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SPINNING, DYEING AND FINISHING

TEXTILE FABRICS

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EFFECTS OF COLORS IN TEXTILE DESIGNS.

THE popular acceptance of figured textile goods so largely depends on the tastefulness of designs brought out that too much attention cannot be paid to the positive character and relations of colors under which these are rendered effective, or "taking" with the public, whose instinctive perception of what is beautiful, as well as novel, must at all times be relied on. Even in the retail trade a knowledge of the effect of modifications of color produced by the blending of one with another, by juxtaposition or other arrangement, as well as of relative proportions, with the result brought about by an article of dress of one color or group of colors being worn with another of different hue, is calculated to be essential service. The effects of colors on each other, as regards the general appearance of patterned fabrics, are reducible to known laws, acquaintance with which leads to correct judgement. For want of reference to the principles of color, nothing is more common in the textile trade than for dealers and purchasers to confound hues, as orange for orange-yellow, yellow for greenish-yellow, and blue for violet-blue.

Two leading classifications exist, one in the results of the juxtaposition of colored bodies belonging to the same group in tones, scales and hues; the other in the assortment of colors of different groups with reference to their effects on each other. The modifications which colors undergo from mixing or being placed in the vicinity of each other, according to their classes, have of late been formulated by French experts with great precision and completeness. In all designs the complex association of colors must be taken into account. Thus the primary mixed colors are orange-red, in which red predominates; orange-yellow, in which yellow predominates; lilac-red, in which red predominates; lilac-blue, in which blue predominates; greenish-yellow, in which yellow predominates; greenish-blue, in which blue predominates. The binary mixed colors are orange (yellow and red) with sub-divisions of deep orange; medium orange and light orange (nankin); lilac (red and blue) of which colors having any one common element in their composition tend to lose it by juxtaposition, and so become more unlike each other. Thus orange and green having yellow in common, the orange appears redder and the green bluer; orange and violet having red in common, the orange appears yellower, and the violet is tinged with green; green and indigo having blue in common, the green is yellower and the indigo bluer; green and violet having blue in common, the green is yellower and the violet bluer.

The sub-divisions are violet evegue (deep lilac), medium lilac, light lilac, green (yellow and blue), of which the sub-divisions are deep green (grass), medium green (Scheele's), light green (water). The tertiary mixed colors are garnet (brown, green and red), of which the sub-divisions are puce (flea color), or deep garnet, medium garnet, light garnet or tobacco; bronze (brown, blue and yellow), of which there are brown, olive and resede; brown, (orange, red and blue), producing brown (solitaire), biatre, wood, and hazelnut (stone drab); black (red, yellow, blue), sub-divided into black, black-black, blue-black, dead-black and light black. Complementary colors heighten one another, producing an agreeable, harmonious effect, as orange and blue, violet and greenish-yellow, if arranged with proper regard to proportion; indeed due proportion of space occupied and relative position is the secret of the attractiveness of many patterns. In the modifications brought about by associated colors the complementaries assert themselves. Thus in the associated colors, orange and green, the complementary color of orange being blue, and of green, red, the tints produced by contrast are in the one case reddish-orange, and in the other bluish-green; with orange and indigo associated, the complementary of orange being blue and of indigo orange-yellow, the orange changes in the contrast to yellow and the indigo to blue; associating green and indigo, the complementary of green being red, and of indigo orange-yellow, the green changes to orange yellow, and the indigo to blue; if green be associated with violet, by the influence of their respective complementary colors, red and and yellow-green changes to yellow, and the violet to green; red and blue being associated, the complementary of red being green, and of blue, orange, the red changes to orange, and the blue to green. Colored textile surfaces reflect all descriptions of colored rays, but the rays which determine the hues are reflected more numerously and more intensely. Green-black, whilst absorbing light, presents numerous interstics of other colors. White surfaces reflect light whilst decomposing it, and complementary colors not unfrequently produce white light, thus softening the hues, besides otherwise modifying the effect. In mixed colors used by dyers and printers the primary colors will neutralize each other when there is an excessive proportion of any one. This is the case with crimson, red and greenish-yellow, which give results far duller than crimson-red with the slightest admixture of color, the latter imparting a coppery tinge. Scarlet-red and greenish-blue give a mixture without color and purity relatively to crimson-red and violet-blue. Pure red and blue give a mixture not so dull, because the color contains no yellow. Orange and blue-violet make a very dull mixture; orange-red and violet are more lively. The combination in textile designs of two tones of the same color are seldom successful, for the lighter loses in hue, and if the deep tone acquires it, it is seldom admired.

The effect of compound colors and of simple colors on each other offers a wide field to the designer for modification, and which has largely been taken advantage of for this season in the production of novel hues for dress goods. The modification of color, instead of being less are the greater, the greater the difference between two contiguous colors. Orange beside scarlet-red, pure red and crimson-red acquires a yellow tint, and the red a purple tint; violet appears livelier when placed beside red, and the red yellower. The modifications of contiguous colors are much more marked when the complementary color is added to them. The mere effect of a succession of colors, owing to the law of simultaneous contrast, will itself exert an appreciable influence on the appearance of patterns. A blue stripe, for instance, placed beside an orange stripe will first appear green and then incline to violet, and the orange which appears at first yellowish, will incline to red. There are some stuffs which appear to be of two tones of the same scale of color, and sometimes also of two tones of two contiguous scales, although the weft and warp of these fabrics are of the same tone and the same color. The cause of this appearance is very simple and arrises from the fact that the parallel threads forming the designs are in a different direction to those of the ground, the former reflecting colored and white light in a different proportion to the latter; this, too, varying with the position of the spectator. To show the effect of position, it may be mentioned that the spiral thread of a piece of silk or wool, held perpendicularly to the eye, appears in the part opposite to the light of a much more decided color than on the rest of the surface. A regular gradation of tone in colors is not infrequently very pleasing in a pattern; so also a clearly defined repetition of colors, not only owing to distinctness, but the attractiveness which attaches to geometrical succession, whether in linear arrangement or occupying in a pattern the same relative position to each other throughout the piece, as in a flowered design containing separate groups, separate, but artistically allied. The contrast of colors which are not analguous tends to enhance them. Colors which produce an agreeable contrast are red, yellow, and blue; the sub-divisions of red being deep-red, cherry-red, and rose-pink; of yellow, bouton d' or immortelle and straw; of blue blue de France, (gros blue, medium blue), ultramarine and celestial blue. The method of bringing out a color by contrast is to use either light tones, complementary, or more or less opposed in broken tones, more or less gray, and of tints complementary to each other; or in employing a broken tone, of a tint complementary to a more or less pure contiguous color. To put a dark color near a different or lighter color is to heighten the tone of the first and to lower that of the second, independently of the modification resulting from the mixture of the complementaries. An important consequence of this principle is that the first effect may neutralize the second or even oppose it. For example, a light blue placed beside yellow and blue are so dissimilar, that their contrast is always sufficiently great for their juxtaposition to be favorable; but by placing a color in juxtaposition with one which is not its complementary, the former is improved whilst the latter may be injured. Thus a blue, which may be improved by a yellow, may lose some of its beauty by being placed beside a violet, by becoming greenish, whilst the orange it adds to the violet improves the latter. Two non-complementary colors, as violet and blue, may injure one another, as in the case of violet and blue when the first greens the second, and the violet assumes a faded appearance. Next, as to contrasts, indigo blue, applied to silk in which brown figures, gives to the brown a violet tinge, and to light hues a greenish tinge. An orange compound upon silk or wool will yield light tones tinged violet-red. Whenever contiguous tints in a pattern are to be mutually strengthened without going out of their respective scales, it is of advantage that the ground should be of a complementary color.

INDUSTRY.

THE way to wealth is as plain as as the way to market. It depends chiefly on two words, industry and frugality; that is, waste neither time nor money, but make the best use of both. Without industry and frugality, nothing will do, and with them, everything. Sloth makes all things difficult, but industry all easy; and he that riseth late must trot all day, and shall scarce overtake his business at night, while laziness travels so slowly that poverty soon overtakes him. Industry need not wish, and he that lives upon hopes will die fasting. There are no gains without pains; then help, hands, for I have no lands; or if I have, they are smartly taxed. He that hath a trade hath an estate and he that hath a calling hath an office of profit and honor; but then the trade must be worked at, and the calling followed, or neither the estate nor the office will enable us to pay our taxes. If we are industrious, we shall never starve; for, at the workingman's house hunger looks in but dares not enter. Nor will the bailiff or the constable enter, for industry pays debts, while despair increaseth them. Employ thy time well, if thou meanest to gain leasure; and since thou art not sure of a minute, throw not away an hour. Leisure is time for doing something useful; this leisure the dilligent man will obtain, but the lazy man never; for a life of leisure and a life of laziness are two things.

BENJAMIN FRANKLIN.

THE FINISHING ROOM—PROCESS OF OPERATIONS.

No. 15.

[Written for BALDWIN'S TEXTILE DESIGNER.]

IN order to illustrate the fixing to be done on a shear, it is best to follow through the several stages from the time the shear has just been ground until it needs grinding again. After a shear has been ground and started up, it should, if done properly, run easy and without any noise, and it is apparent that this should be so, because the blades being sharp do not have to be pressed together as tight as they will have to be later on when they become duller. Not being pressed together so hard there is less friction, and it follows, less noise and less need of oil. As we go on with the work and keep drawing the blades together as they get duller more oil is required and more noise will be heard. then it is well enough to give the oil; but in the first two or three weeks after grinding about half the oil is required to what it needed the last week or just before grinding. On an average a pint of neats-foot oil (double refined) is enough for one shear for a week, and I hardly ever use more. The question of oil to be used on a swab has been vented by several writers but none have so far given any information which would be of any use to a beginner. The oil needed on a swab should be of good body and pure, free from all ingredients that will tend to gum. Any one giving this matter attention will find that only two kinds of oil can be used with any kind of satisfactory results under any and all circumstances, and these two are double refined winter sperm, or double refined neats-foot. Castor oil is used by some but this is rather of too heavy a body to be or much benefit to the shear and also has a tendency to gum. The first difficulty which is likely to present itself is skipping, and this generally shows itself on the second piece that is sheared after grinding, and is attributable to no other cause than that the blades have not settled in their proper place. The remedy which would naturally suggest itself to many would be to draw up on the screw nearest the point where the skipping manifests itself; but by so doing we will find ourselves in the same difficulty again in a short while only at another point and before we get through we will find that we will have to draw up on all the screws before the skipping will stop. To avoid this I have found it a good plan to draw up the revolver instead by ¼ turn, away from the heel of the blade, and the skipping will cease at once, and will not manifest itself again for a week or two, that is if the shear is used decent. By doing this we avoid tightening the blades, which should be delayed as long as possible. I hardly ever have to lay a hand to a shear after doing this for two and sometimes three weeks after grinding. After running awhile the shear will certainly become dull, and it becomes necessary to draw up a little on the screws, the lower row of course, and when this has to be done it should be done evenly all the way across and not only on the particular screw nearest the place where the dullness shows itself. One-half of the unevenness found in blades is due to the practice of drawing on one screw only. I have adopted the following practice, and find it works well: After drawing up the revolver ¼ turn and running until the next time the shear needs drawing up, I draw

up the revolver again and alternate in this manner until grinding becomes necessary again. I am guided by the number of turns. I drop the revolver when grinding and draw it up again as many turns as I dropped it, ¼ turn at a time and when all is drawn up that has been dropped and the shear refuses to cut properly again, I find it is time to grind. In this manner I keep the blades running easy all the time, and there is consequently less chance for heating, less oil required, which in turn will reduce the chances for oil streaks; and above all, there is less noise.

REAUMUR.

THE HISTORY OF WEAVING.

