

in some the connection still exists. The late Richard Roberts was probably the first mechanic trained outside the ranks of the cotton industry who conferred any considerable advantage upon it by his inventions. Until nearly 1850 every mill had its forge and mechanics' shop, and in many cases a small foundry also, for making repairs or even new machines of nearly every description. It was in these shops, to which the managers and foremen had constant access, that the bulk of the improvements in detail were made. In those in which both skill and a considerable degree of inventive power were found, the best machines were made, and the proprietors achieved some reputation, which led to the influx of orders from those less skilled. This class of work increased until a sufficient amount came in to justify their separation from the parent cotton business and establishment on an independent basis. With the advent of the present century small "machine shops" of this class began to be established, the function of which was really more to repair existing machines than to construct new. The latter was a subsequent effort. Very few were founded previously to 1825, and of these hardly more than two or three have left direct descendants. The first notable one was Richard Roberts', which existed until about 1852. This is a typical instance. This phase of the question, however, is of more interest than importance.

In tracing the development of mill construction and engine equipment, Mr. Nasmith is much more at home, though even here we fail to agree with him at all points. In referring to the transmission of power he awards the palm for efficiency and economy to toothed gearing, "when properly constructed," affirming that "there is no doubt about it." This is doubly begging the question. It is very certain that up to the advent and wide acceptance of rope driving, toothed gearing had not been "properly constructed," if a judgment may be based upon its working. We are aware that during the past two or three years in engineering circles it has begun to be affirmed that it is now so much improved that there "is no doubt" upon the matter. We, however, entertain a very strong doubt, and venture to affirm that engineers, if they have convinced themselves, have not yet done the same service for their customers. In proof of this we would point to the fact that within the past few weeks the gearing of India Mill, Darwen, has been "converted" from the toothed-wheel system to rope driving, probably the greatest conversion of the kind that has ever taken place. Those of our readers who wish to read Mr. Nasmith's remarks on the matter in full will find them in paragraph 13, page 10. Undoubtedly the system of rope driving, which was introduced to the notice of the Lancashire public in 1876, by an article contributed to a technical journal by Mr. Richard Marsden, was not at first put into the market in a perfect form. The system originated in Belfast, we believe, in the establishment of Messrs. Combe, Barbour, and Combe, the eminent machinists of that city. Thence it spread very slowly into Scotland, and was brought from there by Mr. William Bamber, a Bolton cotton spinner, who adopted it in a mill he was rebuilding after a fire. Messrs. Musgrave and Sons, the eminent engineers of that town, undertook the work. Mr. Marsden was invited to inspect it, and afterwards wrote the article referred to. A Dundee firm of engineers who had constructed most of the installations in Scotland, appointed Mr. G. Durie to represent them in Lancashire and Yorkshire, and a worsted spinning firm in Yorkshire adopted it. In the meantime it attracted much attention, but was pooh-poohed by engineers, probably for reasons that need not be further referred to here. Mr. Goodfellow, engineer, of Hyde, with the enterprise that has always distinguished his firm, was, we believe, the first who advertised his readiness to furnish mill-owners with installations of the system, and competition quickly brought in the remainder. It is not surprising, therefore, that in entering new and untried paths mistakes were made, grooves were cut of bad shape, and ropes of unsuitable material were used. We admit that if data for comparison with the newest and best system of

toothed gearing are taken from these old installations the results of the comparison may be doubtful. Mr. Nasmith's data appear to be somewhat old. He refers to the difficulty of maintaining an equal diameter in every rope of the series, and the disadvantage of "jamming in the grooves" when leaving the pulleys. But as now made ropes for main driving are exactly equal in diameter and fit properly to the working part of the grooves, and so far from "jamming" they fall out without entailing the loss of any power. Properly fitting ropes rest on the sides of the grooves and not on the bottoms, and impinge upon the best working part of the groove. When this is the case, and it should always be so, the frictional resistance to slipping is very considerable and that without wedging, as the ropes fall out by their own weight. The joints are of course made by splicing, and the length of the splice should not be less than about 20 times the circumference of the rope. The diameter of the pulley should always exceed 30 times the diameter of the rope; and this as a minimum. When these conditions exist we contend rope driving will beat any other system yet before the public in the matter of efficiency and economy.

