thoroughly throughout the fabric, but if the piece of wool be lifted out and allowed to drain, nearly all the liquor will drain away and leave the wool nearly if not quite white, shewing that the dye-stuff in the form in which it is sold has no affinity for the wool fibre. If now a few drops of sulphuric acid be added to the dye liquor the wool will become dyed. The sulphuric acid liberates the free sulpho acid of the dye-stuff, and this is now in a form to combine with the wool fibre, which it does. This is the fundamental principle underlying the acid method for dyeing wool with the acid group of colouring matters.

The practical application of the principle laid down above is a matter of simplicity compared with other methods of dyeing. The composition of the bath is given above; it is best to enter the wool at from 150° to 160°F., and then to slowly raise the temperature to the boil. This method of proceeding gives time for the free colour acid to be liberated from the dye-stuff on the one hand, and for its combination with the wool fibre on the other. In dyeing pale tints with acid dye-stuffs it is a good plan not to add the acid until after the goods have been entered into the bath and worked for a short time to enable them to become impregnated with the dye liquor; the acid may then be added, and the dyeing may be finished as usual. By this plan of working more even dyeings can be obtained than by simply entering the goods direct into an acidified dye liquor.

Any kind of acid may be employed, but generally sulphuric acid is used, partly because it is cheap and partly because it is the strongest acid known.

(To be continued.)

NICKEL AS A MORDANT IN DYEING.

Nickel is now only rarely applied as a mordant in dyeing, partly on account of want of information as to the effects which may be produced by its aid, and partly on account of its expense. This latter feature may be overcome as new sources of nickel are opened, so that it is quite likely that some day this metal will take its place beside chrome, iron, and alumina, as a regular dyers' chemical. It may be useful to give the results of using nickel as a mordant in dyeing and calico-printing with the most common of the mordant-dyeing dye-stuffs. With alizarine it gives a reddish violet lake, yielding the best results when fixed on the fibre by means of oil in the usual way; it is dyed, and then steamed and soaped. The red so obtained is fiery, and rather more blue than the corresponding alumina red. The use of lime salts is not advantageous. Alizarine orange gives brownish or orange-red shades, which are not so fast as those with alizarine. Alizarine blue gives excellent results with nickel; the blues are very pure and beautiful. The nickel is fixed on by means of oil, and the dyeing is done by entering into a cold bath, working for 15 minutes, then slowly raising to the boil and working for an hour longer; the shade then is a bluish-green, but on soaping it turns to a pure blue. The shades are very fast. Cœruleine is dyed with nickel mordants in the same way as alizarine blue, and it gives yellower shades of green than can be obtained with alumina and iron. With nickel, gallocyanine gives blue-violets, which are very fine. Galleine also gives very fast blue-violets. Persian berries give yellows resembling those obtained with chrome, but if anything rather faster. The red-woods can be applied with the aid of nickel, but the results are not very satisfactory. A brown can be dyed with nickel, by first fixing it with caustic soda and then treating with bleaching powder—the same process as is used for dyeing manganese brown. Nickel can be used in calico-printing; the best form is the acetonitrate, which may be obtained by precipitating a mixture of lead acetate and lead nitrate with nickel sulphate, and using the clear solution after the lead sulphate has settled out. The best proportions to use are equal molecules of alizarine and nickel oxide. It is best to print on oiled cloths. The goods are printed, steamed, rinsed, soaped, and finally washed in water. Alizarine gives good results, the whites being left very clear. Alizarine orange gives red-brown to orange, the whites not being affected. Alizarine blue gives bright shades not unlike those obtained with methylene blue, but much faster. Cœruleine gives a yellow green; gallocyanine blue-violets; and galleine blue-violet shades, fast to soap, but not to chlorine. Galloflavine does not give good results. Persian berries give a good yellow. Cutch gives a good brown.

NOTES ON RECENT PATENTS IN DYEING.

The Farbenfabriken of Elberfeld have lately taken out several patents relating to the preparation of colouring matters. One of these is for the manufacture of mordant-dyeing dye-stuffs from alizarine cyanine G, by the action of fuming sulphuric acid in the cold. Some oxidising action is set up and a new dye-stuff is formed, which dyes alumina-mordanted wool pure blues of a more greenish tone than the dye-stuff from which it was originally obtained; and with chromium mordants greenish blue shades of blue are obtained, which like all alizarine colours are fast to light, etc. Besides alizarine cyanine G, other dye-stuffs of a similar character may be treated in the same way, and give new colouring matters analogous to the one just noticed.