HOW, when or where the art of weaving originated we shall probably never know. The presumption is that it was discovered at various periods and by different people. The earliest notices of it in ancient literature do not refer to it as a new invention, but as a common and familiar process. The fine linen of the Egyptians is spoken of in the book of Genesis, and their mummy cloths, manufactured of the same material, are to be seen in our museums. Still older specimens of linen fabrics have been recovered within the last twenty-five years, from the remains of the Swiss lake village of the Stone Age, and a few particulars respecting them may be interesting to our readers. Mr. Barlow does, indeed, refer to these discoveries in two short and obscurely worded paraghraphs; but we think they ought not to be dismissed in so summary a manner. About a quarter of a century ago the remains of pile dwellings were discovered in the course of excavations carried on in land gained from the lake of Zurich. Attention having been called to the subject, it was soon found (1) that similar settlements had existed in connection with all the Swiss lakes; (2) that these settlements were of great antiquity, and that some of them dated back to very remote periods. These pile dwellings were wooden huts built over the water upon platforms supported on piles driven into the bed of the lake, probably as a security against attack from wild beasts and neighboring tribes. That this habit of building over the water continued for many centuries there can be no doubt, and that the earlier inhabitants of the country who adopted the practice were unacquainted with iron and bronze is also evident. Amongst these earlier settlements, that of Robenhusen, (Zurich) is one of the most interesting, from the circumstances that the site of the settlement is now a peat moor, and that carefully conducted explorations have shown that it was twice totally destroyed by fire. To this latter circumstance we owe the preservation of a large quantity of relics which throw a flood of light upon the habits of the lake dwellers, and amongst them are many specimens of their spinning and weaving. Some of these are before us as we write; they have been carbonized by the fire, and thus, instead of rotting away, have been preserved. No hemp has hitherto been discovered either at Robenhausen or elsewhere, but flax must have been cultivated freely. It has been found as seed, and in various stages of preparation, and the fabrics into which it was worked are figured in Dr. Keller's book. Some of them are simply plaited work, the strands of which are formed not of cord, but by bundles of untwisted fibre. Others, however, are distinctly woven, as, for instance, a coarse cloth showing an average of between 25 and 34 threads to the inch in both warp and weft. No very closely woven cloth has yet been found, nor has anything come to light, "which in uniformity and regularity of work can even in remote degree be compared with the products of the present day." Still the Robenhausen weavers were not without some notions of variety, as one specimen found differs from that last described, in "having every alternate three threads apparently thicker than the other intermediate three, by which the cloth becomes ribbed." Another specimen is a piece of fringe, which may have been used for trimming garments, and another is a kind of ribbon. At Irgenhausen the cloth mentioned above was found with embroidery worked upon it, and also a manufacture which Dr. Keller describes as a kind of cloth which is "almost a coarse pattern of what drapers call check muslin." "It has," he says "been made simply by an alteration in both directions of rows of five or six fine threads with rows of probably the same number of smaller ones almost amounting to small string."

A loom of very simple construction would be sufficient for the manufacture of all the fabrics hitherto discovered in the lake dwellings; but that looms were used is evident, both from the nature of the fabrics themselves and the frequent discovery of weights which could hardly have been employed for any other purpose than to keep the threads of the warp streched. At Moringen (a settlement of the Bronze Age) a bone shuttle was found. Dr. Keller figures a loom of very rough construction made by Mr. Pauer, a ribbon manufacturer of Zurich, for the purpose of showing that a very simple contrivance is sufficient for the production of fabrics similar to those of the Stone Age. The main feature of this loom, are two uprights, made of slender forked tree stems, and a cross-bar resting on them. The looms of the Egyptians were also very simple affairs, judging from the representations that have been preserved; but they certainly did much finer work than the lake dwellers of Switzerland. Linen mummy-cloth has been found, "woven with threads of about 100 hanks to the pound, with 140 threads to the inch," and it may be remarked in passing, that the well-known French cambric is a survival of the Egyptian art, tracable backwards from Cambray in France to Zavia, in Spain, where it was introduced by the Moors. Elaborate and complicated machinery is certainly not essential to the production of fine work. The looms of India, which are more interesting, as they have most probably supplied the pattern upon which our own hand looms are made, are more remarkable for simplicity and apparent rudeness of construction than for anything else; and yet the work done by the Indian weaver is all but inimitable. We do not know how long the Indian museum at South Kensington will remain inact, as the Government has, we grieve to say, determined upon breaking up the collection; but there is at present a very beautiful and costly show of Indian fabrics there, and on the walls a display of drawings showing the native weaver at his work. The whole series is well deserving a careful study, especially as bringing out some important points of contrast between ancient processes as represented by Oriental and modern manufacture. Mr. Barlow, for instance, quotes some particulars relative to Cashmere shawls, showing that a first-rate woven shawl, weighing seven pounds, will fetch in Cashmere £300, this price being made up as under:—

Cost of material	£ 30.
Wages and labor	150.
Misscellaneous expenses	50.
	230.
Duty	70.
	£300

A glance at these figures is sufficient to make one feel the old-world character of the manufacture which a Cashmere shawl represents, and how incompatible with our nineteenth century work it is and must remain. It is almost impossible to imagine skilled English workmen spending years of toil over a single article of dress, and if they did, their productions would be too costly to find buyers. The machinery of our manufacturing districts is essentially labor-saving, the main object being to produce the largest amount of work with the least possible expenditure of skilled workmanship. The Oriental workman, on the other hand, is content to labor for a bare subsistence at occupations in which manipulative skill is almost everything.

That this latter condition of things is quite compatible with civilization of a certain grade is manifest from the example of ancient and modern times, but it is equally obvious that it is not in harmony with the Benthamite maxim of "the greatest good for the greatest number," since it is a condition in which the welfare of the masses is sacrificed for the aggrandisment of the few.

YEA, VERILY.

WHAT doth it profit a man?

In the morning he ariseth and putteth on his new spring overcoat and goeth fourth humming a jocund lay.

And when noon is come, lo! the wind riseth and prevaileth over all that region round about.

And the prevalency with which it prevaileth is more prevalent than any other prevalency that hath prevailed in all time.

And the wind beateth upon that man, yea, it smiteth him sore.

Also doth it rain, and when even is come, lo! the coat is spoiled!

And the man taketh unto himself a cold, and wist not what he is going to do about it.

Now, on the morrow, he putteth on the winter overcoat, lest, peradventure, it be cold even yet again, and snoweth.

And, even as on the preceding day, the weather shifted itself about and waxeth very hot.

And the man doeth likewise, even as the weather waxeth he hot.

And many days and many nights doth this thing continue, and no man knoweth the day nor the hour when the weather changeth.

Verily, verily, what doth it profit a man?

MAN AND MACHINERY—WHAT HAS THE FUTURE IN STORE?

THE most obvious characteristic of the present century is the enormous growth of machinery. The new application of steam have wrought a revolution in the industrial world. Machinery has cheapened production to a degree which 100 years ago would have been thought quite incredible. Men live better now than formerly; the mechanic enjoys comforts which a few centuries since were inaccessible to the noble man. We have paid the price for this advance. "The grace of a day that is dead" perished along with its discomforts. The simple artisan, the skilled and thriving mechanic of other times is gone or going. Aggregated capital provides great "plants," where production is estimated in millions, and where thousands of "operatives" discharge functions as mechanical as those of the great machines they serve. The machine is the principal, the human worker only the incident. Provided the plant is of the latest and best pattern, it is a secondary matter who the operatives are. Flesh and blood are daily sacrificed to the Moloch of iron and steel. This is an old plant. The triumphant answer is: What would you have? Would you discard the locomotive and go back to the ox-cart? Would you reject the spinning mule, the power-loom, and revert to the hand spinning-wheel and hand-loom of other days? There can be but one reply. The maddest of sentimentalists would not say "yes" to those interrogatories.

There was a time, while machinery was young, when that answer was boldly given. We have outlived all that. Is this, then, the last word in the history of civilization and progress? Is it forever settled that machinery shall rule, and men and women, and even children shall serve? Is the consolidation of capital, the improvement of machinery to go on forever, while individual enterprise, except, possibly, in the case of a few great operators, goes out of existence? Is the sweet home life that still lingers with us to give place, step by step, to the life of the factory village, where teeming thousands inhabit dwellings constructed on one uniform pattern. Is it the lot of humanity that the individual shall perpetually wither that the word may be more and more? It is a familiar observation that history moves in cycles. Perhaps it is more correct to say that it moves in spirals. Every turn of the mammoth screw brings us back to the point of departure, only a little higher. Men are born, grow, die; a new generation succeeds, but with clearer views and loftier aims.

Nations rise, flourish, decay; a sturdier stock comes to take the place of the race outworn. Old fashions recur, but with added graces. Old institutions revive, but with additions and betterments. May it not be that we are destined to go back to the sweet simplicity, the gracious manliness, the personal independence of other days, and take with us all the advantages that mrchinery now gives us?

It has been suggested that the comparatively new moter, electricity, is the agent which will render this possible. It is the Moses destined, possibly, to lead us out of the wilderness of lofty chimneys and whirring spindles and the domination of capital into the Canaan of home life and individual independence. The progress of electrical science is making it possible to reduce the size of the plants by which this agency may be made available. It provides already the means of transmitting power to great distances at comparaitvely insignificant expense.

Every waterfall is a mine of energy, which electricity will transport for us to a point where it may be made useful. It is suggested, with much plausibility, that, as the progress of discovery goes on, much of the work now done in great factories may be done as cheaply by the operative at home. This may be a dream; it is a dream. But all dreams are not false. The dream of one age has, more than once, become the reality of the succeeding. It is to the poet or to the seer that it is given to behold "the vision of the world and all the wonder that will be." The designs which his fairy fancy dimly sketches are worked out by the busy brains and cunning hands of inventors, and wrought into substantial form by the labors of practical men. This proposed reaction against the trust and the factory lord may never succeed, but it is at least interesting to note that the idea has gone abroad.

THE PICKING MOTION.

I and other contributors have written so much about the woolen loom that it seems almost impossible for me to find anything more in connection with it to write about that would be interesting and instructive to the readers; but we have a large field open for discussion, so I will try to select one of the many points that the fixer is called on to display his talent in keeping in perfect operation, viz., the picking motion. It is a well-known fact that nearly all loom fixers have their own peculiar idea of the manner in which this part of the loom should be manipulated to obtain the best results, yet they are all working with the same object in view, and that is to obtain a good, smooth, and steady pick. This accomplished the fixer can then safely say that he is master of his business; but the question is how to obtain this? For me to claim that I could in all cases offer a solution would be to claim more than I could fulfill, as in some cases it would require the personal attention of the writer to make anything like a successful jub of the difficulty that often arises from an imperfect set picking motion, but to the general run of cases we can very often offer suggestions that may solve the difficulty. A great deal of the trouble arising from the picking motion in looms in fair condition is not direct in the motion but something altogether foreign to it; hence, for the interest of those who are laboring under such a difficulty, I will confine this article.

We will first take three or four looms in our section at the end of the shaft. If the shaft be a small one, that is liable to spring, the first thing we will call for is a balance pulley. This is, in my opinion, essential to the running of the loom, but with this we very often find the same difficulty still exists—the loss of power. Very often you will see a loom running with the shuttle going in the box with all the power required; then, in an instant, the loom will stop from the shuttle losing power, causing no little annoyance to both fixer and weaver. I have found that it is possible to overcome this difficulty in a very simple manner. We find on every loom that the picking shaft can be raised or lowered at the discretion of the fixer, and it is in this that the difficulty in most cases can be remedied. Some of the readers may have had some experience on the old Greenhalgh looms. If so they will remember that on the three-fourth looms, they used the Kelley picker shoe. This shoe required considerable skill on the part of the fixer to successfully make it perform its intended work.

As an illustration I know of no picking device that can be selected to give an idea of the relative positions of the shoe and picking rolls in their relation to each other with any more surety than this one, so from this we will lay the foundation to operate upon. Many fixers, ignorant of the principle motion, supposed that the shoe should be set in such a manner as to have the picking rolls meet with considerable resistance in passing by the point of the shoe. This is a wrong impression, as on any picking device the same principle governs in nearly every case, and that is, to have the picking rolls meet with as little resistance at the starting of the rolls on the shoe and again when reaching the point the same should be observed. On the Kelley motion, when the sweep would be shortened to throw in the point of the shoe to the eye, it would appear that the greatest amount of power could be obtained, and such is the case, but the power in such a case would be the same as the looms that I refer to on the ends of the shaft that was springing—a quick, forcible, yet unreliable pick, that would cause

the shuttle to lose power for the most trifling cause. The proper position for this shoe would be as nearly straight as could be allowed, having the rolls striking on the point of the first curve on the shoe and never forward of it, but to the rear end. This will give a good, steady and effective pick to the shuttle that would pick it from the box instead of being shot as from a gun. When the shoe is properly set in its position the shuttle will pick from the box with a smooth, steady motion and retain that velocity to its destination, while an imperfect one will leave the box with greater force yet seem to lose all power of the driving force at a very short distance after leaving the box. In these two motions we have the solution of the picking motion on all broad looms. On the Crompton and Knowles loom we find the same trouble exists in setting the shoe shaft too low, bringing the shoe so far away from the picking rolls that in order to obtain the required sweep the stick must be shortened. This brings the shoe in the same position in its relation to the rolls as on the Kelley, when the point was slanted to meet the rolls, making all the resisting force of the pick centered in the point of the shoe. When the young fixer understands that the shuttle is forced from the box, gradually increasing in velocity as the rolls reach the point of the shoe, he can readily understand that the point is where the greatest resistence is to be if the shoe is not properly set. The shoe when found in such a position, which is very easily noticed by starting the rolls on the shoe and noting the position of the picking shaft, should be perfectly level on the top part; and if any sway should be given let it be from the frame of the loom, allowing what tip may be in the shoe to be with the rolls instead of against them. This can be accomplished in two ways; one is to raise the shoe shaft up and lengthening the sweeps, which I will call the best, or you may set out the extensions. If you do the latter it will require more than the usual amount of judgment to meet the requirements of the case, but both will bring the shoe in the same position, the only difference being that the latter transmits greater power from the rolls to the shoe causing greater resistence in the running of the loom, while by raising the shoe shaft you diminish the resisting force of the pick, and the rolls will pass by the point of the shoe face and smooth, with less stoppage and wear on the shoe and loom in general.—CHAIN.—*Boston Journal of Commerce.*

WORK AND WAGES.

