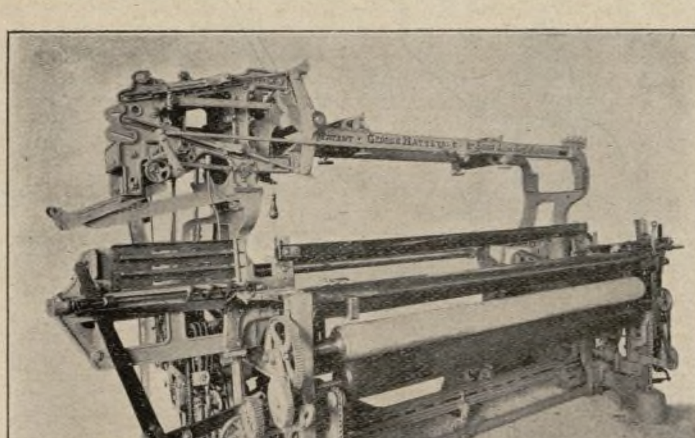


Fig. 9.

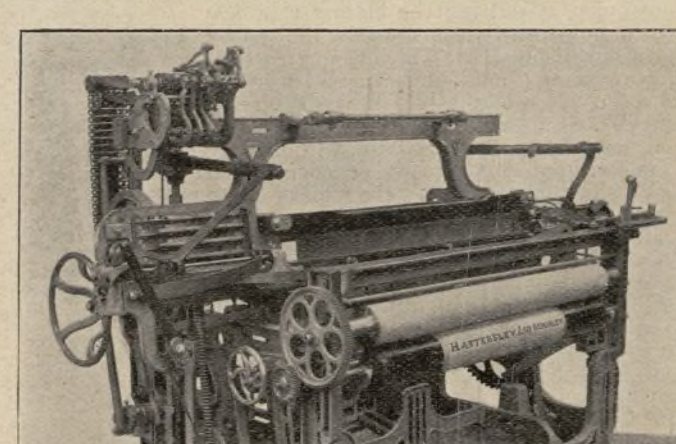


Fig. 10.

Machinery at the Glasgow Exhibition.

reed space, and runs at 185 picks per minute. The box motion is supplied with a card-saving arrangement, which curtails the length of cards that would sometimes be necessary.

(*To be continued.*)

The Manufacture of "Teon" Belting.

During recent years the introduction of substitutes for various natural materials has undergone a radical and noticeable change. The substitute of the last decade was suggestive of shoddy, and was naturally looked upon with distrust and suspicion, but the substitute of the present day is, in many cases, equal to the natural article, and in some cases vastly superior. It is needless to point to artificial dyes, artificial indigo, and numerous other industrial products now in use which are superior to the natural article to prove that substitution is a word frequently synonymous with progressive improvement. It is also unnecessary to observe that in the interest of ordinary economy the introduction of manufactured products in place of those supplied by Nature is frequently essential, if only on the score of adequate supply and reasonable cost.

The opinion is largely held, especially by manufacturers who go on year after year without innovation or improvement in their system of working, that leather is the only economical and reliable material for belting used in the transmission of power. Until well on in the nineteenth century this was practically correct, but it is now understood that good as leather is under normal conditions, it will not long resist excessive damp or heat or the fumes of chemicals—conditions which are found in very many instances in various industries.

After many trials and tests on a large practical scale it began to be recognised that the composition used by Messrs. Fleming, Birkby and Goodall Limited, Halifax, in the manufacture of their "Teon" belting withstood almost every extreme of heat, moisture, or fume, and the makers decided, a short time ago, to lay down a modern plant for its manufacture in large quantities. On the 18th ult. the new works at Fleetwood were opened, and we then had the opportunity of inspecting the various machines and processes, and of putting the belting to different and excessive tests.

The chief feature in the making of the belt is the composition with which it is impregnated—a composition which, after once setting, resists the action of almost any element without losing its flexibility or tenacity. The basework of the belting is a thick cotton web, woven from the class of fibre which has been found strongest and best for the purpose. This fabric is first calendered in the usual manner, and thoroughly impregnated with the cement or composition referred to above, the machines for decorticating the latter standing in a convenient position in the same room. After impregnation and cutting to the required width, the fabric is passed through an ingenious contrivance which folds it into the number of layers required for the thickness of the belt being made, and which also determines its width. In this folding it is so arranged that the edge of the fabric comes inside the folds, preventing any risk of fraying in an after-process or during use. At this stage the size of the belt is readily seen, but it is as yet in a loose condition and ready for passing to the sewing machines, which, arranged in a row, work on the same belt in different positions. By this convenient placing of the machines a belt receives its different rows of stitches without having to be pulled back or otherwise handled more than once, going in loose at one end of the room, and issuing fully sewn from the other.

The belt is now practically complete so far as workmanship is concerned, but the composition, which up to this point is rather soft, requires to be set. The belts are passed in lengths through a long hydraulic press which, with its six plungers, exerts a pressure of 2000lb. to the square inch. At the same time the press is subjected to great heat—in fact, a heat excessively greater than the belt will be required to sustain when running in any kind of factory or works. Each length remains in the press a stipulated time, and the belt is gradually pressed in sections until the 500ft. length is completed.

A great trouble with new belting, not only the cotton kinds, but the leather article, is the stretching which occurs when it is first put into use. In the present case this is obviated by passing the belt through a specially-devised stretching machine, and it is claimed that this treatment will so stretch a belt that it can be put to work and be used for years without requiring taking up.

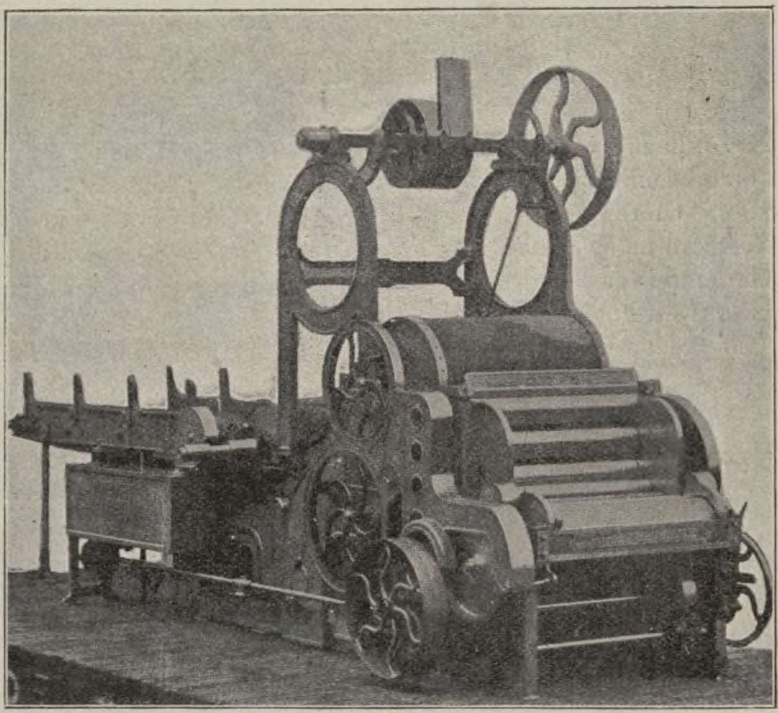
A section of the new works is devoted to making belts for motor-car work, an industry which has lately sprung up, but which is growing with extraordinary rapidity. The belts for this class of work are required comparatively light and small, but must be specially strong for their size. They are made in a very similar manner to the usual type of "Teon" belt, but are stitched with copper wire of square section, the stitching being practically equivalent to riveting.

Whilst inspecting the new works, we also had the opportunity of putting the belting to a few tests, which, however, were necessarily limited by the time at our disposal, but which were greatly in excess of anything found under actual working conditions. A piece of the belting was subjected for a time to a jet of steam from the high-pressure boiler; it was also boiled in water, without any effect, and without the cement or composition showing any inclination to allow the folds of fabric to separate. A piece was subjected to a flame, but to all appearances it was not affected any more than a piece of metal would have been. The only change which excessive dry heat has is a slight softening of the composition, but the belting is in this way made more pliable, without any tendency to crack, either during the presence of the heat, whether regularly or intermittently applied, or after the normal temperature is regained. This feature is of undoubted utility for use in drying rooms, hot flues, and under other conditions of a similar nature, whilst the steam and boiling test covers the chief disadvantages met in dyehouses, washhouses, and other departments. There was not time to give the belting a prolonged test as to its resistance to acids, alkalies, and chemical fumes, but we saw pieces of the belting which had been specially soaked in strong solutions of caustic soda, ammonia, acids, and lubricating oils for twenty-four hours, and which showed little or no deterioration after such treatment. These tests would decompose many other materials, and conclusively show the value of the belting in positions where there is a risk of it being attacked by fumes or splashed by chemicals or oil.

Preparing and Baling Cotton in Round Bales of Uniform Lap.*

By John R. Fordyce.

Although this article on the baling of cotton in round bales of uniform lap is the result of requests for information and reports from those who are engaged in creative work, this process is not so much of a creation as it is of an adaptation of the well-known and tried methods of handling cotton at the mills to the Southern gin-houses. Having stood the test of over a hundred years of constant work, these mill methods and machines are, through evolution, almost perfect, and in adapting mill methods and machines to gin-house work, I have made only such changes as different requirements or less skilful handling seemed to require. This machine and method are the result of six years of study and work, during which time I have built six different machines, each successive one an improvement over the other. I have designed, watched the building, the loading on cars at the shops, and the far more difficult unloading on a country siding, with only the most primitive means, the erecting, and then the days and months of operating, under the most difficult conditions which different classes and conditions of cotton would bring about. I have unrolled the bales and watched the effect on the cotton of various changes which seemed necessary. I have followed the bales to the mills, and have heard their condemnation and their praise, and at first the praise was not frequent.



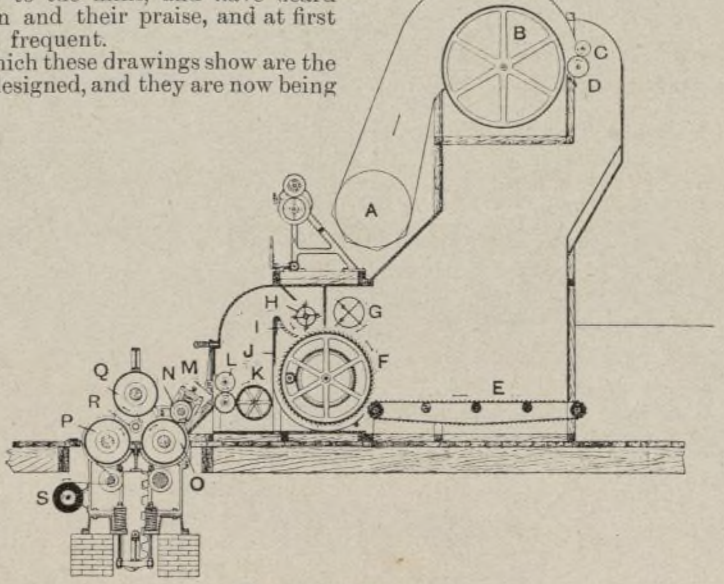
Baling Cotton.—Fig. 1.

The machines which these drawings show are the last which I have designed, and they are now being built. The photographs show last year's work, but they are near enough like the present ones to be of use in helping to understand the present one. A brief description of the process of handling cotton at the mills will enable you to understand the objects and the need for the method of handling cotton at the mills. The first treatment of cotton is the mixing of the different grades to form a uniform stock. The next is beating out the dirt and making the cotton up into round laps. These laps are taken to the cards, and in them the fibres are drawn out, straightened, arranged parallel to one another, and then formed into a loose yarn. After that the yarns are combined and subjected to further drawing and twisting together until the thread is made.

The mixing of the square bale cotton is now done by hand by breaking up the bales and spreading one grade over the other—and a long and tedious process it is. The mixing of cotton put up in round bales is done by machines, which several cotton machinery manufacturers are now building. One is shown in Fig. 1. Several round bales are mounted on a moving belt and unwound together. These bats, one above the other, are beaten together by a rapidly revolving beater, thus mixing them much more thoroughly than can be done by hand. The mixed bat is wound up into a lap, and if desired two or more of these laps can be mixed, so that any degree of mixing can be obtained.

It is customary when working up square bale cotton to form three round laps by breaking and feeding the cotton into the first, and then beating this up and forming the second, and then the second into the third. The third lap goes to the cards. All this beating and lapping is to get out dirt, motes, and trash, and to form laps which do not vary greatly in weight per running yard.

The object of the round bale method is, first, to make automatic or perfect mixing possible; second, to furnish a bale which is put up, kept, and handed over to the mills in such a clean state that so much cleaning is not necessary, thus avoiding the expense, waste, and damage to the cotton. To accomplish these results, the bales must be uniform in grade, the bats must be as nearly uniform in weight as it is possible to make them, and the compression of the bales must be such that the cotton is not knotted or caked by over-pressure, but yet dense enough to make it a desirable package for transportation.



Baling Cotton.—Fig. 2.

Following the round and square bales back from the mills to the plantations, and contrasting them

* A paper read before the American Society of Mechanical Engineers.

we find that the round bale arrives at the mill entirely protected by the bagging, without wires or hoops, and clearly marked, so that it can be traced back to its origin. The tare is only 1 instead of 6 per cent., as in the old square bale with its iron hoops and gaping coarse bagging, which does not protect. The waste in dirt, imperfect seed and damaged lint, amounts to 5 per cent. more in the square bale. In the round bale all of this waste is left at the gin-house, so that no freight has been paid on it, nor has the mill paid for it. The grade of cotton has been improved so much that the owner realises more for what he sells. The round bales are put on a mixer, and the resulting laps can go directly to the intermediate lapper, thus saving the cost of the automatic feeder and breaking lapper, and using only about half of the power of the picking-room, increasing the production and decreasing the mill waste.

Transporting and Warehousing.—Next in importance to having a perfect bale for the mill comes that of having a bale which suits both the transportation lines and storage companies. At present the crop is about 10,000,000 bales. Of this, 65 per cent. is exported, 20 per cent. worked in Northern mills, and about 15 per cent. in Southern mills. The crop is gathered and baled in about three months, while it takes twelve months to work it up. The round bale has a density of 35lb. per cubic foot, while the square bale has only 25lb. when compressed. Ships, cars, and warehouses will hold about 40 per cent. more round than square bales of cotton. The round bale, being better covered and having all air pressed out of it, makes the fire risk less. Owing to the method of making a square bale, the air mixed with the fibre is pressed in the bale, so that if it catches fire the spark will eat its way into the bale and burn for weeks undiscovered. Last year the great Hoboken fire was started by a square bale of cotton bursting into flames on the dock. Every year cargoes of square bales catch fire at sea, and great damage results. The above considerations have caused a reduction on ocean freight of 25 per cent. in favour of round bales. The insurance in transit and storage is 35 per cent. less than for square bales.

At the Gin.—The round bale is made and pressed simultaneously. The square bale is made at the country gin, and then taken to a compress point, and its bulk reduced by powerful presses, weighing about 300,000lb. The round bale press weighs only about 15,000lb., and its bales are denser than the compress bales by about 10lb. per cubic foot. The secret of its work is that it presses the cotton in detail, forcing out the air as it goes, and then holds what it gets, while the square bale is crushed down all at once by the powerful ram of the compress. The entrapped air is compressed but not expelled. The round-bale press requires more power to run it than a square-bale press at the country gin, but the cost of the covering for a round bale is a great deal less than the covering for the square bale, so that the cost of a completed bale is only slightly greater than that of the square bale. The ginner who operates the press becomes a compressor, and receives the rebate paid by the railway companies for compressed cotton. Bales are sampled as they are made, and the samples numbered to correspond to the number and name on the bale, and guaranteed to represent the bale. A better price can be paid the grower, because his bale contains more cotton and less tare.

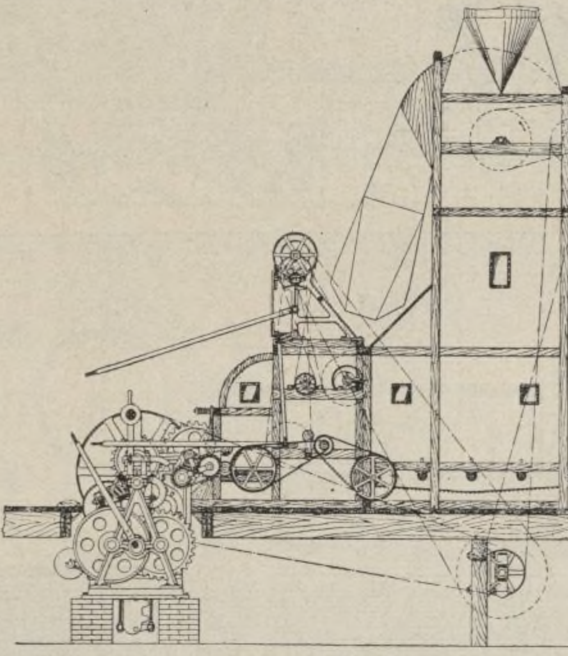
By all of these savings it is estimated that about 16s. per 500 pounds, or £8,000,000 per year, could be saved to the South, were this system used exclusively. The compress owner and others interested in the old square bale are, of course, doing all in their power to retard the round bale growth, but the advantages of the round bale system are real, and in the end must prevail.

The Process.—The cotton fibre grows as a protection to the seed of the plant. It covers the seed, and several locks of fibre and seed are enclosed in a woody hull. When ripe, the hull splits open, and the soft milky fibres are dried and blown out by the wind. The fruit near the ground on the stalk ripens first, and that above in succession, until the last is killed by frost. For this reason, cotton cannot be gathered all at once, but the fields must be picked over and over again by a discriminating hand. Dirt, leaves, hulls, etc., are picked along with the fibre and seed; sometimes the cotton is wet. Upon reaching the gins, it is necessary to dry and clean this seed cotton, and then tear the fibre loose from the seed. This is called ginning, and the gin machinery, with some improvements in detail, remains just where Whitney left it at the beginning of the last century. In brief, a gin is a gang of circular saws 10in. in diameter, mounted about ¾in. apart on a shaft. These saws revolve between ribs which are set so close that a fully-matured seed cannot be drawn between them. The teeth, shaped something like a rose thorn, drag off the fibres. A revolving bristle brush takes the fibres off the teeth, and makes air pressure enough to blow the lint through a pipe to the condenser. An average gin plant consists of four gin stands of 70 saws each, feeders, flues, condensers, and press, engine and boiler. The machinery described in this paper begins at the common flue of the gins, and continues through the press, or final gin operation.

Fig. 2 is a cross section through the condenser, lint receptacle, bat former and press. Referring to the drawing, A is the flue through which the cotton is blown from the gins to the condenser; B is a drum covered with wire cloth; air and dust escape through the meshes of this, and the cotton is carried over as a thin bat to the rollers C and D, which wipe it off the drum and press out some of the remaining air, and then drop it on the apron E at the bottom of the cotton receptacle. This apron moves slowly up to the revolving picker wheel F, which wheel is going rapidly, and carries the cotton up and under the roller G. This roller has teeth, which protrude when they get opposite the picker wheel, and recede on the opposite side. The function of these teeth is to knock back and prevent too much cotton coming over at a time, and to keep the cotton from getting thicker on one side than the other: they are controlled by eccentrics on either side of the machine. A beater H brushes the cotton off the picker wheel and throws it over into the bat former J. This wheel makes a separation of the motes or imperfect seed which the gin saws have drawn through the ribs; these motes fall through the grating I, and are carried by the wheel back under the apron E, where they are cleaned out at intervals. The cleaned lint cotton in small flakes is thrown over and falls on the rollers K and L. The roller K is made of wire cloth, to allow dirt and motes to fall through it. The cotton is drawn between these rollers, and then between rollers L and M, where it receives a preliminary compression. These rollers detect the thickness of the bat, and if it is too thick or thin, a shifter is moved which either slows or quickens the speed of roller K, the picker F, and the apron E. In this way the thickness of the bat per yard is kept very nearly uniform.

The gins are continually choking and stopping, and the supply of cotton, if taken direct from them without holding a reserve supply in the receptacle, will cause at times a variation of 25 per cent. in the weight of the bat. The speed-regulating mechanism is so arranged that it will stop the feeder, if the speed gets too fast, which would indicate, of course, that there was not enough cotton in the hopper to make a standard-weight bat. It is better to have a break in the lap than to have it too thin, although it is usual to stop the press also, and thus avoid breaking the bat. The bat on leaving rollers L and M is drawn between the small roller N and the press roller O, thence round the core R. The surface of the press rollers is going about 20 per cent. faster than the surface of the rollers L and M, thus the fibres are straightened out to a certain extent. The bale is made between the press rollers O, P, and Q, and around the core R. As the bale grows in diameter, the roller Q rises.

When the bale is finished, the supply of cotton is stopped, and the bagging from the reel S is fed around the bale, then pinned, and cut off. The roller Q is raised, and the bale taken out. A new core is put in, and the supply of cotton started again. During the covering and taking out of the bale—which takes about a minute—the gins have been running on and the cotton accumulating in the hopper. This gives the reserve supply of cotton necessary to keep the bat even. The bale outside the press has its core pulled out, the bagging sewed up, and is then weighed and marked.



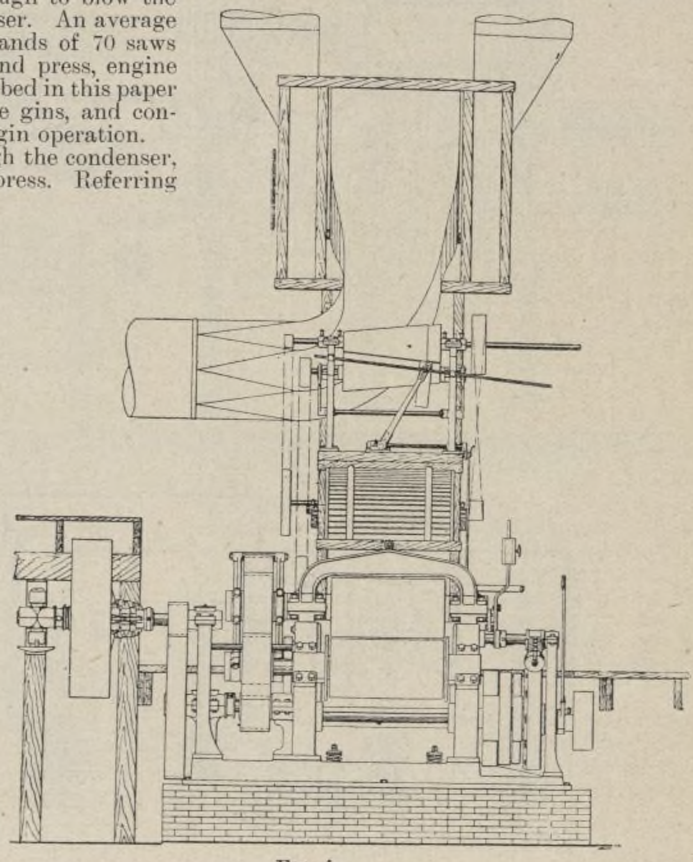


Fig. 3. BALING COTTON. Fig. 4.

The speed of the rollers is figured to give the bat a weight of 2½lb. per yard, and depends, of course, on the number of saws in the gins.

Description of the Machinery.—The lint flue which connects the gins to the condensers is made of sheet iron, and provided with gratings and dust boxes to take out as much dust, dirt, etc., as possible. The condenser consists of a screen drum with open ends connected with the open air by dust flues, which conduct the air which has blown the cotton from the gins and the dust outside the gin building. The drum revolves as shown by the arrow, and thus constantly presents a clean surface to the blast of cotton and air, and acts as a carrier of the cotton to the two small doffer rollers. These wipe off the cotton from the drum. The drum and rollers are driven by one chain, as indicated by Fig. 2. The cotton hopper, feeder, and bat-former consists of an endless apron which is driven by the spiked picker roller, as is shown in the drawing. The spiked picker is driven by a belt from the variable speed cones, shown in Figs. 3 and 4. The roller K is also driven from the spiked picker. A decrease of speed affects all three alike: the cotton is brought up slower, carried over slower, and fed to the compression rollers slower. Thus, not only is the supply slowed up, but the cotton already in the bat-former is drawn out and thus thinned. If the bat is thin, the reverse is the case. The regulating roller G has two sets of double-ended teeth which protrude from the roller at each side, and are so flexibly held that it is possible to make those on one end protrude more or less than those on the other end of the roller. The extent and place they will protrude are regulated by eccentrics on either end of the roller; thus it is possible to prevent the bat running thicker or thinner on one side than the other. The speed of this roller is constant.

(To be continued.)

2000 I.H.P. Triple-expansion Mill Engine.

THE CRIMMITSCHAUER MASCHINENFABRIK, CRIMMITSCHAU, SAXONY.

ALTHOUGH, owing to the general adoption of electrical power transmission at the late Paris Exhibition, no mill engines, as such, were shown, the advances made by Continental builders as exhibited in the engines driving electrical machinery were very generally commented upon by those who had an opportunity of comparing Continental with British mill-engine practice. After carefully making such a comparison, we are constrained to admit that while many of the German, French, and Swiss engines shown appeared unnecessarily complicated, the best designs exhibited a combination of elegance and strength that it is difficult to improve upon; while in regard to economy and cost of upkeep these engines show to equal advantage. A feature of the Continental mill engine is the almost universal use which is made of drop-valve gear, which, in spite of its apparent complexity, gives an excellent distribution of steam, close regulation of speed, and much greater durability than it is customary to assume in this country.

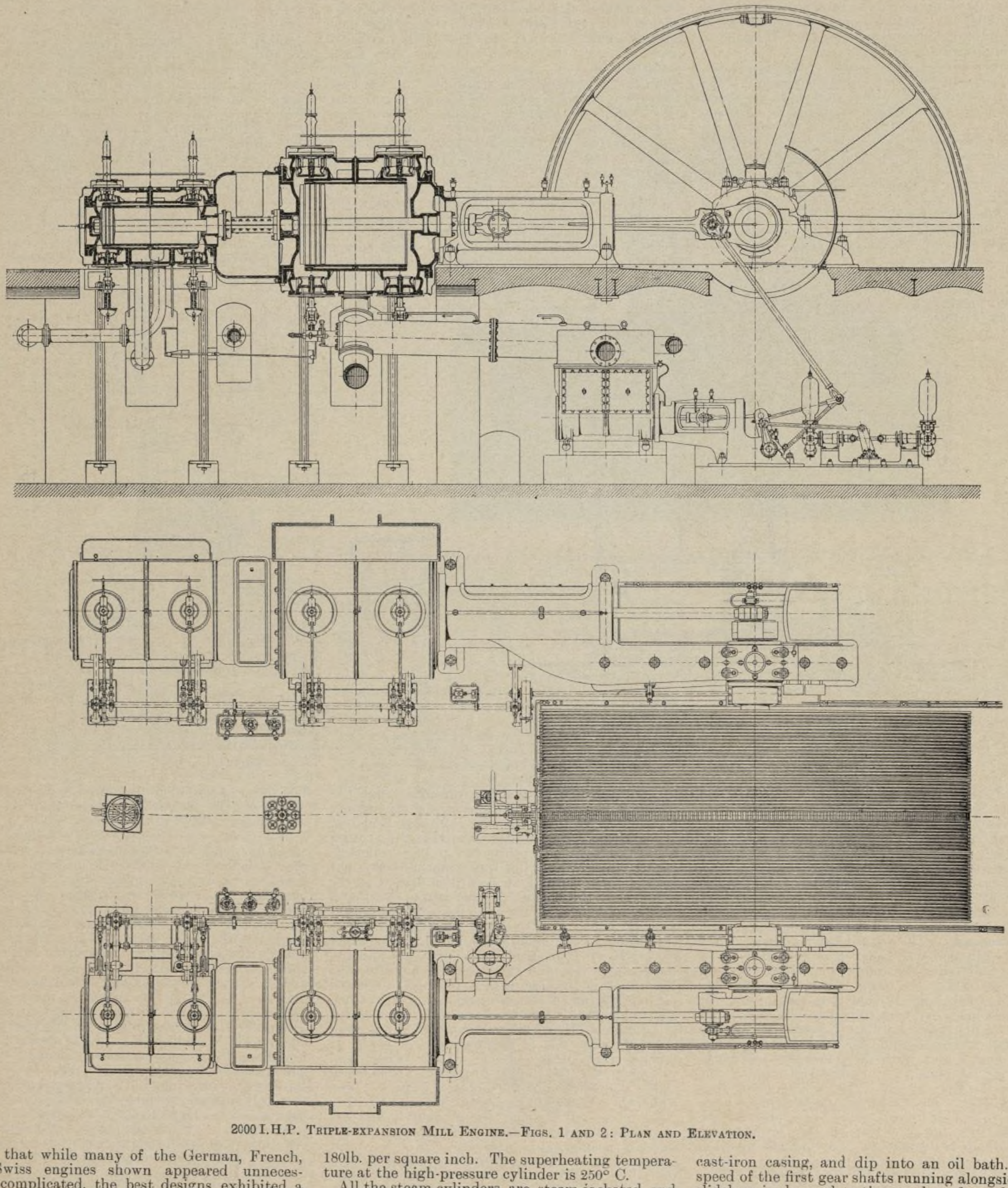
As an example of current practice we give illustrations of a four-cylinder triple-expansion engine of 2000 I.H.P., built by the Crimmitschauer Maschinenfabrik, and driving the cotton mill of Messrs. Gerrit van Delden, Gronau, Westphalia. As will be seen, the arrangement of the cylinders is that now very usually adopted, the high pressure being placed tandem with one of the low-pressure cylinders, while the intermediate-pressure cylinder is similarly placed behind the other low-pressure cylinder, the two tandem engines thus formed acting on cranks at right angles. The cylinders are:—High-pressure, 24½in.; intermediate-pressure, 37in.; and each of the two low-pressures, 55in. in diameter respectively. The stroke is 59in., the revolutions 65 per minute, and the initial pressure 180lb. per square inch. The superheating temperature at the high-pressure cylinder is 250° C.

