PRUNE ON TUSSAH SILK.

Prepare a bath with 5% archil red, ⅓% fast red, ⅓% citronine, and a little sulphuric acid. Work at the boil to shade. Lift, wash, and dry.

NAVY-BLUE ON WOOLLEN CLOTH.

For 100 lb. cloth. Prepare a mordanting bath with

4 lb. bichromate of potash,
2 lb. tartar,
½ lb. sulphuric acid,

working at the boil for 1½ hours; rinse, and enter into a new bath made with

8 lb alizarine cyanine R,
6 lb. alizarine cyanine GG,
2 lb. acetate of ammonia.

Enter at about 100 ° F., work for ½ hour, then heat slowly to the boil, and work for 1½ hours. Lift, rinse, and dry.

WARM BROWN ON WOOLLEN CLOTH.

For 100 lb. cloth. Mordant by boiling for 1½ hours in a bath of

4 lb. bichromate of potash,
2 lb tartar,
½ lb sulphuric acid.

Wash; then enter into a dye-bath made with

7 lb. anthracene brown N,
8 lb. fustic extract,
2 lb. acetic acid,

working in the manner usual with alizarine dye-stuffs.

BROWN DRAB ON COTTON.

For 100 lb. cotton. Prepare a bath with

¼ lb cotton brown N,
¾ oz diamine yellow N,
¾ oz. diamine black BO,
15 lb. phosphate of soda,
3 lb. soap

Work at the boil for one hour.

MEDIUM GREY ON JUTE.

For 100 lb. Steep over night in a bath made with 3 lb. tannin; wash, and enter into a cold bath of 3 lb. copperas; work ¼ hour, then add 1¼ lb. nitrate of iron; work ¾ hour, then lift, wash, and dry.

DARK GREY ON LINEN.

For 100 lb. goods. Boil for one hour in a bath of

12 lb. Glauber's salt,
3 lb. soap,
1 lb. diamine black RO,
2 oz. diamine fast red F,
2 oz. titan yellow.

Wash and dry.

REDDISH-BROWN ON JUTE.

For 100 lb. goods. Prepare a bath with

15 lb. salt,
3 lb. benzo brown G,
1 lb. titan yellow Y.

Boil for one hour; then wash and dry.

PALE BLUE ON COTTON.

For 100 lb. cotton goods. Prepare a bath with

10 lb. salt,
3 lb. soda,
3 oz. diamine blue 3 B.

Work for one hour at the boil; then lift, wash, and dry.

BLUE ON LINEN.

For 100 lb. linen goods. The dye-bath is made with

15 lb. salt,
5 lb. soda,
1½ lb. diamine blue 2 B,
2 lb. diamine blue BX.

Dye at the boil for one hour; then wash and dry.