HALF a loaf is better than none, and workmen who will resist a reduction of their wages, made necessary by the condition of the times, would do well to bear this in mind. The uncertain outcome of the tariff controversy and other causes have had a depressing effect upon many lines of business, and prudent manufacturers have felt the necessity of proceeding with caution. Some have shut down altogether, others are running on short time, and still others have reduced the pay of their hands to save themselves from loss. These reductions have been resisted in every case that has come to our knowledge, and in some the work-people have absolutely refused to labor for less than their former pay. The history of strikes during the past few years indicate how coming ones must terminate, and we earnestly advise all our readers who are liable to strikes to be wise in time, and not repeat the folly of those who, after long and bitter resistence, during which their time was wasted and their means exhausted, were obliged to accept the terms offered by their employers. The reason of this was that right and common sense were then, as now, on the employers' side. The condition of trade would not permit them to pay the wages demanded by their men. They must either get their work done for less money or close their establishments altogether. It is foolish for men to argue, as some do, that employers can pay any wages they please. The object of doing business is to make a profit, and the price a manufacturer can pay for labor is determined by the price at which he can sell his goods. Business, like everything else, is governed by fixed laws. When trade is brisk, workmen can always find employment at good wages. No employer haggles about pay when the condition of his business is such that he can make a profit on the labor of every man he hires. But when trade is dull; when great quantities of goods are upon the market, for which there are no buyers; when it requires the utmost effort to secure sufficient orders to keep the mill running at all, then the manufacturer looks about to see where he can reduce the running expenses of his establishment, and naturally seeks to lower his pay roll, which is the largest item in the account. If, under these circumstances, his men refuse to work for less pay, and he cannot find others to take their places, he must of course shut down. Should he continue to pay the same rates as in prosperous times, it would be at a loss to himself, and it would be only a question of time when he would become insolvent.

The position of BALDWN'S TEXTILE DESIGNER is so well known that it is hardly necessary to say we do not uphold employers as against workmen any more than we defend workmen in unjust demands upon employers. This journal is a true friend to the workmen, and we write now wholly in their interest. It is plainly evident that for employes to demand now the same wages they received some time ago will work more injury to them than to their employers. The latter can stop, and by thus lessening the supply of goods, strengthen the market, and later reap the benefit; but what profit will accrue to the men who, through false notions of their rights, throw themselves out of employment? None whatever. They will waste their time and if they have accumulated any reserve, it will be used to defray necessary expenses. If unfortunately, as is generally the case, they have nothing ahead, want and misery are before them.

The true policy for every man who depends upon his labor for support is, first, to find employment—any employment rather than none—and second, to stick to the place he has until he is sure he can do better. In other words, he should make the most of his opportunities, wasting neither time nor money. What capitalist would be so foolish as to refuse a safe investment at four per cent., and let his money lie idle because he could not get six? The capital of a laboring man is his time, and if he refuses work at one dollar a day, and remains in idleness because he cannot get two, he is guilty of great folly. All workmen would like to rise out of their condition and acquire a competence, but it cannot be done unless they are willing to work dilligently for whatever wages they can get, and be content to patiently accumulate, little by little.

In discussing the the proposition that workmen should receive a certain percentage of the profits, exhibits a phase of the question which workmen generally fail to take into account. Were it proper for the workman to demand a certain fixed proportion of the proceeds of business, that would, in substance, if not in fact, make him a partner, and hence he should be a sharer in the risks as well as the profits of the business. Take, for instance, the case of men working for bridge-builders; would the men engaged on the work like to have to refund their wages if the bridge before acceptance were destroyed by accident? Now the company would stand the loss,but under the new dispensation the workmen should be sharers in the loss also. If they were working under an arrangement giving them a fixed proportion of the profits, why should they not also work under an arrangement charging them with a fixed proportion of the losses?

A manufacturing business is, as a general thing, a hazardous undertaking. The years of prosperity are often supplemented by many more years of adversity. Because the gains in one or two booming years are very large, there is no good reason for assuming that they will continue so for all time.

The laboring classes are better off than than they would be were their fortunes tied up in the business in which they are employed. When their day's work is done their cares may cease. Revolutions and panics may lessen the amount of their recompense, but they do not bring to them the care and trouble which the employer has to bear.

The interests of the employer and his men are, it is true, closely interwoven, and their fortunes often go up or down at the same time; but there certenly is no community of interest whereby the workman should have the right to draw from the proceeds of the business a greater share than the value of his services entitle him to, unless this right is by agreement conceded to him.

MISCELLANEOUS WEAVES

(Prepared for BALDWIN'S TEXTILE DESIGNER.)

BY INTERESTED DESIGNERS AND WEAVERS.

THIS is a combination of three weaves; and is a very pretty pattern for trouserings.

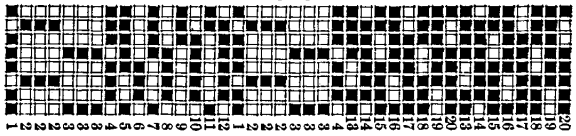
WARP PATTERN.

9 brown worsted.
1 brown drab, medium worsted.
1 brown worsted.
1 brown drab, medium worsted.
1 brown worsted.
1 brown drab, medium worsted.
1 brown worsted.
1 brown drab, medium worsted.
8 brown worsted.
16 light brown drab, and single size It white, silk D. & T.

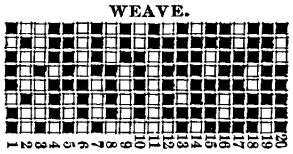
40 threads in pattern; 5,488 ends in warp.

Filling all dark brown worsted; 96 picks.

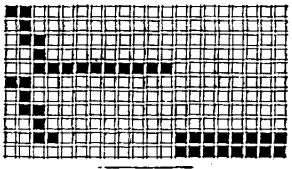
PICKOUT.



WEAVE.



DRAFT.



This is a very pretty silk stripe.

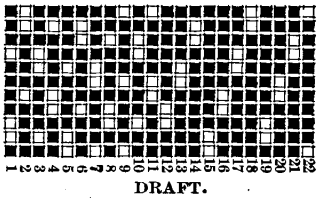
WARP PATTERN.

13 black worsted.
1 black worsted and single size scarlet silk.
1 " " " " " light blue silk. } 12
1 " " " " " scarlet silk. } threads.

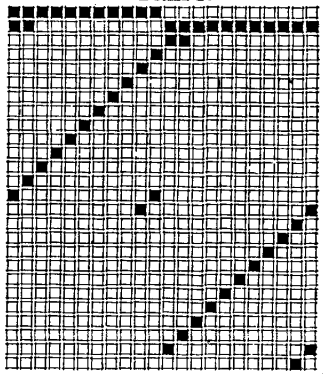
26 threads in pattern; 6,032 ends.

Filling all black worsted; 96 picks.

WEAVE.



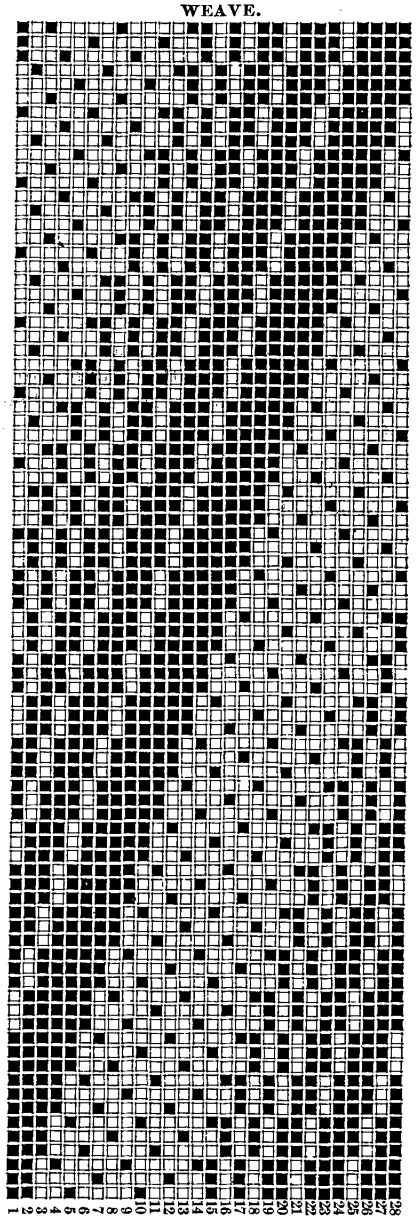
DRAFT.



L. A.

The following design, a fancy wale, is that of a fine black worsted for coatings. Warp 2,520 ends, laid in reed usual width; about 100 picks per inch.

WEAVE.



JACK.

THE GOLDEN RULE AND THE CARD ROOM.

TO act in accordance with the dictates of the golden rule is not only evidence of the highest type of manliness, but like honesty, it is the best policy. Especially is this the case in large manufactories, where the employees, whatever may be their personal likes or dislikes, are forced into a close and mutually dependent association.

To no one is the good will of his employees, and all other associates in the mill, more necessary than to the carder, for reasons that will be apparent. Of course there are persons upon whom no amount of fair treatment or kindliness will have any appreciable effect, but the good will and interest of the majority will often prevent, and always counterbalance, any ill result arising from the acts of an ignorant or maliciously disposed minority.

But why is this of unusual importance to carders? As I have endeavored to show, perfection is demanded here, because it is the first process. Bad work in carding cannot be remedied, though it may be covered up very successfully sometimes. This is where the good will of your associate overseer will be beneficial to you. If they are your friends you may depend upon their best endeavors to set things right. But to secure such favors,

something more than the mere profession of friendship and the ordinary complements are needed. Such things are cheap, and are generally taken at their true value, but habitual gentlemanly treatment, patient listening to complaints about your own work, with no disposition to shirk the full responsibility of your own shortcomings, will never fail to win for a man the best efforts of his fellows. But it will not do to expect miracles. Because they can give your poor work a better appearance, it is no excuse for you to be careless and expect them to continue their labors in behalf of your reputation and that of the mill. For, even if the best disposed did not tire in such an endeavor, you would only carry them down with you.

Again, there are a thousand and one little things that go to make up the sum of good carding. Many of these little things will escape the eye of the most watchful overseer, but a well trained and well disposed operative will very often detect what his overseer misses, and this is where the good will of your employee is of service. To illustrate, here is the story of how the turning of the wrong screw once too much spoiled a whole day's work of a set of cards right under the eye or an overseer, who thought he had taken every measure needed to secure good work from that particular card, and from that particular lot of stock.

In preparing a set of cards for this lot the cleaners were ordered to clean out the small fancies running on the licker-ins. In doing this the head cleaner, who had, like many another learner, no mean opinion of his own knowledge of carding, found, as he thought, a cap loose, and as he failed to stop the apparent play of the shaft with an ordinary turn of the cap screw, he sent that screw home until it required a cold chisel and hammer to loosen it. As the apparent play to the journal still remained, he, of course never thinking he had put a friction on the fancy, put on the belt and started the machine. It was not the cap that was loose, but the box, and it was the setting screws that should have been tightened. The consequence was that the tightened cap produced friction enough to cause the fancy to be driven by the licker-in, and at the same speed. Running in this way it gathered the stock in small lumps continuously, and threw them off into the cards. Now for the reason why it was not noticed until the roving was set up in the mule. The condenser had just been adjusted to condense the roving harder. This had the effect of partially hiding the lumps. The lot was a mixture of both stock and colors that had the same effect. The room, none too well lighted, except at night, was darker because of a cloudy day. The tender was a new hand at the finishers, and as for the overseer, in this particular instance, having personally made all the changes, as he thought, and feeling sure that everything was as it should be, was not looking for anything of the kind, but having got his weight, and from frequent observations from the alley end, having seen that it was not breaking, felt satisfied that everything was all right.