All the steam cylinders are steam-jacketed, and are fixed on strong soleplates. The two cylinders on each side are connected by an intermediate piece which is cast solid with the front cover of the back cylinder; through the opening in its upper part the back cover of the low-pressure cylinder can be lifted out. The piston rods are 7¾in. and 8¼in. in diameter respectively. The steel crankshaft is 25½in. in diameter at the wheel seat, and 17¾in at the journals; its total length is 22ft. 3in The crankpins are 9¾in. diameter and 11¼in. long. The rope wheel is 24ft. 6in. in diameter, and is about 88½ tons in weight. As shown, it is formed in six parts, with altogether 30 arms. Power is transmitted by 45 ropes 1¾in. in diameter. Each of the slidebars consists of a single casting, and rests upon the foundation for its entire length. An oil gutter runs all round them. At the crankshaft pedestal the lateral walls are prolonged downwards, and strengthened and let into the masonry.

All the cylinders have double-beat valve gear. In order to keep the distance between the crankshaft bearings as short as possible, the gear shafts are not driven from the crankshaft, as usual, by bevel wheels, but by worm wheels and worms. The latter are each enclosed in a perfectly-tight cast-iron casing, and dip into an oil bath. The speed of the first gear shafts running alongside the slidebars is changed to the number of revolutions of the engine by hyperbolic wheels.

The engine is provided with a main and an auxiliary governor. The former is driven by the hyperbolic wheel on the gear shaft mentioned above, the latter by a belt. The auxiliary regulator only adjusts the connecting rod of the main governor, which it shortens or lengthens according to the variations in the load, the main governor remaining meanwhile in its mid-position. By means of change wheels at the auxiliary governor, the degree of adjustment can be further regulated as desired.

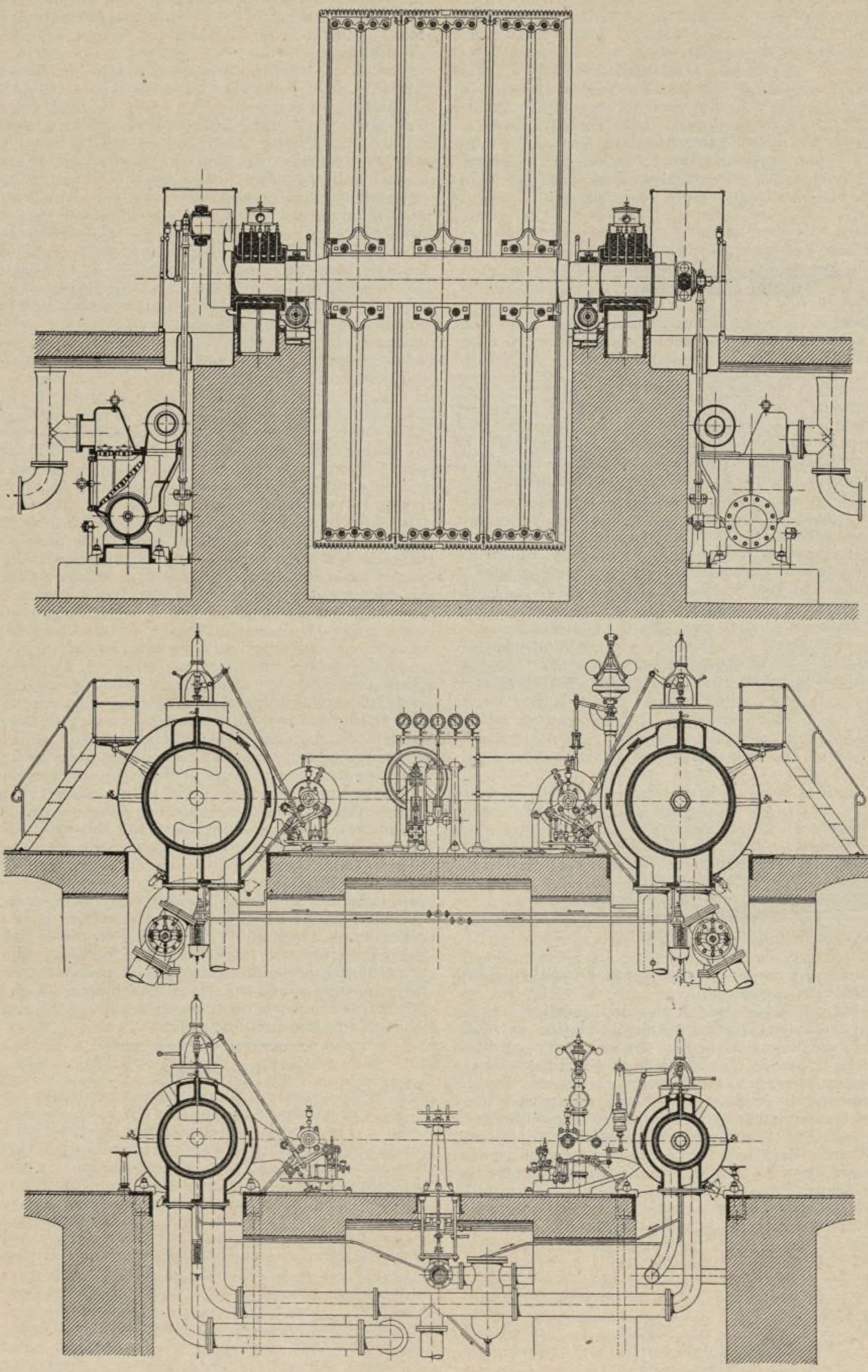
The exhaust from the engine passes to the



2000 I.H.P. TRIPLE-EXPANSION MILL ENGINE.—FIGS. 1 AND 2: PLAN AND ELEVATION.

condensers arranged below the floor, the double-acting air pumps for which are worked from the crankpins. The pump buckets are 19¾in. in diameter and 23½in. stroke. A feed pump is actuated by one of the air-pump levers. The vacuum obtained reaches 92 per cent. of the theoretical.

Special importance is attached to good lubrication. Oil is continuously supplied to the crankshaft bearings by centrifugal pumps, and to the pistons and metallic stuffing boxes by six oil press pumps, three of which lie on each side of the engine and are driven from the gear shaft.



2000 I.H.P. Triple-expansion Mill Engine —Figs. 3, 4, and 5: Sectional Elevations.

Fly-wheel Explosions.*

By C. H. Manning.

About ten years ago an epidemic of fly-wheel explosions began, and in the three years 1892-94 it prevailed to the extent of about one large wheel a month, not to mention those under 12ft. in diameter. These wheels, without exception, were of cast iron and of all sorts of designs and qualities of metal, and most of them went to pieces from overspeed, commonly known as "racing." In the following years, down to the present time, the casualties have been decreasing, and I have not noticed more than one or two since the beginning of this year. Much has been written on the subject, discussing especially the proper design and more particularly the proper bolting of the joints in the rim, but very little has been said on the subject of the material of which the rim of the wheel should be made. Fly-wheels, as their name implies, are primarily used to regulate the speed of an engine—not the number of revolutions, but the uniformity of speed during any one revolution, storing power while the piston is exerting more than the average power, and restoring it when the piston is delivering less than the average, which, of course, causes a series of fluctuations in the strains thrown on the wheel. With most engines the fly-wheel combines with its regulating function the office of main driving pulley carrying the main belt, or it may take the form of a large gear wheel. The combination of these several functions, and their accompanying strains, subject this member of the machine to greater variations perhaps than any other part.

The greatest strain, however, and the one that causes the wreck in most cases, is the centrifugal force, principally of the rim itself, which is the part having the greatest linear speed, and this strain increases with the square of the speed. Increasing the cross-section of the rim does not help the strength at all, as the weight, and therefore centrifugal force, both increase directly with the cross section. This shows that for any material there is an exact limit to the safe speed at which the wheel may run. The centrifugal force acting radially in all directions and uniformly, puts the rim in a state of tension, and therefore it is the tensile strength of the material used on which the integrity of the wheel depends.

Now, as weight is the chief desideratum, it is evident that the material which has the greatest strength for a given weight is the best for a fly-wheel. I contend that cast iron is the poorest, so far as safety is concerned, of any material used for fly-wheels, though it is used to day for at least 95 per cent. of the wheels that are made. I remember many years ago several large cast-iron bridges, but do not believe there is a bridge engineer living who would have the hardihood to put in a cast-iron tension member on any such structure, and the day will come when there will be no cast-iron fly-wheels, and the sooner the better.

For belt transmission a speed of about 5000ft. per minute has been found most suitable, and this has regulated the general run of fly-wheels to about this rim speed, and at that speed a first-class cast-iron wheel has a fair factor of safety. But the trouble is, all engines are liable to "run away," some much more so than others; and, as I before remarked, the explosive force increases as the square of the speed, and it takes but a few seconds to wipe out a factor of safety of from four to six.

For the same weight pine wood has a much greater tensile strength than cast iron, and therefore is much safer for a fly-wheel, and ten years' experience with many such fly-wheels has satisfied me that for engines running at a speed of 100 revolutions per minute or less, a properly constructed wood-rimmed fly-wheel is much the safer. In October, 1891, a cast-iron fly-wheel 30ft. in diameter and 110in. face went to pieces at Manchester, N. H., and a wood-rimmed fly-wheel of the same dimensions was substituted for it, which is running to-day in as good condition as when new. Some twenty other wheels ranging from 20 to 30ft. in diameter and from 30 to 120in. face have been built, and in no case have they given any trouble, though several of them have at times been partly submerged by freshets. Where the speed of the engine runs above 100 revolutions per minute, to keep the rim speed down to 5000ft. per minute the diameter of the fly-wheel cannot exceed 16ft., which is about as small as it is desirable to make a wood-rimmed fly-wheel. Below this I have built fly-wheels with boiler-plate rims, making one of 24 plates ½in. thick and 30in. face, which makes a very satisfactory wheel.

In Germany some balance wheels to run at a surface speed of 10,000ft. per minute and upwards have been constructed by winding a square steel wire on a cast iron spool, and the results, so far as I know, have been very satisfactory.

* Abstract of a paper read before the American Association for the Advancement of Science.

We understand that the automatic loom whose parts and working we described on page 455 of the December, 1899, issue of The Textile Manufacturer, is now being built by Messrs. Butterworth and Dickinson, Burnley, and Messrs. Robert Hall and Sons (Bury) Limited, Bury.

Messrs. George Mills and Co., of Radcliffe, proprietors of the "Titan" sprinkler, have been entrusted with an order from the Imperial Mill (Blackburn) Limited, for one of their fly-wheel pumps with 14in. steam cylinders, 8in. water barrels, and 15in. stroke. This is to be fixed in connection with the hydrant pipes and sprinkler installation which this firm are also supplying at the Imperial Mill.

The erection of the new mill of the Textile Spinning Company, Moses Gate, Bolton, is proceeding rapidly, the second storey being now completed. Contracts have been let as follows:—Engines, Messrs. John Musgrave and Sons; card and blowing room machinery, Messrs. Howard and Bullough; mules, Messrs. Asa Lees and Co. When completed the mill will contain about 100,000 spindles. It is expected that yarn will be produced this year.

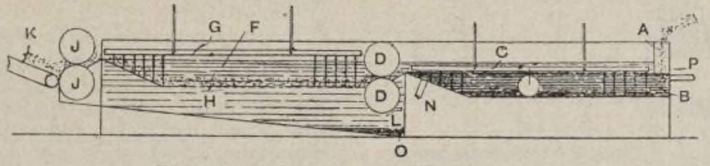
The number of spindles in each country in the world in 1900 engaged in the spinning of cotton is estimated as follows:—Great Britain, 45,500,000 spindles; United States, 20,058,000; Germany, 8,100,000; Russia and Poland, 8,000,000; France, 5,500,000; East India, 4,700,000; Austria, 3,200,000; Spain, 2,650,000; Italy, 2,100,000; Switzerland, 1,700,000; Japan, 1,350,000; Belgium, 950,000; China, 565,000; Canada, 550,000; Sweden and Norway, 500,000; Mexico, 491,000; Holland, 290,000; Portugal, 230,000; Greece, 100,000. Total, 106,534,000.

A recently-published return gives the number of spinning mills in Greece as 20, having an annual production of 6,378,750lb., and employing 3000 hands. Piræus is the principal centre of this trade, having 7 mills and 63,700 spindles. The same return shows the number of cloth factories in Greece to be 12, working in all 1057 looms, with an annual production of 9,363,170yds. of cloth, weighing 2,060,159lb. Five of these factories are in the Piræus, and work 853 looms; the rest are divided between Patras, Syra, and Argos. The Piræus cloth mills alone employ 783 hands out of a total of about 1400.

RAW MATERIALS, PROCESSES, FABRICS, &c.

Extracting Grease from Wool.

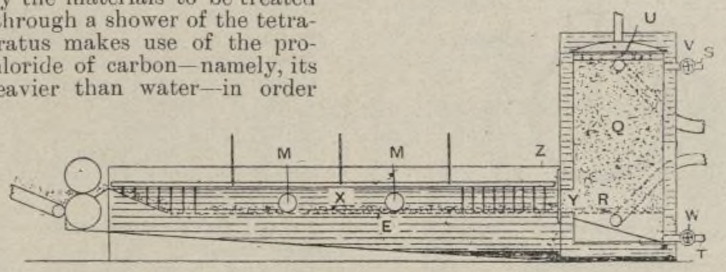
THE employment of tetrachloride of carbon for extracting fatty matters from wool affords considerable advantages over the processes generally in use. On the one hand it gives greater facilities for regaining the product employed, and the fatty matters extracted from the materials treated, as compared with the ordinary washing process with baths of soda and soap; and, on the other hand, it affords perfect security as regards non-inflammability and non-explosibility, as compared with the use of naphtha, benzene, petroleum or the like, which substances are not only dangerous in themselves, but their vapours, mixed with air, form highly-explosive bodies. The use of tetrachloride of carbon also



EXTRACTING GREASE FROM WOOL.—FIG. 1.

affords advantages from an economic point of view, because, owing to its non-inflammable and non-explosive nature, it does not require the localities in which it is employed to be isolated from the other parts of the works, and it obviates the payment of high insurance premiums. The extraction of fat by tetrachloride of carbon can be applied as economically to small quantities of the material to be treated as to large quantities, a feature of great advantage in small works.

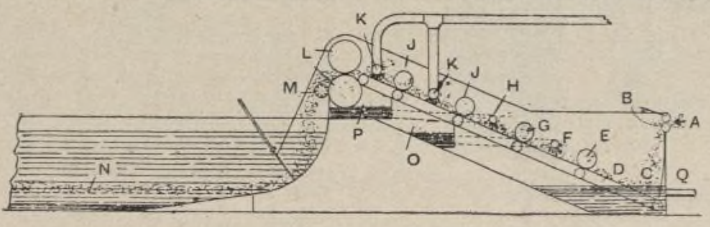
A process which has been adopted by a Belgian firm of manufacturers appears to be giving great satisfaction. Their apparatus allows, according to circumstances, either a circulation of the materials to be treated through the stationary tetrachloride of carbon, or a circulation of the tetrachloride of carbon through the stationary materials to be treated, or a combination of the two systems can be employed, whereby the materials to be treated are caused to travel through a shower of the tetrachloride. The apparatus makes use of the property of the tetrachloride of carbon—namely, its being specifically heavier than water—in order



EXTRACTING GREASE FROM WOOL.—FIG. 2.

during either the whole or only a part of the operation, to effect the separation of the tetrachloride from the substances treated and to protect the tetrachloride against all contact with the atmospheric air, and consequently against evaporation.

In the first of the three above-mentioned cases the operation of extracting the fatty matter is effected in open vessels; in the other two cases it is effected in closed vessels; the tetrachloride is in all three cases protected against contact with the atmosphere after the fat extraction has been effected, and it is separated from the materials treated by means of the water which covers it. The separation of tetrachloride from the materials treated can therefore be effected in all three cases



EXTRACTING GREASE FROM WOOL.—FIG. 3.

mechanically in water (by washing machines), owing to the specific gravity of the tetrachloride; but it can also be effected in closed vessels by means either of heat, of vacuum, or by a current of hot air, or of two or more of these means combined.

Fig. 1 shows a sectional elevation of an apparatus the action of which is based upon the circulation of materials to be treated through the tetrachloride of carbon. The wool or other matter to be treated, from which may be previously extracted by a preliminary treatment of the ordinary kind, the salts soluble in water and the earthy matters, is introduced dry or moist through a hopper at A directly into the tetrachloride of carbon (either cold or slightly heated) in the chamber B, the material being introduced in such quantity through the hopper A as to practically close this against any escape of tetrachloride vapour.

When no material is being fed in, the evaporation is prevented by pouring a small quantity of water into the hopper A, which, in floating on the tetrachloride, prevents contact with the atmosphere. The materials immersed in the tetrachloride chamber B are subjected to the action of a propelling compressing and raising device C, which pushes the same by degrees in the direction of the compressing rollers D, which express the greater part of the tetrachloride of carbon containing the extracted fatty matter from the material treated. This then passes into a bath of water F (which may either be pure or slightly saponaceous, and either cold or heated. Here the material is again gradually fed forward by means of a propelling compressing and raising device G over a perforated plate H towards another pair of compressed rollers J, which express the last traces of tetrachloride. The treated materials are then conveyed by means of a travelling apron K to any locality required.

The tetrachloride separated at F in the presence of water from the materials under treatment, passes down through the perforated plate H, and collects at L, where there will also collect the portions of tetrachloride which are expressed by the rollers D. The water in F will always remain at the same level along the whole length of the apparatus, so as to keep the tetrachloride covered at every point, and thus prevent evaporation. Pure tetrachloride of carbon is supplied at N, while that which has taken up the extracted fatty matter is conducted away through pipes O and P to the distilling apparatus.

Fig. 2 shows a longitudinal section of an apparatus arranged for the circulation of tetrachloride of carbon through the stationary materials to be treated, which, as in the first case, may have been subjected to a preliminary treatment for the removal of soluble salts and earthy matters. They are enclosed in an airtight cylinder Q provided with a double bottom R of perforated sheet metal, and which is itself immersed in an outer vessel filled with water, in order to prevent all possible loss of tetrachloride of carbon, and to allow of the vessel Q being heated as in a water bath. A current of tetrachloride is made to flow through the vessel Q, being either introduced through the conduit at S and made to flow downwards through the material to the discharge pipe at T, or the tetrachloride may be introduced at T and discharged at S. When all the fatty matter has been extracted, the greater part of the tetrachloride is expressed from the material by means of a perforated piston U. The cocks V and W on the pipes S and T are then closed, and on opening a slide Z, the charge of material is made to pass through a passage Y into the water contained in the tank X.

Here the material is gradually fed forward over a perforated plate E by means of a propelling compressing and raising device M, and is made to pass through the end compressing rollers. The tetrachloride, in separating by gravity from the water contained in the tank X, falls through the perforated plate E and is collected at the bottom of the tank. Any tetrachloride that may have escaped through the joints of the cover of the vessel Q will collect in the outer casing. The tetrachloride, after circulating through the material in Q, and consequently becoming charged with the fatty matter, is led away through the pipe T to the distilling apparatus.

Instead of discharging the material from the vessel Q after treatment as described, it may be dried by evaporation in the cylinder itself. For this purpose, after having compressed the material by the piston U for removing the greater part of the tetrachloride of carbon, the cocks V and W are closed, and the water surrounding the cylinder Q is heated to a suitable temperature, and an exhaust is applied, both at the upper and the lower part of the charge by means of two pipes. To accelerate the evaporation of the tetrachloride, a current of hot air may be passed through the same pipes, entering at one and escaping at the other, which hot air will evaporate and carry off the last traces of tetrachloride from the charge of material. The tetrachloride of carbon vapour thus removed is conveyed away into a suitable condensing apparatus.

Fig. 3 shows a longitudinal section of an apparatus in which the material to be treated is passed through successive showers of tetrachloride of carbon. The material to be treated after the preliminary extraction of the soluble salts and earthy matters before stated, is introduced at A between two small feeding rollers B, and falls directly into a body of tetrachloride of carbon at C. An endless travelling apron D carries the material upward beneath a compressing roller E, and then under a shower of tetrachloride at F, thence under another compressing roller G, and under a second shower of tetrachloride at H, and so on under two other rollers J, alternating with two other showers of tetrachloride K; finally the material is carried through larger compressing rollers L, whence it is propelled by a grooved roller M into a body of water contained in a washing machine on the bottom of which, situated under the false bottom N of perforated sheet metal, will collect any tetrachloride that may have been carried along with the material and that will separate therefrom in the presence of water. It is to be observed that the supply of tetrachloride for the shower at F is taken from the tetrachloride of the shower at K after it has passed through a layer of the material to be treated between the rollers J, this supply being collected at the tank O, and also that the supply for the shower at H is taken from the tetrachloride which is expressed by the rollers L and collected in the tank P; the showers at K are supplied with pure tetrachloride of carbon. The tetrachloride of carbon charged with the extracted fatty matters which collects at the bottom of the apparatus is drawn off through a pipe at Q and conveyed to the distilling apparatus.

Humidifiers.*

THE subject of humidification has become of great importance during the last few years. The tendency to make finer goods and the decreased margin of profit combine towards this end. In order to displace imported goods it is necessary to study the methods and conditions under which the foreign goods are made. We have been told that the climatic conditions, more especially the natural humidity, have determined the location of the finer factories. That this was true there is no doubt. The general introduction of means for producing artificial humidity has done away with the necessity for finding a natural humid location, enabling the manufacturer to locate wherever other conditions are favourable. The decreased margin of profit renders it necessary to take into account every means for producing goods at the lowest cost without sacrificing quality. Humidifiers are a means to that end. Originally introduced to create a necessary condition for making fine work, their merits have become recognised, and their use extended to the coarsest goods made. Some years ago the topical question of how to run mills in dry and dog-day weather was brought up frequently before this association. This was before the advent of a satisfactory apparatus for artificial humidification. The discussions were largely in the way of stating difficulties, but without giving remedies. This subject was held over from year to year, but latterly has not been brought up, the general use of humidifiers having practically solved the problem. I will not attempt to treat this subject on a scientific basis, as other and abler men have already done so. In fact, the

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

subject has been referred to so often and ably that it is difficult to present much that is new. I will therefore confine myself to relating some personal experiences and making some observations.

The cotton as you receive it often contains a large percentage of water. There are stringent laws against putting water directly into the bales. There is, however, another way of sending water to market. Those who have travelled in the cotton States have no doubt noticed how the producers store their cotton. It is frequently exposed to the weather, carefully covered in bright sunny days, but promptly uncovered if rain comes on. Such cotton has altogether too much of a good thing. Average cotton contains considerable moisture when opened. This should be retained, in proper amount, in order to work with a minimum of waste. Moisture strengthens the fibre, causes it to cling together, and to assume any desired position by rendering it elastic and pliable. Cotton opened in a dry mill rapidly gives up its moisture. Every operation facilitates this loss, and by the time it is in the form of yarn it has lost all that the air will take up, and is as dry as the air in the mill. It has lost its softness, is harsh and stiff, has very little adhesion, and becomes highly electrified by friction. The fibres become separated readily from the slivers and fly off, making waste and sweepings. During the continuance of a dry, windy spell of weather, the laps in the carding-room, the roving, both stored and laid on the spinning frames, bristle with these electrified fibres. All the lint that gathers on the machines stands on end as if in protest against the conditions.

Yarn spun under these conditions is harsh and kinky, and nothing but steaming or prolonged ageing will set the twist, to allow it to be used as weft. Kinky weft is one of the most unmitigated nuisances that a weaver has to contend with. It fell to my lot at one time to be a loom fixer in what might be termed a "lightning change" mill. We had about two and one half times as many looms as we had working space for, the surplus being stored. They were of about all kinds adapted to our range of yarns. We would frequently begin when the mill shut down on Saturday, taking out warps, removing one kind of looms, and replacing them with others, and getting things in readiness to start Monday morning on another kind of goods. Warps were made in anticipation of the change, but we would have to take weft hot from the frames. There were no humidifiers in the spinning rooms, and the way the weft would kink is something bad to remember. We tried everything we could think of in the way of shuttle frictions, but when we succeeded in getting the kinks out, we had saw-toothed selvages to contend with. We used the old style of vapour pots, with live steam, to humidify the weaving rooms. They were of some use, but introduced some bad features of their own. They would excessively humidify in spots, cause condensation on the looms nearest and on the ceiling and shafting, rusting all bright ironwork and rotting the floor. Besides this they made the rooms uncomfortably hot, and gave forth an odour that was far from pleasant. If located far enough from the adjacent looms to avoid wetting them, they take up valuable floor space. A modern system would have made my recollection of this time much pleasanter. It would have done away with a great many of the troubles consequent on these changes.

I am of the opinion that humidifiers are valuable in every room of the mill, with the single exception of a room devoted exclusively to slashers. They will not be required at all times in the picker room, but if the cotton is very dry they will give you an advantage. It is then possible to start with the cotton in the best possible condition and keep it so throughout the mill. There will be no trouble from electricity in the carding-room, and the waste and sweepings will be reduced. The fibre draws better, in consequence of being stronger, and is more elastic and adhesive. In the spinning-room the same advantages obtain. The fibres are more receptive of twist, and when spun do not have such a tendency to kink. This allows weft to be used without steaming or ageing, which is very important. In twisting, spooling, and warping, a proper degree of humidity is of great advantage. The yarn being stronger and more elastic, there is less breakage of threads. The greatest loss of production in these departments is caused by breakage of threads, which is materially reduced by the use of humidifiers. Yarn is more receptive of size in the slasher, if moist, as the size penetrates the yarn.

The slasher is the source of trouble that nothing but humidification will overcome. We will assume that up to this point all operations have been conducted under the best conditions, and that the yarn is in the best possible shape to use. It is then run through the size box under tension, the tension being determined by the amount of yarn required to be put on the warp beam. It is of course desirable to get a large amount on the beam, in order to lessen the cost of web drawing. The result is that the yarn is stretched sometimes all that it will bear. It then runs upon the cylinder and is thoroughly dried under tension, cementing the fibres together with size. It is possible to make size that will not dry hard, but in most cases it does. The warp then goes to the loom prepared to stand the chafing of the reed and harness, but in the worst possible condition to withstand the impact of the lay.