Another patent is for a method of preparing indigo carmine artificially. The patentees start from phenyl-glycocoll, which has already been used for the same purpose by other chemists; but whereas so far only indigo itself has been obtained, the present patentees prepare indigo carmine. They have found that when this phenyl-glycocoll is acted on by ordinary sulphuric acid no effect is produced, but that if fuming sulphuric acid be used, then the phenyl-glycocoll undergoes both sulphonation and oxidation, the result being that indigo carmine is formed. The operation is carried out by treating one part of phenyl-glycocoll with 20 parts of fuming sulphuric acid containing 80% of anhydride, when a yellow solution is obtained. This is now mixed with ordinary sulphuric acid of about 66° Be. strength, when a blue solution is obtained, from which the indigo carmine may be precipitated out by adding salt. The dye-stuff so obtained dyes wool or silk in the same way as the natural product, but gives rather brighter shades. It is doubtful whether this artificial product will come into the market, as at present it costs more to make than the natural product. Cost is the ruling spirit in most commercial transactions, and influences the use of a good many products in such arts as those of textile colouring.

Dr. Charles Dreyfus, of the Clayton Aniline Co., has taken out a patent for the production of lake pigments from aniline dye-stuffs. Some time ago Müller Jacobs patented a process for preparing lake pigments by the aid of rosin, which he first converted into a soap, and then used this for preparing the lake from the dye-stuff. Dr. Dreyfus's process is an extension of this. He prepares a rosin soap in the usual way, and then precipitates this with sulphate of zinc, whereby he obtains a precipitate of zinc rosinate, which will now combine with a dye-stuff to form a lake pigment. He finds that only the so-called basic aniline colours are available for this purpose, but out of these he can prepare a wide range of pigments. Instead of sulphate of zinc he can use the chlorides of calcium or magnesium, but he finds that these salts do not completely precipitate the rosin soap—a fact which, he says, is now for the first time recorded; and certainly we have not seen it stated before. On adding a solution of these chlorides to a solution of rosin soap, part of the latter is precipitated, but the precipitation is completed on adding a solution of the colouring matter that it is desired to make into a lake pigment. These lake pigments are soluble in a large number of volatile solvents, like carbon bisulphide, benzol, solvent naphtha, etc., and can be used for colouring varnishes, making printing ink, etc.

Acid violets have hitherto been prepared by first making the violet, and then sulphonating by means of sulphuric acid. A German firm of colour makers have patented a process whereby these acid violets can be made directly by a synthetical method, and by a modification of the process acid blues and acid greens can be obtained. The patent specification is full of technical language only comprehensible by a chemist versed in the mysteries of the nomenclature of organic compounds. Some of the colouring matters described have been placed on the market, and are very good products.

Waste Soap Liquors are the subject matter of a patent taken out by Messrs. Kimmins and Craig. These are produced in the process of scouring wool. The method commonly adopted for dealing with them is simply to collect them in large tanks and treat them with sulphuric acid, which decomposes them, causing the fat they contain to rise to the top. This is then collected and pressed in a hot press, and the grease so obtained is sold for a variety of purposes. The patentees point out that there are two defects in this method, both of which arise from the use of sulphuric acid: First, at the temperature which is used there is some risk of the grease being discoloured, owing to charring; and, secondly, the acid also acts on the metal work of the press, causing its corrosion and reducing its working life. The patentees' process aims at reducing these defects. They treat the waste liquors with a mixture of calcium chloride, lime, and bleaching powder, whereby they obtain a greasy mass, consisting chiefly of a lime soap, but containing also some free fat. This greasy mass is treated with sulphuric acid, which separates out the fatty matter, which is then pressed as usual. The patentees say that one object of their invention is to do away with sulphuric acid for reasons stated above, and yet they add it as a final step in their process. The bleaching powder will act as a bleaching agent to the fat, and thus a better-looking product will result; otherwise there does not seem to be much improvement in this over the ordinary process, but in all cases of this sort it is very difficult to give an *ex cathedra* opinion.

Designing.

NEW DESIGNS.

WEAVE TWILLS.

A favourite method of producing figured grounds for waistcoatings or dress fabrics in which an extra weft figure or spot is to be developed, is shewn in *Designs* 8 and 9. *Design* 8 is composed entirely of the two-and-two-twill, the figure produced being the combination of an upright and ordinary twill, the following particulars for production being suitable:—

Warp.

All 2/40's fancy mixture; 9's reed 4's.

Weft.

36 sk. fancy mixture woollen; 36 picks per inch.

