

Bleaching, Dyeing, Printing, etc.

ARTIFICIAL INDIGO: A NEW PROCESS.

The Chemistry, Dyeing, and Printing Department of the Manchester Technical School was opened on Friday night of last week, with an address by Mr. Ivan Levinstein, chairman of the Manchester section of the Society of Chemical Industry.

At the close of his address Mr. Levinstein submitted an experiment illustrative of the latest achievement of chemical technology, viz., an entirely new process for the production of artificial indigo. He said that twenty-two years had passed since the scientific world was surprised by the startling discovery that chemists had at last found the secret of producing alizarine, and before many years had passed away the artificial alizarine had entirely replaced the natural product. Twelve years later another greater achievement was announced, viz., the artificial production of indigo, and thus human hands were able to produce in practically unlimited quantities two of the most important dye materials, which had hitherto been solely accessible to mankind through the chemistry of nature. Fortunately, however, for a portion of our colonial trade, the processes for the production of artificial indigo were all so complicated and costly that its introduction into practical use had hitherto been very limited indeed. Quite recently, however, an entirely new method had been discovered, which was at once so simple and easy to execute that he could not help thinking that it might lead to the result so dreaded by our Indian friends who were interested in this product. Considering that Manchester was perhaps the largest consumer of indigo, and that the practical perfection of the process of manufacture of the artificial product would have a marked influence on the export of our colonies, he thought it might be of interest to them to make them acquainted with this latest discovery in the field of chemical technology. Long before the first attempt was successfully made at producing artificial indigo there was known to chemists a compound which was called "Phenylglycocine," a substance which could be easily obtained by the action of aniline on monochloroacetic acid. No technical use, however, had been found for this compound, until at last Professor Houmann, of the Polytechnic School in Zürich, was fortunate enough to discover that this apparently useless substance could easily be converted into indigo by simply heating it with caustic potash or caustic soda, a discovery which was as simple as it was beautiful. Monochloroacetic acid was produced by treating glacial acetic acid with chlorine. The ingredients therefore necessary for this new mode of manufacturing indigo were acetic acid, chlorine, caustic alkali, and aniline, ingredients all readily obtainable in the market. It was also interesting to observe that whilst aniline was first obtained in the year 1826 from indigo, aniline appeared to be destined to become the primary and principal material for obtaining indigo.

DYEING OF LINEN.

FOR 90 PIECES.

1. **Black.**—Enter into a warm bath at 60° C. containing 9½ lb. cutch, 6½ lb. dry logwood extract, 3½ lb. copper sulphate. Work half hour, then enter in a boiling bath of 3½ lb. bichromate of potash for one hour, next dye with 20 lb. logwood and 1½ ozs. soda, sadden with 1 lb. 10 oz. of copperas, wash, soap, then wash and dry.

2. **Aniline Black.**—Work the linen in a bath of 11" Tw. (strength containing 1,000 parts of aniline salts), 600 parts chlorate of potash, 100 parts copper sulphate, for some time at a temperature of 45° C.; age at 60° C. in ageing room, then run through a bath of bichromate of potash, at hand heat; wash in soda, and dry.

3. **Fast Grey.**—The linen is given a light blue bottom with indigo, and is then topped with tannin and iron liquor. For 90 pieces of linen

give a pale blue on the vat, then immerse in a bath of 16 lb. sumac extract at 30° C. for a few hours, then to the same bath add 9½ lb. nitrate of iron. Work to shade, rinse, and soap.

By using benzoazurine 3 G, and fixing with copper sulphate instead of the vat blue, fast greys can also be got.

4. **Dark Blue.**—Give a bottom with the indigo vat, then top with indophenin B.

5. **Drab.**—Very good results can be got with *cachou de Laval*. A method for obtaining a very fast colour is: For 90 pieces of linen, prepare a bath of 2 lb. cutch, 2½ ozs. copper sulphate, and 6 ozs. logwood extract. Use at 40° C. for one hour, then to the same bath add 6 ozs. sulphate of iron, work well, then pass through a fresh bath at 60° C. of 1 lb. bichromate of potash. Or the yarn may be treated at 40° C. with 4½ lb. cutch, 1½ lb. copper sulphate, 3 lb. dry quercitron extract, 3 lb. dry sumac extract, and 1½ lb. logwood extract. After working, add to the same bath 1½ lb. sulphate of iron, and 3 lb. nitrate of iron, then darken by running through a bath of 1½ lb. bichromate of potash at 40° C.