## *DYERS AND PROOFERS.*

Mr. C. A Fawsitt, in the course of a paper on "Dry Heat Vulcanizer," read before the Glasgow Section of the Society of Chemical Industry, said that the co-relation of different dyes and pigments with rubber proofing was little understood as yet. He further said that the operations of the dyer and the proofer should be brought more into partnership, instead of standing quite distinct as at present. It is to this latter statement that we are about to refer, and we think that an apology for doing so is hardly needed, considering the great interests which are involved in the waterproof garment manufacture of to-day. It should be known that the processes under which the various manufacturers conduct their business are more or less in the nature of trade secrets, and therefore the fewer there are "in the know" the better for the preservation of the secret. On this head objection may be felt by the waterproof manufacturer to admitting the dyer to his council, always supposing that the latter had not enough to do in his own business without going into the mysteries of the waterproof or other kindred trades. We think it would be more to the point for the waterproofer to give instructions to the dyer as to the dye he should use. Of course here it may be urged that the dyer also has trade secrets, but the proofer would only stipulate for certain conditions to be fulfilled, and there is no doubt that this is being done more and more at the present day. To take the case of those two great enemies to rubber proofing, grease and oxide of copper, the dyers are now fully aware that these must be absent or practically so from goods intended for proofing purposes. Formerly this was not so, and there can be no doubt that the numerous cases of decayed proofings which occurred some ten or fifteen years ago were caused by the high percentages of grease to be then found in the cloths. Whether the effect of oxide of copper in small quantities as the mordant for blacks is really so injurious as has been stated may be open to question, but as it is certain that this body in any quantity quickly determines the destruction of the rubber, it is better to be on the safe side and demand its absence. We grant that the amount of knowledge which the proofer has as to the good or bad effect of the larger portion of the dyes and mordants on rubber proofing is not at all complete, and much room still remains for research. Beyond the two agents already mentioned, there is little more to condemn with absolute certainty. An attempt has been made by an eminent chemist to shew that oxide of chromium is highly injurious to rubber, but we cannot acquiesce in this statement. Regarding the evidence on which these statements depend, they are most generally found to proceed from experiments made in favour of one side or the other in a legal action. Litigation not unfrequently arises between the proofer and the dyer as to who is to blame when a claim is put in by a customer for proofing that has "gone wrong." The proofer says that the injurious action of the dye has caused the mischief, and the dyer retaliates that the proof is a bad one and the cause of its own decay. The case goes before a jury, who are bewildered by the opposing statements of analysts, who, however eminent they may be in the matter of food and drugs, have but a superficial knowledge of the rubber manufacture. One chemist, finding oxide of copper present to the extent of ·01 per cent. in the cloth, claims victory for the proofer, while the other, finding possibly something in the proof which he considers to be injurious, claims for the dyer. Such cases as these, requiring an intimate knowledge of the manufacture, combined with considerable analytical skill, should surely be submitted to experts, and the arbitration system of settling such disputes should need no recommendation. So little is really understood as to the chemistry of rubber itself that it is quite possible that oxidation occurs more rapidly in one season's growth than in that of another. Several cases of decay have come under our own notice where no other explanation could be offered. We do not intend to pursue the subject of the decay of rubber further in this place, and merely mention the above to shew that there are many problems in the technology of waterproofing still to be solved. As to the best method of doing this, we are not prepared to adopt Mr. Fawsitt's suggestion of calling in the practical dyer to advise, nor yet to take the figures or statements made in courts of law by the chemist for the winning side as necessarily reliable. Rather let the proofer work out these problems himself, of course with the best scientific aid he can afford, and then by giving the dyer instructions to work as regards the dyes and mordants which are or are not allowable, we may expect much good to result. Certainly the avoidance in the witness box of the unedifying spectacle of opposing experts, with more or less qualification for the title, would be one result to be looked for in an improved state of affairs.

A NEW dye-stuff dyeing wool from acid baths a pure flaming red colour is prepared from nitrosonaphthol sulphonic acid by heating with aniline and aniline hydrochlorate, sulphonating the product so obtained, and then again sulphonating the product of the first sulphonation, which, of itself, is a dye-stuff dyeing fibres of a violet-red colour.

# Designing.

## *THE ANALYSIS OF PATTERN.—XIII.*

### THE WEIGHTS OF CLOTHS.

(*Continued from p. 327.*)

A large number of fancy dress fabrics, usually included under the heading "crammed stripes," require distinct treatment under the second heading, since whether they are true crammed stripes or only those in which two distinct materials are employed, the treatment of each material separately is much to be preferred.

The method of finding the weight of the latter class of goods—viz., those in which two distinct materials are employed—is very easy, as the following example will demonstrate:—

*Warp.*

12 threads 2/50's salmon worsted.
12 ,, 2/50's white worsted.
12 ,, 2/50's green ,,
12 ,, 2/50's white ,,
12 ,, 40/2 blue silk.
12 ,, 2/50's white worsted.
12 ,, 2/50's green worsted.
12 ,, 2/50's white ,,
—
96 threads in pattern.