The best way to meet this condition is to thoroughly humidify the weaving-room. It requires a high degree of humidity to soften the warp in the short time that it is exposed to the air, as there is little exposed at a time. This is the reason why weave-rooms require more moisture than other departments. Of course, I have assumed extreme cases, but the principle involved remains the same under the best conditions. There is another point in the economy of a weaving-room that I do not remember having heard mentioned, but have experienced. Our climate is very variable, especially at certain seasons. First we may have a dry windy spell, when everything about the room becomes thoroughly dried out. The loom fixer has to adjust all his looms to meet this condition. He reduces the power, tightens the binders, and replaces pickers and picker sticks that have been used up by the impact of the shuttle boxing too hard. Then comes a rainy spell; shuttles bind and stick, causing the looms to knock off, and the fixer is wanted everywhere at once to reverse the operation. By maintaining a fairly constant humidity in the mill, this trouble and consequent expense are in a great measure done away with. It also lessens the expenses for supplies. A fixer can care for a larger section in a properly humidified mill than in one not so equipped. There is another phase of the advantages of humidification—that is, the improvement in the health of the operatives. This has been taken up in almost all of the papers that have been presented touching on humidification.

The proper degree of moisture for the best health conditions has been determined, and a great many statements made confirming the value of humidifiers from a sanitary point of view. I have run across a case that is interesting, as verifying these statements. It is as follows: A Southern mill employs a physician by contract to look after the health of its people. Some two years ago the company put a system of humidifiers into the mill when it was erected. After a year's run the doctor, who kept a record of all cases coming under his care, reported to the management that the ratio of cases from the new mill was less than 50 per cent. of that in the mill not provided with humidifiers. This difference could only be attributed to the humidifiers, as the people lived in the same village and under the same conditions of life. The immediate result of this report was the equipment of three other factories under this management, and the statement that the installation would pay from a sanitary point of view alone.

It is necessary, in order to realise all the advantages of artificial humidification, to keep a constant degree of moisture in the air. This should be attended to in weaving-rooms early in the morning before the machinery starts, thus avoiding the usual difficulties at the starting hour, which are well known. In order to do this every room should be provided with at least one reliable hygrometer. Readings should be taken at regular intervals, and humidifiers turned on or off as the reading indicates. It would be well to have limits established as experience dictates for each department, and some one to be responsible for the maintaintence of the humidity between limits. It is easier to maintain a high degree of humidity than a low one by artificial means, as there is no good way of drying the air when too moist, while you can moisten to any desired degree, provided you have sufficient capacity in your humidifier system. In order to secure even conditions of moisture, it is desirable to maintain the proper temperature as well. I believe it will pay to employ a man whose sole duty is to maintain the temperature and humidity, unless the mill is too small to warrant the expense. Give this man the entire charge of the heating and moistening apparatus, and require the limit conditions maintained in the various departments. Have the overseers take readings and record them, thus giving you a check on the man.

Hygrometers should be of standard wet and dry bulb thermometer pattern, and should be carefully looked after. The water used to moisten the bulb ought to be filtered, unless very clear. Otherwise the wick will become clogged with foreign matter, and the bulb will not be properly moistened. The silk covering of the bulb should be frequently examined and renewed as often as required. I am told by a friend who has had a long experience with hygrometers that a wick of slack-twisted worsted yarn is the best. But if one hygrometer is used in a room, it should be located in the middle of the room, where the air can circulate around it, and not in a corner or near a steampipe. In large rooms where more than one is used, the same precautions should be observed. The hygrometer, if of good make and accurate, will tell the truth if cared for; if neglected, it will lie shockingly. There are some so-called hygrometers that should be avoided. Most of them are affected more by temperature than by moisture. As the temperature rises and the relative humidity becomes less, they will indicate greater. This is very misleading.

The most fruitful cause of trouble with the humidifier system is want of cleanliness. A humidifier system is a faithful servant if cared for, but otherwise not. There is nothing about a mill that will not repay for care and attention, and humidifiers are no exception. Lint and dirt will collect in a mill as elsewhere, and must be cleared away. It costs less to clean thoroughly and frequently than to let conditions become unbearable before attending to them. One of the most serious objections to running nights is the certain lack of cleanliness and care that is certain to ensue from the divided responsibility. The night hands shirk their duties, in the hope that the day hands will attend to them, and the day hands pass everything on to the night hands they can. Humidifiers are apt to fare badly in such cases. Nearly everything else in the mill has someone responsible for its condition; why not the moistening system? I am interested and want to make a special plea for care for your humidifiers; they will require little, comparatively, and will repay it many times.

New Cotton Fields.

ARRANGEMENTS have been made by a well-known firm of Liverpool shipowners (Messrs. Elder, Dempster and Co.) to send six American cotton-growing experts to the West Coast of Africa, to institute experiments in the growing of cotton in that region. In the early 'sixties cotton growing was started on the west coast of Africa, the incentive being the opportunity afforded by the disorganisation of the cotton trade consequent on the civil war. The experiments cannot be considered to have been a success. Liverpool received nearly all the cotton exported from South Africa. In 1864, 1710 bales were received here. The largest number of bales received since then was in 1869, when 19,300 bales came to Liverpool. Since that date the figures have fluctuated, showing a tendency, however, to steadily decrease. In 1870, 13,000 bales of West African cotton were imported into Liverpool; in 1880, the number of bales was 574; in 1890, 3333 bales arrived; in 1895, 207; the next year not one bale was received; in 1897 just one solitary bale came, and since then a few hundred bales have annually been imported. The West African cotton that has come here has been of the short-staple variety, and not of a very good colour. It is, however, a fairly good cotton, with a better staple than the East Indian. When "middling American" was quoted last year at 5½d., "West African" was quoted at 4½d. to 9d.

The Germans are trying to establish cotton growing in their West Coast colonies. Cotton growing has also been introduced in the French West African colonies; and only recently an inquiry was received by Elder, Dempster and Co. as to freight charges for a cargo of cotton from Dahomey to Liverpool. The district of British West Africa in which it is proposed to make the special cotton-growing experiment is Lagos. Quite recently a sample of cotton came to Liverpool from Lagos, and was pronounced very good. It is proposed also to make experiments under British auspices in Sierra Leone and Liberia.

Liverpool cotton men do not attach much importance to this new enterprise, although some interest is being taken in it. The general opinion is that the Southern States will always have a monopoly of producing the cotton mostly in favour for general purposes, not only in the United States, but on the Continent and in England. Suggestions have been made that Egyptian cotton might in time be produced in such quantities as to be a formidable rival to American cotton; but there does not seem to be much foundation for this suggestion, the Egyptian cotton being best suited, owing to its long and fine staple, for special purposes; and what is more important, the production will always be comparatively very limited, even when the great irrigation system now in course of construction is in full operation. Experiments on the West Coast of Africa may, however, develop into actual (although comparatively small) competitive trade with the cotton-growing industry of the Southern States. It is only a bare possibility, however. An attempt will be made to acclimatise American cotton seed on the West Coast; but the chances are that the cotton which will be produced from this seed will not be identical with, nor as good as, the home product. That has been found from other experiments made in different parts of the world with American cotton seed. Experts here doubt very much whether the West Coast of Africa can ever produce as good cotton as the Southern

States; and yet it is difficult for anybody to give a well-founded judgment, as heretofore cotton growing on the West Coast has not been on a scientific basis.

It might occur to cotton men that the extra distance from the West Coast of Africa (Lagos is 4387 miles from Liverpool), as compared with that from the American seaboard, would permanently prevent West Coast cotton from competing with American cotton. It should be borne in mind, however, that the American cotton, or rather the English buyer, is handicapped by the fact that in most cases ships which bring over cotton from the United States to England have to make the return trip largely in ballast, so that one voyage must actually pay for two. This is because the ships have little or no cargo to take westward. With the West Coast, however, it would be different. The trade between Liverpool and the West Coast of Africa is profitable both ways, the ships bringing all sorts of raw material from Africa to Liverpool, and taking back full cargoes of manufactured articles. Its West African trade is one of the most prosperous that Liverpool has, and it is growing all the time. The development of cotton growing on the West coast would undoubtedly greatly increase the export trade of Liverpool to that region. It is easy to see, therefore, that the freight charges from Africa, while for a much longer distance, need not necessarily be greater than from the American coast—that is, the shipowners can afford to charge less freight rates, for the reason that they make money both ways. If, therefore, the experiment on the West Coast be successful, American cotton growers may be faced with a competition (even though limited) which heretofore has been thought absolutely out of the question.

It is safe to assume that the trials will be thorough and conclusive. No shipping company in the world is so familiar with existing conditions on the West African Coast as the firm which is undertaking the experiment, and the managers are experienced in the development of new and vast enterprises. For instance, they have won practically a monopoly of the trade with the Canary Islands; they have the contract with the British and Jamaican Governments for the development of the Jamaica fruit industry; and it is believed that they do more business, not only as carriers, but commercially with the West Coast of Africa than any other firm in the world. They realise that even though the soil and climate of the West Coast be favourable to their cotton-growing experiment, they are confronted with a great obstacle in the indisposition of the native labour to hard physical toil, the actual necessities of a primitive form of existence on the coast being easily obtainable with little or no work.

Waterproof Non-inflammable Composition.

A COMPOSITION which will render textile fabrics and the like non-inflammable and waterproof is obtained by mixing suitable earths with a chromated solution of size glue or other gelatinous substance in water. The treatment of the material with such a mixture renders it not only non-inflammable and waterproof, but also extremely flexible without any tendency to crack, peel off or fall out as dust. Amphibolin can be strongly recommended as a suitable earth to form part of the said composition, as it renders it when dry particularly resistant to the action of fire. Other earths can be employed in substitution for amphibolin, but not with equal success.

Amphibolin is a natural earth which, as far as is known, is unlike any other earth, and is found only on a property near Baden (Germany), belonging to a Dr. A. Hamann, who gave it the above name owing to failure to identity it with any known substance. It has the characteristic that when once it has been mixed with water and allowed to dry, it will not mix again with water.

The following forms a suitable mixture for general use in carrying out the process:—34 parts of amphibolin; 9 parts of size or other gelatinous material; 2 parts of chrome alum; and 2 parts of sulphate of ammonia, the whole being thoroughly mixed with 53 parts of water. The portions of the various substances in the composition would, however, be varied according to the nature of the material to be treated. The composition is applied either by a brush or by means of a priming machine. One coat or several coats of the composition may be applied to the material, and after each coat the material is exposed to light. When additional waterproof qualities are required, a coat, or more than a coat, of the composition may be followed by a coat, or more than a coat, of chromated size, or gelatinous substance dissolved in water, the material being exposed to the action of light after the application of each coat.

Cotton Mill Accounts.*

THE object of all accounting is to present a final and correct balance-sheet. The term "balance-sheet" is used in this connection as the ultimate result. Leading up to it, and auxiliary to it, is the "profit-and-loss statement." The latter shows when and where we have made or lost. On the other hand, the balance-sheet shows our actual financial condition—our degree of solvency or insolvency, as the case may be. No man can make money trading with himself. As an axiom, it may be asserted that no money is made in either merchandising or manufacturing until the goods are sold—that is, until they have passed from the hands of the manufacturer or merchant into the hands of a second party. When, therefore, we inventory our materials at any other figure than their cost, or when we inventory our manufactured goods at any other figure than actual cost, we are likely to put upon our books an apparent profit or apparent loss, which as a fact does not exist. We should remember that the value of these assets is simply what they represent, or as explained, in conversion of assets. These statements are made with the full knowledge that in various respects they do not agree with current practice in the cotton industries, nor yet in various other branches, but they are the necessary preliminaries to an adequate classification of accounts, and to a correct statement of business operations.

There are one or two other features to which brief attention should be given before considering the analysis and classification of the accounts of a typical cotton mill. One of these is the distinction that is to be made between fixed and floating assets. So far as my observation goes, there are less lapses from the correct principle in this regard among cotton-mill men than in any other branch of industry which I have encountered. However, even though this is the case, there will be no harm in referring to it. A sharp distinction is to be maintained always between fixed assets like mill property, mill equipment, tenement property, etc., and floating assets like materials, including cotton and manufactured product. As a fact, it makes no difference to you as manufacturers, whether a given mill (meaning now the land on which it is situated, the buildings and the mechanical equipment, including power plant, etc.) stands on the books at £20,000 or £200,000, so far as the earning results of the mill are concerned. A mill makes or loses money according to the way in which it is operated, and as influenced by market prices of materials and labour and finished product. It does not make or lose money in the direct sense of the term by reason of the figure at which it was carried on the books as a fixed asset. It does make a material difference in capitalisation whether the plant is carried at a low or very high figure, and it does make an important difference in the matter of dividend paying, whether the mill property is under-estimated or over-estimated in value. All this is, of course, conceded. The point, however, is that in the running of the mill, money is made or lost as the result of the operations alone. This leads me to the conclusion that in our classification of accounts we must very carefully distinguish between that which is fixed and that which is floating, between that which has an established value like the mill property referred to, and that which is changing or fluctuating all the time as the result of the operations in progress.

The next point to which I desire to direct your attention before considering the matter of classification and analysis, is one entirely practical in character, and which by its nature comes close home to every cotton-mill man. What does the manufacturer or business man want to know from his accounts? When does he want to know it, and how does he want to know it? My observations in the business world lead me to believe that the average set of books, whether in the cotton mill business or any other, contains a very large array of miscellaneous information, ill-assorted and very often presented in a slovenly manner, in which the managing man has little or no interest. On the other hand, there is omitted from the average set of books a great deal in which he is vitally concerned. The classification, to be of any value, must sort up the facts of the business in such a way as to give the managing man just what he wants to know, in the way he wants to know it, and at the time he wants to know it.

Mention has already been made of the profit-and-loss statement as preceding and being auxiliary to the balance-sheet. The balance-sheet has been defined as a statement of the solvency of the concern. As books are ordinarily conducted, the profit-and-loss statement is made out at long intervals of say three months or six months, and in many cases only once a year. When the profit-and-loss statement has been completed, the balance-sheet as of that date is then constructed. With the balance-sheet thus made out, we feel that we have a new lease of life. We have been made acquainted with the results of our recent operations, and upon that information we are in a position to make plans for the future. If all this occurs only when a balance-sheet is available for examination, and if we are at a corresponding disadvantage during those periods in which we have no balance-sheet, then, inferentially at least, it would be extremely desirable to have a balance-sheet before us at all times. In other words, what the business man wants is a going balance-sheet.

As before stated, however, a balance-sheet complete in all details is possible only when a profit-and-loss statement has been made out. The fact that logically follows is that the business man would be best served in this regard by having a perpetual or going profit-and-loss statement. From every point of view it would seem that the cotton-mill manager's plans would be most intelligently formed, and his operations best conducted, if he had the advantage of the use of a perpetual profit-and-loss statement and a perpetual balance-sheet. Or, to state it otherwise, with a profit-and-loss statement to date and a balance-sheet to date constantly before him, he is in the very best position to decide the policy and give directions to his subordinates. Such a result is by no means impossible. In fact, such a result is easily accomplished, and that, too, as experience has proved, at a cost in many cases even less than that which attends the usual book-keeping plans, and in no case has it exceeded the cost of common clerical administration.

The ordinary manufacturer, including the cotton-mill man, transacts a dual business. He both makes goods and sells them. The ordinary merchant, on the other hand, transacts a business of a single function. He merely sells that which he has bought. The two functions of making and selling in the cotton-mill business, as well as in any other manufacturing line, must be kept apart from each other. They are unlike in details and unlike in results. There are other good reasons for this separation. It makes no difference how economically our goods are made; we may lose money on them simply by extravagant sales methods. On the other hand, it makes no difference how excellent our machinery is for disposing of goods, nor how economically it is administered; we still may fail to make a profit because our goods cost too much to make. The cotton-mill operator, therefore, wants to know, first, what his goods cost, independent of any commercial or distributing expenses, and, second, he wants to know what his commercial expenses are, independent of any costs of production whatsoever. It seems to me I hear someone say that commercial or distributing expenses in cotton-mill operations are reduced to such a small quantity that, practically speaking, it may be declared that they do not exist. Cotton-mill men are in the habit of consigning their goods to commission merchants, and in various ways avoiding ordinary commercial expenses. Admitting that all this is true, still there are exceptions to the rule, for some have considerable commercial expenses, and all have some commercial expenses, even though they are only the charges of the commission merchant. The point to be made is that whether the commercial expenses are large or small, still there should be a distinction between them and the cost of making the goods.

Let us consider for a moment the elements that enter into the cost of goods. There are first the materials. Next there is the labour; and, finally, there are the costs of operating the mill, including such items as power, light and heat, superintendence, foremanship, clerical labour, insurance, taxes, repairs and depreciation, and various incidentals. I have already directed your attention to the fact that manufacturing is only a conversion of assets. We have exchanged cash for materials and labour, and have paid factory costs, with the result that we now have so much yarn or so much cloth, as the case may be. Whatever we have represents the money expended for it, and nothing more nor less. The factory by its operation can neither make money nor lose money, for profit can only be made when the goods are sold, or when the property passes from our hands into the hands of another in exchange for cash or some other substantial value. Factory accounting, therefore, as has already been asserted, is only a record of facts, a proper placing of costs, a correct statement of just what has been done. These facts have an important bearing upon the classification of accounts and the analysis which should be the basis of any accounting scheme. Since manufacturing is only a conversion of assets, then all factory expenses in the chart of our accounts will fall into the asset division. On the other hand, all commercial expenses, being those which must be paid to dispose of our goods, fall into the profit-and-loss statement.

Returning to the question suggested above, as to what the business man wants to know, it may be asserted that the manager of a cotton mill would

* A paper read by A. O. Kittredge before the New England Cotton Manufacturers' Association.

like to have constantly before him, among other facts, the following:—The amount of cotton and other materials on hand stated at cost; the amount of goods in process of manufacture stated at cost; the amount of manufactured product on hand, likewise stated at cost.

These items collectively constitute a running or perpetual inventory. There is a distinction between a running inventory and an inventory that is taken from time to time as a separate and distinct proposition. The first is like a cash book, showing all the fluctuations in the cash by the entries made and the amount on hand by the difference or balance between the two sides. The occasional inventory, on the other hand, is like the first entries made in opening a new set of books. There is nothing behind them except observation and inquiry as to general facts. They are unsupported by the going record of a previous period, the examination of which would show errors if errors existed. The manager of a cotton mill would likewise be well served by a running or perpetual profit-and-loss statement. This would show:—

The commercial expenses or costs of marketing the product that is being disposed of.

Losses that are being encountered in the way of bad debts, and likewise in the way of depreciation of goods or product on hand.

The gross profit on the goods sold.

The net profits on the goods sold.

All this becomes easy with proper classification and proper adjustment of the book-keeping machinery for the accomplishment of these results. With a going inventory and a going profit-and-loss statement, a running or perpetual balance follows in natural sequence. At this stage it becomes a matter of course, something that requires nothing in the way of preparation, and something which causes no extra expense. The going balance-sheet shows at all times the exact condition of the business, presenting the accounts of assets and liabilities in correct arrangement.

Where a single proprietor or corporation is conducting several mills, all these details are shown for each mill, independent of the others. Each mill divides into several departments, and the statement of each is rendered independent of the others. To particularise this by way of illustration, it may be asserted that the scheme in mind gives the following:—

The cost of roving of different kinds, sizes and colours, running side by side.

The cost of yarns, warp, filling, hosiery, etc., of different character and different colours, as well as of different numbers, running side by side.

The cost of cloths of different weaves, kinds, weights, etc., running side by side.

All the accounts of any cotton mill, or of any business, for that matter, will sub-divide into two general classes—namely, the balance-sheet and the profit-and-loss statement. In our balance-sheet we can have nothing but assets and liabilities, and, considering our capital stock and undivided profits as liabilities of the business, the assets and liabilities exactly balance. We can only have in the profit-and-loss statement expenses and revenues. Our expenses, as before explained, are restricted to the costs of distribution of goods, and our revenues are what is realised over cost in the way of sales of materials and manufactured product, and likewise in the way of revenue from whatever there may be carried on in connection with the mill as side industries or subordinate undertakings.

Referring more specifically to our revenue accounts, it may be stated that if we debit each of our sales accounts with the cost of the goods disposed of, and credit the corresponding sales accounts with what we get for the goods, we shall have as the result the gross profits on the transactions. Each revenue account is to be closed at very short intervals, by carrying its balance into loss and gain. In turn, at corresponding intervals, loss and gain is debited with the expenses for the period during which these sales have been made. Gross profits diminished by the expenses of distribution produce net profits, and that is exactly what our four-week loss-and-gain account shows. To debit our sales accounts properly—that is, to charge them with the cost of the materials or goods sold—we must necessarily credit the asset account from which they were taken with the same amount. This leaves behind in the asset account the balance on hand, thus completing the circle. The absurdity of the old merchandise account, which permeates much of the book-keeping of the period—namely, the fact that in a single account two sets of values are used indiscriminately, the cost of the goods on one side of the account and the selling price of the goods on the other—is avoided by the employment of two accounts, one called "finished product," or "manufactured goods," to record the stock on hand, in which cost prices alone are employed; and the second, a sales account, to show by its balance the gross profit on the goods disposed of.

Gleanings from Consular Reports.

STOCKHOLM (SWEDEN).—In last year's report it was pointed out that at the close of the season the state of the market was most uncertain, owing to the variety of estimates as to the amount of the crop. When harvested it was found that the yield turned out poor. On account of the scarcity of cotton, most of the owners of mills, both in the United Kingdom and elsewhere, were obliged to limit their production or for some time to cease manufacturing altogether. Prices went up very rapidly. In the middle of September, 1899, the price quoted was $3\frac{1}{2}$d., whereas on September 13, 1900, it was $7\frac{3}{8}$d., showing a rise in price during the course of one year of 111 per cent. During September and October it fell very quickly. At the end of the year the price was $5\frac{1}{2}$d.

The high prices ruling for cotton caused the owners of spinning mills to reduce their production of yarn. In the majority of cases the mills worked from three to five days per week. In spite of this, manufacturers were not able to sell all that was produced, but were obliged to retain heavy stocks.

The price of No. 12 cotton yarn in the early part of the year was 6s. 1d. per bundle, then it gradually went up till in September it was 7s. 8d., after which it fell till, at the end of the year, it was quoted at from 6s. 10d. to 7s. $0\frac{3}{4}$d.

The same difficulties which troubled the spinning mills have affected cotton mills, though not to the same extent.

The result of the sales of textiles during 1900 may be characterised as bad.

Although the activity of most of the cotton factories was reduced, as was also the case with the spinning mills, yet the stocks in hand increased considerably. Prices for ordinary unbleached or the coarser kinds of bleached calico showed an increase of about $\frac{1}{2}$d. per metre, and for better qualities it was rather higher.

Aleppo (*Turkey*).—Compared with the preceding year, the import trade from the United Kingdom and its colonies shows a decrease of 986 tons, with a value of £160,240. This is chiefly noticeable in that most vital article of the trade, cotton stuffs from Manchester, and is attributed, not only to the fact that the importer, scared by the rise of prices in the United Kingdom, ceased buying the goods, but that he applied to Italy, where he obtained the same article on far more favourable terms.

Special attention is drawn to the energy and success with which Italy is pushing her trade here to the prejudice of the Manchester market. Italy supplies sewing cotton, cotton stuff (T-cloths), and printed calicoes at a lower price; and further, she affords the importer facilities of payment which he cannot obtain from the British manufacturer. The Italian merchant allows him three or even six months' credit, while the British merchant requires cash payment. This competition, which was not very noticeable in former years, has now assumed a distinct and threatening character, and merits the special attention of merchants. While British imports decreased 1170 tons, with a value of £159,732, Italian imports advanced 119 tons, with a value of £38,580.

Considering the fact that hitherto Manchester may be said to have monopolised this trade, it cannot afford to remain indifferent to this state of things.

Sivas (*Turkey*).—The most interesting native industry of the vilayet is carpet weaving, which, though it probably dates back to the beginning of the seventeenth century, has only during the last twenty years acquired activity, the reason being that so great a number of old carpets have been exported that it has become necessary to replace them to a certain extent. The value of the carpets made in the Sivas vilayet during the year 1900 amounted to about £17,900, of which to the value of about £10,000 were exported.

There are ten different kinds of carpets or rugs made—*i.e.*, (1) Yatak halesi, or bed carpet; (2) hale sejjadé, or prayer carpet; (3) kilim sejjadé, or prayer carpet (lower quality); (4) haibé, or saddle-bag stuff; (5) yan halesi, or divan rug; (6) yasdig hale, or cushion rug; (7) Kurd kilimi, or Kurdish kilim; (8) Sharkishla kilimi, or kilim made at Sharkishla; (9) Ebbeyili kilimi, or kilim made at Ebbeyili; (10) perdé kilimi, or kilim for curtains.

The principal centres of manufacture are Zara, Dirrik, Sharkishla, Azizié, and the town of Sivas.

The carpets made in the villages are coarse and long haired, those made in Sivas being much finer. It is only during the last ten years that the industry has been carried on in the town of Sivas itself. The carpets made in the town are fine and thin, of short cut wool, and generally of the kind called sejjadé, from 54 to 61in. long, and $40\frac{1}{5}$in. broad. Carpets of this size weigh only from $5\frac{1}{2}$ to $8\frac{1}{2}$lb. each, and they are generally hung on walls, and not placed on the floor. The work is very good, but the colours and designs leave much to be desired.

The old carpets have been for some length of time an article of commerce, not so the modern carpets. The chief reason for this appears to be the prevalence of the use of inferior and aniline dyes. These are almost exclusively used in this district. The dyers, moreover, are very unskilful; they scarcely ever succeed in obtaining the same shade of colour twice in succession, and are very careless about matching colours.

The prosperity of the industry seems to be intimately bound up with the colour question, so it may be worth while to say a few words about it.

It seems to be pretty generally believed that the secret of obtaining many of the old vegetable dyes has been forgotten; this however is not so, and the almost universal use of aniline dyes is simply due to the spirit of laziness and false economy prevalent among the people. Inferior aniline dyes are much easier to get, and are slightly cheaper than the vegetable dyes; the question of quality and durability is not considered.

Japan.—The most remarkable feature in the importation of raw cotton for the year 1900 was the fact that American cotton occupied the first place. It had already attracted more attention the previous year owing to its comparative cheapness. The quantity imported from the United States was almost twice as great as it was in the preceding year, while that which came from British India, on the contrary, fell to less than half the amount taken by Japan in 1899. China, in spite of the dulness of the trade, supplied more cotton than before. Raw cotton is now the article of import which is represented by much the highest values.

Aided by the high prices at which Japanese cotton spinners were able to dispose of their manufactures, the importation of cotton yarn was greater by a large quantity in 1900 than in 1899. Compared with previous years, however, the effect of the industry in Japan itself, in gradually diminishing the demand for yarns from abroad, is apparent. In the case of most cotton manufactures, stocks at the end of 1899 were less than at the end of 1898, and the figures for each class of goods for the year just ended show a marked increase. Cotton satins, velvets, and shirtings especially contributed to the greater volume of this branch of trade.

The diminution in the quantity of wool which was taken by Japan had its origin in the smaller amount of the raw material obtained from China, and also, though to a much less degree, from Australia. The principal wool supply comes from Germany, and that has increased.

Stocks of mousseline de laine at the end of 1899 were comparatively insignificant, and the imports the succeeding year were large, in spite of the growing competition of the Japanese weaving establishments. Indeed, the stocks of most woollen goods at the end of 1899 were insufficient to supply the demand, and the consequent large orders account for the growth in the importation of woollen manufactures.

The import trade in flannels showed signs of revival, but did not attain to anything approaching its former dimensions, as flannelettes of cotton still continue to take its place. Increased quantities of other woollen tissues helped to augment the total.