6. **STONE COLOURS.**—These important colours are in shade between grey and drab, with often a weak olive tone. The great variety of these shades may be seen from the following few recipes:—

Pale Stone.—For 90 pieces: Treat in a 30° C. warm bath of 2½ oz. tannin for a few hours; then in the same bath sadden with 5½ lb. acetate iron (iron liquor).

Middle Stone.—For the same quantity of linen: Take 2 lb. cutch, 5 oz. tannin, and 2 oz. quercitron extract; work well, then sadden in a fresh bath with 4½ lb. nitrate of iron.

Dark Stone.—For the same quantity of linen: Take 3 lb. cutch, 8 oz. tannin, and 4 oz. quercitron extract; work well at 40° C., then sadden in the same bath with 6½ lb. nitrate of iron.

Stone with Olive Shade.—For the same quantity of linen: Work in a warm bath at 40° C. of 3½ lb. cutch, 3½ lb. dry quercitron extract, and 4 oz. tannin; afterwards sadden in the same bath with 3 lb. nitrate of iron.

7. **BROWN.** (a) **Dark Brown.**—For 90 pieces: Treat in a bath at 60° C. with 12½ lb. cutch, 14 lb. logwood extract, and 14 lb. copper sulphate, for one hour; then in a fresh bath treat with 2 lb. bichromate of potash; enter again into the first bath, again chrome, rinse twice, and oil.

(b) **Cherry Brown.**—For the same quantity of yarn: Treat in a warm bath at 60° C. of 12½ lb. cutch, 6½ lb. logwood extract, and 3 lb. of copper sulphate; then sadden in a fresh bath of 3 lb. bichromate of potash. Repeat these operations as may be required, soap twice, and oil.

(c) **Olive Brown.**—Work in a bath at 60° C. of 5½ lb. cutch, 14 lb. copper sulphate, and 5½ lb. fustic extract; sadden with 2 lb. bichromate of potash, repeat the operations, rinse, and dry.

(d) **Gold Brown.**—Treat in a bath of 60° C. 3½ lb. fustic extract, 1 lb. cutch, and 1½ lb. copper sulphate; then sadden in a bath of 1½ lb. bichromate of potash. Repeat the operation, rinse, and oil.

(e) **Dark Bronze Brown.**—Work the goods in a bath of 9½ lb. quercitron extract, 9½ lb. cutch, 14 lb. logwood extract, and 3 lb. copper sulphate at 60° C.; then sadden with 3 lb. bichromate of potash; enter again in the first bath, to which 1½ lb. of sulphate of iron has been added; again enter in the chrome bath, repeat twice, rinse, and dry.

8. **OLIVE.** (a) **Dark Olive.**—For 90 pieces: Treat in a warm bath with 1½ lb. cutch, and ½ lb. copper sulphate. In a new bath treat with ½ lb. bichromate of potash, rinse, and enter in a weakly acidulated acetic acid bath of 1½ lb. alum, 18 lb. fast olive; dye to shade, rinse, and oil.

(b) **Yellow Olive.**—For the same quantity of linen: Treat in a bath at 60° C. with 3 lb. fustic extract, 1½ lb. cutch, and 1½ lb. copper sulphate; sadden in the same bath with 1½ lb. sulphate of iron; darken in a fresh bath with 1½ lb. bichromate of potash; repeat the operations, then rinse, and dry.

(c) **Dark Olive.**—Treat in a warm bath of 8 lb. fustic extract, 1 lb. cutch, 1½ lb. logwood extract, and 3 lb. copper sulphate; then sadden in the same bath with 3 lb. sulphate of iron; next darken with 1½ lb. bichromate of potash; repeat the treatments, rinse, and oil.

THE production of colour direct upon the fibre by the use of thioparalouidine and its homologues is the subject of a recent patent taken out by Messrs. Read Holliday and Sons. Thioparalouidine is closely allied to primuline, being prepared from the same materials and by the same process.

