Diagram *g*, the fabric section, illustrates the interlacing of picks 1 and 2, representing respectively a dark and a light pick. The 24 warp-threads in the repeat of the weave are indicated by corresponding numerals accompanying full and shaded circles, representing respectively dark and light ends. The interlacing of each pick on face and back of the fabric by the 4-harness twill is plainly shown.

CHECKERBOARD EFFECTS.

Fig. 14 shows a broken twill, broken warp and filling ways every 6 warp-threads and picks, having

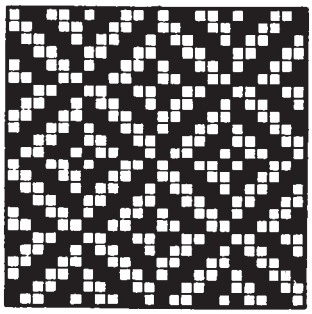


Fig. 14

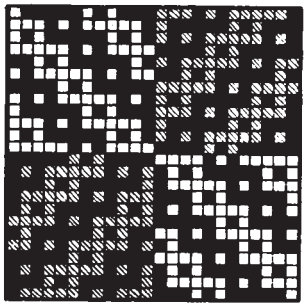


Fig. 15

the 4-harness twill for foundation and repeating on 12 by 12.

Fig. 15 is a reversible broken twill having weave Fig. 14 for the interlacing of each ply structure, *i. e.*, 12 ends (reversible) twill from left to right alternating with 12 ends twill running in reverse direction, both warp and filling ways.

The combination of face and back threads in the weave is uniform for warp and filling, one end face to alternate with one end back, hence 2 ends of one

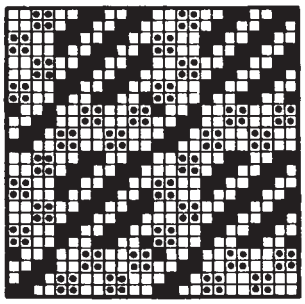


Fig. 16

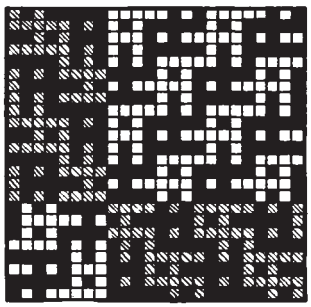


Fig. 17

color must be used in warp and filling where the reversible effects occur in the fabric structure, the arrangement being:

1 dark, 1 light } × 6
1 light, 1 dark } × 6

Repeat of Weave: 24 warp-threads and 24 picks.

Fig. 16 is a checkerboard, twill and basket effect combination, repeating on 12 by 12, with 4 ends changing against 8 ends. Twill is shown by *full* type, basket by *dot* type.

Fig. 17 is the reversible, having weave Fig. 16 for its face effect. The combination of face and back in warp and filling is uniform, one end face to alternate with one end back, the arrangement of the colors in warp and filling being:

1 light, 1 dark } × 4
1 dark, 1 light } × 8

Repeat of Weave: 24 by 24.

Wherever in the weave the face-ply interlaces twill effect, the back-ply interlaces basket, and vice versa where the face-ply interlaces basket, the back-ply interlaces twill. The latter weave is made to run in the reverse direction from that of the face twill on the point paper, hence runs in the same direction on the back of the fabric structure as the face twill does on the face of the fabric structure.

(To be continued.)

THE MANUFACTURE OF RIBBONS, TRIMMINGS, ETC.

(Continued from January issue.)

Entering Threads.

The same refer to fancy edges of ribbon produced by an outside warp-thread or threads floating for a certain number of picks outside of the body of the fabric structure, after which the same interlace similar to the filling into a portion of the ribbon, in turn producing a fancy edge (loop) to the fabric. Either one or both sides of the ribbon may thus be ornamented. These warp-threads are called entering threads, for the reason that they are entered into the body of the fabric structure by means of the filling pulling them into the shed and thus interlacing them.