Now there are several ifs and the sequences that would have changed all this. If the cleaner had seen the real trouble and called the overseer's attention to it, as he should have done, there would been no trouble. If the friction had been a trifle harder, the licker-in would have wound up on the first pair of spools and stopped, and matters would have been righted at once. Had the tender been an older hand and well disposed toward her overseer, she would have seen and called his attention to the lumps, and there would have been an end to them. Still another possibility is, if the roving had not been condensed so hard, the lumps might have been drawn out in spinning, for they were not large.

Some one is probably asking what this has to do with the treatment of help. It is just this. When a young man learns to be thorough, or rather, to learn not to let a thing go half done, as he has been perhaps permitted to do, by previous overseers, when he appreciates the efforts of his psesent overseer to teach him the business, as well as taking an interest in the success of his boss and room, he will not only be more careful not to make mistakes himself, but will prevent, to a greater or less extent, others from making them. When the tender finds that it saves her and the spinners a great amount of unnecessary work and trouble to immediately call the attention of the overseer to poor work, and that he gives it prompt attention and remedies it, she will be on the lookout for defects, and will be prompt to point them out.

It is a mistake for an overseer to imagine that he can do all the thinking for himself and his operatives. Especially should he give them the reasons for all new requirements, treat them as men and women should be treated, and by all means never blame them for what is his own fault, or that of the machinery or stock. I have seen help roundly abused for not doing impossibilities or for not knowing what they had not had time or opportunity to learn. There is another party whose good will it is very important to have, and that is the employer. There is no surer way to secure it than by strict attention to duties and by pursuing the course recommended above toward the other employees.—* * *—*Industrial Record.*

COTTON MILLS IN BRAZIL.

UNITED STATES Consul-General Armstrong, of Rio Janeiro, writes the States Department at Washington as follows:—"The most important manufacturing industry in Brazil in that of cotton fabrics, there being, it is said, about one hundred factories of these fabrics in the Empire. These factories, when properly situated and well managed, should not fail to prosper, as there are many circumstances to favor them. There are in this Empire vast tracts of land admiraby adapted to the production of the raw material, which, in fact, is produced in abundance. The comsumption of the fabrics manufactured therefrom is larger than that of any other class of manufactured goods. The exportation of the raw material is expensive, as it has to pass through several hands and to pay heavy tribute in the form of commissions or intermediary profits, freights, export duties, and other burdens, to which it is subject. The inportation of the manufactured article is burdened, in turn, with heavy expenses of the same kind, including very high import duties. All these expenses give the Brazillian manufacturer a wide margin for profit, even after taking into account the difference between the cost of manufacturing here and that in countries where labor, capital, machinery, etc., are cheaper. If some of the cotton factories in Brazil have failed to prosper, this is due to incompetent administration or improper location. As a general rule the factories which are most successful are those that are not organized on too large a scale, and are situated in the midst of cotton-producing districts. Of the cotton factories in this Empire, 20 are in the province of Minas Geraes, 12 in that of Sao Paulo, 15 in the city and province of Rio Janeiro, and the rest distributed through the other provinces. The largest is the Brazil Industrial Factory, at a place called Macacos, in the province of Rio Janeiro. This factory has 800 looms, and employs 500 operatives. The capital of the company is about $1,650,000. The shares are quoted at some 15 per cent. below par. The company, which is in debt, has issued debentures to the amount of $550,000, on which it pays interest to the amount of $19,000 every six months. Another large factory is the Petropolitana, which is also in the province of Rio Janeiro. The capital of the company is $1,000-000, which it has resolved to increase to double that sum. It has recently enlarged its plant, which is now valued at over $3,500,000. It has issued debentures to the amount of $1,000,000, and has a floating debt of about $1,200,000. Its receipts last year amounted to $184,242, and its expenses to $117,806, including the loss by bad debts and interest on endebtednes. The Rink Factory in this city, in which is invested a capital of nearly $800,000, employs 400 workmen, and produces an annual average of 1,300,000 yards of cotton goods, 220,000 of woolen goods, and 65,000 of felt."

THERE is a law of New York State, adopted in 1886 which prohibits the employment of children under the age of 13 years in any of the 50,000 manufacturing establishments of the state, and which makes 60 hours the limit of a week's work in such factories for all women under the age of 21 and boys under 18. The state inspectors of factories are required to enforce this law. Another law, adopted in 1887, enlarges the power of the inspectors in the protection of factory operatives.

BALDWIN'S TEXTILE DESIGNER.
A PRACTICAL MONTHLY JOURNAL
DESIGNING, WEAVING, CARDING, SPINNING, DYEING, FINISHING
TEXTILE FABRICS.

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All who find this paragraph in their paper, marked with an index hand, can take it for granted that their subscription expires with the present number. We respectfully request the renewal of your subscription by remitting $2.00 for one year, or $1.00 for six months at your earliest convenience. Prompt payments encourage the publisher, and will enable him to add new features to the journal. Please bear this in mind, and don't forget the "hand."

* * *

JUST received at this office a handsome line of fancy worsted samples of coatings, suitings, etc., from Paris. Twenty-five of which will be sent to any one on receipt of one dollar.

* * *

A GOODLY number of subscribers have paid up during the past month, and we hope to see more do likewise during the present month.

* * *

THE British legislation regarding child labor in factories has been gradually extended until now the work of all children under ten years of age is prohibited, and work by those under thirteen is limited to half time, attendance at school half of each week being required. None under sixteen can work without obtaining a physician's certificate of fitness. No one in Great Britain under eighteen, and no woman of any age, can work more than sixty hours a week in factory or store, and only fifty-six and a half hours in textile factories, while most factories reduce the week's toil to fifty-four hours by giving most of Saturday afternoon as a half holiday.

* * *

WITHIN a short time there has been some important labor ligislation in Belgium, Holland, and Germany. In Belgium there is now a law for the establishment of councils of industry, or arbitration boards, in which trade disputes may be settled. In Holland, a new law for the regulation of the labor of women and children in factories has been adopted. In Germany, the law enacted by the Reichstag for pensioning the aged and infirm workmen provides for assessing the wages of labor and the incomes of employers to raise a fund for this purpose, which will be managed and controlled by the government.

* * *

PERHAPS the greatest single industry of any city in the world is the carpet manufacture carried on in Philadelphia. The establishments engaged in this industry employ 17,350.

* * *

THE cotton-mill owners of Georgia are protesting against the passage of the State ten-hour law, claiming that it will reduce wages.

* * *

THE weavers of Fall River, Mass., have been trying to secure a conference with the Board of Trade upon the question of wages.

* * *

AS far as she is capacitated for doing the same work, a woman ought to be paid as much as a man.

* * *

THE number of cotton mills in the South has doubled since 1880.

HOW TO GET AHEAD.

THERE are people who do not exert the powers they suppose they possess, because they do not occupy a position adapted to call forth those powers. They stand idle, because, they say, no man hired them. When asked if there is nothing for them to do they reply in effect, nothing worthy of their powers. Those who thus wait for stations worthy of their supposed powers may spend a life in idleness.

The true man does vigorously whatsoever his hand findeth to do. His is never out of employment, because he is ever ready to accept any work which he can obtain.

A merchant, before the late was, had made what was then regarded as a handsome fortune. In consequence of losses occasioned by the war he failed. He surrendered all his property to his creditors. He was not out of employment a week. He took the first thing that offered. Though he had been the head of a large jobbing establishment, he took a clerkship in a comparatively small one. He attended to the duties of his clerkship as faithfully as he had attended to the duties of the firm of which he was the leading partner. Of course, it was not many years before he was among the merchant princes of the city.

Let no young man wait in idleness for a situation worthy of his powers. Let him do with his might whatsoever his hand findeth to do. The way to get a better place is to perform in a first-rate manner the duties of your present one. The way to prepare for greater usefulness is to make yourself as useful as possible in your present calling.

A TYPICAL NEW ENGLAND DESIGNER.

JAMES HENRY PICKFORD, the subject of this sketch, was born in the town of Woonsocket, State of Rhode Island, on the 25th day of May, in the year 1860, and is therefore in his thirtieth year. At the age of one year, his parents took him across the big pond to England, where he resided for about four years, but owing to climatic conditions he had to be brought back to his native land. At the age of eight years he, for the first time, entered a woolen mill as a spooler tender, in the village of Greenville, R. I. After working a short time, his employers, Polk & Steere, became bankrupt, which occasioned his parents removing to Pascoag, R. I. Here he attended school part of the time, and part of the time worked in the mill operated by A. L. Sayles, as spooler and twister tender. From this he went to Dayville, Conn. which place was his home for the next nine years. In the latter place he was employed first as spooler, then as twister boy, and after a short time he was able to run an operator, which he continued to do till he arrived at the age of fouteen years. He then learned to weave on a narrow Greenhalgh loom, spent about one year at that business, when he was taken away to run a pattern loom, under the late Benj. Cogswell, superintendent for the S.

L. Sayles Manufacturing Co. At the age of seventeen he was given a section of Greenhalgh looms to fix, and worked in the capacity of fixer for seven m

His ambition at that time took a decided leaning toward the art of designing, so that he took lessons from Mr. Miles Farrar, designer and boss weaver for A. & W. Potter, of Killingly, Conn., Mr. W. E. French, ex-designer of the Manchester mills, Manchester, N. H. and B. Wiesner, designer of the Amoskeag mills, of that city. Mr. Pickford afterwards was employed as pattern weaver in Warren, East Brookfield and Leominster, Mass. His first position as designer was in Jesse Eddy's Sons' woolen and worsted mill at Fall River, Mass. He was afterwards employed at the old Elm-street mill in Providence, R. I., where he was designer, under the veteran superintendent, Ben. Ainsworth. He resigned his position in that mill to except a more lucrative one in the big Vassalboro mills, of North Vassalboro, Maine, as designer, and to take charge of the lots, under the management of Mr. R. A. Clogher. He had been there but a short time, however, when the mill suspended operations, thus throwing him out of work. It was after the shutting down of those works that he went into the publishing business, where he was one of the publishers of a textile paper, but not finding it congenial to his taste, nor remurative in a pecuniary point of view, he left the business, and with characteristic Yankee grit, went back into the ranks as a weaver. Since last October he has been in the employ of Messrs. Lewis Anderson & Co., of Skowhegan, Maine, as designer. Mr. Pickford has been a constant writer for textile papers. Strange as it may seem, his first position as designer was obtained by inserting some fancy worsted diagonal weaves in a Boston publication, over his own signature, while he was employed as a weaver in Jesse Eddy's Sons' mill, of Fall River. His employer, seeing those original designs, offered him the position of designer upon the retirement of their other able designer, Mr. John Nightingale. Mr. Pickford was married in the summer of '83, the union has proved a happy one; he is the father of two children, only one of whom, a girl, is living. He is a member of several societies, among which may be mentioned Vassalboro lodge, F. & A. M.; Dunlap Royal Arch Chapter; St. Omer Commandery R. T.; Friendly Union Lodge, I. O. O. F.; A. O. U. W. Kennebec Lodge, also the N. A. of W. & W. Overseers.—T.—In. *Wade's Fibre and Fabric.*

TELL IT ALL!

THE above biographical sketch was published in *Wade's Fibre and Fabric*, No. 232, August 10, 1889, and signed "*T.*" Immediately after receiving the said number, we penned a few lines to the editor, together with a copy of a letter of recommend (given below), and requested that both be published in the next issue for the purpose of proving that "T" had not told all; and, furthermore, that if there was any credit due anyone in being the instructor of this "Typical New England Designer," we wished to have a *share* of that honor. The next issue of the paper appeared without a word in relation to the matter. August 20, we received the following from Mr. Wade: "The matter about Pickford I shall probably use, but it will not go into this week's number. As you are well aware, it will be a big advertisement for you." Three numbers of that paper have been issued since its editor received our communication for publiction, and as nothing, so far, has been mentioned of it, we feel that it is high time to take the matter in hand and insert the "big advertisement" (?) ourself.