12's reed 4's.

*Weft.*

Same as warp; 48 picks per inch.

Piece to be woven 48 in. wide in loom, 60 yards long:

Then, 48 threads per inch ÷ 96 threads in pattern = ½ pattern per inch, or 1 pattern = 2 in.

Therefore, 48 ÷ 2 = 24 patterns in piece, an

$$\frac{48 \times 24 \times 60}{25 \times 560} = 4 \text{ lb } 15 \text{ oz. of white worsted.}$$

$$\frac{12 \times 24 \times 60}{25 \times 560} = 1 \text{ lb. } 4 \text{ oz. of salmon worsted.}$$

$$\frac{24 \times 24 \times 60}{25 \times 560} = 2 \text{ lb. } \tfrac{1}{2} \text{oz. of green worsted.}$$

$$\frac{12 \times 24 \times 60}{40 \times 840} = 8 \text{ oz. of blue silk.}$$

The weight of weft yarns will be exactly the same, *minus* the take-up in weaving of the warp.

The above is not a true "crammed stripe," since a true cram has more threads in one portion than in another, as instanced below:—

*Warp.*

40 threads of mohair, 4 in a reed = 10 reeds.
20 ,, cotton, 2 ,, = 10 ,,
12 ,, mohair, 4 ,, = 3 ,,
40 ,, cotton, 2 ,, = 20 ,,
12 ,, mohair, 4 ,, = 3 ,,
20 ,, cotton, 2 ,, = 10 ,,
—
14's reed 4's. 56 reeds in pattern.

Piece to be woven 56 in. wide:

Now it is very evident that here also the extent of pattern must first be found, and if the number of reeds occupied by the pattern be ascertained, then this, divided into the reeds across piece, will give the answer, *i.e.*:—

56 × 14 = 784 reeds across the piece, and 784 ÷ 56 = 14 patterns across the piece; then 14 × 16 splits of mohair × 4 threads in a split = 896 ends of silk, 14 × 40 splits of cotton × 2 threads in a split = 1,120 ends of cotton.

Having the counts of mohair and cotton with the length of warp, etc., the weight of cloth may now easily be found as previously shewn.

OTHER NECESSARY CALCULATIONS.

There are many other forms in which warp and weft calculations may occur, but the following formula will probably prove all that is necessary:—

Let C = counts, W = width in loom, L = length, N = number of ends or picks per inch, and P = weight in lbs. Then $\frac{N \times W \times L}{C \times 560} = P$, or N × W × L = P × C × 560 for worsted, 256 for woollen, or 840 for cotton.

Now this is a complete formula; consequently, if one of the terms be missing, the sum worked out will give that term—*i.e.*, the number which will complete the equation—so that all the following questions are here involved:

(1) To find the *counts* when ends or picks per inch, width, length, and weight are given—

$$\frac{N \times W \times L}{P \times 560} = \text{counts in worsted.}$$

(2) To find the *length* when ends or picks per inch, width, weight, and counts are given—

$$\frac{N \times W}{P \times C \times 840} = \text{length, if yarn is cotton or silk.}$$

(3) To find the *width* when ends per inch, length, counts, and weights are given—

$$\frac{N \times L}{P \times C \times 256} = \text{width for a given weight of woollen yarn.}$$

(4) To find the *ends per inch* when width, length, counts, and weight are given—

$$\frac{W \times L}{P \times C \times 200} = \text{ends per inch if the counts of yarn are Galashiels system.}$$

With these formulæ not only should the analyst be able to work out any calculations which are likely to occur, but he should also be able to reason the matter out on reference to the particulars already given.