The Japanese Government, which is the largest purchaser of blankets in this country, buys all that it requires now from the Japanese factories. Hence the continued falling-off in the importation which has been going on for the past few years. The quantity imported in 1900 was small. The factories in Tokio and elsewhere are turning out more and more of these coverings. The blankets made in Japan include red and fancy-coloured ones.

The cotton-spinning industry in Japan has been in an embarrassed condition for the past three and a half years. The evil results of the tendency to over-expansion after the China-Japan War, and above all the lack of sufficiently large capital funds, are acutely felt. 1900 was in particular a very bad year for cotton spinning in a country which finds the principal outlet for its yarns in China. During the first six months of the year the business was much worse than it had been for a long time, owing to the rise in the cost of materials and wages. The difficulties induced by dear cotton and the absence of demand for Japanese yarns found a climax in the closing of the North China trade. Manufacturers were able to carry on work only at a loss, and strong companies alone could face the situation. In April the Union cotton mills decided to close their establishments for four days more in the month in order to raise prices by limiting the output of yarns. In June the help of the Government was invoked on the ground that the loss incurred was £2 0s. 10d. on each bale sold.

Canary Islands (*Spain*).—Taking the imports into Teneriffe in detail, the trade in cotton textiles showed a considerable diminution as compared with that of the previous year. The imports from the United Kingdom fell from 525 tons in 1899 to 282 tons in 1900. The chief reason for the falling-off of British trade has been the rise in exchange, which has had the effect of diverting much of the business in cotton textiles from the United Kingdom to Spain. High prices and difficulty of delivery had also a detrimental effect upon the trade. The bulk of it still remains in the hands of the United Kingdom, Spain coming next with an import of 171 tons in 1900, and then Germany with 54 tons. The latter country still confines her business chiefly to cotton flannels and cotton suitings, in the latter of which articles she practically possesses a monopoly. There is an increasing demand for goods of Italian manufacture, but Italy has not yet become a serious competitor for the trade of these islands. Belgian shippers have also been making efforts to gain a footing, and apparently with some success. The share France holds of this trade seems likely to suffer still further diminution.

The business in both cotton and woollen textiles is done through local commission agents, the credit given being from three to six months; for longer credit an extra 6 per cent. is charged.

The woollen trade shows a marked and steady improvement, and the United Kingdom has been rapidly regaining the trade diverted to Spanish channels by the rise in exchange. In 1898 the imports from the United Kingdom amounted to 9½ tons only; in 1899 they rose to 27 tons, while last year they increased to 50 tons. Spain continues to be the chief competitor, followed at a distance by Germany, whose imports increased from 8 tons in 1899 to 13 tons in 1900, and France, with 8 tons in 1899 and 9 tons in 1900. The demand is for the showy and less durable class of goods.

Yokohama (*Japan*).—The following statement, taken from the Yokohama foreign Chamber of Commerce returns, shows the deliveries of cottons and woollens in 1900 and 1899:—

Articles.	—	Deliveries.		Estimated Value of Deliveries for 1900.
		1900.	1889.	
				£
Cotton yarn......	Piculs..	54,604	86,433	577,926
Grey shirtings...	Pieces..	725,476	896,920	296,234
White shirtings.	Pieces..	141,554	—	79,369
T-cloths	Pieces..	—	24,299	—
Indigo shirtings	Pieces..	—	23,216	—
Dyed shirtings..	Pieces..	17,765	23,216	4,232
Prints	Pieces..	192,006	265,534	68,602
Cotton Italians and sateens ...	Pieces..	119,597	77,491	109,879
Turkey reds ...	Pieces..	84,743	74,011	25,952
Velvets, black..	Pieces..	56,817	47,788	58,001
Victoria lawns..	Pieces..	124,316	89,462	13,326
Silk-faced satins	Pieces..	2,806	1,577	8,879
Flannel	Pieces..	49,398	16,731	75,642
Italian cloth ...	Pieces..	68,570	94,420	104,999
Mousseline-de-laine	Pieces..	479,446	370,580	262,167
Cloth	Pieces..	108,752	18,719	526,512
Blankets (4lb. per pair)	Pairs ...	72,882	83,194	22,319
Total......	—	—	—	2,234,039

Yarns generally have shared the depression which was on all sides apparent during the year. Shipments from the United Kingdom to Japan show a decline of about 12 per cent., whilst deliveries in Yokohama give a falling-off during the twelve months of 37 per cent. compared with the year 1899.

In twist spun from American cotton the decrease of consumption is very noticeable, and although the continuance of the high price of the staple is to some degree accountable for this, there is no doubt that the cheaper spun native yarn, composed chiefly of Indian and Chinese cotton, taken together with the continued improvement in the skill of the mill operatives, is gradually but surely supplanting the foreign importation.

Deliveries were to a large extent influenced by the general dulness which made itself especially evident during the latter half of the year, following upon the lamentable disturbance of peace in China, thus closing to Japan the most important outlet for her manufactures, of which cotton twist forms the largest item.

In yarns made from Egyptian cotton, the consumption demand was affected by the unusually high price which the staple attained during the first quarter of the year, thus placing textiles manufactured from Egyptian cotton yarns beyond the purchasing powers of the people generally. At normal prices it is fairly safe to say that the import of fine yarns, gassed or otherwise, is increasing. Clearances were similarly interfered with by the spell of bad trade referred to above, thus the carry-over to 1901 is larger than under more propitious circumstances it would have been.

In grey shirtings business for 1900 proved exceedingly quiet, the contracts made in the autumn of 1899 for arrival in 1900, at prices some 10 per cent. under those which were ruling at the close of the year under review, having proved sufficient for the wants of the market.

For local consumption, purchases during the year were upon a very restricted scale, and the twelve months closed with from two to three months' consumption on hand.

White shirtings show a large increase over those of the preceding years, the returns giving 190,000 pieces against 78,000 pieces respectively averaging 50 yards per piece.

This excess is somewhat explained by the fact that the price of printed goods, handkerchiefs, etc., generally imported was considered too high, and that a large proportion of white goods were dyed or printed by native concerns to replace articles of the above descriptions heretofore brought in from abroad.

Stocks on hand at the end of the year were fairly heavy, amounting, according to the foreign Chamber of Commerce statistics, to nearly 50,000 pieces.

The market for woollen piece-goods was very good at the beginning of 1900. Top prices had been reached at home, and ruled firm, while the supply here was short and dealers anxious to secure goods.

On account of this brisk business, buyers contracted freely for the autumn season, and forward contracts by far in excess of the actual probable demand were placed at top prices in Europe.

Hankow (*China*).—The gross import of Japanese yarn this year greatly exceeds that of the Indian article, but 171,013cwt. of the latter were re-exported to the West, against 40,280cwt. of the former. The growth of Japanese competition is shown in the following table of gross import of the two commodities:—

Year.	Quantity.	
	Indian.	Japanese.
	Cwt.	Cwt.
1894	194,737	221
1895	228,342	107
1896	245,368	4,273
1897	203,504	62,008
1898	181,668	92,042
1899	277,521	295,756
1900	196,671	277,970

This extraordinary development may be due to the cheaper freight on the Japanese yarn or to its being twisted in the same direction as the native article. The supply of yarn from the Shanghai mills fell from 140,351 to 115,288cwt., of which only 6586cwt. went into local consumption. The export of the produce of the Wuchang mills, likewise, was less by 18,742cwt., the work having almost ceased during the troublous months. The values of the four kinds, according to Customs returns, are per cwt.:—Indian, £3 6s. 8d.; Japanese, £3 1s. 5d.; Shanghai, £2 18s. 9d.; Hankow, £2 14s. 9d. Japanese yarn is gradually ousting Indian yarn from its stronghold, won with much difficulty in Szechuen; and Indian yarn may presently fall to the position of British, only special counts of which are still in demand. Of the three competitors for the yarn supply of the West, the Hankow mills seem handicapped by inferior management and perhaps old machinery, while the labour rate and the price of cotton kept down the Shanghai product.

Tangier (*Morocco*).—Cloth to the value of £32,990, exclusive of made-up clothes, was imported at Tangier during the year 1900. Of that amount only £302 came from the United Kingdom, there being but a small demand for the better quality cloths such as are made in the United Kingdom, and "army cloths," which formerly used to find a market here, being no longer in demand. Most of the cloth now comes from Germany, and is of German and Austrian manufacture. Some fine cloth is also brought from France.

The total value of cottons imported is in excess of that of any year since 1894, when their value was £198,395. Since that year their value has steadily fallen, till in 1898 it was only £113,569, whereas in 1899 it rose again to £171,317. The increase is to be accounted for by the general improvement in trade. Of the total value imported, £128,007 is shown as having come from the United Kingdom, whilst France shipped £23,460 worth, presumably in great measure muslins, etc., from Switzerland, and Germany is credited with £12,660, which probably includes hosiery, etc., of Austro-Hungarian origin.

THE GAZETTE.

ENGLAND.

Partnerships Dissolved.

Henry Carey Houston, Henry Spiers Houston, and Stuart Carey Houston, cloth manufacturers, Frome; as regards S. C. Houston.

George Platt and William Platt, mill furnishers, Stalybridge-road, Ashton-under-Lyne, as W. H. Platt and Co., by the death of the former.

John Walker and Ronald Williams, cotton brokers, 22 Hackins Hey, Liverpool.

Thomas Haworth, William Thomas Haworth, Benjamin Haworth, and Herbert Haworth, cotton-waste spinners and manufacturers, Vale Rock Mill, Hoddlesden, near Darwen; as Holden Haworth.

John William Hughes Rothwell, Mary Ann Rothwell, and Richard Percy Rothwell, cotton spinners and manufacturers, Meadow Mill, Ramsbottom, as J. and E. Rothwell.

Jesse Wright and Thomas Myers, yarn finishers, 140, Harris-street, Bradford, as Jesse Wright and Co.

Samuel Bunting and William Anderson, cotton doublers and thread manufacturers, Lower Carr Mill and Churchgate Mill, Stockport, as Samuel Bunting and Co.

Voluntary Windings-up.

Addingham Manufacturing Company Limited, Town Head Mills, Addingham, Yorkshire; Mr. G. B. Prior, Addingham, mill manager, liquidator.

Drogheda Spinning and Manufacturing Company Limited. Meeting held at 56, Fountain-street, Manchester. Mr. W. Lunt, Ashton-under-Lyne, liquidator.

Ramie Company Limited, 64, Mosley-street, Manchester; Mr. A. Watson, Lancaster-avenue, Manchester, liquidator.

Cleckheaton Mill Company Limited, on the sale of the undertaking; Messrs. J. Hirst, contractor, T. M. Speight, engineer, and R. Castle, architect, Cleckheaton, joint liquidators.

NEW COMPANIES.

Belmont Manufacturing Company Limited.

Registered May 25, with a capital of £5000, in £1 shares, to acquire the business of cotton manufacturers and merchants, formerly carried on by Brunton Bros., at Laneshawbridge Mill, near Colne, Lancashire, and to carry on the business of cotton spinners, doublers, and manufacturers, linen manufacturers, yarn merchants, bleachers, dyers, etc. No initial public issue. Table A mainly applies. The number of directors is not to be less than three nor more than five; the first are J. F. Hynd, F. Hynd, and H. Wilmore, and two others to be appointed by the subscribers. Registered by Proctor and Co., 3, Grimshaw-street, Burnley.

Burton and Frost Limited.

Registered May 25, with a capital of £10,000, in £5 shares, to carry on the business of spinning, weaving, manufacturing, or dealing in and with cotton, woollen, or other fibrous substances, preparing, dyeing, bleaching, or colouring of any of the said substances, and buying and selling yarn, cloth, or other manufactured substances. No initial public issue. The first directors are G. Burton, T. Frost, and W. H. Frost (governing directors); qualification of governing directors, £500; of ordinary directors, one share; remuneration, as fixed by the company. Registered by Proctor and Co., 3, Grimshaw-street, Burnley.

Edwards, Cunliffe and Co. Limited.

Registered May 25, with a capital of £80,000, in £10 shares, to acquire all or part of the business and property (real or personal) of W. J. Cunliffe, hitherto carried on at Manchester and Glasgow, as a shipping merchant, manufacturer, and calico printer, as Edwards, Cunliffe and Co., and to carry on the business of shipping merchants, spinners, weavers, bleachers, dyers, printers, commission agents, wholesale and retail buyers, sellers and dealers of and in fabrics of all kinds, import, export, and commission merchants, packers, general agents, etc. No initial public issue. The number of directors is not to be less than three nor more than six; the first are to be appointed by W. J. Cunliffe (governing director); special qualification of governing directors, £10,000; qualification of ordinary directors, 25 shares; remuneration of ordinary directors, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, 16, Byron-street, Manchester.

J. W. and F. N. Priestley Limited.

Registered May 23, with a capital of £20,000, in £10 shares, to acquire and carry on the business of woollen manufacturers, carried on at Victoria Mills, Littletown, in Liversedge and elsewhere in Yorkshire, as J. W. and F. N. Priestley, and to adopt an agreement between J. W. Priestley and F. N. Priestley of the first part, T. Horsfall and others of the second part, J. Armitage and others of the third part, and C. Medley (for the company) of the fourth part. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are J. W. Priestley, F. N. Priestley, J. Armitage, V. Edelstein, O. Haigh, R. H. Holman, and T. Horsfall; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Victoria Mills, Littletown, Liversedge, Yorkshire.

Patent Carding Machine Company Limited.

Registered May 25, with a capital of £1000, in £1 shares, to acquire from J. Tetlow, D. Crabtree, M. Day, and L. Gaunt, their interests in certain patents and rights connected with improvements in the carding of fibrous materials, and to carry on the business of a carding machine company. No initial public issue. The number of directors is not to be less than two nor more than five; the first are D. Crabtree, M. Day, L. Gaunt, and J. Tetlow; qualification, 100 shares; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C.

Sowerbutts (Freckleton) Limited.

Registered June 1, with a capital of £10,000, in £5 shares, to acquire the business carried on by J. W. Lever and J. Bibby, at Balderstone Mill, Freckleton, near Preston, Lancashire, and to carry on the business of cotton manufacturers, spinners, and brokers, yarn and cloth agents, salesmen, and general textile manufacturers. No initial public issue. The number of directors is not to be less than two nor more than five; the first are J. W. Lever and J. Bibby; qualification, £1000. Registered office, Balderstone Mill, Freckleton, near Preston, Lancashire.

Transatlantic Trading Company Limited.

Registered May 23, with a capital of £50,000, in £10 shares, to buy, sell, import, export, and deal in cotton, linen, silk, wool and other threads, cloths, fabrics, goods, produce and merchandise, and to carry on in the United States of America or elsewhere the business of traders, agents, cotton brokers and merchants, cotton spinners and doublers, flax, hemp, and jute spinners, linen manufacturers, flax, hemp, jute, and wool merchants, woolcombers, worsted and woollen spinners, yarn merchants, bleachers, dyers, capitalists, etc. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are A. E. J. Reiss, H. J. Reiss, G. Eckhard, J. F. Heimendahl, and A. M. Hoch; qualification, one share. Registered by Busk, Mellor and Norris, 45, Lincoln's Inn Fields, London, W.C.

A. Barrowclough and Co. (Morley) Limited.

Registered May 2, with a capital of £20,000, in £1 shares, to acquire the business of worsted and woollen manufacturers, now carried on at Morley and elsewhere in Yorkshire, as A. Barrowclough and Co., to adopt an agreement with J. L. Wylde and J. P. Wise, to carry on the business of worsted and woollen cloth manufacturers and merchants, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are J. L. Wylde and J. P. Wise (managing directors); qualification, £4000 each; ordinary directors to be appointed by the above managing directors; remuneration of J. L. Wylde, £500 per annum; of J. P. Wise, £300 per annum. Registered office, Albert Mills, Morley, Yorkshire.

Banbury Woollen Manufacturing Company Limited.

Registered April 30, with a capital of £10,000, in £1 shares, to adopt an agreement with G. W. Lightowler, and to carry on the business of weavers, worsted manufacturers, etc., at Banbury Woollen Mills, Banbury, Oxon. No initial public issue. The number of directors is not to be less than three nor more than ten; the subscribers are to appoint the first; qualification, £150; remuneration, £100 each per annum (£50 extra for the chairman). Registered office, Banbury Woollen Mills, Banbury, Oxon.

Gartside and Co. (of Manchester) Limited.

Registered April 29, with a capital of £100, in £1 shares, to acquire the goodwill, trademarks, and designs of the business of Gartside and Co. (of Manchester) Limited, and to carry on the same or any other business acquired by this company, as agents for the Calico Printers' Association Limited, or otherwise. No initial public issue. The directors are to be appointed by the Calico Printers' Association Limited. Registered by Grundy and Co., 89, Gresham-street, London, E.C.

Westfield Cotton Company (Huddersfield) Limited.

Registered April 30, with a capital of £1000, in £1 shares (500 preference) to carry on the business of cotton yarn manufacturers, dyers, bleachers and cleaners, manufacturers of satin, satinette, plush, velveteen, and textile fabrics, dealers in dyeing and bleaching materials, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are H. Ellis and Mary Ann Ellis; qualification, 50 shares; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C.

Portree Wool Mill Company Limited.

Registered at Edinburgh, May 3, with a capital of £2000, in £1 shares, to acquire the undertaking known as the Portree Wool Mills, with water rights and all the property of every description, heritable and movable, to acquire also lands or premises in or near Inverness, Portree, or elsewhere in Scotland, and to erect buildings thereon to be used in connection with the company's business. The number of directors is not to be less than two nor more than ten; the first are R. Duffy and A. MacDonald; qualification, 20 shares. Registered office, 53, Academy-street, Inverness.

W. E. Cotton and Sons Limited.

Registered May 4, with a capital of £40,000, in £1 shares, to carry on the business of cotton, wool, and waste merchants, dealers in raw materials for the textile trades, dyers, bleachers, scourers, cleaners, extractors, laundry proprietors, manufacturers of yarns, cloths, cleaning wastes, flocks, shoddies, soaps, and oils, to acquire and turn to account any patent rights and other property. No initial public issue. Registered without articles of association. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Lewisham-road, Slaithwaite, near Huddersfield, Yorks.

Century Ring Spinning Company Limited.

Registered May 17, with a capital of £80,000, in £1 shares, to purchase, prepare, spin, double, reel, gas, wind, warp, weave, manufacture, bleach, dye, print, and manipulate cotton and other fibrous substances, to sell and deal in cotton, cotton yarn, and other fibrous products and materials, to carry on the business of spinners, doublers, weavers, manufacturers, bleachers, dyers, printers, finishers, etc., and to adopt agreements (1) between Joseph Fearnhead, F. Fearnhead, and A. B. Fearnhead of the first part, the said Joseph Fearnhead and John Fearnhead of the second part, and W. Kay (for the company) of the third part, and (2) between Dobson and Barlow Limited of the one part, and the said W. Kay of the other part. Minimum cash subscription, 40,000 shares. The number of directors is not to be less than two nor more than five; the first are Chas. H. Nuttall, Hilary S. Forest, William S. Forest, and Alfred Higginson; qualification, 1000 shares; remuneration, £350 per annum, divisible. Registered by Woodcock and Co., 15, Bloomsbury-square, London, W.C.

Royton Dyeing and Waterproofing Company Limited.

Registered May 17, with a capital of £3000, in £1 shares, to carry on the business of bleachers, dyers, finishers, and waterproofers, and manufacturers and purchasers of and dealers in materials capable of being used in any such business. No initial public issue. The number of directors is not to be less than two nor more than seven; the first are Walter Hardwick, John T. Reid, and Tom Taylor; remuneration, as fixed by the company. Registered office, Ely Clough Mill, Royton, near Oldham, Lancashire.

Alfred Hill and Sons Limited.

Registered May 21, with a capital of £20,000, in £10 shares, to acquire the business of an oil extractor now carried on by A. Hill, at Victoria Oil Works, Batley Carr, Dewsbury, and elsewhere, and the business of carpet manufacturers, carried on by the said A. Hill and C. Hill, as Charles Hill and Co., at Victoria Mills, aforesaid, and to carry on the business of oil extractors and merchants, chemical manufacturers, manure makers, shoddy manufacturers, yarn spinners, carpet manufacturers, general textile manufacturers, millowners, etc. No initial public issue. The number of directors is not to be less than three nor more than seven; the first are A. Hill, H. Hill, C. Hill, and E. Hill; qualification, fifty shares; remuneration, as fixed by the company. Registered by Jordan and Sons Limited, 120, Chancery-lane, London, W.C. Registered office, Victoria Mills, Batley Carr, Dewsbury, Yorkshire.

G. R. Portway and Co. Limited.

Registered May 21, with a capital of £40,000, in £10 shares (2400 preference), to acquire under an agreement with G. R. Portway and J. H. Portway the business now carried on at 1 and 2, York-place, Leeds, as G. R. Portway and Co., and to carry on the business of woollen and worsted manufacturers, wool dealers, yarn merchants, woollen and worsted spinners, bleachers, dyers, finishers, buyers and sellers of cloth, wholesale and retail clothing manufacturers and merchants, soap manufacturers and merchants, and textile manufacturers generally. No initial public issue. The number of directors is not to be less than two nor more than five; the first are G. R. Portway and J. H. Portway; qualification, 100 shares; remuneration, £1000 per annum, divisible. Registered by R. H. Calvert, 7, Greek-street, Leeds.

Samuel Porritt and Sons Limited.

Registered May 21, with a capital of £70,000, in £1 shares, to acquire the woollen manufacturing business carried on as Samuel Porritt and Sons, at Bamford and Meadowcroft, near Rochdale, Lancashire, and to carry on the business of woollen manufacturers, combers, carders, finishers, spinners, doublers, weavers, warpers, reelers, winders, fullers, bleachers, dyers, and printers of cotton, flax, wool, hemp, jute, and other fibrous substances, etc. No initial public issue. The number of directors is not to be less than two nor more than five; the first are J. Porritt, C. Porritt, J. E. Porritt, and A. E. Porritt; each of the three first named may retain office so long as he holds £5000 shares; ordinary qualification £1000. Registered by C. Doubble, 14, Serjeants' Inn, London, E.C.

JOTTINGS.

THE President of the Board of Trade has appointed Mr. Francis J. S. Hopwood, C.B., C.M.G., to be the Permanent Secretary to the Board of Trade in the place of the late Sir Courtenay Boyle, K.C.B.

THE directors of Messrs. Brunner, Mond and Co. Limited, chemical manufacturers, Northwich, have declared a dividend of 40 per cent., making a total of 35 per cent. per annum. The sum which has been carried forward and put to the reserve fund is £107,130.

AUSTRALIAN contemporaries are discussing what is undoubtedly a very important matter concerning the gradual depletion of the soil of some of its most fertilising elements by the steady export of wool. It has been calculated that from 1893 to 1899 something like twelve and a half million pounds of potash were exported in the form of wool. The yolk of the wool is composed to a great extent of soluble potash salts. Where there is an insufficiency of yolk the fibre of the wool is dry, hard, and weak, and the whole of the fleece becomes thin and hairy, whereas with a sufficiency of yolk the wool is soft and oily, rich and strong.

THE Board of Trade returns show that the imports for May amounted to £42,426,759, against £43,876,427 for the corresponding month of last year, being a decrease of £1,449,668. The exports for May amounted to £23,556,712, compared with £24,715,930 in May last year, showing a decrease of £1,159,218. The imports for the five months ended May 31 were £220,821,835, against £213,749,770 for the corresponding period last year, being an increase of £7,072,065. The exports for the five months amounted to £116,356,024, against £119,481,429 for the corresponding months last year, showing a decrease of £3,125,405.

SILK WEAVING in Italy seems to have improved considerably, judging from the high export figure of the manufactured quality. The primitive Italian factories and obsolete hand machinery have given way to large establishments with modern appliances worked by steam or electricity. The number of factories is now returned at 2084, and the operatives at 172,356. Italy provides silk manufactures for several countries, foremost among which is the United Kingdom, followed by Switzerland, Turkey, Germany, United States of America, Austria-Hungary, Central and Southern America, and small quantities to France, Africa, and Malta. The centres of the silk industry are in Lombardy (Milan, Como, and Bergamo), Piedmont, and Venice.

THE population of the United States is growing, and yet, *per capita*, a diminishing quantity of wool is being used. This is not to be accounted for by any falling-off in the popularity of woollen garments. The fact seems to be that since the removal of raw wool from the free list the use of shoddy has grown to an amazing extent. There are used annually in the United States approximately 125,000,000lb. of shoddy, which would be equivalent to 350,000,000lb. of wool in the grease. As the American production of wool is about 300,000,000lb. a year, and that amount is annually put into the consumption, it would appear that in the production of fabrics of wool there is more shoddy used than there is of home-grown wool. If to the quantity of shoddy thus annually employed is added the cotton which in the last two or three years has entered in increasing quantities into the manufacture of worsted and woollen goods, the amount of adulteration must be even greater than would appear from the figures given above.

THE death occurred on the 22nd ult. of Mr. Reuben Spencer, chairman of the firm of Messrs. Rylands and Sons Limited, Manchester. Mr. Spencer was born at Belper in 1830. At an early age he came to Manchester to enter the office of an accountant, with whom he remained about twelve months. By the aid of this first employer and another friend he obtained a situation, in 1847, with the firm of Messrs. Rylands and Sons. In 1867 he was admitted into partnership. On the conversion of the concern, in 1873, into a limited liability company he became a member of the board of directors, and on the death of Mr. Rylands he was appointed its chairman. Early in 1890 Mr. Spencer published a useful work entitled "The Home Trade of Manchester, with Personal Reminiscences and Occasional Notes." Mr. Spencer took a prominent part in the establishment of the Warehousemen and Clerks' Provident Association, the Porters' and Packers' Benevolent Society, and numerous other societies of similar character. Closely associated in name and object were the Warehousemen and Clerks' School. For a period of twenty-seven years he was the president of the Manchester Home Trade Association.

MR. WILLIAM EGERTON HUBBARD, the chairman of the Anglo-Russian Cotton Factories, presided at the fourth annual meeting of shareholders, held on the 30th ult. at the London offices of the company. The chairman, in moving the adoption of the report, stated that the dividends declared by the Russian companies and the interest earned on advances amounted to £41,594. After providing for all charges and expenses, including income-tax to April 5, 1901, there remained a sum of £39,053, which, added to the balance of £2333 brought forward from last year, gave £41,397 to be dealt with. After providing £30,000 for the debenture service, and writing off preliminary expenses account a further sum of £2000, there remained a balance of £9397, from which the directors recommend a dividend on the share capital of the company—£500,000—at the rate of 1½ per cent. per annum, leaving £2342 to be carried forward. This, he said, was a better balance-sheet than last year's, notwithstanding that the rise in the price of cotton and fuel had militated against the success of the Petroffsky and Spassky Spinning and Weaving Mills. On the other hand, as appeared from the reports of the manager and directors of the Schlusselburg Calico Printing Company, that company had been considerably more successful than for many years past. The calico printing works were of considerable promise for the current year, and he hoped next year to show a large increase of profit. Mr. Walter Thornton seconded the motion, and the report was adopted. Mr. Evelyn Hubbard was re-elected a director.