An effective modification of this design will be to change the twill in one direction into a three and one weft face effect, when the following sett should be adopted:—

Warp.

All 2/40's black worsted; 12's reed 4's.

Weft.

All 25's black mohair; 48 picks per inch.

Of course the above effect may be woven for a piece-dye. The above setts are for dress fabrics. For heavier cloths suitable for waistcoatings or mantlings the following are useful particulars:—

Warp.

All 2/36's dark blue; 14's reed 4's.

Weft.

All 18's dark brown mixture; 56 picks per inch

The construction of *Design* 9 is based upon the fact that the eight-end sateen coincides with ordinary twills, and therefore may be combined in a perfect manner with them. A finer sett is required than in the foregoing, say 2/36's worsted, with about 64 threads per inch. Many other effects on a similar principle will no doubt be suggested.

COTTON DRESS GOODS DESIGNS.

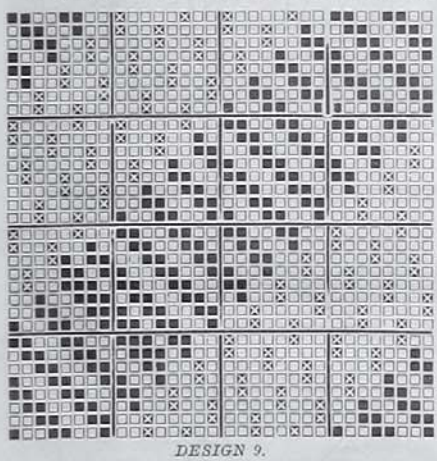
When the period for mourning garments expires, there will be an impetus in the home trade for coloured fancies in every possible textile material. As we at one time prognosticated through these columns that Scotch clan tartans would be revived, which really took place shortly after we had given patterns for same, so again we are called upon to a forecast in the same direction. These tartans seem to command attention at all times and seasons. Perhaps one main feature in connection with their popularity is the consummate colour arrangements of the crossings, independent of the weave, and now that we have so many bright brilliant dyes for enhancing the ornamentation of all tissues, no wonder or surprise need be felt at Scotch plaids, clan tartans, and their modifications in stripes, taking a leading position.

In the spring, cotton canvas in light neutral shades, as well as same in decided dark colours, will be in use for daily wear as serviceable costumes, while white and printed muslins will compose toilets for more dressy occasions. Zephyrs and other fancy cotton gingham cloths will be used for plain morning gowns.

Design A now given is somewhat of a novelty so far as weave, combination effects, and all-over diagonal in cotton dress goods are concerned. It may be found useful in a variety of fabrics; in fact it is so constructed that any counts or material in shirtings, vestings, or coatings can be utilised by this weave. It is on 13 shafts, straight-over draft, with 52 of a round. This necessitates a dobby, and as any class of fabric, heavy, medium, or light, may be produced from it, particulars can scarcely be given without going through the different qualities; but we may just point out that for dress goods 20's cotton warp, 64 ends per inch, 16's weft, 64 picks, will form a guide. It may be woven in solid colours, or piece-dyed. Contrasts may be made to create capital effects, the warp grounds being all very dark or extremely light tints. Uhlan blue is a favourite shade. Weft grey or cream, warp grasshopper green, with faint pink weft; warp Dahlia-red, weft grey; heliotrope or brown warp, with orange weft; billiard green warp with the brightest blue weft obtainable,—these will give some idea how beautiful and effectual contrasts may be formed.

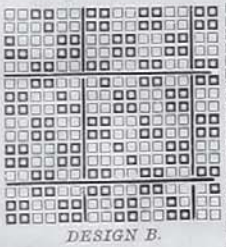
Design B is for cotton suitings, which will be in vogue for the various out-door pastimes. This is a fabric that must be made from the best of materials and without stint; a very simple weave, on 16 shafts, 16 to the round, straight-over draft, 18's cotton warp or 36/2 fold, 80 ends per inch or say 20 dents per inch, four in a dent, and 60 picks per inch of 12's cop weft: the least twists per inch possible. This will give a good cloth. For a heavier fabric shewing up the patterns more boldly, 20/2 fold for warp, and 8's weft, 72 ends per inch, 18 dents, four in a dent, 56 picks per inch, good finish. Both sides of this cloth should be examined before deciding upon the class of finish requisite.

Design C is merely a variation on 8 shafts, straight-over draft, 8 to the round, same particulars as *B*. We have given this arrangement for limited weaving machinery, where perhaps 16 shafts would be unattainable. The product will be found equally valuable as a cloth, and as there seems some desire for a special back to these goods for the purpose of acting as a substitute for linings and a rough carded surface, we will endeavour in our next issue to furnish weaves for this purpose.