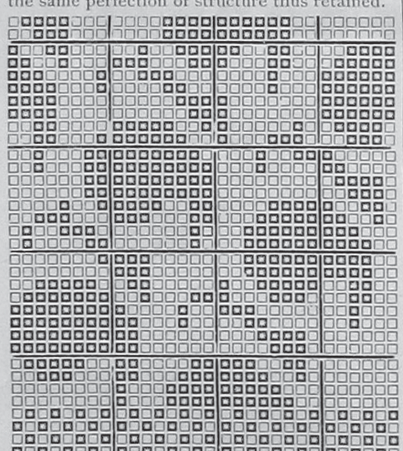
As already intimated, the above systems, although answering all requirements when dealing with cloths in the loom, require certain modifications in application to the cloth in the finished state. These modifications will be considered fully later on.

CHANGING THE WEIGHTS OF CLOTHS.

There are three ways in which the weights of cloths may be changed—viz., by change of counts; by changing the number of ends and picks per inch; or by a combination of both the foregoing. The latter method is undoubtedly the correct one, but since all three methods may be useful to the analyst for modifying cloths in weight, each shall be briefly considered.

Since counts in reality equal weight, a direct change of counts of yarn in a cloth necessarily implies a direct change of weight, inversely. For example, if a cloth woven with a 20's yarn = 1 lb. per yard, a cloth woven with a 10's yarn will weigh 2 lb. per yard, or as 20 is to 10 inversely. This is exceedingly simple, and at first sight would appear all-sufficing. Such, however, is not the case, since although it is true that the weight is changed in the right proportion, it is also true that the diameter of the yarn is increased, while no deduction from the ends per inch has been made; consequently, if the first cloth is a perfect one, the second cannot be perfect, and *vice-versâ*.

Again, the required change in weight may be made by the ends per inch, 80 ends giving double the weight of 40 ends per inch, and so on. But the same objection must be raised to this as was raised to the counts: if one cloth is perfect the other cannot be; and so for the true method we turn to the third method, in which both counts and ends are changed, and the same perfection of structure thus retained.



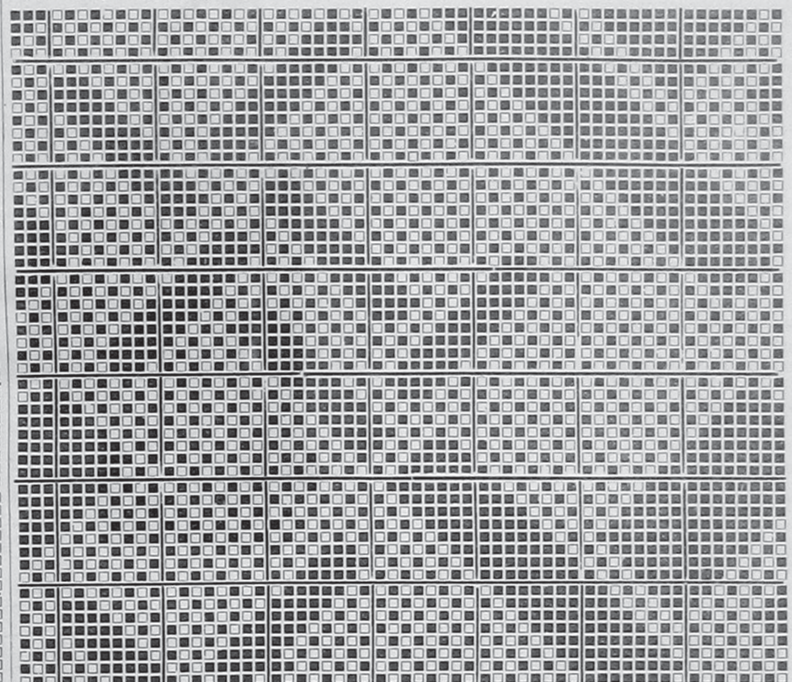
DESIGN 1: PEGGING PLAN.