THE report of the directors of the Fine Cotton Spinners' and Doublers' Association for the year ended March 31 has been issued. It deals with the third year's working, and in it the directors recommend a higher dividend than any that has yet been paid on the ordinary shares. The directors state that the balance brought forward from last year's account, after payment of bonuses to management and auditors' remuneration, is £13,460 14s. 11d. The profits for the year, after charging £130,836 16s. to depreciation, and after providing for bonuses and auditors' remuneration for the year covered by the accounts, amount to £493,935 17s. 2d., and after deducting interest on debenture stock (£84,217 5s. 3d.) there remains a balance of £423,179 6s. 10d., out of which have been paid interim dividends as under:—On preference shares at the rate of 5 per cent. per annum, £50,000, and on ordinary shares at the rate of 8 per cent. per annum, £72,000, leaving a balance of £301,179 6s. 10d., which the directors recommend should be appropriated in the following manner:—To reserve fund (making a total of £280,000), £100,000; to payment of a dividend for the half-year ended March 31, 1901, at the rate of 5 per cent. per annum on preference shares, £50,000; to payment of a dividend for the half-year ended March 31, 1901, at the rate of 10 per cent. per annum on the ordinary shares, making a total distribution for the year of 9 per cent., £90,000; total, £240,000; the balance of £61,179 6s. 10d. to be carried forward. The directors have purchased during the year the Bradford Colliery Company, Bradford, Manchester. The financial arrangements in connection with the purchase of additional properties have led the directors to create first mortgage extension debenture stock to the amount of £750,000, specifically secured by properties not included in the original trust deed dated October 7, 1898. Of this sum £450,000 was offered for subscription to the stockholders and shareholders of the association by circular-letter dated November 30, 1900, with the result that the whole of the issue was subscribed.

THE death occurred in London, on the 31st ult., of Sir Andrew Fairbairn. He was born at Glasgow on March 5, 1828, and was a son of Sir Peter Fairbairn, of Leeds, and a nephew of the late Sir William Fairbairn, Bart., of Manchester. Sir Andrew Fairbairn was educated at Leeds, Geneva, Glasgow, and Cambridge. He was forty-seventh Wrangler in 1850. After taking the M.A. degree he was called to the Bar at the Inner Temple, and for a few years practised on the Northern Circuit. He abandoned the legal profession to engage in carrying on the engineering firm of Messrs. Fairbairn, Naylor, Macpherson and Co., of Leeds, which was founded by his father. Sir Peter Fairbairn sent his son to Germany, where the firm had already many business connections; and Sir Andrew travelled over a great part of Bohemia, Moravia, Silesia, and Prussia, acquiring as he went a close acquaintance with the practical working of the flax mills of those places. Subsequently he made similar journeys to France, Belgium, Switzerland, and Italy, and in the two latter countries obtained an insight into the waste silk-spinning trade. In 1858 he made a business tour in Russia, visiting Moscow, Narva, and other centres of trade, and he returned to England by way of Warsaw and Vienna. In 1860 his father took him into partnership. The training he had undergone, and the diligent observation he had cultivated, qualified him to become a master of his business at the eventful time when, in 1861, Sir Peter died. Sir Andrew carried on the business alone until 1863, when he took into partnership his cousin, Mr. T. S. Kennedy, and Mr. J. W. Naylor, who had long been connected with the works. The firm then carried on business under the style of Messrs. Fairbairn, Kennedy and Naylor, and it greatly expanded its operations. Mr. W. Macpherson afterwards became a partner, and the style of the firm was changed to that of Messrs. Fairbairn, Naylor, Macpherson and Co. In 1900 the firm united with Messrs. S. Lawson and Sons, of Leeds, and Messrs. Combe, Barbour and Combe, of Belfast. Sir Andrew Fairbairn was also a director of the Great Northern Railway, and had an important share in the International Railway Congresses of Brussels and Paris.

THE TEXTILE COLOURIST:

DEVOTED TO

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

New Dyeing Materials.

NOTES ON THE PATTERNS ILLUSTRATED.

PATTERN No. 1 is an all-wool cashmere dyed with Wool Blue (Kallé). The bath is prepared with 3 per cent. Wool Blue and 20 per cent. Glauber's salt. The wetted goods are passed into the cold dyebath, which is raised slowly to the boil, and several portions of 4 per cent. acetic acid added. In order to completely exhaust the bath, 3 per cent. bisulphate of soda is added, and boiling continued for half-an-hour longer.

Pattern No. 2 is an all-wool cashmere dyed with 3·75 per cent. Wool Blue and 0·25 per cent. Orange IV. (Kallé). These proportions of dyestuff, along with 20 per cent. Glauber's salt, make up the dyebath, into which the wetted goods are entered while cold. The bath is then raised slowly to the boil, portions of 4 per cent. acetic acid being added from time to time. After boiling, 3 per cent. bisulphate of soda is added, so as to completely exhaust the bath, and the boil kept up for half-an-hour longer.

Pattern No. 3 is a cotton sateen dyed with Carbon Black B W (Kallé). The dyebath is made up of 3 per cent. Carbon Black B W, 20 per cent. Glauber's salt, and 0·5 per cent. soda. The goods are entered at the boil, and dyed boiling for one hour.

Pattern No. 4 is a cotton sateen dyed with 6 per cent. Carbon Black B (Kallé), with the addition of 20 per cent. Glauber's salt and 0·5 per cent. soda. The goods are entered at the boil, and dyed boiling for one hour.

Pattern No. 5 is a half-wool crépon dyed with Union Black G extra (Kallé). The cloth is dyed with 6 per cent. colouring matter, adding 20 per cent. Glauber's salt and 0·2grm. of soda per litre of dyebath. The goods are entered at the boil, and dyed boiling for one hour.

Pattern No. 6 is a half-wool crépon dyed with 6 per cent. Union Black B extra (Kallé), and the addition of 20 per cent. Glauber's salt and 0·2grm. of soda for each litre of the dyebath. The goods, after being entered at the boil, are boiled for one hour.

Pattern No. 7 is a cotton sateen dyed with 10 per cent. Katigen Chrome Blue 5G (Bayer), 10 per cent. sulphide of soda crystals, 5 per cent. soda ash, and 20 per cent. Glauber's salt crystals. It is afterwards treated with 3 per cent. bichromate of potash, 3 per cent. copper sulphate, and 5 per cent. acetic acid. By the after-treatment above, it will be noticed that a greenish blue is obtained. If this is omitted and the goods dyed direct, a green shade very similar in tone to Katigen Green 2 B is produced. The after-treatment is said to render the colour extremely fast to light, washing, and boiling. This dye is adapted for dyeing either loose cotton, hanks, or pieces, and its fastness to light makes it suitable for curtain and upholstery goods. Its bright shade also makes it suitable for dyeing mercerised yarn or cloth.

Pattern No. 8 is a cotton sateen dyed with 15 per cent. Katigen Black S W (Bayer), 7 per cent. Katigen Black 4 B, 20 per cent. sulphide of soda, 8 per cent. soda ash, and 40 per cent. Glauber's salt crystals. The two dyestuffs combined are both of the Katigen series. The S W brand dissolves for the most part in hot water, but still better with an addition of caustic soda; but such a solution is absolutely unsuitable for dyeing, as the colour is not dissolved in such a manner that it can be absorbed by the fibre, and, in fact, the colour which falls on to the fibre can be almost entirely washed off again by rinsing the goods. The solution which is suited for dyeing, and which remains clear when Glauber's salt or common salt is added, is only obtainable by adding sulphide of soda at the same time. This addition has the further advantage of preventing uneven results, even when the material—as is usually the case in yarn dyeing—is about one-fourth above the top of the liquor. Besides this, soda is also added to the bath, which has the effect of counteracting the hardness of the water, and the consequent result of such—viz., crocking off, precipitating, etc. It further renders greater fulness and depth of shade to the black. It must further be mentioned that the volume of dye liquor, sulphide of soda, and common salt (or Glauber's salt), should be in correct proportion—*e.g.*, if a short liquor is employed, more sulphide of soda is required to prevent the dye liquor when cooling down from becoming gelatinous, and less common salt is then necessary; but if, on the other hand, for some reason or other a long liquor is required, more common salt should be employed to obtain the same depth of shade, which is only possible if the quantity of sulphide of soda be in correct proportion to keep the colour in solution. A sure sign that sulphide of soda and common salt are not in proper proportion is the appearance of a reddish bronzy hue on that part which has not been dipped in the liquor. Pieces should be well rinsed, for any traces of sulphide of soda left in the goods are liable to effect oxidation later, and cause the black to lose in fulness and bloom. The 4 B brand has a bluish tone, and could almost be classed as a navy blue. It is, however, best dyed in combination with some other dyestuff, as in the present instance, and is far less suitable as a self-colour. It is well adapted for the vat dyeing of cotton pieces, and need not necessarily be dyed on the jig.

Pattern No. 9 is a cotton sateen dyed with 10 per cent. Katigen Olive G N (Bayer), 10 per cent. sulphide of soda, 5 per cent. soda ash, and 20 per cent. Glauber's salt crystals. This dyestuff is an addition to the G brand, but is bluer and rather duller in shade, either when dyed direct or after-treated. With the exception of being faster to acids, it has similar properties.

Pattern No. 10 is a mercerised cloth dyed with 5 per cent. Immedial Brown B (Cassella) in a standing bath (in the jigger), with the addition of 8oz. soda, 4½oz. sulphide of sodium, and 3lb. common salt per 10gals. of liquor. The goods are given from six to eight ends at the boil, squeezed, and then passed on to a second jigger containing cold rinsing water.

Pattern No. 11 is a mercerised cloth dyed exactly like the preceding pattern, only using twice as much dyestuff (10 per cent. Immedial Brown). These direct dyeings are fast enough to washing and milling without the necessity of an after-treatment, such only being occasionally resorted to for shading purposes. By coupling with Nitrazol C or Diazoparanitraniline, considerably brighter shades are obtained, whilst an after-treatment with bichromate of potash and sulphate of copper causes the shades to turn darker. Both the above and direct dyeings may be shaded with basic dyestuffs, which fix well upon Immedial Brown.

Pattern No. 12 is cotton yarn dyed with 13 per cent. Immedial Black N G (Cassella), with the addition of 8 per cent. sulphide of sodium (reckoned on the weight of the dry goods), 8oz. soda ash, and 3lb. common salt per 10gals. of water required for repleting the dye liquor.

Pattern No. 13 is cotton yarn which has been dyed with the same dyestuff and in the same manner as the preceding pattern, and then after-treated with 3 per cent. bichromate of potash and 2 per cent. acetic acid.

Patterns Nos. 14 and 15 are dyed with Immedial Black N B (Cassella), the former like Pattern No 12, and the latter with an after-treatment like Pattern No. 13. Both the dyestuffs in question (N B and N G) are best dissolved by pouring hot water over them and the quantity of sulphide of sodium required, and then adding the solution to the dyebath. These dyes must not be brought into contact with copper, and none of the vessels or apparatus used should be made of or contain fittings of this metal. The hanks are best dyed on bent iron pipes in wooden or iron vessels. The bath is charged with the requisite ingredients, boiled, and when the steam is shut off, the yarn—which has previously been well boiled—is entered and turned with a stick, at first frequently, and then about once every ten minutes. After giving each stickful one or two more turns, the yarn is well squeezed, one stickful after the other, by means of two squeezing rollers adjusted to the front of the vat, and is then immediately well rinsed in vats placed close to the dye vat.

Bleaching Vegetable Fibres.

By E. Tassel.

(*Continued from page* 174.)

KIERS FOR LIME BOILING.—These are of exactly the same kind as used for lye boiling, and will be described when that operation is reached, the only point of interest to examine being the relative advantages of open and pressure kiers. The author decidedly favours a pressure of 4½ to 14lb. per square inch, since the action of lime is one of saponification when the fats present in or with the fibre are in question, but one of double decomposition when it is a question of displacing cellulose from combination with pectin bodies, both of which operations are facilitated by heat. In view of preserving the fibre, there is no difficulty in producing a 26in. vacuum in the kier by means of a Körting injector before applying heat, a method which preserves the cellulose in the best condition, and enables the lime lye to be replaced by water at the close of the operation without exposing the material to the action of the air.

From the economical standpoint, every bleacher knows that a pressure kier does not consume any more steam than an open one, and that once boiling temperature has been reached, only a very small quantity of steam is needed to keep up a pressure of from 4½ to 7lb. In open vessels lime boiling must be continued for at least ten hours, whereas eight hours are sufficient at a pressure of 14lb., which pressure, moreover, should never be exceeded. When the operation is completed, the main precaution to be adopted is to prevent access of air while the material is being cooled down from 105° C. to the ordinary temperature. To attain this end, it is sufficient to provide the kier with an inlet tap at the bottom, through which the cooling water is introduced, whilst the displaced lime liquor escapes through an outlet tap at the top, without the kier having to be opened at all.

In examining the fabric after liming, the intensity of the reaction readily becomes apparent. The appearance of the goods is completely altered, having changed to brown, a sure sign of the formation of pectates and metapectates of lime. The liquor, however, is much paler in colour than that resulting from the use of soda lyes, a condition that is not at all unusual when we remember that the pectates of lime are insoluble, and therefore remain fixed on the fabric, which then requires treating in an acid bath (souring) in order to secure their elimination.

Souring.—On leaving the liming kier the goods must be well washed by passing them several times through a vessel containing a constantly-renewed supply of clean water, and squeezing them between wringer rollers each time. The washing must be thorough, in order not only to remove the whole of the lime remaining adherent to the fabric, but also to bring up to the surface of the fibre as large a proportion as possible of the pectates formed in the liming process. It is easy to understand that any lime left behind will neutralise a corresponding quantity of acid, and thus cause a loss. The next stage is souring, the first object of which is to neutralise any lime remaining on the fibre after washing, since this lime would be certain to corrode the fibre, and also be a source of great damage during subsequent operations.

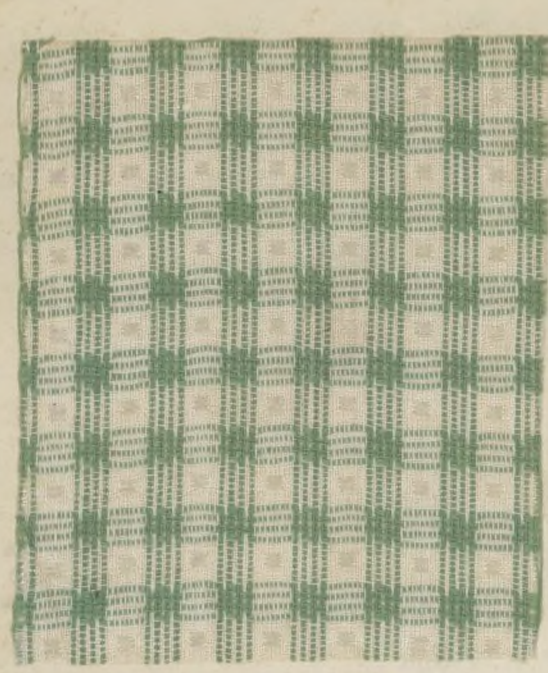
Souring should follow liming without delay, the author having known goods suffer great alteration by being first left for forty-eight hours exposed to the air after an imperfect washing. Another purpose served by souring is the decomposition of the lime soaps formed during the previous treatment. This action is rapid and readily apparent; on examining a parcel of goods that have been soured in a confined vessel where the action of the acid was necessarily irregular, it will be seen that where the fabric has come in contact with the acid it has become less hard and lighter in colour, the remaining portions still retaining their darker shade. The acid has also to decompose the metallic soaps resulting from the bases present in the dressing preparations used, and sets the fatty acids free. Finally it also acts as a solvent on portions of the fatty substances that have been modified by oxidation: this is not a mere hypothetical assumption, but can be demonstrated by evaporating the liquid to dryness.

In reply to the query as to which acid is the most suitable for use here, it may be stated that hydrochloric acid is preferable to sulphuric acid, since, apart from the question of price, it has the great advantage of never forming insoluble subsalts. The chief product is calcium chloride, which is far more soluble than the sulphate, the latter being removable only with great difficulty, even when very energetic washing is employed, and is, moreover, dangerous, inasmuch as the solution burns the fabric when concentrated thereon. In England, however, sulphuric acid is still largely used in places where the waste liquors have to be discharged into rivers inhabited by fish. In such cases the liquors are run into tanks, whence they are decanted, leaving the lime deposited in the form of sulphate instead of passing away in solution as chloride.

The fabric, on leaving the acid bath, must be thoroughly washed, and should be carefully tested afterwards for the presence of any trace of acid, since not only would this acid react on the material when exposed to the air in the bleaching

PATTERN SHEET No. 100.

Samples of Cotton Cloths.



PATTERN No. 187.

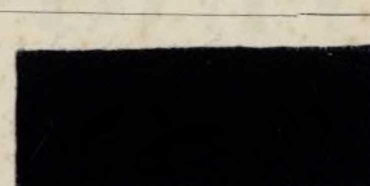
PATTERN No. 188.

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. 101.

Illustrating New Dyeing Materials.

No. 1.



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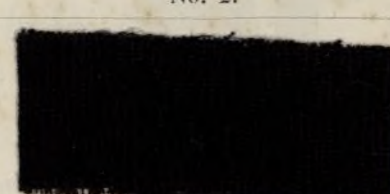

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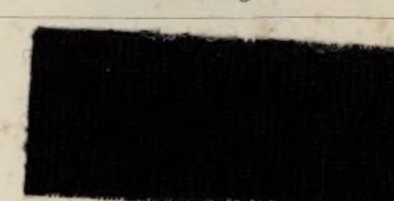

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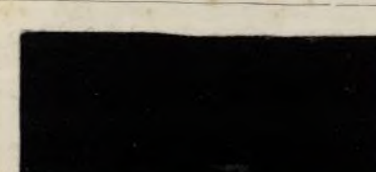

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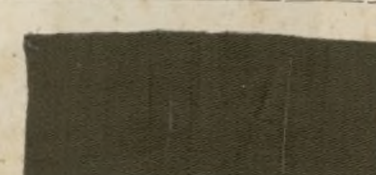

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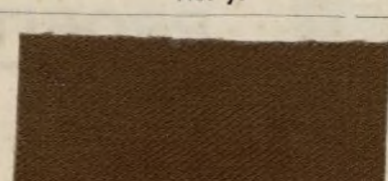

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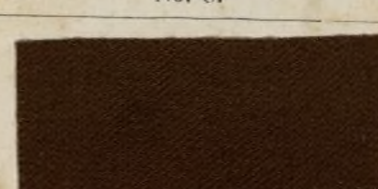

No. 11.

No. 12.

No. 13.

No. 14.

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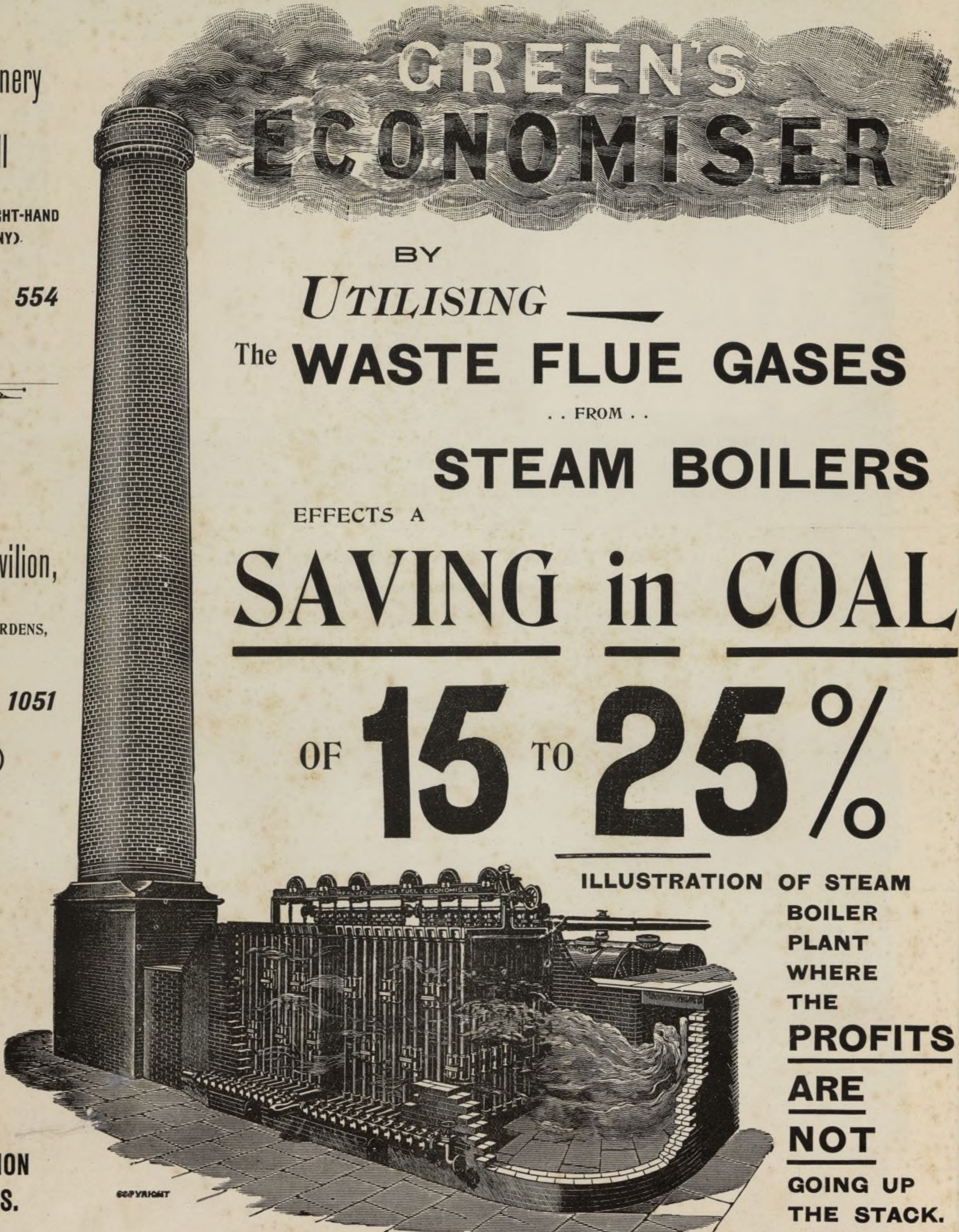

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works, but—and this is more serious—would also corrode the fibre during the subsequent operations wherein heat is employed. Dilute acids react—harmlessly, it is true—on cellulose, even in the cold, the latter body acting as a weak base; and at temperatures exceeding 35° C., acids, and dilute hydrochloric in particular, attack cellulose and give rise to the formation of hydrocellulose ($C_{12}H_{20}O_{10} : H_2O$), which becomes soluble at from 80 to 100° C., oxidising and forming soluble brown products.

Acids should always be used cold in bleaching operations, the temperature never being allowed to rise above 25° C.; and the strength should never be greater than 2 per cent., whether hydrochloric or sulphuric acid be employed. In special cases stronger acid baths are sometimes necessary, but with cold sulphuric acid the maximum degree of concentration compatible with the preservation of the fibre is between 35° and 40° Bé. (equal parts, by volume, of acid and water). A mixture of three volumes of acid and eight volumes of acidified water (37° Bé.) does not begin to exert any appreciable effect on the fibre until after three hours' exposure. A 10 per cent. solution of acid at 8° C. produces sensible alteration of the fibre in a quarter of an hour, and the alteration is complete in thirty minutes. Consequently the washing cannot be too thorough after souring.

The question arises whether the same fabric should be put through several treatments with lime, the bleacher being naturally tempted to make use of this agent on account of its greater cheapness and activity than soda; but the author finds, by personal experience, that when liming is repeated, the bleaching effect is smaller than that obtainable by soda, and that an almost invariable result is the partial alteration of the fabric in places. This diminished effect of repeated liming is easily explained, in that the lime being only very slightly soluble, acts mainly by direct contact—that is to say, on the surface only,—so that as in the second treatment the lime cannot gain access to the interior of the fibre in sufficient strength to do any good, the result is poor. The partial alteration produced is not so easy to explain, and one can merely assume that, in the first place, the lime, not being able to find a sufficiency of pectin bodies on the surface of the fabric, reacts directly on the cellulose, in an excessive degree of concentration. It may also be that defective washing has left a certain quantity of acid behind in the fibre, and that this acid, being left unneutralised by the lime, attacks the cellulose. The partial character of the attack lends some colour to this hypothesis; but, however this may be, not more than a single liming should be given.

The souring may be performed in a vat containing very strong acid, followed by washing in a second vat, as is the practice of certain bleachers, in which event the action is very regular, provided the acid be renewed; but the exposure is too short, and the consumption of acid very high. Consequently it is generally preferred to steep the cloth for from three to ten hours in an acid-proof tank of wood or cement, containing five volumes of HCl per 1000 of water after 25° lime, or 20 volumes of water after 10° lime.

Soda Lyes.—In order to more fully elucidate the chemical reactions occurring in the operations of lye boiling, we will take the case of goods to be full-bleached. The object of soda-lye boiling is to completely dissolve all the non-cellulose that has resisted the action of the lime. We have seen that flax is composed of pectocelluloses, lignocelluloses, adipocelluloses, fatty matters, and other foreign admixtures introduced in the operations of spinning and weaving. The lime has eliminated a portion of the pectin principles combined with the cellulose and the ligneous principles, but has left almost intact the adipocellulose group, whereas the soda removes both the pectic and ligneous principles, as well as the adipose principles, which, as we have already seen, constitute the greatest difficulties to the bleaching process.

(*To be continued.*)

Showerproofing Textile Fabrics.*

By Dr. C. O. Weber.

For a number of years textile fabrics have been in the market, chiefly for dress purposes, to which by various processes water-repellent properties have been imparted. Until comparatively recently such fabrics have been somewhat vaguely described as showerproof, but at present they are quite commonly, though falsely, described as waterproof. This description is misleading, as the same term is used in respect of the indiarubber-coated waterproof fabrics, and whereas the latter are undoubtedly permanently and under all conditions waterproof, the former are so to a very limited extent only, for a limited time, and under rather limited conditions only.

This is not due so much to the intrinsic difference of the materials used in the manufacture of indiarubber waterproof and showerproof fabrics respectively as to the essentially different structure of these two classes of fabrics. In indiarubber waterproof fabrics there is no water-repelling action intended or relied upon, the impermeability to water of these fabrics depending upon the impermeability of a continuous film of indiarubber. On the other hand, in showerproof fabrics no such film is produced; indeed, it should not even be aimed at, as this would destroy their only specific claim by virtue of which, under certain restricted conditions, they possess any tangible advantage as compared with indiarubber waterproof fabrics —namely, their porosity, their permeability by air.

This last point, which is always strongly emphasised by the manufacturers of this kind of fabrics, proves, however, at once that owing to this porosity they cannot be waterproof in the strict sense of this word, but only water-repellent. This is borne out by the behaviour of these fabrics on exposure to rain. The latter collects upon them in the spheroidal form—the form adopted by all liquids upon surfaces they cannot wet,—but the passing of the water through the pores of the cloth is prevented by the comparatively high surface tension of these water globules. Up to this point these showerproof fabrics behave, therefore, in effect as waterproof fabrics. But if the impact of the falling rain-drops is sufficiently strong, or assisted by a high wind, they are forced through the pores of the fabric, and this almost invariably signalises the more or less complete breakdown of the waterproof qualities of these fabrics. The same effect is produced by a variety of such mechanical influences as these fabrics are subject to in actual wear, particularly pressure or friction, which press the surface moisture into the fabric, with the result that the rain now passes through with perfect freedom.

This could only be prevented by forming a continuous film upon or in the cloth. But this is not possible with the materials employed for showerproofing, which do not possess sufficient cohesion and elasticity for the purpose. The showerproofing effect is therefore arrived at simply by coating or incrustating the threads of the fabrics with some water-repellent substance, but leaving the pores unobstructed. The processes by means of which this effect has been aimed at are so numerous that a full discussion of them would require a very considerable time. Almost countless is the number of patents taken out for these processes, and there is still a regular perennial crop of them, the same thing being patented over and over again, with no benefit to anybody but the royal exchequer.

The processes employed for showerproofing may be divided into two large classes of processes. In the first of these, the fibre is simply impregnated or coated with some water-repellent hydrocarbon or wax. In the second, a deposit of alumina or of some colloidal aluminium salt is formed upon the fibre.