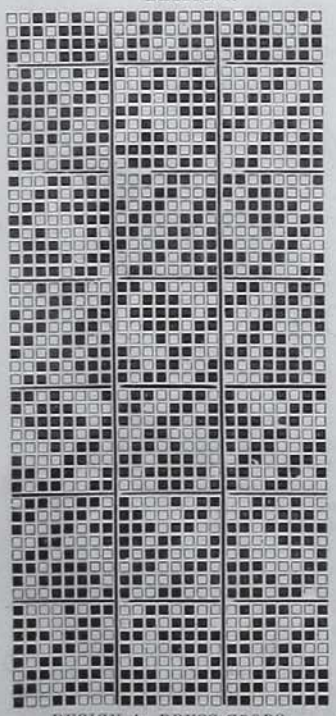


DESIGN 9.

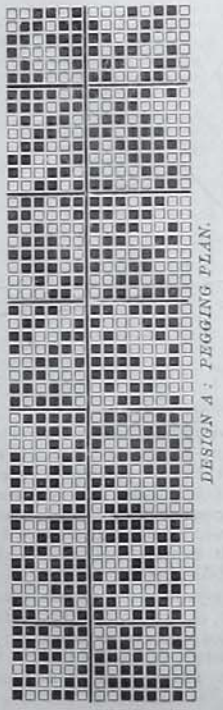
DESIGN C.



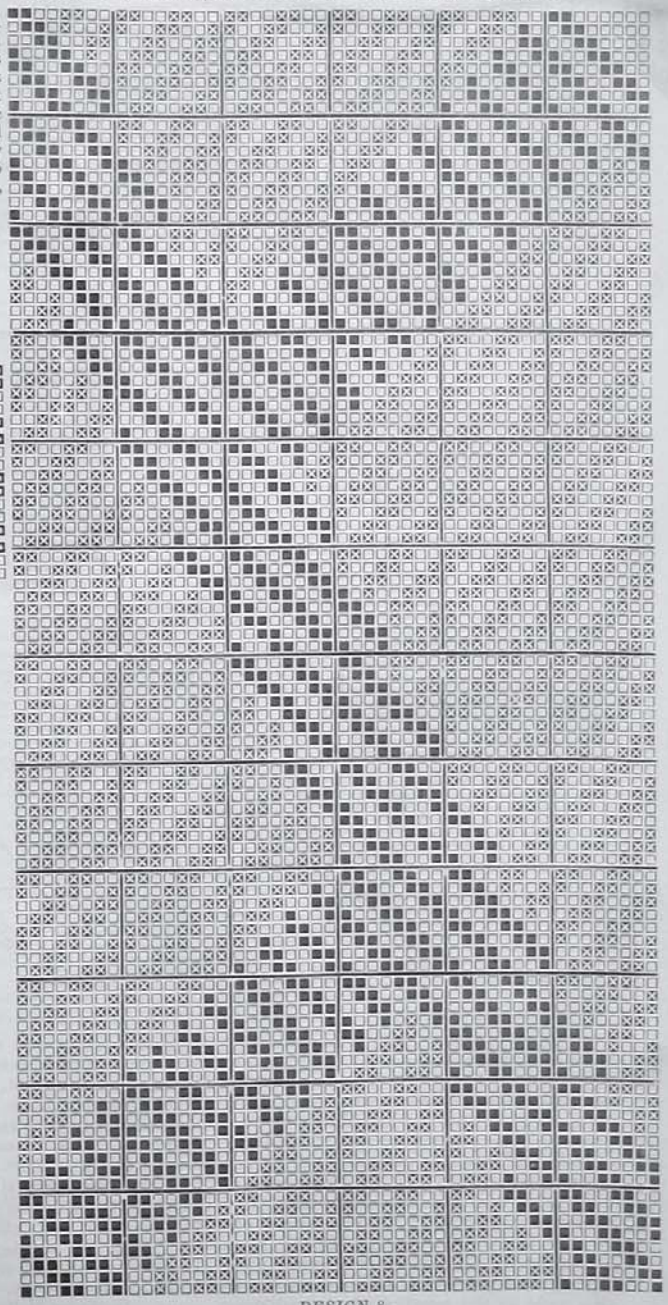
DESIGN B.



DESIGN A: DRESS GOODS.



DESIGN A: PEGGING PLAN.



DESIGN 8.