Any person not familiar with the facts would believe, from reading the above sketch, that Mr. Pickford received his instructions in the "art of designing" wholly from the gentlemen named —Mr. Farrar, French, and Wiesner. This, we propose to prove is absolutely *false*. The following letter of recommend will sustain our assertion:

NORTH VASSALBOROUGH, ME., Sept. 18, 1886.

To Whom it may concern:

The undersigned having taken instructions in the art of designing from A. A. Baldwin, of Brasher Falls, N. Y., would recommend any one desirous of learning the business to go and spend a short time with Mr. Baldwin, as I consider fifty dollars ($50.) spent with Mr. B. to be a profitable investment, and which I believe to be far superior to attending any school for instructions in designing. The writer stayed one week with Mr. Baldwin, for which he paid $50, and though he was with him but a short time, he has never regretted it. It was in 1880 that I went to Mr. Baldwin's, since which time I have held positions as designer for Jesse Eddy's Sons, Fall River, Mass.; Elm St. Woolen Co., Providence, R. I.; Vassalborough Woolen Mills, No. Vassalborough, Maine.

Students taking lessons from Mr. B. will have the advantage of being with a practical woolen-mill superintendent and designer, and also the use of a large library; and in regard to samples, he has the largest collection of Foreign and domestic samples that the writer has ever seen.

J. H. PICKFORD, Designer.

Reader, does it appear from this letter that Mr. Pickford learned the "art of designing" from the three gentlemen, or from the writer—A. A. Baldwin? The fact is, all the instructions Mr. Pickford received from them was gotten between his seventeenth and twentieth year as will be seen. From his biographical sketch we learn that he was born May 25, 1886; farther on that, at the age of seventeen he fixed looms for seven months, when he decided to take lessons in the art of designing, and names Messrs. Farrar, French & Wiesner as his instructors.

It was in August, 1880, that Mr. Pickford came to us for personal instructions, therefore he must have been in his twenty-first year, and *after* he had taken lessons from those gentlemen. Furthermore, we have in our possession letters writen to us, by Mr. Pickford, for advice in relation to his business as a designer while acting in that capacity for Jesse Eddy's Sons, and also while at North Vassalborough. The contents of these letters show that he looked to us as his counsellor in many instances while holding those positions. Now, we leave it for you, kind reader, to answer: from *whom* did Mr. Pickford learn "the art of designing?"

There are always two sides to every issue, and it is very plain that "T" fell far short of telling all; also, that he intended we should receive no advertising through him. We will not say here who "T" is, although we know as well as though he had signed his name outright.

As to Mr. Pickford's "Yankee grit," we wish to say that, had he shown more of it while engaged in the "publishing business," it would have proved more to his credit, and honor as a man.

We have nothing further to say in this matter unless driven to it by more one-sided statements, when, if need be, we can show up things that might not set good with some.

THE MANUFACTURE OF LINEN IN IRELAND.

DURING the first three months of the year 1889, says a writer in the *Canadian Manufacturer*, the importations into the United States of manufactures of flax aggregated $7,445,199, and the importations of flax and substitutes thereof, unmanufactured, aggregated $6,086,957, a grand total of $13,532,156. This is at the rate of over a million dollars a week.

The soil and climate of both the United States and Canada are quite as well adapted to the successful cultivation of flax as is that of Ireland, Russia and Germany, and yet the industry on this side of the ocean is almost entirely neglected, or carried on in such a desultory manner that it can scarcely be taken into account when considering the extent of it in these two countries. It indicates an astonishing short-sightedness on the part of Canadian and American farmers and manufacturers that flax is not more extensively grown, for it could be always counted on as a sure crop that would produce an average of about fifteen bushels of seed

per acre, worth a dollar a bushel: two and a half tons of flax straw worth $20 per ton, from which could be produced a thousand pounds of flax fibre, worth $200 a ton. It would seem to any thoughtful person that this is a matter worthy of consideration.

The flax industry in Ireland is an old one; for the Milesians who conquered Erin thirteen hundred years before Christ, introduced there a knowledge of the cultivation of flax and also the art of spinning and the manufacture of linen fabrics. In the Irish Book of Rights it is recorded that among the tributes paid by the provincial kings were garments of linen, embroidered in colors and with threads of silver and gold. In the days of Saint Patrick the art of weaving and embroidery had attained what was then considered a high state of perfection, and history tells us that that good man himself gave constant employment to three noble ladies, one of whom was his sister, another the daughter of a noble of high rank, and the third a daughter of the King of Ulster. Eochaidh, one of the ancient Irish kings, was himself a cloth designer who introduced the weaving of various colored cloths, by which the social rank of all wearers might be known. Five hundred years before the Cromwellian Commonwealth hand linen spinning and weaving had reached a perfection in Ireland not surpassed in any other country, but the wars which devastated that unfortunate island for nearly a hundred years almost wholly destroyed the industry; and it was not received until the revocation of the edict of Nantes drove large numbers of skilled artesans and their families from France to Ireland. Many of these settled in the counties of Antrim, Armagh, Down and Tyrone, where they found employment in the towns of Belfast, Lisburn, and Lurgan.

Wet spinning of linen yarns was begun at Belfast in 1830. Previous to that time three-fourths of all the yarn used in weaving linen was made on the ancient spinning-wheel, in the homes of the cotters and farmers among the peasantry. A woman servant was not only expected to accomplish her every day household duties, but in addition she must spin a certain amount of yarn weekly. Mothers, daughters, and even the old grandmothers had their allotted hours at the wheel, and its buzz and hum were seldom missing from the cabin save during hours of sleep. The women of Tyrone were most famous in all Ireland as spinners; and their "kemps," or spinning matches, often plunged a whole townland into excitement. So late as 1850 only 58 power-looms for linen weaving were in use in Ireland. In the intervening years the increase in importance in every branch of linen manufacture has been marvelous. The amount of capital invested in this industry alone in and about Belfast, exceeds $110,000,000. Thirty-five spinning-mills, with over 850,000 spindles, and about the same number of weaving-mills, driving 25,000 looms, are in operation. These employ in all capacities more than a hundred thousand persons; and more than four thousand male and female operatives may be seen at work in one establishment in the city of Belfast every day in the year.

In all the world there is no agricultural product so rich in labor, from seeding to the ultimate of preparation for use, as flax. To begin with, the preparation of soil requires more labor than for any other sown crop. Before flax-fibre is marketable by the farmer several distinct labor processes are necessary. Weeding, a slow, laborious process, is the first one. Then comes the pulling and sheafing, or gathering the flax into "beats" in the field. After this it is carted to the "steep-pond" and "rotted" or "steeped" from eight to ten days. Then the wet and sticky stuff is again carted to the field or "spread-ground" and carefully dried. "Lifting" and "stooking" follows this, so that the flax may be again got into sheaves and "capped," as with the "grain-shocks" of America, for additional drying and curing. It stands in these for some time, and is then taken to the "scutch-mill," where the roots, branches, withered bolls, woody heart, and flinty outer sheath are removed. The fibre comes from the "scutch-mill" in wisps, or "strikes," containing about one and one half pounds each. These are tied with a twist of the fibre into stone or fourteen-pound bundles, and are ready for the little Irish market towns where the flax factors, or buyers, pay the farmer about six shillings per stone for it.

The conversion of this flax fibre into thread for the weavers' use involves an interesting series of processes, and in these great spinning mills of Belfast they are all carried on under one roof. The first process is termed "roughing." The fibre is still filled with flinty slivers of flax-sheath. These are removed by drawing the flax through coarse steel combs, wholly a manual operation; and lads of from fourteen to eighteen years of age, called "roughers," are employed. It is stifling, dreadful work, the air being filled with myriads of almost impalpable particles pointed like steel. The constant inhalation of these soon produce consumption and other fatal lung diseases. For the privilege of existing awhile under these circumstances "roughers" are paid about nine shillings per week. The next operation is one of a similar nature, called "hackling." Straightened in steel clamps, the fibre is further cleaned and combed by concentric steel teeth revolving towards each other. Machine tenders, called "screwers," lads from eight to twelve years old, are paid from five to seven shillings per week for this work. The bunches of flax taken from the machines by other lads are laid crosswise in wooden frames. When one of these is filled it is called a "tipple of flax," and the "tipplers" are paid eight shillings per week.

The next process is effected in the sorting room. This is filled with benches, each provided with a stationary double steel hackle or comb. A very coarse one "opens up" the bunches of flax without breaking the fibre, and a much finer one is used in finishing the combing and dressing. Flax "sorters" are undoubtedly the most skilful men connected with any branch of linen manufacture. Their deftness in dressing and sorting is truly marvelous. Half-a-dozen different grades of weight and color are often found in one bunch of flax, but when the silken stuff leaves their hands there is not a particle of variation in weight or shade in the shining, hair-like piles before them.

The utmost these sorters are permitted to make is twenty-five shillings per week. All the subsequent processes are in the hands of girls and women. The sorted flax is carried to the "spreading machines." These are provided with boards over which straps, moving at the speed of eighteen inches per minute, run between cylinders to "spread" and "blend" different desired grades of dressed flax. A girl standing at the right of each machine supplies or spreads these never-halting straps with little wisps of differently-graded fibre so laying each wisp on each strap that an even quantity is constantly being received by the cylinders. This work is done with incredible rapidity. Profficiency requires years of practice but the wages are but eight shillings per week. The flax is delivered from the "spreaders" into cylindrical cans in continuous shining "slivers," looking for all the world like a thin ribbon of confectioner's taffy. Automatic indicators ring bells when a certain desired quantity has been wound into the cans. These are removed for the fifth process to the "drawing" rooms, where machines, attended by women, double and "draw out" the "slivers" of fibre, until when it leaves this process, in round numbers, fully 20,000 "doublings" of the fibre have taken place; all for the purpose of "levelling," or evening, the "sliver" before spinning. The next operation is that of "roving," where from sixty to eighty "slivers" are run through each frame, and wound by machinery upon spools into "roves" ready for the spinning-machines. The women thus engaged are known as "rovers," and earn from seven to eight shillings per week, set wages. The seventh and last process in the manufacture of linen yarns is spinning. This is so well known that extended description is unnecessary. The great machines are fed from the "roves" just mentioned, the flax "slivers" passing through boiling water over brass rollers to the spindles, which make from 4,000 to 6,000 revolutions per minute; the spun thread passing from spindle to spool with such vibration and speed that it is scarcely visible to the eye. All spinners are women.

The struggle for life of these operators is pitiable. They are taken on as "helpers" at ten years of age, and are allowed to work every other day for two shillings ninepence per week. From three to five years of such labor are required to make them "full spinners," when they receive only from eight to nine shillings per week. For reasons which are claimed as necessary, they are compelled to labor in rooms at a temperature of ninety degrees, and

manufacturers themselves say that the escaping steam, the dreadful odor of hot oils, the foul air and the intense heat, kill fully thirty per cent. of all spinners before they reach twenty-five years of age. These poor beings live and dye in ignoranc of any personal comforts—shelter, food or raiment—yet it is upon them that those who indulge in the luxury of fine linen must largely depend for what they use.

NATURE, COMPOSITION, AND TREATMENT OF ANIMAL AND VEGETABLE FABRICS.

THE inseparable duties of studying the composition of the various animal and vegetable fabrics, as also their nature—when in contact with the various mineral, vegetable, animal, and gaseous bodies applied in the individual industries—should not devolve upon the heads, chemists, or managers of firms alone. It is most important that every intelligent workman, whom we cannot expect to acquire a very extensive knowledge of chemistry and perfect acquaintance of the particular nature and component parts of fabrics, should at least be able to thwart the possibility of the majority of accidents brought about in regard to the quality and aspect of materials treated by them.

In the treatment of wool the first operations are of no mean importance, and the whole subsequent operations and final results, almost as a whole, depend on the manner in which the fleece washing had been effected. In presence of suintine, as also fatty matters, as well as the countless kinds of acids deposited on the wool through exudation from the body, etc., the various agents and materials cannot act and deposit as evenly as might be desired, and the complete obliteration of the former therefore becomes an absolute necessity.