Notwithstanding that we thus differ somewhat from Mr. Nasmith's views, we have very great pleasure in recommending this work to our readers as a valuable acquisition to the technical literature of the day, and a book that should be in the hands of every person who desires to make acquaintance with the present state of machine construction for the cotton trade.

Foreign Correspondence.

TEXTILE MATTERS IN THE STATES.

NEW YORK, DECEMBER 20TH.

An interesting commentary on the action of the McKinleyites in endeavouring to stifle the foreign commerce of the country is furnished by a table recently published, and shewing the extent of the trade, the existence of which has been jeopardised by recent legislation. The statistics shew that of the total tonnage cleared from American ports in the year 1889-90, about one-third was for the United Kingdom, while if the quantities from Quebec and Ontario be added, it will be found that the commerce of this country with Great Britain and her dependencies amounts to more than half of the total. This is a fact which possesses, I think, a peculiar significance in view of the tone adopted by a section of the American people when speaking of England.

New England machinists have been so busy that quite a pean of joy has arisen from those who take an interest in the progress of this branch of our manufacturing industries. Letters from the leading business centres in the East speak of the encouraging outlook in this branch of trade, and it is stated that the majority of the textile machine shops are now running to their fullest capacity, many of them employing their hands night and day in order to fill the increasing demands of the manufacturing trade both North and South. The activity in the South is one of the chief features of the situation, and it is stated that extensive consignments of looms have been forwarded from Rhode Island and Massachusetts of late to points south of Mason and Dixon's line. In addition to this there is, of course, the Northern demand to reckon with. One prominent machine builder says: "If all the concerns for manufacturing machinery are being pushed to the same extent that we are, the country is certainly calling for an extraordinary large supply of machinery for textile purposes. We have actually been obliged to decline several orders for goods that were wanted for immediate delivery, because we could not possibly fill them in the time required. I am of opinion that there is going to be a boom in the cotton and worsted manufacturing business all over the country."

An important meeting of the committee of dry goods importers, of which Mr. Gibb, of Mills and Gibb, is chairman, was held last Monday. It was there decided to call a general meeting of all importers for Monday, December 22nd, to decide what action relative to legal advice, which was lately received by the committee, should be taken regarding the constitutionality of the McKinley Bill.

It is rumoured that there will be a reduction in the prices of American made linen threads on January 1st next. If this rumour proves to be well founded, it will be an unexpected fulfilment of the promises of some of the linen thread men last spring, that if the new tariff should afford them the needed protection, they would give their customers the benefit of whatever reduction in cost might result from their enlarged business. The case of the linen thread trade is, however, rather exceptional, as manufacturers can well afford to drop prices. The trade here is in a position somewhat similar to that which exists in the United Kingdom, the system under which Barbour and Finlaysons work there having its counterpart here, where the firms named are also the leaders of the industry.

Designing.

NEW DESIGNS.

FANCY DIAGONAL.

This design is a very neat, pleasing, and effective fancy diagonal, on 16 shafts, straight over draft; 16 to the round. A serviceable cloth for vestings may be made from the following particulars:—Warp 60's linen, two in a heald, 70 ends per inch; 52 picks per inch of 20's linen weft; made in the grey, well bleached, or dyed any of the fancy or fashionable shades, a really saleable article would be produced. For cotton trouserings the warp might be 20's twist, two in a heald in a 56 reed, 3 in a dent, or 84 ends per inch and 60 picks per inch of 8's weft. In this case warp and weft all cotton. Again, the warp might be 24's cotton twist, 60 ends per inch, two in a heald, and linen weft 30's, with 56 picks per inch; this would give a good cloth for ladies' jackets, or wraps. The diagonal could be adapted to any class of cloth in worsted, woollen, or silk. In the latter material, a beautiful effect would be produced by having warp a very dark ground, black, brown, dark green, dark slate, etc.; the weft crimson, white, light pink, and light fawn. Any amount of change can be made with this weave combined with colour, and in unions, say linen warp, cotton weft, cotton warp, linen weft, cotton warp and worsted weft, or cotton warp and silk spuns. It will thus be seen that there is a very large field open for experiments, and if any one combination out of the number succeeds in obtaining notice, most of the others will certainly follow.