THE City and Guilds of London Institute have made some alterations in their examination in bleaching and printing cotton and linen. Hitherto this has been considered one subject, but next year it will be divided into two—Cotton and Linen Bleaching, and Calico and Linen Printing.

Designing.

NEW DESIGNS.

DRESS DIAGONAL.

This design may be considered of universal application; as a shirting, dress fabric, vesting, mantle, waterproof material, skirting, or suitings in woolen, worsted, silk, cotton, and linen, it is equally available. Of course to adapt the pattern to any or all of these materials the requisite calculations for counts, reeds, weft, &c., would have to be made. We give particulars suitable for a fancy shirting and vesting: 64 ends per inch of 24's cotton twist for warp, 2 in a heald, 1 heald per dent, 80 picks per inch of 16's cotton weft; warp all white; weft all dark shades; or weft light shades and warp dark blue and other dark shades. These details are for a shirting.

For a vesting a 48 reed, 4 in a dent of 40's two-fold cotton, dark myrtle for warp, of 96 ends per inch, 2 in a heald, 2 healds per dent, 80 picks per inch, of 40's two-fold polished cotton, in scarlet, white, maize, straw, primrose, and silver grey. The warps may be of these tints, and the weft dark, whichever arrangement may be fancied. A very pleasing, serviceable vesting cloth can be produced on 16 shafts straight over draft, 16 to the round. Spun silk wefts may be used if a more expensive material is required.

COTTON GINGHAM CHECK.

Plain canvas cloth made in 80 reed, 2 in a heald, 1 heald per dent, of 24's cotton twist, 80 picks per inch, 2 in a shed, of 24's cotton. Colours of warp and weft must be bright, clear, and fast, as this is meant for a washing material. Pattern of warp and weft as follows:—4 yellow, 4 black, 20 light strawberry, 4 white, 12 light strawberry, 4 white, 20 light strawberry, 4 black, 4 yellow, 12 mid blue, 4 light pink, 12 mid blue, 4 light pink, 12 mid blue, 4 yellow, 4 black, 20 light strawberry, 4 white, 12 light strawberry, 4 white, 20 light strawberry, 4 black, 4 yellow, 12 mid blue, 4 white, 12 mid blue; total ends in pattern: 224. This will make a very pretty gingham plaid and ought to make up with delicacy and daintiness. If the colours are fast it will wash well, and look fresh after every operation of the laundry. Useful widths are 44 and 49 inches.

FIGURED DRESS AND MANTLE CLOTHS.

Two figures, Nos. 25 and 26, are supplied as illustrations of the art of reducing natural forms to a condition suitable for application to textiles. The plant taken in both cases was the sunflower.

Figure 25 is almost an exact drawing of the plant, the same figure being placed in two positions opposing each other.

In Figure 26 an attempt has been made to conventionalise the same figure to a much greater extent. Looking at the design as given it would be difficult to say on what principle it had been constructed; the square, the drop pattern, the stripe, are all involved, and yet as a matter of fact the pattern has been produced by experimenting with none of these, but with the ogee basis. The treatment naturally suggested by the growth of the sunflower is a "straight up-and-down" effect; thus we have endeavoured to retain the tone of the form of the plant and yet to give the idea of some freedom of treatment.

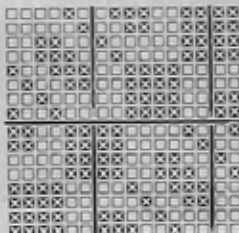
Other methods of treating the same form will undoubtedly present themselves; the two under consideration have simply been selected as types of the two systems of treatment, viz., the



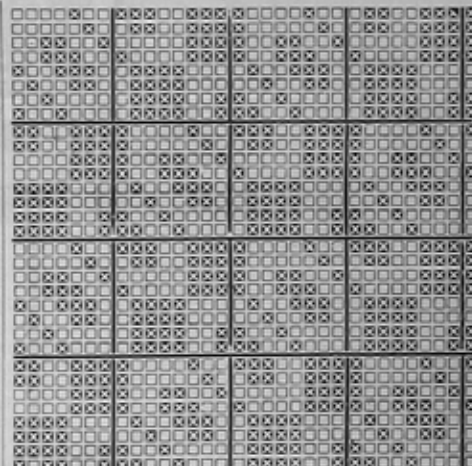
FIGURE 25.