For vegetable fabrics a great technical and practical knowledge is already requisite in their cultivation itself, and before any operations are necessary at all. One of the greatest points is the ripeness of the fibers. It is almost an impossibitity to produce delicate colors on vegetable fabrics which were gathered inopportunely. Numerous experiments have been made on cotton containing smaller or larger quantities of unripe fibers, and after the necessary preceding operations, have been dyed in the rose, purple and blue colors, and the beauty of the shades invariably differed in proportion to the greater or lesser quantities of unripe fibers contained in the samples, and by a careless admixture of unripe and unseasoned fibres the most brilliant colors have been completely spoiled in the presence of the former. These deficiencies of unripe vegetable fibres are so serious that the utmost precautions should be taken not only by planters to gather the fibres in a ripe state, but the natural aspect of ripe and unripe fibres and their respective differences should be known to the operators of the individual branches in the cotton industry themselves.

The newest vegetable fabrics, as *ma* (China grass), pina, *abaca* or Manilla hemp, *agave*, jute, and that obtained from the palm tree must be tended with equal care to that of cotton. The *ma* or China grass, is obtained from *Boehmeria nivea*, as also from the less known *Boehmeria puya*. The fibres of this stalk, after preparing and bleaching, have the whiteness of snow and the brilliancy of silk. By a special process—the description of which we must for the present leave in abeyance—the China grass can be transformed into a material greatly resembling the finest quality of wool. The greatest advantage afforded in the application of China grass is, moreover, that the tissues produced with this fiber are much more easily washed than silks, and in this operation they lose none of their beauty or their quality.

The *abaca* is produced from the fibrous parts of the bark of the wild banana tree found in the Philippines. Its botanical denomination is *Musa Troglodytarum*. The *abaca* fiber is not spun or wrung, but is jointed end to end. The threads are wound and subsequently beaten for softening, and finally bleached by plunging in lime water for twenty-four hours, and dried in the sun.

The *pina* is a fiber obtained from the leaf of the anana tree (*Bromelias ananas*), and is prepared in the same way as the *abaca*, but extreme care must in this case be observed in culling the fibers in order to sort in accordance with their degree of fineness.

The Arabs manufacture the stuff for their tents with a mixture of camel's hair, and the fibrous flocks (kind of wadding) obtained from the stalks of the wafer palm (the *chamærops humilis*).

The tissues used by the Arabs are coarse and colored, but the palm fibers—when freed from gluten, which makes them adhere more strongly—are susceptible to divide in a most astonishing manner.

The *Agave Americana* is a coarse fiber, mostly used in France for the manufacture of gobelin carpets, and the production of ropes. Great efforts have been made to bleach it in a satisfactory manner, as is done with the *phormium tenax*, but the former kind of fiber resists the ordinary treatment with lyes, etc., and an appropriate bleaching process has only been discovered quite recently.

Jute, which by many is confounded with *phormium tenax*, or New Zealand lint, is a fiber which can be divided as finely as desired, and can be most beautifully bleached.

The jute or Indian *paat* is generally known as a fibrous and textile fabric, obtained chiefly from Calcutta, and is similar in nature to the *corchorus capsularies*, an Oriental species, known in Oriental India by the name of *hatta jute*, and *gheenatlapaat*. This fibrous plant has the property of dividing into the finest parallel fibers, which can be carded without difficulty, and may be said to have the excellent properties of linen, hemp, and cotton at once. When properly bleached, it has an aspect which is as beautiful as that of silk. A mixture of silk and jute can be easily worked together, and can also be mixed with such vegetable fibers as cotton and linen. An immense quantity of flannel and other stuffs are now manufactured and imitated with the different mixtures containing jute.

The *suun* is a fiber of a plant in the form of a cane (*crotalaria juncea*), and the paat or *suncheepaat* is the thread of a species of spiral (*corchorus olitarius*), sold under the name of jute tissues.

The cotton tissues lose about twenty-five per cent. of their weight in bleaching, five per cent. of the substances are dissolved through alkalies, and the other twenty per cent., which are not attacked directly through the alkalies, are removed through chlorine, acids and the water itself. The linen and hemp tissues contain eighteen per cent. of substances which are soluble in alkalies, and they lose from twenty-seven to thirty per cent. of their weight when taken through the consecutive bleaching operations.

The substances do not alone include the substances contained in the fabric originally, but also such as are deposited in the preliminary treatment of the fabrics, as dirt from the hands of the operator, and gluten soluble in warm water; as also glue or gelatine, potash or soda, starch, albumen, and sugar, used by weavers, etc., and which are all soluble in water; further, such as greasy matters, calcareous soap, coppery soap, resinous or gummo-resinous matters, and the yellow and green coloring matters contained in textile fabrics, which are soluble in caustic soda; and finally, the earthy constituents which are soluble in acids.

The nature and compositions of silk and wool is diametrically opposed to that of the former. The silk is more of a gummy nature, and is susceptible to decompose into a kind of gelatinous mass if specially treated.

The yellow coloring principle in silk was found only to be contained in a very small proportion, and consisting of several distinct bodies.

The wool contains, firstly, a fatty matter which is solid at an ordinary temperature, and perfectly liquid at 60° C.; secondly, a fatty matter which is liquid at 15° C.; thirdly, a fibrous substance which essentially constitutes the wool in the strict sense of the word.

The wool at least contains three important principles, as it will be known that the fibrous substance disengages sulplur and hydrosulphuric acid without losing its peculiar properties; and it therefore appears probable that the sulphur entered as an element in the composition of a body which is perfectly distinct from the fibrous substance aforementioned.

In treating wool with nitric acid, and taking all possible precautions to determine as accurately as possible the quantity of sulphuric acid produced by the contents of sulphur in the wool by the reaction with chloride of barium, it will be found to contain from 1·53 to 1·87 per cent. of sulphur.—*Wool and Textile Fabrics.*

Designs.

LATEST NOVELTIES
—IN—
WOOLEN & WORSTED FABRICS FOR LADIES' & GENTS' WEAR.

EXPLANATIONS.

Weave:—The character thus ■ represents a riser or the rising of a harness. The character thus □ represents a sinker or the sinking of a harness. The top bar represents the first pick of filling—reading from left to right or *vice versa*.

Draft:—The character thus ■ represents a thread and to be drawn on the No. of harness in line with it. The character thus □ represents the skipping or passing the No. of harness in line with it. Always read from *left* to *right*—from the front to the back harness.

Warp Pattern:—Draw the threads through the harnesses in the order as laid down in pattern.

Filling Pattern:—Picks required to go into a certain shed will come right by starting the first thread of pattern with the first bar of weave and continue in their order downward unless otherwise specified.

168 PATTERNS WERE PUBLISHED IN THIS DEPARTMENT, VOL. I.

(*Continued from page 127.*)

PATTERN No. 91.

A fancy cassimere stripe for trouserings in medium stock, common yarn, and a good thing for small, country mills to make.

WARP PATTERN.

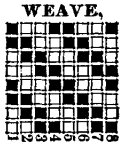
12 black.
2 white. } 10 threads.
2 black. }
12 black.
2 white. }
2 red and green, D. & T. } 10 threads.

44 threads in pattern; 1,684 in the warp of 4¼ run; lay in a No. 11 reed, 4 threads in a dent.

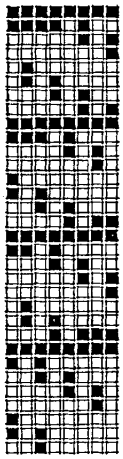
Filling a dark olive brown, or dark red brown, of 4½ run and 48 picks per inch.

A good range of samples can be made from this pattern by changing the colors in the 2 and 2 striping.

WEAVE.



DRAFT.

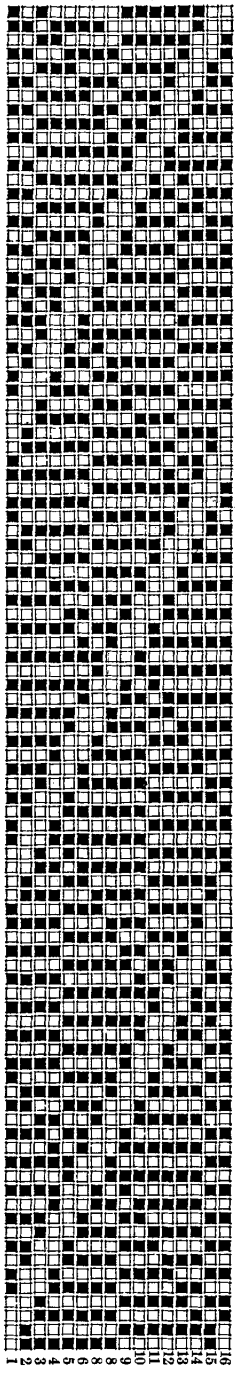


PATTERN No. 92.

This represents a very handsome diagonal figure for ladies' dress goods in cotton and worsted yarns; make with single black cotton warp, 96 threads to the inch, finished goods.

Filling very fine single worsted of dark blue; 100 picks per inch—finished goods. Other solid colors can be used if preferred.

WEAVE.



PATTERN No. 93.

This design represents a cassimere, herring-bone stripe for trouserings, made in the following manner:

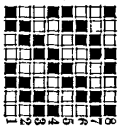
WARP PATTERN.

1 red.
3 drab.
1 white.
4 black.
1 white.
3 drab.
1 red.
10 black.

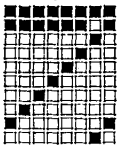
24 threads in pattern; 1,536 in the warp of 4 run—spun on the heavy side; No. 10-½ reed, 4 threads in a dent.

Filling all black of 4 run—spun on the light side; 45 picks per inch.

WEAVE.



DRAFT.

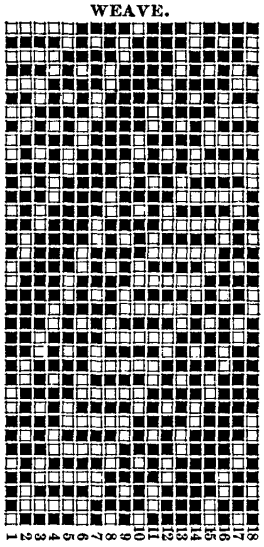


PATTERN No. 94.

This represents a nice, fancy diagonal for coatings, made with black worsted warp of 2,520 ends; lay out in a No. 12 reed, 6 threads in a dent.

Filling of common woolen yarn, either black, brown or dark blue, and spun 5 run; put in about 70 picks to the inch.

WEAVE.



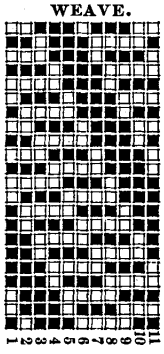
PATTERN No. 95.

This represents a pretty diagonal mix for whole suitings, and is a good thing made in the following manner:

Warp 1,600 ends of black, 4 run; lay out in a No. 11 reed, 4 threads in a dent.

Filling a mix as follows: 80% black, 10 of red and 10 of orange, spun 5 run and put in enough picks to make the goods feel firm.

WEAVE.



PATTERN No. 96.

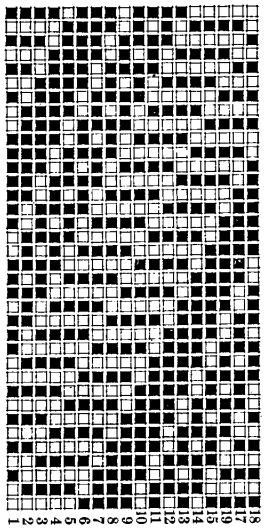
This pattern represents a good diagonal of the wale style, for coatings or whole suitings, either in medium worsted or

woolen yarns; if of the latter make as follows:

Warp 1,800 ends, all black or dark blue, of 4½ run; lay out in a No. 12½ reed, 4 threads in a dent.

Filling the same as warp, or of any solid color, and spun 5 run; 60 picks per inch.

WEAVE.



PATTERN No. 97.

A fancy hair-line stripe, wove with a 3-harness twill, for trouserings, and made as follows:

WARP PATTERN.

1 black.
1 orange.
1 white. } 6 threads.
2 black.
2 blue.
2 white.
1 black.
1 blue.
1 white. } 6 threads.
1 black.
1 green.
1 white. } 6 threads.

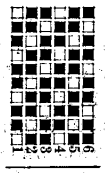
24 threads in pattern; 1,344 in the warp of 3¼ run; draw into a No. 12 reed, 3 threads in a dent.

FILLING PATTERN.

1 black.
1 old gold.
1 red brown.

3 threads in pattern of 4 run; about 45 picks per inch. Give it a velvet finish.

WEAVE.