DHOOTIE BORDER DESIGN.

This will be found a novelty. It is not in any sense a copy from the Hindu patterns, but it follows strictly the same lines, being a combination of the geometrical with a leaf of conventional foliage. The ground, which is the undotted space, may be grass green, end and end with the figure of turkey or other good red. If yellow be used for ground and a deep rich purple for the figure a pleasing effect will be produced. Only two colours are required for this design, including the bands: the dark portion the same colour as the figure, the white band as the ground, and the shaded portions of both band and figure a light variation from the figure colour. Whatever the colours or shading, they should be thoroughly in touch with each other as good contrasts or harmonisers.

FANCY SILK VESTING.

This is a suggestive original design for a vesting. The ground or warp might be silk organzine, printed crimson and white equals; block of sixteenth of an inch; the weft silk tram forming the figure with chartreuse, a light green having a preponderance of yellow. Of course

the ground would have to be shewn to the best advantage by using a nine shaft satin weave. The warp in this case would conceal the weft only where it was really employed in the figure. We need scarcely say that many uses may be made of the figure even as a printer for light makes of calico, etc., or in silk dress goods it could be made to shew with good effect.

NOVELTIES IN WORSTEDS AND WOOLLENS.

It is our intention in this and the following numbers to bring more definitely before our readers some suggestions given in these columns a few months ago. The current issue of the French journal *Les Tissus* contains at least one pattern that we may fairly claim as coming under the above suggestions, and therefore with the idea of furthering the production of novelties of a varying type, we again propose to consider the class of pattern named and give further suggestions. All manufacturers of dress materials will be aware that in dealing with large checks, etc., dressmakers often cut the cloth diagonally and thus obtain the effect of a stripe running diagonally instead of straight across the piece. Now if reference be made to this journal of some few months back, it will be found that we indicated briefly the method of weaving an effect similar to this in the case of

Scotch Tweeds, and promised further remarks on what we deemed a useful means for producing novel effects. Our remarks in later numbers on the distribution of colour by means of weave in part fulfilled this promise, but probably a much better idea will be obtained of what can be done in this direction by the perusal of the following particulars and designs.

The simplest method of obtaining a representation of diagonal lines in the place of lines running with the warp and weft, is shewn in *Design 1*, the effect of which in the cloth is indicated in *Sketch A*. The principle employed is simply warping and wefting the 2-and-2 twill, 1 black and 1 white, when what are termed steps are formed, always running in the direction opposite to the twill. A diagonal stripe has by this means been formed, as shewn, and if the pointed effect produced by reversing twills be required, this may be effected by drafting.

The setts ordinarily used for the 2-and-2 twill will prove sufficient here.

In *Design 2* a still more definite effect has been attempted by the use of a corkscrew make and weft rib. If this design be warped 1 thread black, 1 thread white, and wefted all black, then a marked diagonal effect will result, being formed in the first place by the weft rib followed by a white warp stripe; then a black

warp stripe and then another white warp stripe joining the weft rib, as shewn in *Sketch B*. If the weft rib weave used be considered to have too long a flush of warp at the back, weave *A* may be used, but we would point out that the weave used sends the white warp entirely to the back, and thus obviates the chance of any white shewing in the black weft rib. The following is a suitable sett:—

| | |
|--------------------------------|--------------------|
| <i>Warp.</i> | <i>Weft.</i> |
| 1 thread 2/44's black worsted, | All 22's black, |
| 1 ,, 2/44's white worsted. | 80 picks per inch. |
| 20's reed 4's. | |

Design 3 denotes an even simpler way of effecting the same thing. Here an ordinary twill with warp white and weft black or *vice versa* is utilised in conjunction with a weft rib. The sett should be

| | |
|-------------------|--------------------|
| <i>Warp.</i> | <i>Weft.</i> |
| All 2/40's black, | All 20's white. |
| 18's reed 4's. | 72 picks per inch. |