The "Cravenette" process is a typical instance of the first-named class of processes. It consists in the treatment of the cloth with a dilute solution of paraffin wax or similar hydrocarbons in petroleum spirit, coal-tar naphtha, or benzole, and subsequent pressing of the cloth between hot plates. This impregnation of the fibres of the fabric with paraffin wax renders them water-repellent, and the water, being no longer able to wet the textile fibre, assumes at once spheroidal form on coming into contact with it. The surface tension, which is the determining condition of this spheroidal state, is also the force—an elastic stress—counteracting the tendency of the water to pass through the open pores of the cloth. It is therefore obvious that any reduction of the size of the pores or meshes of the cloth will tend to increase this effect. It will be seen from this that this process of showerproofing relies upon the same physical principle on which depends the possibility of carrying water in a sieve. This very well known lecture experiment is carried out by immersing brass or copper gauze in melted vaseline, and subsequently allowing the excess to drain off in a water oven. The extremely fine coating adhering to the wire of the gauze is, of course, water-repellent. Any water poured upon it at once assumes spheroidal form, with the result that the passage of the water through the meshes of the gauze is prevented by the force of the surface tension under the influence of which the water acts as if it were enclosed in a very fine bladder of indiarubber. The "Cravenette" process has, of course, found various imitators, but as it is not my intention to criticise the efficiency of the various processes, it will suffice if I say that the principle involved in these rival processes is exactly the same as that upon which the older process is based, the physical nature of which I have been above discussing at some length.

The second class of showerproofing processes above referred to is very large indeed. Common to all is the attempt to deposit upon the fibre or to coat or incrustate the fibre with a water-repellent precipitate formed *in situ*. The processes belonging to this class, with no notable exception, utilise either alumina or aluminium salts, or insoluble soaps in conjunction with a variety of indifferent colloidal precipitates. In every case the effect aimed at depends upon the water-repellent qualities of these precipitates.

The oldest of these processes, which is, however, faithfully every year repatented by somebody or other, consists simply in treating the cloth with a solution of aluminium acetate, passing through wringing rollers and drying upon a tentering machine. At first sight it is very difficult to understand, or even to believe, that a fabric treated in this manner should have any water-repelling properties, but the fact itself is undeniable, although the effect is none too strong. An explanation of this fact is probably to be found in the circumstance that on the tentering machine the aluminium acetate is decomposed into a highly basic aluminium-acetate deposit and free acetic acid, which is driven off with the water. The water-repellent property would therefore have to be ascribed to the highly basic aluminium acetate rather than to alumina, and I have little doubt that this explanation is substantially correct.

A very great improvement of this process is the conversion of the aluminium acetate into an aluminium soap, preferably an oleate. This is carried out by passing the cloth, after padding it in the solution of aluminium acetate and wringing it, through a soap solution, and subsequently washing and drying it. A variation of this process, giving even a better result, consists in drying the cloth after padding it in the aluminium acetate, and then passing it through a boiling solution. Of course, in this case we obtain a highly basic aluminium soap, but the very small amount of fatty acid combining with the alumina under these conditions appears to be quite sufficient to produce a very highly water-repellent deposit. One considerable advantage of this last form of the process is the circumstance that before the cloth enters the soap bath the aluminium salt has been fixed upon the fibre as the insoluble basic salt. Consequently the soap bath shows no muddiness through aluminium acetate dissolving out the fibre and forming an insoluble precipitate in the soap bath, which not only leads to considerable waste of valuable material, but is also apt to cause irremediable stains in the cloth itself.

The substitution of other aluminium salts, such as alum, aluminium sulphate, or chloride, for the somewhat expensive aluminium acetate, has been found to give very unsatisfactory results. All these substitutes, it will be noticed, show only to a very slight degree the tendency of the acetate to form basic salts by their direct hydrolysis in aqueous solution. It would therefore appear that the function of the aluminium acetate in this process is far more complex than it appears at first sight.

A further variation of this process consists in forming upon the fibre simultaneously a precipitate of the basic aluminium soap and of some other insoluble and colloidal aluminium salt. As such, aluminium silicate has been and is used with very good effect. The aluminium silicate is, of course, used in one solution with the soap. Numerous attempts have also been made to lay tannic acid under contribution for these processes, and every imaginable kind of tannin material has been tried. Although there could be no doubt that under certain conditions tannic acid might be a useful adjunct in showerproofing, the results generally obtained were never particularly satisfactory. During the last two years, however, a process has come into prominence which not only gives highly satisfactory results, but which also possesses several advantages of a technical nature over the before-discussed processes.

This process, which is the subject of a number of patents, and which is commercially known as the K.A. process, consists in the preparation of a 3 per cent. solution of aluminium acetate by the interaction of aluminium sulphate and lead acetate in equivalent quantities. To this solution a concentrated solution of tannic acid is added until a permanent precipitate is formed. The actual quantity of tannic acid thus required is very small. The solution is now ready for use, and is employed by passing through it the fabric to be showerproofed, squeezing between rollers, and briskly drying on a suitable machine. To obtain the best result it is desirable to damp the fabric before treating it. It will be observed that before most other processes, the K.A. process is distinguished by its great cheapness and ease of application. It has the further advantage of being much more lasting in its effect than any of the other processes named.

The showerproofing processes above described are the most important types of the processes at present in use, and also of the enormous number of processes proposed at various times. Whether they are also the best processes possible is perhaps a difficult question to answer. But the fact that so far the physical nature of the showerproof effect

* A paper read before the Society of Dyers and Colourists.

has been very imperfectly understood, makes it highly improbable that any of our present-day processes should have attained, or even approximated to, final perfection. The problem to be solved in showerproofing consists in covering the fibres of the fabrics with an extremely thin but continuous and water-repellent coating. It is quite obvious that crystalloid substances cannot possibly fulfil these conditions, as crystalloid deposits are never continuous, and for this reason we must look to the now very numerous class of colloidal substances to furnish us with suitable material for the purpose of showerproofing. All colloids as a class yield, under suitable conditions, the continuous coatings we require, and there are great possibilities contained in the fact that colloids with basic properties form absolutely insoluble colloidal precipitates with colloids possessing acid properties. The K.A. showerproofing process may, indeed, already be looked upon as an application of this principle, the colloidal aluminium hydrate and the colloidal tannic acid forming an insoluble and water-repellent colloidal aluminium tannate. Nor should it be forgotten that colloids in combining with a number of crystalloid precipitants form, not crystalloid, but colloidal precipitates, a fact which enormously enlarges the range of substances to be drawn upon for the purpose of these experiments.

Permanganate of Potash in Dyeing.

COTTON steeped in permanganate turns brown in consequence of the reduction of the permanganate to hydrated peroxide of manganese, which becomes fixed on the fibre. Since, however, the reduction of the permanganate takes place at the expense of the fibre (oxycellulose being formed), this method of dyeing a manganese bronze, though convenient, says the "Rev. Gén. des Mat. Colorantes," can only be employed for the dyeing of very light shades. By incorporation with the fibre of some suitable reducing agent, however, it is possible to obtain a good manganese bronze without fear of tendering the fabric. The most convenient substance for this purpose is tannic acid. The goods are prepared in some form of tannin, and then passed through the permanganate in the cold, when the reduction takes place rapidly and evenly. Any elevation of temperature must be avoided, otherwise reduction will take place at the expense of the cellulose. The depth of shade is determined by the amount of tannic acid fixed. Better results are obtained, however, by fixing the tannic acid previous to the treatment in permanganate. This is done, for instance, by padding first in chestnut extract and then in black liquor. After allowing the goods to lie for some time, they are washed and passed through a cold and dilute solution of permanganate of potash. After about a quarter of an hour the grey colour due to the tannate of iron disappears and is changed to a drab, the depth of which will depend upon the intensity of the original grey.

In place of iron, other metallic fixing agents can be used to form the insoluble tannate on the fibre. Plumbite of lime formed on the fibre may also serve for the fixation of the manganese. In this case a maroon results, which consists of a mixture of the peroxides of lead and manganese. The bronze obtained by this method is very easily affected by light, a two-hours exposure to direct sunlight causing the colour to fade considerably. By passing the faded colour through bleach, however, the colour is restored. Strange to say, no oxycellulose appears to be present. It is also remarkable that the colour is considerably weakened by steaming without pressure, and that in this case a treatment with bleaching powder does not restore it. Treatment with soda at 60° C. renders the colour much faster to light. Much faster colours are obtained on oiled material, especially if the goods are soaped at 60° after dyeing.

Difficulties During Finishing.

AS a rule, the difficulties originating outside of the finishing room can best be corrected in the department where they arise, though some demand special care and treatment in the finishing room. At all events, the finisher is expected to bring the goods out as nearly perfect as possible, and to do this entails upon him the double duty of having his eyes open to faults in both his own and other departments which have an influence upon his work. Difficulties in the finishing room, says the "Textile World," often come when least expected, and sometimes disappear before their cause can be determined.

One of the troubles which almost every finisher has at times to deal with is that of cockled cloth; while it is made distinctly manifest in the finishing department, the cause may or may not be due to any fault in the finisher's method. In fact, it is more frequently traceable to some other department, and there is hardly a department in the mill that is entirely free from a possibility of causing the trouble. There are three conditions that may cause cockles to originate in the finishing room. If the fulling soap is not sufficiently strong to thoroughly saponify the grease in the goods, the fulling must be imperfect. In places where the grease has been overcome, and its effect destroyed, the fulling will proceed, while it will be retarded where the saponification has not taken place, or is imperfect. This, of course, results in irregular fulling, and the cause can only be removed by adding to the fulling soap a sufficient amount of alkali to render its action perfect and complete. Another cause of cockles may be the lack of a sufficient soap. If there are parts of the cloth that are not sufficiently wet, they will fail to full, while the parts that are wet are favourably affected, thus producing an irregularity. A third cause, which is somewhat similar to the second, is the careless application of the soap, by which, even though the quantity be sufficient, it fails to go on the cloth evenly, and the parts that are wet first get the start of the places that become wet later, thus producing an irregular width which the after fulling may not fully overcome. The finisher should therefore see to it that his soap is equal to the requirements, and that the soaping is carefully and intelligently done.

It would be impossible to designate all the things in the other departments that would cause cockles But it is plainly evident that anything that could in any way produce uneven fulling might be responsible for them. The following are a few of them: In the picker-room any irregular mixing of long and short stock, or wool and cotton, by which some portions of the filling yarn would have more of the good stock than other portions: Any irregularity in either the size or twist of the yarn; and we may here say that this suggests the importance upon some kinds of work of keeping top and bottom spools from the cards separate, and using the yarn separately. Careless steaming of the weft, by which some parts may become saturated with water, causing irregular weaving, will sometimes give trouble. A variation in the weaving by which the cloth may vary in weight, having heavy and light places; this may occur from the carelessness of the weaver or from an irregularity in the take-up of the cloth, or the friction or let-off at the warp beam; or sometimes a beam that is crooked or with a sprung shaft will cause an irregularity in the cloth. All of these possible causes make it nearly impossible for the finisher to at once locate the cause or to apply the remedy. But he should be able to determine if the trouble is in his department, and act accordingly.

Cockles caused in the finishing-room are usually irregular, and the wrinkles caused by them more pronounced in the middle than on the sides of the cloth; while if caused in the other departments, the wide and narrow places will show equally all across the cloth, the changes being abrupt from wide to narrow, and often in spaces indicating one or more bobbins of weft, or at uniform intervals, corresponding with the revolutions of the warp beams. In the matter of the oil used upon the material in carding, the manufacturer cannot be too careful to secure a good oil and avoid frequent changes. The manufacturer is sometimes too ready to try experiments, and by getting into the works two or three kinds of wool oil, each of which requires a different strength of soap, gives the finisher the impossible task of producing uniform results with a soap only adapted for one of the oils in question. By a proper adaptation of the soap, and a careful application of the same, together with a prompt report when it is discovered that cockles are caused by faults in the other departments, the finisher will have done his duty regarding them.

Another trouble which the finisher has sometimes to contend with is mill wrinkles, or wrinkles made in the fulling mills, which become felted, so that they cause an imperfection in the finished fabric. As a rule, these wrinkles occur near the ends of the cloth, usually being most pronounced on the end that enters the mill first. Careless sewing of the ends, by which the seam is irregular, or the stitches too long, will produce wrinkles; and often their extent into the cloth is in proportion to the irregularity or length of the stitches. Fine and uniform sewing, or, what is better, the use of a mill sewing machine, will remove this cause.

The weaving of headings in the ends of the cloth, of yarn that fulls faster than the body of the piece, will cause the cloth to wrinkle, on the same principle that narrow places in cockled goods will produce them; and where the wrinkles remain in the cloth during the fulling, they produce felted streaks. It is best to have no headings woven in the cloth, unless it be of yarn of less fulling quality than the regular weft. Should the mill wrinkles occur in the body of the piece, without reference to the ends, the only remedy is a frequent overhauling or opening of the cloth to change the folds in it before they become set or felted. If the cloth is not intelligently designed or "laid out" in the loom, and the warp threads are crowded or out of proportion to the weft, mill wrinkles will result, in spite of the finisher's best efforts, especially upon goods requiring several hours' fulling. Anything that tends to open the cloth on its passage from the rolls to their entrance again, or otherwise to change the folds, will obviate the trouble, and in this matter there is an opportunity for an improvement in the modern fulling mill.

Rolling selvages are usually due to something not under the control of the finisher. Frequent opening and shaking of them out, or sewing the edges of the cloth together, with the side toward which they roll outward, so that in their tendency to roll they are holding each other from it, are the only remedies for the finisher. Further corrections must be made in the yarn or weaving. Cloth with a predominance of weft on one side will tend to roll toward that side, and the trouble is intensified by the open or loose character of the weave. If the selvages are made in the loom tighter, or of stock that will shrink faster, and in consequence become tighter than the cloth, they will at once begin to roll, and the only remedy is a change either in the yarn or the weave of the selvage, to make it slacker or less inclined to shrink.

Sometimes, when the selvages are all right, the leaving out of a broken warp thread in them, or a wrong draw, will expose the weft, causing a shrinkage at that point that will turn the edge of the cloth and produce the trouble. It is too often the case that the weaver fails to understand the importance of perfect selvages, and they go to the finishing-room in all kinds of conditions, giving the finisher trouble in fulling, gigging, shearing, and pressing, often resulting in their destruction, despite his best efforts to save them. The result of rolling selvages is a more compact and heavier felt on the sides of the cloth, owing to the increased warmth at that point in fulling; so that it is quite impossible to produce a uniform finish, even if the finisher succeeds in opening out the cloth in the last processes of his work.

Dirty goods mean a serious difficulty. One important thing which is too often overlooked is the fact that the fulling is, or should be, considered a part of the scouring process, and serves as such when it is correctly done. As a rule, where goods are not properly cleansed, the fault is as likely to be in the fulling as in the scouring. If the saponification is imperfect or incomplete in fulling, the heat produced in the process tends to set the grease, making it harder to remove in scouring. If the saponification is perfect it converts all the grease into soap, and though in a dirty state, if of sufficient body, it holds all the foreign matter until the scouring follows to complete the work. There are many difficulties in the dry finishing that are the direct result of a failure to properly clean the goods, hence the battle is largely won by thorough work in the wet department. Crooked plaids or checks are sometimes made worse by uneven or very slack selvages; but good results can only be assured by care to keep them as nearly straight as possible in drying and on the press.

Aniline Black for Wool Dyeing.

ANILINE BLACK, useful as it is for cotton dyeing, has only just been found serviceable for the treatment of wool. It is unnecessary to say that its use on wool has been impracticable, though by a judicious preliminary treatment such has been accomplished, but at the sacrifice of the quality of the material so treated. It is now about thirty-six years since a method of adapting aniline black to wool dyeing was tried, the wool being previously subjected to an energetic oxidation by a treatment with hypochlorite of lime or by hydrochloric acid, in order to counteract its reducing property. This preliminary treatment affects the wool to a considerable extent; it weakens the fibre, and even then a level, perfect dye is far from guaranteed.

After a series of experiments, a German chemist recently found that it is not only the reducing action of the wool which stands in the way of the use of aniline black, but also its alkaline reaction, and the discovery of such at once paved the way for a more practical dyeing process. The treatment evolved consists of subjecting the wool, before saturation, to the usual padding or steeping mixture of diluted inorganic or organic acids in liquid or gaseous form, or under high pressure, such as 20lb. above atmosphere, so that such acids are absorbed by the fibres and neutralise them. This saturation with acids does not affect the wool injuriously, and obtains in a short time the effect formerly produced in known processes by a long and very injurious operation.

In practice the wool is first boiled for about an hour in diluted acid; for instance, a solution of 5 per cent. of sulphuric or hydrochloric. The application of boiling heat is necessary, because the wool is not completely saturated at normal temperature. During the boiling a pressure of about 20lb. per square inch above atmosphere may be applied. If desired, other methods may be used, by which the complete saturation and neutralisation of the wool or other animal fibre is obtained, such as by impregnating the same with diluted acid of about the strength as above described, and drying; or by treatment thereof with acid vapour. The wool or other animal fibre is then brought into a steeping mixture, termed a padding mixture, made in the usual manner. This padding mixture contains, however, somewhat more than the usual quantity generally used of sodium chlorate or similar oxidising substance, to the extent that after steeping and squeezing or wringing the fibre it still contains about 3 per cent. of chlorate for its oxidation. After this treatment the colouring substance is developed by steaming or by hanging up the fibre or fabric in an oxidation room, and the material is then treated with alkali bichromate in the usual manner. The operations of dyeing can also be carried out by saturating the wool with diluted acid, and then adding a chlorate of an alkali or other similar oxidising agent, the proportions of acid and chlorate being the same as above stated, or the acid may be wholly or partially added to the known padding or steeping mixture. This process is said to render the dyeing of wool or other animal fibres with aniline black as simple, quick, and reliable an operation as the dyeing of cotton.

Reclaiming Indigo Remaining in the Vats.

After the lime and copperas indigo vats have been run down as low as is practicable in the colouring of calico, there still remains more or less indigo in solution, as well as a certain quantity precipitated at the bottom of the tub, and the value of this indigo is sufficient to warrant the expense of recovering it. To save the indigo remaining in solution, the usual method is to let the liquor stand for a while, and then pump it into another bath which has not yet been exhausted, instead of introducing so much clear water.

The sediment at the bottom of the tub is treated in three different ways:—

1. The precipitate is subjected to the action of an excess of hydrochloric acid, which dissolves, at least partially, the lime, iron and copper, and leaves the indigo insoluble. While this process is very simple, it does not work very well in practice. It requires a large quantity of acid to neutralise the lime, and that does not dissolve the sulphate of lime as well as the particles of fibres, which collect at the bottom of the tub. In consequence a certain quantity of indigo will still remain attached to this foreign matter, and be lost.

2. This is the cold-water process: a series of large tubs are placed on a lower level than that of the vats, but connected with them. Each tub is somewhat lower than the preceding one. The sediment in the tubs is well mixed with cold water, vigorously stirred, and allowed to settle. As soon as the insoluble portion of the sediment is precipitated to the bottom, the liquor is run into the large tub on the next level, and then the operation is repeated with the sediment which still remains in the tubs, and is continued so long as any indigo can be washed from the sediment. The indigo in the water in the lower tubs quickly oxidises, and is precipitated to the bottom, and by having a series of these receptacles placed each one lower than the preceding one, the operation can be carried on until nothing but clear water runs from the last one. The liquor is removed carefully from the tubs from time to time, and the indigo taken out. This process is simple, requires little attention, and no expense for material; yet the quantity of indigo recovered is even less than that obtained by the first process.

3. This process is evidently the best, especially where there is not room for the tubs required for the second process. It is perhaps the best under any circumstances. It consists in boiling the residue in caustic acid and yellow arsenic. The reducing liquor is composed of 1kilo. of yellow arsenic, 4 litres of caustic soda, and 2 litres of water. The arsenic is previously ground very fine, and the three ingredients are boiled in an iron vessel, effecting a thorough mixing. Usually, about 30gals. are prepared. Three or four litres of the solution are then put in the tub containing the indigo sediment. Steam is introduced, and the liquor is allowed to settle. The liquor is then run into the other receptacles, and from them pumped into an elevated reservoir in the open air. The troughs which conduct this liquor to the reservoir are made as wide and shallow as possible, in order to expose the liquid thoroughly to the air, and thus effect a rapid oxidisation of the indigo. In this way, the indigo precipitates quickly, after reaching the reservoir. The clear warm water in which the indigo has already been deposited is preferred to clear water for the preparation of the new reducing solutions for lime, zinc, or bisulphite vats. Where there is very little residue, says "Le Moniteur de la Teinture," the best plan is to force air into the bath. This will cause the indigo in suspension to oxidise and be rapidly precipitated. The liquor is then allowed to stand, and the precipitate is afterwards treated with a small quantity of hydrochloric acid, which dissolves any oxide of zinc which may be present, and leaves the pure indigo ready to be used for another bath. It will generally be found that the expense and trouble of extracting the indigo are almost nil. The expense is very little in comparison with the value of the indigo saved.

Mercerising Short-stapled Cotton.

In the early days of mercerisation (which were not very long ago), good long-stapled Egyptian cotton was used in practically every case. Now that the first novelty has, in a degree, worked off, and the machinery used better adapted and better understood, attention has been turned to the treatment of the shorter-stapled cottons by this useful and beautifying process. The ordinary treatment has a very slight effect upon American cotton, but by a modification of the mercerising process, introduced by a Swedish firm, very good results may be obtained. Well-gassed yarn is cleansed by being boiled in a soda bath of about 7° Bé. for two hours. This is done for the purpose of cleaning the material and swelling the fibre. The material is then wrung or centrifuged and allowed to dry, just sufficiently for evaporating the superfluous moisture. Hereupon the cotton is stretched and steeped for about 10 minutes in a strong soda lye heated at about 80° C. and at 45° Bé., with an addition of copper oxide ammonia, the solution being as strong as possible—say one part of copper oxide ammonia to ten parts of soda lye.

The copper oxide ammonia is prepared in the following manner:—Copper sulphate is placed in a vessel, and water and soda poured over it until all the sulphate is dissolved, when the fluid is filtered. What remains in the filter is washed and is allowed to dry a little. The partially-dried oxide is diluted with as much ammonia as is necessary for making a solution, and this solution is added to the hot caustic soda. The length of the treatment and the quantity of copper oxide ammonia to be added depends upon the twist and thickness of the yarn. Owing to the soda being hot, there is but little contraction of the material; powerful tension only appears with the cooling, and is to be avoided as much as possible. The lye penetrates almost momentarily, and hereby the circular fibre obtained by the boiling is fixed in its new form, whilst the copper makes the external layers of the fibre jelly-like, and settles therein. With fine yarns, in order to protect the material and to remove it quickly from the machines, a larger quantity of copper oxide is added to the soda than in the case of loosely-twisted yarns. The proper and most suitable quantity is easily found in the course of practice. The termination of the process is recognised by the dark-blue and brown colour which the cotton assumes by the treatment. It is not possible beforehand to give a precise time for the operation, which must be regulated according to the material under treatment. Before the material has cooled — that is, before the contraction takes place — it is rinsed with boiling water, or with cold water slightly acidulated with nitric acid (from 1 to 5° Bé.). Both kinds of washing may be carried out in succession. The shrinking which otherwise occurs when the cooling is effected is thus avoided, and at the same time the blue colour removed. After the material has been thoroughy washed, a dried sample has the appearance of Egyptian cotton, although the lustre at this stage is only slight.

The desired silky lustre is most easily produced by laying the cotton in concentrated nitric acid of about 35° Bé. and cooled to about 5° C. After about eight minutes the sample may be taken out and washed in cold water until the acid is completely removed. No precise time can be given for the working, as the treatment may be terminated earlier or later with different materials, according to their closeness. The cotton, however, is in no way injured by lying a long time in the acid, but care must be taken to keep the acid at as low a temperature as possible. The termination of the treatment is recognised by the cotton, when taken out of the acid, having an appearance as if it had been steeped in oil. If the cotton has this appearance, it is thoroughly washed and dried. Before becoming completely dry, it is advisable that the yarn should be wrung, as this gives the thread a still better appearance.

NOTES ON DYEING, BLEACHING, FINISHING, &c.

Specially compiled for THE TEXTILE MANUFACTURER.

Immedial Black N B and N G.—These new dyestuffs (Cassella) are used as follows:—For 100lb. yarn charge the bath with 200gals. water, 10lb. soda ash, 15lb. sulphide of sodium, 18 to 24lb. dyestuff, and 70lb. common salt. Charge the bath with the requisite ingredients, boil up, shut off steam, enter the well-boiled yarn, turn with a stick four times in succession, and then about once every ten minutes. After giving each stickful one or two more turns, the yarn is well squeezed, one stickful after the other, by means of two squeezing rollers adjusted to the front of the vat, and is then immediately well rinsed in vats placed close to the dyevats. To the last rinsing bath from 3 to 4½oz. acetate of soda per 10gals. liquor are added.

The Action of Ozone.—Potassium sulphocyanide treated with ozone in aqueous solution yields free sulphuric acid. Thiophene does not appear to be changed. The same applies to Phenylisosulphocyanide. If ozone is passed into a solution of diphenyl thiourea in glacial acetic acid, the solution becomes turbid, with separation of sulphur, especially if heated to 80°. Thiourea in aqueous solution soon becomes turbid on treatment with ozonised air. The precipitate consists of sulphur, but at the same time a considerable quantity of free sulphuric acid was formed. In order to ascertain the action of ozone on sulphur, 2grms. of finely-ground sulphur were mixed with 200cc. hot water, and ozonised air passed into the boiling liquid. Sulphuric acid could be detected after a short time. By using oxygen in place of the ozone, no sulphuric acid was formed. Ozone passed for several hours into an aqueous solution of albumen yielded no sulphuric acid. The latter was tested after boiling, with the addition of nitric acid to coagulate the albumen.

Scouring Preparation.—A recently-patented detergent preparation for use in both wool and cotton fabrics is a preparation in cream or paste form made from soft soap, borax, turpentine, ammonia, glycerine and water, in suitable proportions, dissolved and mixed together. The soft soap and borax are first mixed in a suitable apparatus, a little water being first placed therein, in which the borax is dissolved, and then the soap, and heated to a temperature of from 150 to 200° F. This first mixture is preferably allowed to cool, and the turpentine, ammonia and glycerine are added separately, each being thoroughly mixed as it is added. A sufficient quantity of water (preferably warm) is then gradually added and mixed with the other ingredients to bring the mass to a smooth paste-like consistency. The following are suitable proportions:— Best soft soap 140lb., borax 20lb., turpentine 10lb., liquid ammonia (0·880) 15lb., glycerine 1lb., and water 10gals. About 2lb. (or 1 pint) of the cream may be added to and dissolved in 9gals. for general use.

Naphthole Black 2 B.—This dyestuff (Bayer) is dyed in the usual way with bisulphate of soda or Glauber's salt and sulphuric acid, and produces a bright blue-black shade. It is easily soluble, penetrates well and dyes level, and its fastness to alkali, acid, rubbing, and perspiration is said to be good. The principal features, however, are its excellent fastness to water and light, but its fastness to milling, on the other hand, only answers moderate demands. Its chief use is for piece dyeing, but it can also be suitably employed for dyeing woollen yarn (carpet yarn) and hats, as well as for braids and cords. Dyed in light shades this colour is well adapted for working in combination with Soluble Blue, Acid Violet, or Acid Green, for the production of cheap navy blues on cheviot and worsted cloth.

Deodorising Bleaching Agent.—A saturated aqueous solution of soda is prepared, causing the crystallisation of the soda, and then adding another solution of resin in a mixture of cresol and ether, whereby a compound of cresol, ether, resin and soda is obtained. The compound is soluble in water, and when dissolved the resin will be saponified, whilst the cresol passes into the aqueous solution. The composition is in the following proportions:—In 100kilos. weight of the product, 10kilos. of cresol, 5 of resin, and 20 of sulphuric ether are employed. The cresol is of the strength known as tri-cresol. The resin is the usual mixture of colophony and gum-lac. Thus is formed a compound having soda for its base, and being made more or less saponaceous by the addition of resin. In making the soda solution, 10kilos. of calcined soda are dissolved in about 20 litres of water heated to about 36° C. The liquor is then left standing, and the temperature is reduced to about 10° C. As soon as the crystals are formed, they are taken out of the liquor and left to dry, after which they are impregnated with the cresol solution. The proportions of cresol and ether may be varied—that is to say, the resin may be dissolved by either cresol or ether; and as it is the former which gives the product its deodorising property, more cresol and less ether will produce a stronger deodorising agent, while the ether may be omitted altogether if the product is to be used solely as an antiseptic or disinfectant agent. On the other hand, it is the resin in combination with the soda which renders the product a washing agent.