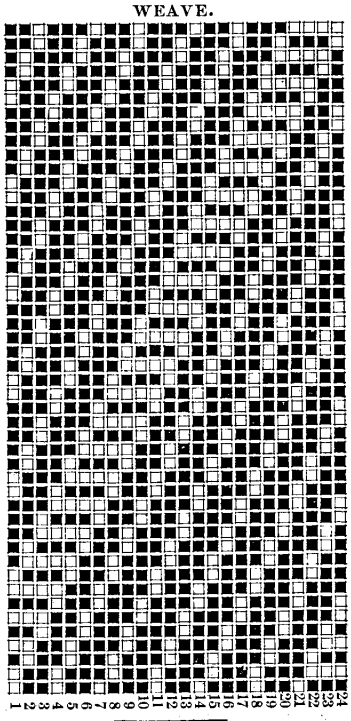
PATTERN No. 98.

This design is that of a fancy wide wale for coatings in worsted yarns.

Warp, a black, brown or blue, of 2,352 ends; lay in reed usual width for this class of goods.

Filling of the same color as warp, or it may be of a different color, and it should be a little finer than the warp. Put in sufficient picks to make the goods handle well.

WEAVE.

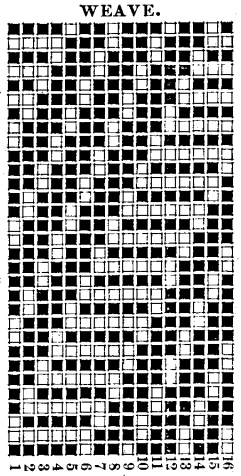


PATTERN No. 99.

This represents another fancy wale, of a narrow pattern, for coatings, and common yarn may be used of 5 run for the warp of 2,016 ends; lay in a No. 14 reed, 4 threads in a dent.

Filling 5½ run of same color as used in warp, or of a fancy mix will look well, and put in about 60 picks per inch.

WEAVE.



PATTERN No. 100.

This represents a pretty little plaid for business suitings made as follows:

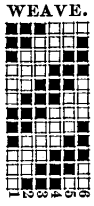
WARP PATTERN.

3 dark red brown.
3 light gray.
3 dark gray.
3 light gray.
1 dark red brown.
1 light gray.
1 dark red brown.
3 light gray.
3 dark gray.
3 light gray.

24 threads in pattern; 1,152 in the warp 2¾ run; draw into a No. 8 reed, 4 threads in a dent.

Filling pattern, the same as warp except use light and dark drab in the place of light and dark gray, and black in the place of the dark red brown; 3½ run; about 40 picks per inch.

WEAVE.



NEW STYLES FOR THE SUMMER SEASON, 1890.

WORSTED stuffs for trouserings will retain their present favor for summer 1890, and the samples now out are soft in feel, bright in appearance, and seemingly durable. There is less inclination to adopt loud vario-colored patterns, one color designs coming to the front. Broad stripes are shown in bright and dull finish. Ribbed effects all in one color, and galon stripes are also shown. Silk, woven in diagonal patterns, is taking the place of straight silk stripes, although the latter style will continue in favor. Other styles show small blue, brown and gray stripes on light ground. Square patterns show galon stripes interwoven on the sides. Red and blue lines in stripes and squares, are well thought of for trouserings. Flamme designs, containing also small quare effects in fine lines will have much favor. The same designs will prevail on woolen and on cheviots. On cheviots, lighter colors are prevalent. Large squares are being abandoned. Altogether the new styles tend more to simplicity in design, elaborateness being more or less discarded.—*U. S. Economist.*

HOW TO BE IDENTIFIED.

"THERE is no source of annoyance to a travelling man so great," remarked one of the fraternity the other evening, "as the necessity to which we are frequently put of securing men to identify us when we desire to cash drafts or money orders. We are, all of us, annoyed and embarrassed at such times, and I never saw any scheme to do away with the difficulty until one day last week in Des Moines, Iowa.

After dinner a friend of mine said to me, 'come down to the bank a minute. Want to show you something.'

"We went down and he remarked to the paying teller:

"'Draft here for me?'

"'Yes, sir,' responded the banker.

"'Photograph accompanying it?

"'Yes, sir.'

"'Please look at it and see if I am the man.'

"'The clerk did so, he was the man, and a moment later he had his money, and had been subjected to no trouble or mortification at all.

"He told me, as he went out, that he immediately returns the photograph to his house and they always enclose it with drafts. It's the cleverest scheme I ever saw."

WEAVING GINGHAM.

S. T. L. CLUB, in a communication to the *Boston Journal of Commerce*, writes: "Why not weave gingham in a plain loom and do away with drop boxes? To do this all that is needed is to make up the cop so as to contain the various colors of the proper lengths as will make the pattern designed. To make a cop of this kind, machinery specially constructed for this purpose will be required, and in the construction of this machinery some brains and capital will be needed. It will cost more for machinery and labor in making the cop than it does now, but the saving will be in the weave room, for the first cost of the loom will be less as will also the weaving and fixing, besides the production will be greater. By this plan a greater variety of colors as well as a longer pattern can be woven than by the drop box, though the drop box may have the advantage in some patterns, as in those where there is only one or two picks of one color. Should any chatterer choose to go to the trouble to make a cop of various colors, and various lengths, and knot the ends together and then weave it in a plain loom weaving plain cloth, he will then understand clearly what is here proposed."

EARLY COTTON MANUFACTURE OF THE UNITED STATES.

THE tracing the development of a great industry is always a matter of interest. It is invariably the story of energy and enterprise, with a few favoring conditions. At the inception of the cotton manufacturing industry of this country, in an extended and organized form, both foreign competition and legislation of a hostile character had to be encountered. In the early part of the last century, the fabrics worn in this country were of a coarse character, chiefly stuffs, kerseys, linsey-woolseys and flannels, a large proportion being of domestic production. A letter from the New England Board of Trade, dated 1708, and quoted by Lord Cornbury in his official report of that year to the English Government, states that the importation of these articles has fallen off £50,000 per annum. Much of the woolen cloth made by the country people, and sold in the stores, was worn without pressing or other finish. Linen manufacturers succeeded the woolen, being made first in New Hampshire and Boston, where a number of Scotch-Irish had settled. The richer classes wore, in the warm season, East India calicoes and their London imitations, and the production of these was the succeeding branch of textile industry undertaken in this country. The intimation in 1764 that a stamp duty was to be laid on India and China goods, with the interruption of English trade with the colonies which enhanced the price of cotton cloths, gave the needed impulse to the production of these. English legislation, however prohibited the introduction of machinery, cards and patterns; but several provincial assemblies offered premiums for cotton cards, and in 1775 the manufacture of these was commenced by Nathaniel Miles, at Norwich, Conn. The first spinning jenny was introduced into Philadelphia in the same year by the Pennsylvania Society of Manufacturers and Arts, which offered to receive subscriptions of £10 and upwards for "establishing factories," the subscribers to be the owners, and operations to be controled by a committee of management. The society recommended the cultivation of cotton in the South, where it had been raised when prices were lower, and offered a reward for rolls for spinning. A premium for calico printing offered by it, led to the first establishment of the kind in the United States, by John Hewson, who received a loan of £200 from the state of Pennsylvania, "to enable him to carry on the business of calico bleaching and printing." The subscriptions, which amounted to £1,327, were partly put to account in making "flowered cottons," and plain cotton cloth, the price of cotton then ranging from 2s. 3d, to 2s. 10d. per lb. Olive colored jean, with a linen chain, the material of which cost 2s. 5d. per yard was sold by the society for 3s. 3d. per yard. The manufactory was in time furnished with a set of Arkwright machinery for spinning cotton, but after some years was destroyed, with its contents, by fire. Meanwhile the domestic cotton production was everywhere increasing, together with the importation of cottons, nankeens and silks from India and China. To drive India goods from the market, Great Britain supplied cottons in unlimited quantities and on the easiest terms.

Often the movements of an individual affect in an important degree the movements of a great industry. The first cotton mill successfully put into operation in this country was one at Pawtucket, for which the machines were constructed by Samuel Slater, "the father of the American cotton industry," who came over to this country in 1768, stimulated by a reward that had been given by the Pennsylvania Legislature for carding cotton. The machines were made for Messrs Almy & Brown, without original patterns, suitable materials or skilled workmen.

In Massachusetts, Rhode Island, and New Hampshire, numerous cotton mills came into operation in the couse of twenty years. Of one factory at Boston for turning out cards, General Washington wrote, October 28, 1789: "They have made 63,000 pair of cards in a year, and can undersell the imported cards; nay, cards of this manufacture have been smuggled into England." Cotton thread at this time was made at Ipswich, which contained 5,000 inhabitants. In 1787 Providence turned out 5,858 yards of cotton cloth. The spirit of a self-dependent industry animated almost every household, and the home goods were readily sold. The great difficulty was in getting good machines. We find the Legislature of Massachusetts, after the examination of models for carding and spinning, submitted by Thomas Somers, who had "proved his knowledge of adapting the thread for and of weaving of dimities and plain, striped and checked calicoes," voting him £20 to encourage him in a trial.

The first New England cotton factory was set up in Beverly in 1787, a spinning jenny having been made from the State models, and a carding machine imported at a cost of £1,100 ($5,500). This factory, visited by General Washington in 1789, excited the greatest interest, as being the first attempt in New England to manufacture cloth wholly by machinery. The proprietary, however, who could not turn to account a grant of land, or obtain from the State monetary assistance, incurred heavy losses, and afterwards discontinued the business as a corporate body, private individuals carrying it on. Several rival establishments soon sprang up—one at Worcester, another at Providence, and a spinning frame was built at Bridgewater.

A leading event in the United States cotton industry was the raising of a successful crop of sea-island cotton in 1789, at Hilton Head, near Beaufort, S. C. Carolina planters at this time clothed their slaves in homespun, the produce of their cotton fields, the spun material being sent to the nearest weaver. In 1789 also, cotton was manufactured on a small scale at Baltimore. In view of the advantage offered by the Falls of the Passaic, a company was organized among individuals of New York, New Jersey and Pennsylvania, in 1791, with a capital of 5,000 shares of $100 each, for the purpose of establishing there the manufacture of cotton cloth, and for setting up "a great emporium of manufacturers." They were granted extensive privileges including a city charter over a district six miles square, and containing about ten houses, which they named Paterson, in honor of Judge William Paterson, the Govenor of the State.

To manufacturers and artisans who desired to settle there, water privileges were granted, and they were aided with capital. The company was not at first successful in its immediate purpose but it has the credit of having established a flourishing centre of industry. The manufacture of cotton goods was at this time progressing in Connecticut, and success was there being attained in the printing and dyeing of the goods.

It may be noted as a curious fact that a cotton mill established in 1795, at Warwick, R. I., and which was an extensive concern, was followed in the fifteen successive years by one cotton mill annually—a proof of the flourishing character of the business. The year 1803 saw the first cotton factory erected in New Hampshire, the location being Ipswick, the second cotton factory in Massachusetts, and the third cotton factory in Providence, R. I. In 1804, cotton was first carded and spun in Pittsburgh, by the carding machine and spinning jenny; and the first regular factory in this State was established at Union Village, Washington Co., and it

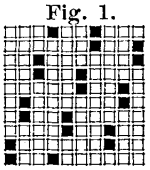
continued up to 1849 the largest factory in this country. It was conducted by Samuel Slater, who had acquired his knowledge in the pioneer establishment at Pawtucket. The quantity of cotton manufactured in the United States in 1805 was 1,000 bales; the price for Nos. 12, 16 and 20 of cotton twist yarn was respectively 99,115 and 131 cents. The number of spindles in Slater's cotton mill was increased in 1806 to 900. It is always pleasant to learn of genius and industry rewarded. Slater, on removing to Smithfield, R. I., accumulated a large fortune in the cotton and iron business. By the interruption of our foreign trade in 1807,and the suspension of imports, a vast impulse was given to the United States cotton manufacture, and powerful corporations, with large capital made their appearance. The first lot of cotton goods printed in the United States by engraved rollers and machines, these superseded the process of block printing previously in use, were produced in 1810 at the block and print works of Thorp, Liddell & Co. six miles from Philadelphia. Their arrival in that city created a sensation. It was announced that one man and two boys were able to print 10,000 yards of cloth, or 50,000 children's handkerchiefs in a single day. Up to 1813 the weaving generally had been done by hand looms, the cotton mills being principally for spinning, but the Boston Manufacturing Co., organized in that year, proceeded to combine the two. The stock was principally held by Mr. Lowell. after whom Lowell was named. The factory was at Waltham and the first goods made were heavy unbleached sheetings of No. 14 yarn, 37 inches wide, 42 picks to the inch, and weighed somewhat under three pounds per yard.