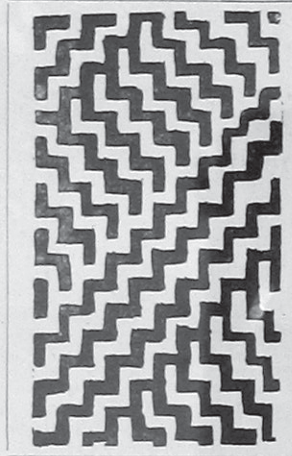
Or a more open sett with coarser yarn would be quite admissible in this case, viz. :—

| | |
|---------------------------|-------------------------|
| <i>Warp.</i> | <i>Weft.</i> |
| All 2/30's black worsted, | All 15's black worsted. |
| 14's reed 4's. | 56 picks per inch. |

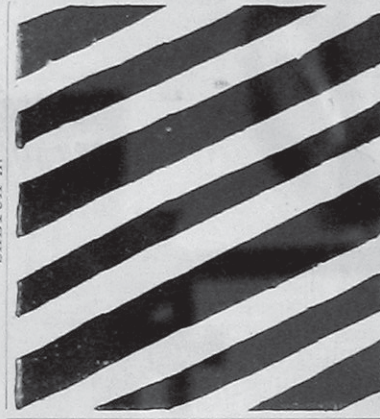
Of course a variety of colourings may be introduced, as will be shewn later on, but we defer our remarks on this subject until the structure of these effects has been fully demonstrated, thus placing readers in a position to fully grasp what can and what can not be done.



FANCY SILK VESTING.



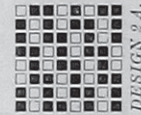
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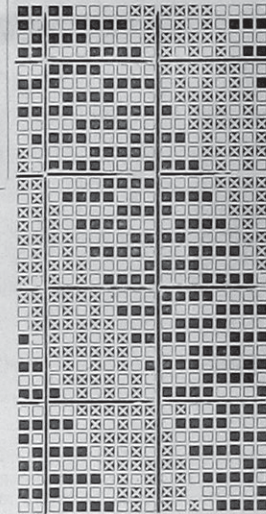
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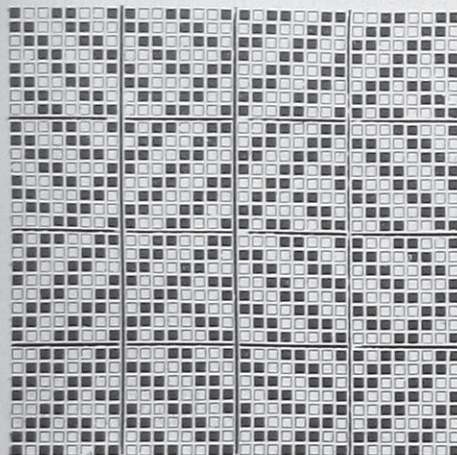
DHOOTIE BORDER.



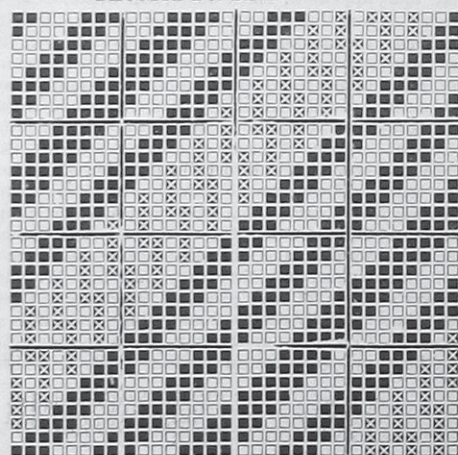
DESIGN 2.



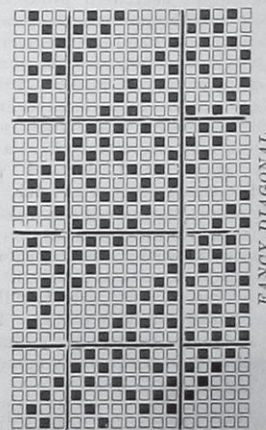
DESIGN 3.



DESIGN 1.



DESIGN 2.



FANCY DIAGONAL.