THE TEXTILE MANUFACTURER PATENT GAZETTE.

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

Applications for Patents.

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

1901.

6th May.

9328 J. WOODS and E. ECCLES, Chorley. Prevention of accidents in connection with the fly-wheel and large toothed wheel on the tappet shaft of looms.
9329 T. WESTERN, Batley. Tentering machine brush.
9378 E. LECONTE, London. Retting flax, hemp, and other textile plants.

7th May.

9439 A. G. BROOKES, London. Warp stop-motion apparatus.* (*G. O. Draper, United States.*)
9446 F. E. DAWSON, London. Self-acting mules and twiners.
9482 B. J. B. MILLS, London. Improved fabrics. (*J. Mugnier, France.*)
9490 C. G. DIEDERICHS, London. Means for tensioning the warp in looms.
9495 W. E. KREY and A. DUPPLER, London. Twisting-in machines.*

8th May.

9531 C. BAMFORD, Belfast. Holder stand for machines for hackling flax or other fibres.
9535 H. THOMSON, Glasgow. Needle-selecting attachment for the jacquard mechanism of carpet and other looms.
9537 T. R. MARSDEN and PLATT BROS. AND CO. LIMITED, Manchester. Machinery used in the preparation and treatment of cotton and other fibrous materials.
9547 T. CHADWICK, Halifax. Electric stop motions of drawing frames.
9565 OGILVY AND CO. LIMITED and J. J. ANDERSON, London. Process for the treatment of vegetable fibres in order to render them suitable for textile and other uses.
9566 OGILVY AND CO. LIMITED and J. J. ANDERSON, London. Treatment of cocoanut fibre to render the same useful for textile, stuffing, and other uses.
9589 A. POLLAK and C. ESSER, London. The treatment of peat fibre for the manufacture of half stuff.*
9596 A. WOOLTORTON, London. Cutting and holding device for reels of cotton, silk, thread, and the like.
9613 J. Y. JOHNSON, London. Indigo. (*Badische Anilin and Soda Fabrik, Germany.*)

9th May.

9640 A. J. TONGE and E. TAYLOR, Manchester. Thread and yarn winding, clearing, gassing, doubling, and other similar machines.
9694 J. Y. JOHNSON, London. Production of colouring matters and intermediate products derived from methylanthraquinone. (*The Badische Anilin and Soda Fabrik, Germany.*)
9695 W. H. PERKINS, JUN., and WHIPP BROS. AND TOD LIMITED, London. Means for the treatment of raw cotton, cotton goods, and linen to reduce the combustibility of the same.

10th May.

9701 F. H. GOSLING, Bury. Pile-cutting machines.
9704 A. M. MILN, Dundee. Reeds used in connection with textile processes.
9708 I. HEY, Bolton. Machines for combing fibrous substances.
9726 R. ILLINGWORTH and OTHERS, Manchester. Apparatus for dyeing and otherwise treating fibrous material in a spun or other state.
9774 J. Y. JOHNSON, London. Production of acylated derivatives belonging to the indigo group. (*The Badische Anilin and Soda Fabrik, Germany.*)
9775 J. A. A. IMBS, London. Spinning and twisting machines known as ring throstles.*

13th May.

9347 E. KNECHT, Manchester. Method of discharging dyed textile fabrics.
9863 G. HOWE and G. T. BRIERLEY, Manchester. Pickers for looms.

14th May.

9993 H. E. NEWTON, London. Anthracene derivatives. (*The Farbenfabriken vormals F. Bayer and Co., Germany.*)
10,007 A. OESTERHELD, Liverpool. Improved article or fabric.*
10,029 C. F. TOPHAM, London. Regulating the flow of solutions of cellulose or the like through squirting nozzles.

15th May.

10,052 G. H. KIRKPATRICK, Manchester. Belt driving gearing for self-acting mules.
10,070 W. and B. PRESTON, London. Apparatus for finishing woollen, woven, or other fabrics or goods.
10,098 J. and H. N. BROWN, London. Device for use in making cloth hearth rugs.*
10,109 E. DITTRICH, London. Circular knitting frames.*

16th May.

10,126 P. P. CRAVEN, Manchester. Cutting appliqué lace.
10,148 E. PURSSELL, London. Holders and stops for embroidery needles.*
10,164 C. H. and F. J. DALE, London. Machines for winding yarns or the like into balls.

17th May.

10,251 J. F. FREUR and J. MITCHELL, Glasgow. Cloth guide for lappet clipping machine.
10,267 E. JARDINE, London. Twist lace machines.
10,271 W. ENGELKE, London. Spool-holder with two spring arms, each carrying a tubular spool support.
10,277 H. H. LAKE, London. Disazo colouring matters.* (*K. Oehler, Germany.*)
10,279 W. E. MOORE and F. R. CLARK, London. Weft-replenishing looms.*
10,280 C. W. BIRKIN and J. MAXFIELD, London. Twist lace.

18th May.

10,313 J. BARBOUR, Halifax. Apparatus for facilitating the fixing and removal of collars and footsteps in and from the rails of spinning and twisting frames.
10,368 J. H. HOWARD and OTHERS, London. Baling presses.

20th May.

10,399 A. HITCHON, Accrington. Mounting band-driven spindles as used by textile spinning or winding machines.
10,402 T. CAINK, Worcester. Sprinklers.
10,427 F. STINER, London. Cloth finishing machines.*
10,430 L. C. SCHNEIDER, London. Card clothing.

21st May.

10,503 T. F. FROGGATT and H. RUDD, London. Apparatus for winding yarns.
10,535 C. I. GOESSMANN, London. Fabrics.*

22nd May.

10,576 E. G. THRELFALL, Preston. Traverse of revolving flats in carding engines.
10,583 W. ALTHAM and J. W. SHUTTLEWORTH, Halifax. Looms for looped fabrics.
10,593 W. MYCOCK, Manchester. Apparatus for distending textile fabrics.
10,599 G. STIBBE, London. Knitting machines.

23rd May.

10,640 J. J. WILSON, Kendal. Making web straps by weaving the holes needed for the buckle tongues and reinforcing the same with suitable material.
10,642 J. FIRTH, Huddersfield. Coupling link for the pattern chains employed in looms.
10,660 E. N. BAINES and J. W. SCHMIDT, Manchester. Shaper and guide-lifting mechanism of thread-winding machines.
10,676 L. O. TRIVETT, London. Twist lace machines.
10,694 H. C. HOUSTON, London. Bedford cords.
10,728 J. Y. JOHNSON, London. Production of a brown colouring matter. (*The Badische Anilin and Soda Fabrik, Germany.*)

25th May.

10,752 A. NICHOLS and L. SYKES, Huddersfield. Tube for mules and other spinning machinery.
10,766 A. P. S. MACQUISTEN, Glasgow. Electro-magnetically controlled looms and kindred textile machinery.
10,785 J. PRESTON, Manchester. Drawing rollers of woollen and worsted spinning machinery.
10,808 M. MONTGOMERY, Glasgow. Carding engines.
10,821 J. R. GARRATT and W. SCOTT, Belfast. Fibre hackling machines.
10,824 J. R. WHITELEY, Halifax. Flat stripping process.
10,830 E. HAMBLOCH, London. Napping and brushing machine for fabrics.*
10,833 W. P. THOMPSON, Liverpool. Process for the reduction of indigo. (*Chemische Fabrik Opladen vorm. Gebr. Flick Gesellschaft mit beschrankter Haftung, Germany.*)
10,885 J. Y. JOHNSON, London. Colouring matters of the anthracene series. (*The Badische Anilin and Soda Fabrik, Germany.*)

28th May.

10,899 J. PARK, Leeds. Plush or other pile fabrics woven face to face.
10,906 J. and H. TWEEDALE, Oldham. Spinning mule carriage steadier.
10,914 W. H. TAYLOR and H. DAWSON, Keighley. Woven fabric.
10,920 W. STRANG, JUN., Glasgow. Weaving lappet fabrics.
10,990 R. BLACKBURN and A. B. SPRING, London. Circular knitting machines.
11,022 A. RAHTJEN, London. Method of preparing monobrome-indigo and dibrome-indigo, as well as monochlore-indigo and dichlore-indigo, as well as monochloremonobrome-indigo.*

29th May.

11,032 F. REDDAWAY, Manchester. Rubber-covered rollers used for expressing moisture from fibrous or woven material.
11,049 J. DICKSON and H. SMITH, Sheffield. Spiral cutters for shearing the surface of linen and other fabrics*

30th May.

11,094 W. and T. P. LONGWORTH, Bolton. Coupling and bearing applied to hollow all-brass bottom rollers for textile doubling frames.
11,095 W. RODGER and H. N. BALLANTYNE, Glasgow. Production of ornamental or mixed or variegated effects in yarns and woven fabrics.
11,104 H. BEAUMONT, Huddersfield. Shuttle-box motion of looms.
11,129 J. MUNK, Charlottenburg, near Berlin. Device for cooling air, and saturating same with moisture.*
11,156 THE PHŒNIX BOOT MACHINERY COMPANY LIMITED, London. Device for waxing thread. (*J. Keats, Austria.*)
11,162 G. W. JOHNSON, London. Black dye containing sulphur. (*Kalle and Co., Germany.*)
11,168 A. MEYENBERG and OTHERS, London. Production of colouring matters containing sulphur.
11,173 W. B. KEEFER, London. Ingrain carpet fabric.*

31st May.

11,189 G. TUNNICLIFFE, Huddersfield. Healds and leashes, and the manipulation of the warp in weaving pile fabrics, curl cloth, etc.
11,202 W. and G. W. DRUMMOND, Glasgow. Apparatus for use in softening water.
11,236 C. CHIPPIER, London. Apparatus for printing on fabrics.

1st June.

11,287 H. FERGUSON and J. KEEFE, London. Detergent for the treatment of raw silks and silk yarns in the gum.
11,288 H. FERGUSON and J. KEEFE, London. Detergent for treating raw wools and wool yarns.
11,291 J. A. JANSSON, London. Automatically unrolling the warp in mechanical looms.

3rd June.

11,321 T. MEACOCK, London. Sheep and like shearing machines.
11,358 B. WILLCOX, London. Production of new halogenised bodies, new indigo colouring matters, and of indigo. (*The Badische Anilin and Soda Fabrik, Germany.*)
11,359 L. ALOY, London. Dyeing compositions.*

4th June.

11,385 J. ROBERTSON, Glasgow. Thread cutters for automatic spooling machines.
11,386 W. MCGEE, Glasgow. Thread cutters for automatic spooling machines.
11,389 T. HIRST, Manchester. Woven chenille fabrics.*
11,403 H. SYKES, London. Apparatus for use in the manufacture of rope and twine.
11,414 D. G. BAKER, London. Thread-measuring machinery.*
11,419 THE COTTON SEED COMPANY LIMITED, London. The bleaching of oleaginous matter.* (*J. C. W. Stanley, United States.*)
11,441 F. H. CONNOLLY, London. Weft inserting needles for needle looms.*
11,469 J. IMBS, London. Spinning and twisting machines known as ring throstles.*

5th June.

11,503 M. DUNNAGAN, Preston. Prevention of oil stains in the bobbin department of slubbing, intermediate, and roving frames.
11,523 R. SCOTT, London. Machines for embroidering lace.*

6th June.

11,551 H. C. LONGSDON, Keighley. Apparatus for drying and conveying fibrous substances.
11,568 J. WOODS and E. ECCLES, Chorley. Steel clips for the preservation of loom-long crank arm straps, also loom lamb hooks and loom-spring handles.
11,570 K. MEES and L. TALER, Glasgow. Governors for looms.*
11,624 J. Y. JOHNSON, London. Production of colouring matter for the direct dyeing of black or blackish shades. (*The Badische Anilin and Soda Fabrik, Germany.*)

7th June.

11,631 LANG BRIDE LIMITED and E. INGHAM, Accrington. Sliver and other cans.
11,716 J. Y. JOHNSON, London. Rib knitting machines.* (*R. W. Scott and L. N. D. Williams, United States.*)

8th June.

11,729 ASA LEES AND CO. LIMITED and T. BROOKS, Manchester. Lap rollers employed in machines for preparing cotton and other fibres.
11,733 R. J. URQUHART, Manchester. Dyestuffs.* (*The Chemische Fabriken vorm. Weiler-ter Meer, Germany.*)
11,753 C. D. ABEL, London. New azo dyestuffs. (*Actien-Gesellschaft für Anilin-Fabrikation, Germany.*)
11,766 H. E. NEWTON, London. Production of new azo-colouring matters, and of intermediate products for use therein. (*The Farbenfabriken vormals F. Bayer and Co., Germany.*)
11,776 C. S. MCCONNAN, Liverpool. Spinning machines.

Recent Textile Patents.

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

1900.

6155. Spinning. April 2. A. J. Boult, London (communicated by N. Laurency and J. Laurency, Dolhain, Belgium). For the purpose of effecting a regular torsion or twist on the thread and an equal tension, the annular thread guide is stationary as regards vertical movement, while the spindle reciprocates vertically, so that the length and consequently the weight of thread between the runner and the feeding rollers does not vary. In order that the tension produced on the thread should always remain practically the same, whatever the diameter of the winding of the thread on the spindle, the wire runner is provided with a counterweight at one of its ends, and with a vertical extension serving as a thread guide, or if required as a point of support against the inner circumference of the ring in such a maner that the runner acting as a lever oscillating round its point of support, exercises always by its longer arm an even tension on the thread, the value of this tension being measured by the difference during the work between the centrifugal force on the long arm of the runner, and its short arm provided with a counterweight.—March 16, 1901.

6925. Yarn clearing devices. April 12. C. Schuler, of Wetzikow, and J. Schuler, of St. Ingbert, Switzerland. A knot-catcher is arranged between the delivering rollers and the thread guide of ring frames. This knot-catcher consists mainly of a plate formed with a slot through which the yarn passes. The slot does not allow the faulty parts of the yarn to pass through, but holds them back, and if necessary breaks the yarn.—April 12, 1901.

7289. Lace machines. April 19. C. Martin, 52, Robin Hood's Chase, Nottingham. Relates to improvements in the Lever's twist lace machine, for the purpose of producing lace similar to cushion or hand-made lace, and other fabrics, enabling as many breadths as desired to be manufactured, which require little or no clipping. The work roller has two rack wheels on the axle, so that the roller may be wound up or down, as desired, said rack wheels being under control of the jacquard. Clawkers, under the control of the jacquard, are arranged to wind up beam threads which have become slack to their required tension.—April 19, 1901.

7394. Spinning. April 21. T. Ashworth, Lynwood, Urmston; and J. S. Gaunt. Relates to frames for spinning and doubling fibrous substances, the object being to prevent the "ballooning" of the yarn as it is being wound on to the spindle, spool, or tube, and also in the event of a thread breaking to prevent the end from flying out and becoming entangled with the adjacent threads.—April 20, 1901.

7682. Looms. April 25. H. Panitschek, 44, Zeile, Brünn; and C. Herold. Consists of an appliance for beating up the weft in flat or ordinary looms by means of a revolving reed-shaft or of an oscillating reed which turns in fixed bearings in front of a fixed lathe or slay and is adjustable in a vertical direction. The slay or lathe of the loom is fixed, and the reed serves merely to separate the warp threads.—April 13, 1901.

7990. Knot-stitch carpets. April 30. F. Boyer, 71, Rue de Richelieu, Paris. Relates to a loom for the manufacture of knot-stitch carpets in which the work of the operator who makes the pile-thread loops is replaced by an operation similar to that of the needles of the Swiss embroidery machine.—April 20, 1901.

8085. Carding engines. May 1. W. P. Thompson, Liverpool (communicated by P. Vigano, Triuggio, Lombardy, Italy). The object is to give a signal to the attendants when the cotton sliver breaks on its way from the card to the sliver can, and also at the same time to stop the card doffer. The cotton lap is taken from the doffer by a vibrating comb, the shaft of which is shown at *b*, and calender rollers *d*, from which it emerges in the form of a continuous sliver *a*, which is passed into the sliver can *e*. When the sliver *a* breaks, a lever, 1 2, which was previously held down by the tension of the sliver passing through a funnel N on its end, is caused to turn in the direction shown by the arrow in Fig. 1, and by means of connecting rod 3 and another lever 4 5, raises a bell 6, the stem 7 of which, by means of a slotted link 8, a stud 9, and a connecting rod 10, causes another lever, 12 20, and a short crank arm 11, to engage with a tooth 18 on the shaft *b* of the vibrating

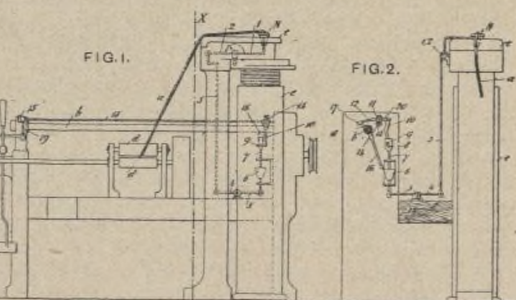


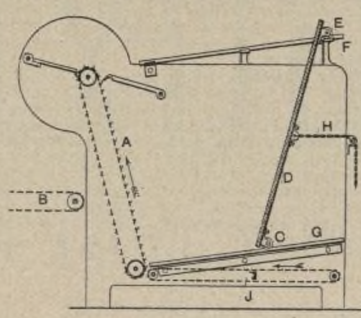
FIG. 1. FIG. 2.

comb. On this change of position taking place, the crank 11 turns the shaft 13, which is journalled at its ends 14 and 15 (Fig. 2). On reaching the raised position, the bell is struck by a clapper 16 mounted on the shaft *b* of the vibrating comb, whereby the attention of the attendants is directed to the breakage. By the time the lever 12 20 reaches the raised position its nose 17 on the end of arm 12 engages with the tooth 18 projecting from the shaft *b* of the vibrating comb. The latter imparts an oscillatory motion to the secondary shaft 13, which in its turn, by means of an arm 19 connected therewith, strikes against a catch *f* pivoted on the starting lever *g*, which, when once turned from the vertical position, is thrown off by the counterweight to which it is connected into an inclined position, in which the doffer is brought to rest.—May 1, 1901.

8884. Loom shuttles. May 14. A. Jendrysik, Strzemieszyce, Russian Poland. A loom shuttle is provided with a slot in its rear face extending inwardly into the body of the shuttle and communicating with a thread passage extending through the rear shuttle from rear to front for the purpose of threading.—April 27, 1901.

9027. Carding engines. May 16. R. Pintner, Manchester-road, Denton; and The Lancashire Felt Company Limited. Relates to an improvement in the construction of hopper feeding machines for application to carding engines, and has for its object the provision of means whereby the material is more evenly pressed up to the ascending spiked lattice by means of which the material is fed. A is the ascending spiked lattice by means of which the material placed in the hopper is carried upward until it is stripped off and delivered on to the lattice B, by which it is conveyed to the carding machine. The lattice J is always moving so as to carry the materials towards A. Attached to the upper part of each of the side frames of the hopper are brackets which sustain an inclined rod F, and at the lower end of each frame an angular bar

G is fixed parallel to the rod F. A board D is introduced into the hopper, its width being nearly equal to that of the hopper. Two freely-rotating runners C are carried in brackets fixed to the board D and rest upon the bars G, while similar runners E rest upon the



rods F. Owing to the inclination of the ways or rods E, G, the board D always tends to move towards the lattice A, and thus forces the wool or other material up to the face of the said lattice.—April 13, 1901.

9081. Colouring matters of the anthracene series. May 16. J. Y. Johnson, London (communicated by the Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine). If amido-anthraquinone derivatives be treated with formaldehyde in the presence of sulphurous acid, acid colouring matters of the anthracene series are obtained. The said colouring matters are regarded as sulpho-methylene-amido-anthraquinones. It is now discovered that these products, upon treatment with halogens, yield halogen derivatives which are themselves colouring matters dyeing wool, from the acid bath, orange-red, but which appear to be of greater importance as intermediate products in the production of bluish to green colouring matters. These latter are obtained by the condensation of the said halogen derivatives with aromatic amines, and subsequently sulphonating the condensation product.—May 11, 1901.

9488. Mule carriages. May 24. R. Taylor, 4, Pitt-street East, Oldham; and J. Taylor. Relates to an attachment to a spinning mule carriage for the purpose of automatically removing the loose lid or cover of same by the generation of heat within the interior of the carriage caused by fire or friction.—April 6, 1901.

9500. Pile fabrics. May 24. C. Bollé, Manchester (communicated by C. Mengen, Viersen, Prussia). Relates to pile fabrics or plushes, woven double, with a crossed pile binding, and in which weaves one of the warp threads for the ground acts at the same time for binding and backing or covering the pile warp. These weaves have the advantage that, in consequence of the absence of a

FIG. 1.

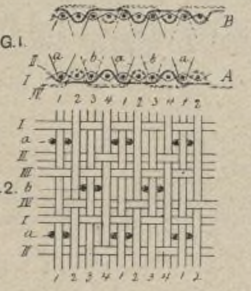


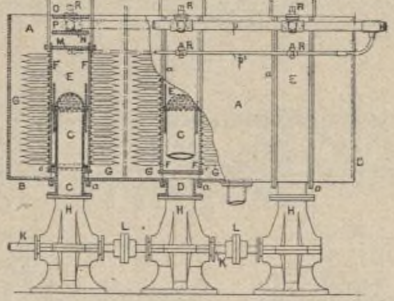
FIG. 2.

special backing warp, there is less friction in weaving, and consequently fewer faults occur in the fabric. Fig. 1 shows a longitudinal section of the double plush, and Fig. 2 a plan of the lower fabric as seen on the face. The warp threads of each repeat are marked I., II., III., IV., and the weft threads or picks, 1, 2, 3, 4.—April 20, 1901.

9587. Printing with indigo. May 24 G. W. Johnson, London (communicated by Kalle and Co., Biebrich-on-Rhine). Relates to indigo prints on cotton, printing the goods (whether unprepared or prepared with glucose or grape sugar) with a paste made of finely-divided indigo, a thickening material (such as British gum), and a large proportion of caustic alkali; then drying the printed goods, and then steaming them in an open apparatus with superheated steam of a temperature of not less than 103° C., whilst air and moisture are excluded.—April 27, 1901.

9682. Clips. May 26. J. Stewart, 20, Irwell Grove, Eccles. Relates to improvements in and connected with clips used in tentering machines for stretching, straightening or otherwise operating fabrics in the process of finishing. Hitherto the body of such clips has been formed in one piece, and the plate upon which the movable jaws operates with a hole in the middle for the tongue or feeler to drop in; but now the body is formed in two pieces—*i.e.*, the part by which the clips are linked together separate from that which grips the fabric, so as to render the latter part interchangeable.—April 27, 1901.

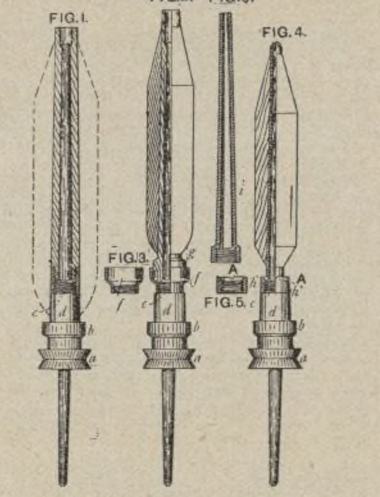
9722. Treating yarns in cop. May 26. J. Brandwood, Hardman-street, Elton, Bury. Relates to apparatus for dyeing or otherwise treating with liquor, yarn in cop cheese bobbin or other similar compact form, wherein the yarn is placed on hollow perforated skewers or the like which are attached to perforated plates, and through which the liquor is circulated by a pump or other means. The apparatus is constructed with a vat or vessel A of any desired size. It is preferably made in a number of sections bolted together by flanges *a* so that any size of vat or vessel may



be made, or it may be extended to any extent. The end sections B are bolted on in a similar manner and form the ends of the vat. The vat is provided with one, two or more circulating pipes C, D placed at intervals, each section being provided with a set of circulating pipes connecting with a suction chamber E. The circulating pipes project upwards through the bottom of the vat or vessel A as shown into the suction chamber E. The suction chambers E are formed by two of the cop carrying plates F placed back to back in guides or grooves *e* in the sides of the vat. The cop plates F enclose the projecting end of the suction pipe C forming a chamber around it. The return circulating pipe D enters the bottom of the vat with a false bottom over it to direct the inflowing liquid into the vat around the exterior of the cops G. The circulating pipes C and D are connected to a circulating pump H, preferably a separate pump to each suction pipe C. These are preferably all worked by a single shaft K to which they are each separately connected by a clutch L which can be thrown into and out of gear as required. Above the suction pipe C and suction chamber E are fitted transverse horizontal plates M, N and O. The plate M seals or closes the top of the suction chamber E, and the plates N and O form an exhaust chamber P (the sides of which are also closed by the cop plates F as they pass) for the purpose of withdrawing moisture from the cops as the cops are raised from the vat. The exhaust chamber P is connected with an air pump (not shown) by a pipe *p*. The air pump is also directly connected to the suction chamber E (or to the suction pipes C) by the pipe p^1, by which air is exhausted from the cops before the circulating pumps H are set in action. The pipes *p* and p^1 are provided with stop cocks or valves R to shut off the air pump when not required.—April 6, 1901.

10,094. Spindles. June 1. H. Cheetham, 18, St. Ann-street, Manchester (communicated by F. Rosskothen, Dresden). It has been usual when spinning weft in the shape of pirns or pin-cops on ring-spinning frames to use spindles different from those used when spinning warp or twist on bobbins or cops. Twist spindles are generally made so that the bobbins or cops partly surround the sleeves of the spindles, and the cups for holding the bobbins are placed on the sleeves immediately above the wharves of the spindles. Weft spindles are generally made so that the bobbins or cops are placed above the sleeves, and the cups to hold the bobbins or pirns are also placed either above or on the upper part of the sleeves. According to this invention, a twist spindle having a cup above the wharve for use in spinning twist on bobbins is provided with a screw-thread in the upper part of the sleeve. This screw-thread does not interfere with the use of the spindle for spinning twist, and may be used to secure a detachable wood or other plug for use in spinning on to paper tubes. When the twist spindle, with the screw-thread on the upper part of the sleeve, is required to be used for spinning weft, a detachable cup with an internal screw-thread, in shape similar to the cup already fixed on the lower part of the sleeve of the twist spindle, is screwed on to the screw-thread which is formed to receive it on the upper part of the sleeve. When the detachable cup is fixed to the twist spindle, the spindle is for all practical purposes converted into a weft spindle, and can be used for spinning weft on pirns. Fig. 1 shows an old screw-thread *c*

FIG. 1. FIG. 2. FIG. 6. FIG. 4. FIG. 3. FIG. 5.



as used to secure to the spindle a detachable plug for use in spinning twist on to thin paper or other tubes. Fig. 2 is partly a side elevation and partly a vertical section, and illustrates a spindle similar to that illustrated in Fig. 1, arranged according to the invention for use in spinning weft on to pirns, and provided with a cup *f* secured to the spindle by the screw-thread *c* on the sleeve *d* of the spindle. As is indicated by Fig. 2 and by Fig. 3, which illustrates such cup *f* in vertical section, the cup *f* is similar in shape to the cup *b*. The cup *f* serves to receive the foot of the pirn *g* on which the weft is to be spun. Dotted lines are used in Figs. 2 and 3 to indicate the manner in which the cup *f* may be provided with a cut or notch or cuts or notches in order that such cup *f* may be used in spinning weft on to pin-cops on paper tubes or on the bare spindle. Fig. 4 is partly a side elevation and partly a vertical section illustrating a spindle similar to that illustrated in Fig. 1, furnished with a ring *h* which is provided with an internal screw-thread, and is screwed upon the screw-thread *c* of the sleeve *d*, and, as is further indicated in Fig. 5, which shows such ring *c* in vertical section, is provided with cuts or notches A in order that when such ring *h* has been screwed upon a spindle such as is illustrated in Fig. 1, the spindle may be used in spinning weft on to pin-cops on thin paper tubes or on the bare spindle. Fig 6 is a vertical section illustrating a form of thin tube *i* of wood, paper or other light material, which may be secured to a spindle formed with a screw-thread in the manner hereinbefore described, in order that weft cops may be spun upon such spindle.—April 6, 1901.