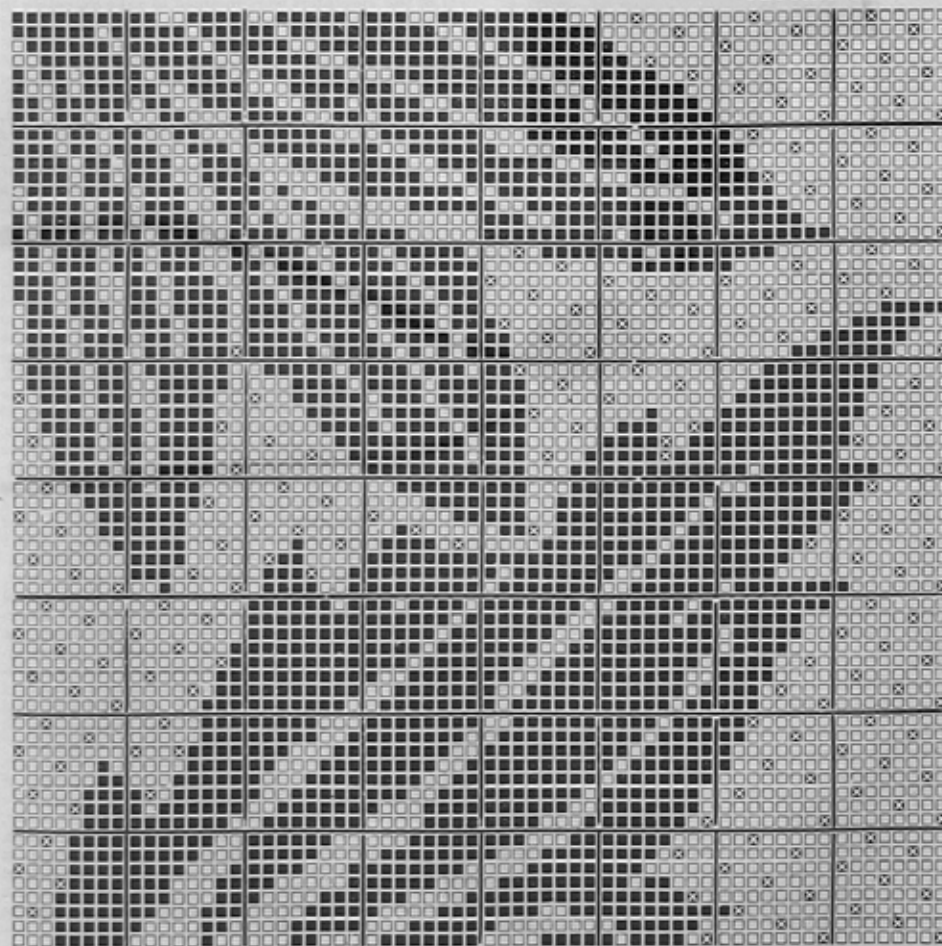
FIGURE 26.



DRESS DIAGONAL
PEGGING PLAN.



DRESS DIAGONAL.



DESIGN 83.—1st. Cut a card 8-end Sateen for ground. 2nd. Cut all but solid black marks.

natural, and the conventional. The natural system seems to be in favour at the present time, there being a growing tendency to copy and adapt from nature more precisely than has been the case for generations. Figure 25 is a type of figure utilised in many ways other than here specified. For example a very good effect will be obtained by using a bold scroll figure developed in neutral shades for the ground portions of the design, and then placing the two figures here given much farther apart and developing them in more pronounced colours and more lustrous materials.

Design 183 indicates the principle of developing Figure 25 either as a mantle cloth or figured silk. As a mantle cloth the following sett will be found suitable:—

Warp.
2/80's dark worsted,
18's reed 6's.

Weft.
1 pick 40's worsted for the ground,
1 " 80's n.ohair for the figure.
100 ground picks per inch.

The ground weave is sateen throughout; thus the figure will shew up very clearly upon it.

If the pattern be required for a figured silk, one weft, say dark green, should form the leaves and stem and also form the weft for the sateen ground, while only one extra weft will be required for the flower. Or again if 1 pick dark green, 1 pick yellow, be introduced, the green may be brought up to form the leaves and the yellow the flower every other pick, while both assist in binding the warp for the sateen ground.