The general success of cotton manufacture, with the improvements in machinery and the rapid immigration of cotton operatives caused great activity in the securing of water rights, particularly in Massachusetts and Rhode Island. Providence, R. I., had in 1813 no less than 120,000 spindles, which comsumed in a year 6,000,000 lbs. of cotton. The year 1823 witnessed the organization of the Waltham Manufacturing Co., the most extensive in the Union, and which, by its operations, was able to divide yearly 12 per cent. on its capital. With the design of introducing the manufacture and printing of calicoes on a large scale, the present site of Lowell was selected and purchased by the principal shareholders in the company, these disposing of a portion of the shares to it. At Lowell, the manufacture of calicoes was commenced in 1822. The cotton crop of the United States reached in 1821 to 210,000,000 lbs., of which more than half was exported. The Waltham and Lowell undertakings stimulated further enterprise, and on the Brandywine, American chintzes were turned out in seven or eight colors, fast and brilliant, and jaconet muslin of Bengal and Surat cotton. A cotton factory capable of running 1,000 spindles came into operation at Fayetteville, N. C., in 1824. In short, the cotton industry had now assumed a magnitude which excluded all prospect of foreign competition, and was the prelude of a production which now exceeds the home demand, and successfully competes with English goods not only in England itself, but in foreign markets.

WORSTEDS AND WOOLENS, ETC.

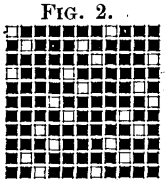
IN making designs, patterns, and cloths for worsted coatings, trouserings, suitings, etc.; also for woolens, and other cloths which are made to fit close to the wearer, the chief objects must be that they shall be firm in handle, sufficiently pliable not to feel hard and file-like, and also bright and attractive looking. Cloths for gentlemen's wear require these conditions to be carried out much more perfectly than the light fabrics used for ladies' dresses, inasmuch as the cloths for the latter purpose are generally made so as to drape in folds, while those for gentlemen have to bear the strain of physical exertion in all its aspects. Having a desired pattern to make, it is often necessary to try it on several different cloths before one can be found which will suit it perfectly. Some cloths, in which the pattern looks well, are too heavy, some too light; whilst in others that are the proper weight the pattern is either too loose, or too fast, giving the file-like appearance spoken of. We shall endeavor to give a few of the most important patterns in use at the present time and also the build of cloth which will yield suitable results, though of course, the weight of the materials may be different from what the reader may at present require, but as there has been so much said in our Textile Journals lately about "cloth building" and "cloth structure," and so much correspondence has been entered upon, and as the subject has been so heartily taken up in our various schools, the readers of this Journal will have little difficulty in adopting any one of them to his own immediate use. We shall not give the well known 13-end corkscrew, because it is, we think, nearly played out, though it is still a good and serviceable pattern, but its great fault lies in its feeling hard and papery if much material is put in, whilst it has also a tendency to shine or wear brilliant where friction has been applied—principally down the front of the coat, where it is buttoned, and also under the sleeves where the arms rest upon the table or the desk. One of the first considerations in designing for materials of this kind is to have a pattern and cloth which will be strong enough to bear the strain to which it will be subjected, and also sufficiently pliable not to wear brilliant or "shiny." Figure 1 is simply a twill upon 10 ends, ar-

Fig. 1.



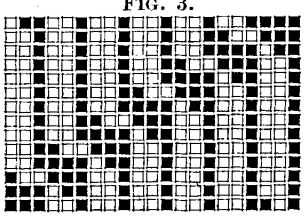
ranged in ordinary satin, with the warp floating on the face for 8 picks, then going to the back for two picks: this arrangement gives what some people call a "corkscrew," while others designate it a "rolling twill." It is a very fine rib, running at an angle of about 60 degrees across the cloth. The fineness of the rib might be varied considerably by altering the size of the warp, and the angle at which the twill runs will depend upon the thickness of the weft and the quantity of picks. A very good cloth can be made as follows:—100 ends per inch of 2-36's worsted, and 88 picks per inch of 16's worsted weft. This would give about 20 oz. per yard, finished 56 inches by 36 inches, and woven about 64 inches in the reed. Figure 2 is another similar pattern, but

FIG. 2.



upon 11 ends. In this the warp floats on the face for 7 picks, then goes to the back for 1 pick, and again floats on the face for 2 and on the back for 1. By this arrangement, the ribs have a complete separation from each other, and appear very bold and conspicuous while the large float gives the cloth a loose and open texture, and at the same time maintains a good weight. The binding of the pattern gives the back of the cloth a very peculiar appearance, something like the 13-shaft "corkscrew" back previously spoken of. Anyone interested in this branch of designing would do well to study this and similar patterns, as the order of inter-weaving and the particular satin order of arrangement, in some cases, give altogether unlooked for results, some of which are extremely valuable in the making of new patterns. A good cloth for figure 2 would be 112 ends per inch of 2-36's worsted, and 80 picks per inch of 18's worsted weft, being about 20 oz. finished. Another style of this kind is shown in figure 3. This pattern has a back-

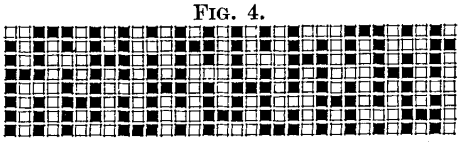
FIG. 3.



ing warp put upon it to give it extra weight, and also to give the pattern more definition. If the pattern be carefully examined, we shall see that the face pattern is made by transposing, or reversing, every pair of threads, the pattern being of 14 ends with a long warp float. The back is a 14-end twill, being allowed to float at the back over 13 picks, and to bind on the 14th, and is

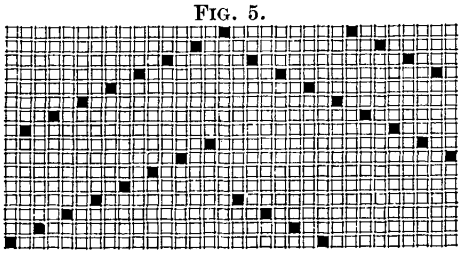
complete upon 7 ends, as the threads advance in twos across the design, which allows it to be complete at the same time as the face, the face being 2 ends to the back 1. This would make a good cloth if made as follows:—140 ends per inch of 2-40's worsted, and 90 picks per inch of 2-30's worsted, giving a cloth 23 oz. per yard finished, the face and back warp being the same. Another similar pattern is shown in figure 4, where the twill is re-

FIG. 4.



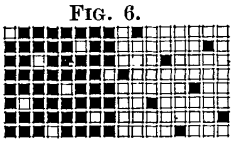
versed at intervals. The pattern is shown as having 16 ends in each direction, but this might be varied at will. 16 ends in this sett would give a very small stripe, therefore we would suggest that it be repeated twice or three times, or the stripes might be arranged so that one is considerably larger than the other. In this pattern, a backing warp is put upon it so as to make the cloth a very heavy one. As will be readily seen, an 8-end satin on the face, and bound on the back with the same pattern, will allow a large amount of material to be put in. Figure 5 is the

FIG. 5.



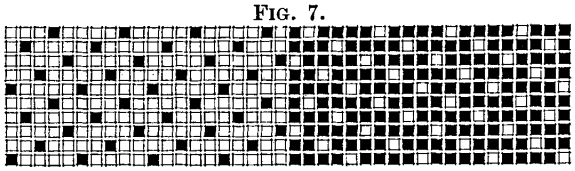
draft for it, on 16 healds, 8 for face and 8 for back, figure 6 be-

FIG. 6.



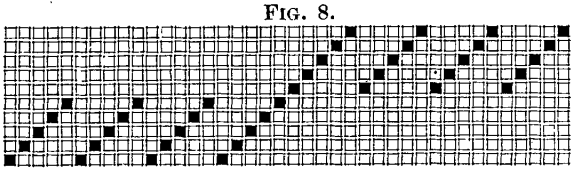
ing the pegging plan for the same. A good build of heavy cloth would be:—180 ends per inch 2-36's, and 80 picks of 2-30's, giving 28 oz. finished. In each of the foregoing patterns, novel and pretty effects can be got by reversing the twills, and also by the introduction of color, especially twist yarns. Another form of pattern is shown in figure 7, where the pattern is an ordinary sat-

FIG. 7.



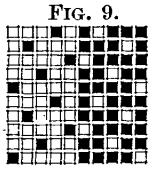
in stripe, composed of warp and weft stripes alternately. The effect of this is to throw up the stripe, formed with warp, while the stripe formed with weft is equally depressed, giving a very pretty appearance; the effect is also heightened by employing thick warp and crowding it together, while the weft might be of any reasonable thickness without materially altering the effect. This class of pattern might be advantageously employed for the making of light serges for ladies' wear. Figure 8 is the draft

FIG. 8.



and figure 9 is the pegging plan for the above, and for a 16 oz.

FIG. 9.



cloth a good build would be:—70 ends per inch of 2-32's worsted, and 72 picks of 18's worsted weft. This class of pattern might be very successfully imitated by employing right and left twist yarns for the respective stripes, and running the satin all in one direction.

In the making of fancy woolen cloths, we do not trust so much to pattern as to color. We generally find that woolens, in whatever weight of cloth, use the ordinary twill, 2 weft and 2 warp, and vary the weight by altering the thickness of the warp and weft, and by predominating one material over the other. Many of the fancy woolen hair-lines get their peculiar and smart appearance by adopting what is known as the double plain cloth, which is two plain cloths one over the other, interwoven in such a manner that each weft thread intersects each cloth in the same degree, care being taken to arange the colors in such a manner that one color of weft passes over only those threads of warp which are of the same color. Another method of ornamenting woolen cloths is to introduce mohair or other bright yarns, the bright yarn being allowed to float largely on the face of the pattern, while the dull woolen yarn is being interwoven into the body of the fabric, and shows up the bright material very prominently. In all fancy woolens, twist yarns enter very largely into the composition of the fabric, being generally much thicker than the body of the cloth, and in some cases, made up of three or four different colors twisted together. As the twist cannot be always in the same position in relation to the twill, sometimes one color is on the face, and sometimes another, which gives it a variegated appearance. Another form is to employ what is known as knop or "snowflake" yarn, which is ordinary colored thread with different colored flocks twisted into it; this gives the fabric a very rich appearance, when good and harmonious colors are used, as the knops can never repeat themselves with the regularity of either stripes or twists, making an ordinary plain cloth appear as though it were a very large pattern. We shall not trouble the reader with any example of the above as they are so simple and easy of adoption, but we should like to point out that the main thing to look to in this class is the arrangement of color, which is the acme of all good designing. Another class of fancy woolens which are now claiming a great deal of attention are what are known as tennis cloths. These again depend principally upon the coloring of them, they are generally made in stripe form, though equally good in checks, if the checking be done judiciously. Of course as will be readily understood, this class of cloths should be so colored that they will give the appearance of lightness and coolnese, hence the use of so much light blue which we see in them. The coloring, in all cases, should be used sparingly and not so as to destroy the appearance of cool comfort, which pure white so readily gives; in fact, it should be carefully bourn in mind that these cloths are to be worn in summer, while the sun shines, and that dark sombre colors would look very much out of place on the tennis ground. These cloths are made 8 to 10 oz. per yard finished, being about 32 inches wide. A good heavy cloth might be made as follows:—60 ends per inch, 24 skeins woolen warp, and 56 picks per inch, 25 skeins woolen weft, giving a cloth about 9½ oz. per yard. Another good cloth would be 70 ends per inch of 40 skeins warp, and 72 picks of 36 skeins weft, giving 8 oz. per yard. This would be very much finer and lighter than the first. For colorings we should recommend the following:—White and light indigo, white and dark indigo, white and pale pink, white and light blue and pale pink in the same combinations, pale brown and medium brown, each combined with white, etc. In all the combinations, let the white predominate very largely. In checking patterns of this kind, use less color for the stripe, otherwise there would be too much massing in them, which would spoil the purity of the combination. These are generally woven with an ordinary twill—2 warp and 2 weft, but they might with effect be arranged in stripes after the manner of the herring-bone. If this be done well, the slight raising that the cloth undergoes will tone down the effect, while the coloring will be shown with greater advantage; care being taken that it is not too prominent. This method will allow a stronger color being used if it is placed in the centre of the stripe, as the break in the pattern will prevent any violent contrast due to the juxtaposition of two strong colors. —*Journal of Fabrics, Eng.*