10,132. Ribbed knitted fabrics. June 1. G. Padmore, Salisbury-road, Leicester. Can be applied to circular rib frames, and also to machines of the "Griswold" type. The object is to make an improved welt of an elastic nature on a two-and-two ribbed fabric, and to facilitate the change of rib from a two-and-two to other rib. The dial has needle grooves arranged in such a manner that the two dial needles may operate in the space of one cylinder needle. To make the welt the dial needles are retired out of action, and by shogging either dial or cylinder as desired, and by working the requisite courses, the stitches composing the welt are locked. To change from a two-and-two rib to any other rib, a cylinder needle is placed in the groove, through which the above-mentioned two-dial needles have been operating, and transfer the two loops therefrom to the needle placed in the cylinder groove.—May 4, 1901.

10,183. Bobbins. June 2. H. Southwell, 11, Clover-street, Rochdale. Relates to bobbins used in connection with winding or warping frames. The object is to provide a means for strengthening the flanges of such bobbins by forming the flanges of two separate circular pieces or sections of wood, and arranging concentrically to the barrel of the bobbin and near the periphery or outside circumference of the flange one or more pieces or strands of metallic wire, which are firmly secured in position between the two circular pieces.—April 13, 1901.

10,396 Woven machine belting. June 7. G. Banham and Co. Limited, Pendleton Mill, Pendleton; and C. K. Sagar. Relates to improvements in and in the manufacture of machine belting woven from animal fibre or from vegetable fibre, or from admixtures of the two fibres. As is well known, such machine belting is commonly woven in a series of layers or thicknesses, which series of layers or thicknesses are bound together in the loom by means of a suitable number of warp threads introduced for that purpose. Now, the various woven thicknesses are bound together in the loom, and during the actual operation of weaving, by means of a number of binding warps or strands of a suitable metallic wire, which are specially introduced and worked with the object in view.—May 11, 1901.

10,450. Scutching flax. June 8 E. J. De Courcy, and R. Crawford, 7, Lombard-street, Belfast. Relates, firstly, to a differential speed imparted to the breaking and softening rollers, and also to a difference of pitch in the flutes of same, and secondly, to an improved method of effecting the necessary reciprocating stepwise motion to all the rollers constituting the series.—April 13, 1901.

10,459. Removing wool from skins. June 8. S. L. Johnson, 327, Wakefield-road, Bradford; and the Electrical Wool Pulling Syndicate Limited. Relates to a machine for removing wool and hair from skins. The skin is stretched on a cylinder with the hair outwards. To secure the skin to the cylinder a number of annular grooves are formed in the cylinder, with a number of hooks in each groove, so that they do not project beyond the periphery of the cylinder. The hair is removed by a number of electrically-heated wires arranged similar to the hand appliance described in Patent No 26,576 of 1898. A number of these electrically-heated wires are mounted side by side, upon a reciprocating carrier, which also has a rising and falling motion imparted to it, and is so arranged that during each movement it brings the incandescent wires in contact with the hair at or close to the roots, so as to burn through it and detach it.—May 11, 1901.

10,709. Colour printing. June 12. C. H. Hope, 31, Vineyard-street, Providence, Rhode Island, U.S.A. Relates to the production of the effect of changeable colours upon cotton, linen, or other textile fabrics by the process of printing when the fabric has been first calendered and finished, so as to produce the required glossy surface for the shining reflection of light. The invention consists of a merchantable piece of cloth having a glossy calendered surface, upon which are printed lines of a contrasting colour from that of the cloth, and of a sufficient degree of fineness and nearness to each other to simulate the threads or wales of the fabric, the deposited pigment or colouring matter of the printed lines being retained above the glossy calendered surface of the fabric upon which the printing is performed, whereby the effect of changeable colour will be produced when the cloth is viewed at different angles of light and shade.—April 27, 1901.

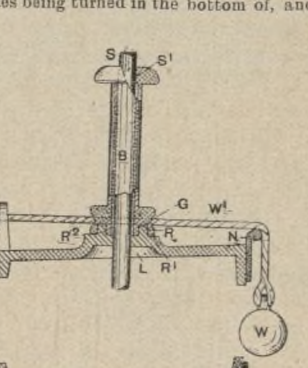
10,821. Preparation of designs for card cutting. June 14. E. Beveridge, St. Leonards Hill, Dunfermline, Fife. Relates to the enlarging or producing and preparing of the large-sized copies required from the original small hand-drawn or painted designs and sketches for jacquard and similar loom pattern weaving for the purpose of reading off and cutting in the "piano" machine by a process in which photography is used as part of the process, instead of doing the whole work by painting by hand labour as heretofore, and which invention will save much time and labour in the producing of these large copies required for pattern weaving, in comparison with the ordinary processes heretofore in use. The improvements consist in taking an ordinary negative of the small original design or sketch, on glass or on paper, in a camera, or direct by photographic printing either by sunlight or by artificial light, and then enlarging the same to the desired size, on ordinary sensitised bromide-of-silver paper, or on other usual sensitised paper in an enlarging camera, or by other usual means, either on the square-lined ruled paper used for enlarging designs on by hand, or on plain paper which would be square-lined in black or colour lines in paper-ruling machines, or by lithographic printing, taking care that the paper is not unduly stretched by damping or otherwise in so ruling the paper. The original design to be enlarged from may be worked out or executed in a flat tint of black or non-actinic colour (preferably not with pencil, as this produces a mottled effect in the enlargement), and at whatever stage the ruling is applied care must be taken not to obliterate it nor render it invisible by the photographic image of the sketch or design, but to allow the square ruling to stand out distinctly through or above the design in sharp, clear lines, as is usual in square-ruled design paper, in which case the ruling shows through the colour used in painting the design upon it.—May 11, 1901.

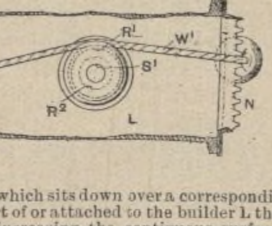
10,844. Black disazo dyestuffs. June 14. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). In Specifications 24,527 of 1897, 2360 of 1899, and 6583 of 1899, are described processes for the manufacture of black disazo colouring matters by combining the diazo compounds of para-amidodiphenylaminesulphonic acids or para-amidophenol-β-naphthylaminesulphonic acids, or para-amidophenylaminecarboxylic acids, or of homologues or substitution products of these acids, with α-naphthylamine, rediazotising the products thus obtained and finally coupling them with other suitable dyestuff components. It is found that dyestuffs of similar character are obtained by using as first components sulphonic acids of para-amidophenylamine which contain both a hydroxyl and a carboxyl group.—May 4, 1901.

11,035. Colouring matters of the acridine series. June 18. H. E. Newton, London (communicated by the Farbenfabriken vormals Friedrich Bayer and Co., Elberfeld). Relates to the production of the hitherto unknown unsymmetrically-alkylated diamido acridines, it also having been found that these bodies represent valuable yellow dyestuffs for leather.—May 4, 1901.

11,348 Dyestuff for wool. June 22. O. Imray, London (communicated by Meister, Lucius and Brüning, Hoechst-on-the-Main). Chloroamidophenolsulphonic acid, obtained by first sulphonating and nitrating paradichlorobenzene, then treating the product with alkali and subsequently reducing it, may be employed for the manufacture of valuable dyestuffs by diazotising the said acid and combining with γ-amidonaphtholsulphonic acid.—April 6, 1901.

11,634. Dragging bobbins. June 27. J. Barbour, Whitehouse, Belfast; and G. Heslip. Consists in a circular groove A, with parallel sides being turned in the bottom of, and concentric





with, the bobbin B, which sits down over a corresponding projecting ring R which is a part of or attached to the builder L that carries the bobbin B; thereby increasing the contiguous surfaces R^1 and R^2 of the bottom of the bobbin B, but the contiguous surface S^1 of the spindle S and bobbin B are not acted on when extra pressure is put on by moving the drag weight W along the front notched strip N as in the ordinary methods, where the contiguous surface S^1 of spindle S and bobbin B is acted on detrimentally when pressure is put on by the drag band W^1, thereby counteracting the dragging operation.—April 27, 1901.

11,922. Amido-ammonium azo dyestuffs. July 2. C. D. Abel, London (communicated by Actien-Gesellschaft für Anilin-Fabrikation, Berlin). Relates to the manufacture of a new series of azo dyestuffs which, owing to their containing strongly basic groups, dye cotton on tannin mordants, but are free from the sensitiveness to acids, generally possessed by basic azo dyestuffs.—May 11, 1901.

11,930. Ingrain carpets. July 2. T. F. and A. Naylor, Green-street, Kidderminster. Relates to the manufacture of Kidderminster, Scotch, or ingrain carpets, consisting of a carpet fabric of four colours woven in sets of three weft threads of diverse colours in two planes of weft material with a stuffer warp B of another colour between said planes, such fabric having one weft thread guided to the top surface and two weft threads to the bottom side by side in each set, or reversely two weft threads side by side to the top and one weft thread to the bottom in each set, in accordance with the pattern or design, the said warp B showing its colour effect beside the single-weft thread in the set, combined with two binding warps D and E, each worked regularly and

FIG. 1.

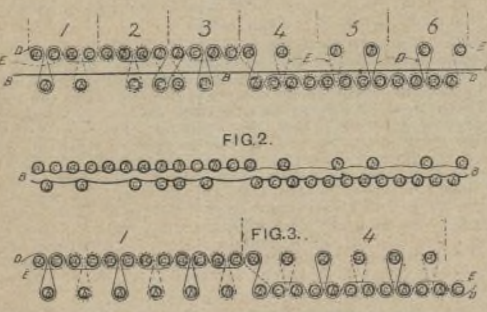
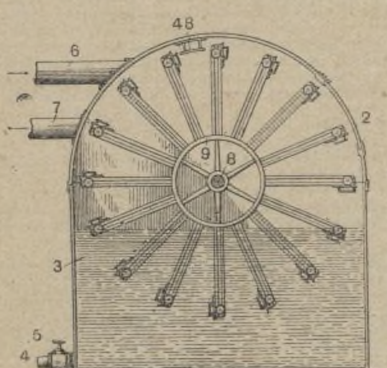


FIG. 2.

FIG. 3.

oppositely with the other all through the fabric, so as to be self-compensating as to the bind.—May 4, 1901.

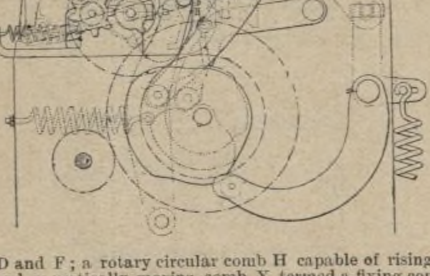
12,020. Dyeing or drying yarns. July 3. W. P. Thompson, Liverpool (communicated by G. Mallinson, Carolina, U.S.A.). The yarn tank has a semi-cylindrical top, a door 2 being provided in the top to permit of access to the interior. The tank is intended to contain a suitable quantity of dyeing mixture, as at 3, and will be provided with a suitable discharge pipe 4 provided with a valve 5, and in some instances pipes 6 and 7, for the admission and discharge of hot air for drying purposes, can also be provided. 8 indicates a horizontal shaft journalled in suitable bearings in the sides of the tank or vat, upon which is mounted a hub 9 of any suitable form, in this instance being composed of a cylinder or ring concentric with the shaft, and supported thereon by suitable spokes. Radiating from the hub are slides arranged in pairs.



Each slide is provided with a longitudinal slot or space extending from the hub through the outer end of the slide. On the top of the upper slide is secured a bearing, in which is journalled a short shaft provided on its upper end with a pinion above the bearing and a squared socket below the bearing, said socket having its bottom and outer face open. To one side of each slide is secured a spring strip, which projects slightly beyond the end of the slide, and is provided with a laterally-bent or latching projection normally held by the elasticity of the spring across the outer end of the slide, closing the slot at that point. A rigid bar is also secured to one side of the slide, extending outside and parallel with the spring strip. On the inner face of the circular top of the vat or tank is secured a rack 48, facing toward the shaft 8 and curved on an arc having the shaft for its centre. When, in the rotation of the main frame with the shaft 8, the pinions engage the racks 48, the pinions, the shafts, sockets, and square rods are rotated, causing the position of the skein on the yarn frame to be changed.—April 27, 1901.

12,976. Dyeing yarns. July 18. R. F. Schule, Kirchheim, Germany. The dyeing or boiling of yarn in hanks, cops, or "chain" form (the latter being intended for warps) is effected by exposing the goods to the action of liquor heated by steam, so that it foams over and the yarn is permeated right through with the liquor, and in consequence of the foaming over the dye-liquor is drawn out of the goods.—April 20, 1901.

17,137. Combing mechanism. Sept. 26. J. A. A. Imbs, 20, Rue Greuze, Paris. Relates to improvements in combing mechanism for use in the preparation of fibrous materials. It comprises the following principal parts: Feed nippers A and drawing



nippers D and F; a rotary circular comb H capable of rising and falling, and a vertically moving comb X termed a fixing comb.—March 16, 1901.

21,114. Sieve cloths. Nov. 22. M. Kirchner, Porzellangasse, Vienna. Sieve cloths are produced without seam and of any desired diameter in a circular loom in the manner that alternately crossing warp wires or metal threads hanging down in a circle are traversed spirally by the shuttle wire or metal thread, the shuttle being actuated by an electromagnet driven round in a circle from the central vertical shaft of the loom.—April 6, 1901.

23,213. Tufted fabrics. Dec. 19. A. G. Brookes, London (communicated by T. J. Drummond, 51, Mount Pleasant-avenue, Boston, Mass.). Relates to looms for weaving tufted fabrics, and relates more especially to the so-called needle and lay motions, these being organised and operated to enable the production of a larger amount of fabric in a given time, the machine being run at a certain speed; and the invention also comprehends improvements in the mechanism for operating the spool frames, and also the frames themselves.—April 20, 1901.

23,376. Warping machines. Dec. 21. J. Esser, Rheine, Westphalia, Germany. In order to provide more space, and thus facilitate the exchange of the bobbins, a part of the frame of a warping machine is made so that it can be swung out or opened to one side.—April 6, 1901.

23,576. Winding machines. Dec. 24. J. F. Gordon, 65, Lane-street, Lowell, Mass., U.S.A. Relates to winding machines of that variety which are adapted to wind filaments, thread, cordage, wire, and similar forms of material into balls or cylindrical or tapering cops upon twills, tubes, or bobbins, without heads, the layers of material being wound into alternate right and left-hand spirals from end to end of the cop.—April 13, 1901.

1901.

1204. Mule spinning. Jan. 18. I. Briggs, jun., Rutland Mills, Wakefield. Relates to the production of a continuous yarn of varying or graduated thickness, such variations from one thickness to the other being extended over a considerable length of yarn. This yarn is afterwards used to produce garments thick in some places and thin in others, without any sudden changes or breaks in the yarn.—March 23, 1901.

2028. Clips. Jan. 29. R. W. James, London (communicated by the Winsor and Jerauld Manufacturing Company, Saco, Maine, U.S.A.). Is an improvement on spring clips or clamps as ordinarily constructed, including the automatic and convertible spring clamp claimed in Patent No. 3824, A.D. 1900. In each of the clamps referred to, a torsional wire spring is pivotally supported by a horizontal pin within the coil of the spring, and serves to close the clamp upon the cloth. The spring-supporting pin, which also forms the pivot of the "top jaw" or "arm" of the clamp, has heretofore been riveted in place. Now if the spring breaks, the pin must be unriveted and removed, together with the top jaw, a new spring and sometimes a new pin inserted, and the pin again riveted. In a full-length tentering machine there are over a thousand of these springs (one to each link), and when one breaks—as occurs quite often—the machine must be stopped some time for the required repair. Moreover, in unriveting and re-riveting the pin, the workman is liable to twist or bend the top jaw, which must fit the cloth-supporting plate very accurately; and this necessitates testing the clamp over again. In the clamps above referred to, the spring and the movable jaw of each clamp have one and the same pivotal axis; and it is of great practical importance to retain this feature, because any eccentricity of one with reference to the other causes a sawing action where the spring presses against the movable jaw, and tends to materially increase the wear of the spring. The object of the present invention is to provide for replacing broken springs without disturbing the advantageous coincidence of the axis of the spring with that of the movable jaw; and it consists in a novel combination of parts comprising a pair of short pivots for the movable jaw, and a removable spring-supporting pin normally in line with said pivots, and in certain improved clamps embodying such novel combination of parts.—March 2, 1901.

2100. Cropping fabrics. Jan. 30. J. Schlenter and F. Schlenter, 26, Oligsbendengasse, Aix-la-Chapelle. Relates to a spiral knife of sheet steel for use in cutting, shearing, or cropping textile fabrics, in which the cutting shank is bent to form an angle, in consequence of which the angle of its cutting edge is made acute, and remains so even when the cutting shank has become so short that the knife can no longer be used. By this invention the cutting process is considerably facilitated, while the durability of the knife is greatly increased.—March 2, 1901.

2473. Spinning frames. Feb. 5. F. A. Breeze and J. Wilson, Richmond, Ontario, Canada. Relates to improvements in spinning frames, and is designed to simplify the construction of ordinary frames by dispensing with certain mechanisms, and at the same time produce a mechanism by which the spinning operation may be carried on continuously, and also to produce a high-grade yarn which, during the drawing process, is attenuated to the proper or desired degree of fineness, and is also twisted simultaneously with its attenuation.—March 16, 1901.

2483. Fulling and washing machines. Feb. 5. H. Niedergesäss, Bellevuestrasse, 159, Cottbus, Germany. The rollers a and b, between which the material is made to pass, are provided with helical grooves round their peripheries, between which corresponding ribs curved in cross section are formed. By the revolution of the rollers a movement is communicated to the

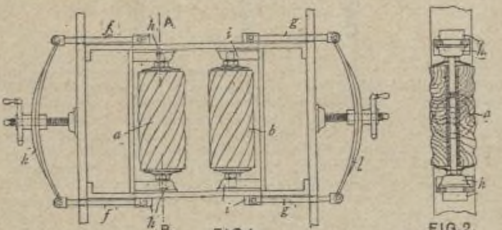


FIG. 1. FIG. 2.

material, as the helical ribs on both rollers run in the same direction, whilst the rollers themselves revolve in opposite directions. By this movement any creases are removed, and the material is rendered smooth and even. The rollers a and b turn in suitable bearings which can move in suitable guides h, i, and are pressed together by connecting rods f, g, and adjustable springs k, l. By this means the rollers can separate if material of insufficiently yielding character and of uneven thickness is passed between the rollers.—April 27, 1901.

2914. Anti-ballooning device. Feb. 11. S. Silberstein, J. Margulies, and A. Böhme, Pustastrasse, Lodz, Poland. Relates to a separator or anti-balloon device for ring-spinning machines for the purpose of keeping the thread always at a uniform tension, and to enable spinning with considerably greater number of revolutions of the spindle to be effected with much lighter travellers. Fig. 1 is a front elevation of the apparatus, in which, for the sake of clearness, the spindles are only indicated by dotted lines. Fig. 2 is a view of the apparatus from above, with the ring rail and spindle bar omitted. The separator rings a are fixed to the bar b, which is connected with the ring rail in such a manner by means of bolts x that the bar b with the separator rings unite in the movement of the ring rail, but if requisite can move nearer to or farther away from the latter. The separator rings a are fixed to the bar b concentrically over the rings of the ring rail t so that the spindles s pass through the centre of both rings. The bar b is provided with lugs h placed at a certain distance apart, through which the bolts x pass, and are secured at the upper end by means of nuts. The lower end of the bolts is firmly screwed into the ring rail, but the bolts pass loosely through the lugs h so that the bar b can be moved parallel towards the ring tail t. The ring rail is also

FIG 1

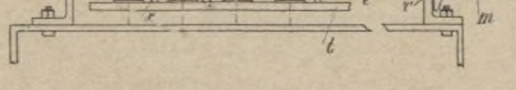
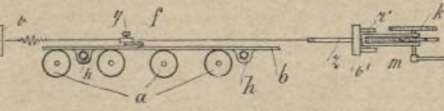


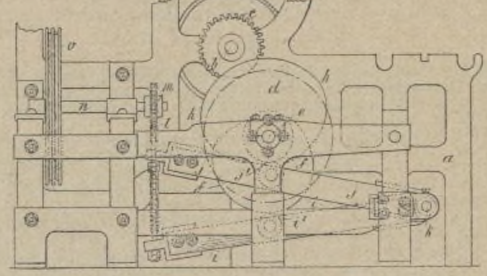
FIG 2



joined to the bar b by means of several jointed pieces c d, which have a common axis of rotation in the block f. The part c is moreover pivoted to the bar b, and the part d to the ring rail t. The block is perforated and slides on the wire e, to which it can be fixed by means of set-screws y. One end of the wire is firmly joined by means of a spring to the axle of a pair of rollers r. The pair of rollers roll on the standard v (having a slot for the wire or spring to pass through), which is firmly screwed to the spindle bar. The other end of the wire is connected with a rack z, which is lodged in the support m, on the sides of which is the second pair of rollers r^1, which roll on the standard v^1. This second standard is also provided with a longitudinal slot for the rack to pass through, and firmly screwed to the spindle bar. A gear wheel o lodged in the support m engages in the rack z, the ratchet wheel k is located on one side on the axle of the gear wheel o, and on the other side is the crank n. In the ratchet wheel engages the pawl p l, which is likewise mounted on the support m.—March 30, 1901.

2986. Clips for tentering machines. Feb. 12. W. Birch, Milton-street, Lower Broughton, Manchester. Relates to improvements in clips for tentering machines, and has for its object to simplify and render such clips quicker, positive and uniform in action, immaterial whether used for thick or thin fabric, and less liable to injure the fabric than heretofore has been the case.—March 16, 1901.

3095. Wire motion of looms. Feb. 13. J. Hall, R. Hall, J. H. Hall, and O. S. Hall, Hope Foundry, Bury. Relates to improvements in the wire motion of looms for weaving carpets and other pile fabrics, and the chief object is to dispense with the usual rack and pinion for putting in and withdrawing the wires employed in weaving, and to substitute a quieter, quicker and simpler motion. a designates the frame of the loom, b the crankshaft upon which is secured a spur-wheel c which gears into a spur-wheel d secured upon a shaft e, which carries the tappets for actuating the wire motion. The pair of wheels c d drive the wire motion, and



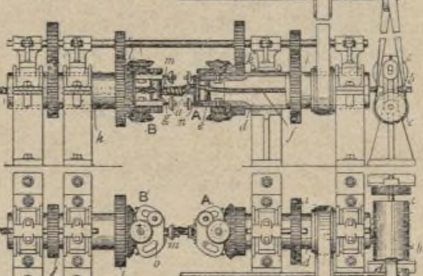
tappets actuate the healds, the tappets being loose upon the shaft e and driven by a separate spur-wheel on the crankshaft. Upon the tappet shaft e is secured a tappet f, and to this tappet is bolted, by means of adjustable bolts g, a second tappet h, the bolts passing through slots in one or both of the tappets, so that the positions of the tappets in relation to one another may be regulated as desired. A pair of levers i, j, are pivoted on a stud k, carried in a bracket secured to the frame, and upon each of these levers are mounted bowls i^1 and j^1 respectively, the tappet f acting upon the bowl i^1 and the tappet h upon the bowl j^1. The free ends of the levers i and j are connected to opposite ends of a chain l, which passes over a chain wheel m secured upon a shaft n, on which is keyed the usual grooved pulley o of the wire motion. The rotary motion imparted to the tappet shaft e by the crankshaft causes the tappets f and h to alternately depress the levers i and j, which, by the chain l, gives a reciprocating movement to the chain wheel m, shaft n, and grooved pulley o, and so, by a band not shown, puts in and withdraws the wires from the shed and the fabric in the ordinary way.—March 23, 1901.

3316. Preparing flax. Feb. 15. M. M. Greeves, Forth River Mill, Falls-road, Belfast; and T. Lucas. Relates to an improved appliance for removing fibres adhering to the front drawing roller of drawing or other frames applicable for the preparation of flax or similar fibres for spinning. Such rollers have hitherto been kept clean by a revolving rubber, or by a stationary scraper applied thereto, but neither of these effectually cleans the roller or prevents the waste fibres returning again in irregular pieces to the sliver as it passes away from the roller. The invention consists essentially in constructing a scraper with two or more blades or sets of blades, which will at intervals be moved or rotated to bring the blades or sets of blades alternately into engagement with the roller while the fibres that have been collected by the other are being brushed away or removed.—March 30, 1901.

3562. Folding and cutting fabrics. Feb. 19. H. H. Lake, London (communicated by C. B. Cottrell and Sons Co., Stonington, Connecticut, U.S.A.) Relates to apparatus for cutting and folding fabrics, and includes as its folding devices a slotted table upon which the sheet to be folded is placed, a blade situated at the face of the table and presented edgewise opposite to the slot therein, and reciprocating gripping jaws operating through the slot to first crease the sheet over the edge of the blade in the intended line of fold, and to afterwards complete the folding of the so creased sheet by drawing it from the blade and through the slot. In combination with such folding devices the invention includes cutting or slitting devices, on opposite sides of which are two sets of such folding devices, for the purpose of first creasing in two places preparatory to the folding a sheet which has been placed upon the folding table, next slitting the sheet into two smaller sheets between the creases, and finally folding the smaller sheets on the lines of the creases.—March 23, 1901.

4077. Composite rollers. Feb. 26. C. L. Jackson and H. L. Jackson, Wharf Foundry, Bolton. Relates to improvements in the manufacture of composite bowls or rollers, particularly to bowls of large diameter, employed in machines for hot pressing and otherwise treating and finishing textile fabrics. These are composed of a metal body or core surrounded by an outer shell of compressed cotton, paper, or analogous material clamped between metal end plates.—March 30, 1901.

6321. Fibre twisting and curling. March 26. S. A. Flower, 79, Clinton-avenue, Newark, New Jersey, U.S.A. Relates to apparatus for roping or twisting and curling animal and vegetable fibres for upholstery purposes. A and B represent a pair of twisting and drawing heads geared for both being rotated in the same direction, but so that head A rotates slower than head B, as seen by the different proportions of the gears i and j. They carry the usual drawing rolls e and g, rolls e being driven at faster speed than rolls g, as seen by the different proportions of gears k and l, and both pairs turn on their axes in the same direction to receive the fibres b to be twisted and curled from the feed rolls c, and deliver the product at the other end of the machine. Between the feed rolls c and the rolls e of head A the fibres are twisted in the usual way, as shown at f. At the delivery side of the rolls e the taper mandrel a is supported by its base, the taper end being free; it may be supported in any approved way, but as shown its disc



head n is attached to the head frame, said disc having a throat o through which the twist f is led from rolls e and is coiled on the mandrel and passed between rolls g, between which the mandrel also extends, so that as head B rotates faster than head A, it draws the coils tightly around the mandrel and gives permanent set to the curls of the fibres, and at the same time rolls g draw the coiled rope from the mandrel and pass it along to be delivered from the machine on to reel or other apparatus for receiving it. The head B running faster than head A causes effective stress on the rope and close winding of the coils, gradually reducing them along the taper mandrel to a solid rope as they escape from the end of the mandrel; the taper form of the mandrel facilitates the movement of the coils along it.—April 27, 1901.