## *NEW DESIGNS.*

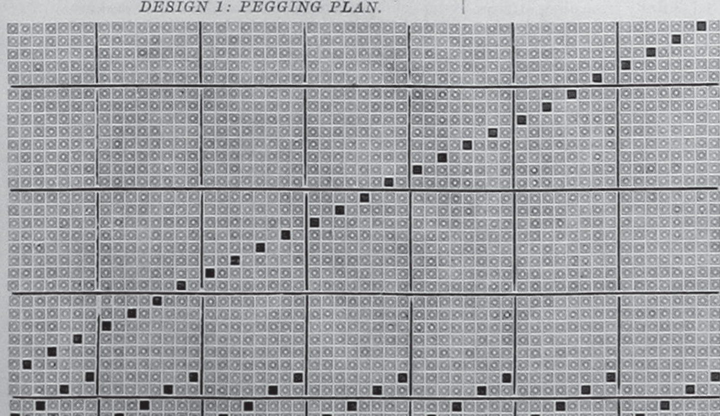
### COTTON SHIRTING.

*Design A* is for a fancy shirting, which will require a dobby for the weave; 30 shafts for the figure, and four for a plain ground, 30 to the round; it may be worked out by 30 shafts, straight-over draft. Omitting the 4 plain shafts in this case, the pegging plan would be found within the bounds of the design as indicated by the crosses at bottom and one on the margin, 30 ends, 30 picks; the dots must be developed by the weft. Warp, 20's cotton, 30 dents per inch, two in a dent, 60 picks, 16's weft for one quality. For a fine cloth for ladies' wear, 40 dents per inch, two in a dent, 30's twist, 80 picks per inch of 30's weft, woven all grey and well bleached, or piece-dyed in fancy colours; if the warp is all bleached white, cream, or faint primrose ground, a most desirable effect could be produced by the use of dark dahlia weft, which would make the figure very prominent. We give a number of weft shades suitable for the warp grounds alluded to: dark Humboldt, red brown, dark Gobelins blue, terra-cotta, dark heliotrope, dark golden brown, peacock blue, dark stone drab, dark apricot, dark olive, dark lead, and dark slate; any of these shades in the weft will give beautiful results. The warp ground can also be extended in various tints to suit these wefts, as in light, dark, or mid cream, very light lilac, gold, very light blue greens, pinks, dove, silver grey, very light lavender, yellow drab, light buffs, and shrimp. The greatest range possible may be obtained also by light-tinted wefts and dark warp grounds.

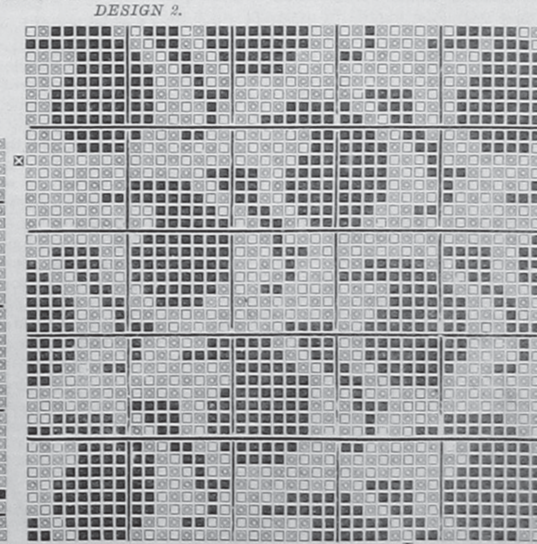
*Design B* is merely a suggestion for a fancy shirting cloth on a plain ground. Carrying out the design to the full extent it will be found to occupy a great number of ends and picks, and would require a Jacquard harness. The idea may be developed for cotton zephyr dress goods, and would require a warp 40's twist, 45 dents per inch, two in a dent; 90 picks per inch of 40's weft, and same colours used as are given for *Design A*; or woven grey and bleached, or piece-dyed, with good finish.



*DESIGN 2.*



*DESIGN 1: DRAFT.*



*DESIGN 1: SHIRTINGS.*