These entering threads may be used either for the formation of raised figures, for the embossing of warp figures, for producing multi-colored effects, and finally to substitute a cheaper yarn in certain places of the ribbon for a more expensive one.

The chief requirement for a perfect entering of said warp-threads in the body of the fabric structure is that they are let off from their spools under a very loose tension, whereas the filling must come from its bobbin under sufficient tension to pull the entering thread (after engaging with it) for a certain distance across, and into the fabric. Single, two or more fold threads may be used as an entering thread.

If the entering thread rests on the right hand side of the fabric, as shown in Fig. 113, then draw said entering thread, after all the body warp-threads are drawn in the harness, as the next warp-thread towards the right, using for it a separate harness.

Considering fabric sketch Fig. 113 we see that the filling is first entered for portion *a* to *b* of the fabric in its regular way (plain weaving, for example, throughout the width of the fabric) the entering warp-thread *x* not interlacing with the filling. At *c* we then see that the filling, as entering into the shed from the left, then interlaces with plain weave, up to *d*, the point to which the entering warp-thread *x* is drawn into the fabric structure; from *d* to *c* only those warp-threads are raised as are to rest above the entering thread *x*.

The entering warp-thread, according to its twist, is either raised at the first entering pick and lowered at the second, or vice versa; being caught by the filling, on account of its slack tension, it then can be readily drawn by the latter into the fabric structure.

The second entering pick, coming from the right, after having itself interlooped with the entering warp-thread, pulls the latter into the fabric for the portion *e* to *d* of the shed, which for this purpose corresponds with that of the previous pick, whereas from *d* to *c*

regular plain weaving of the warp-threads takes place. The filling, on account of the shed from *d* to *e* being the same for both picks, pulls itself out of this part of

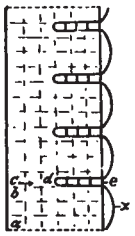


Fig.113

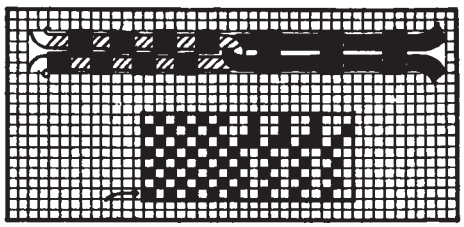


Fig.114

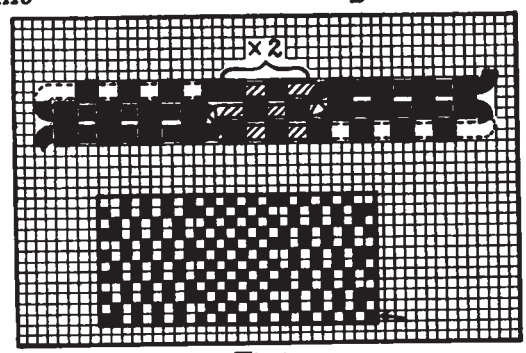


Fig.115

the shed, compelling the entering thread to follow into the shed up to the point d.

Fig. 114 shows the weave plan for fabric sketch Fig. 113. Above this weave plan, we have diagrammatically shown the connecting, *i. e.,* looping, of the entering warp-thread with the filling. The entering warp-thread is shown in black, the regular filling in outline—shaded and the regular warp in black.

Provided it is desired that the entering thread is to form a larger loop, the same is then made to travel around a wire, passed through the reed, near to the edge of the fabric, and which will hold the entering thread somewhat away from the edge of the fabric, in order to produce the more prominent loop desired. The wire must be alternately raised for two entering picks and in turn lowered for the next two entering picks.

If the entering thread rests at the left hand side of the fabric structure, the entering is done in the same way as in Fig. 114, having the shuttle enter for the first pick from the right and for the next from the left.

Fig. 115 shows the working of an entering thread situated on both sides of the fabric structure. These

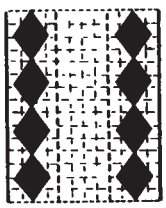


Fig.116

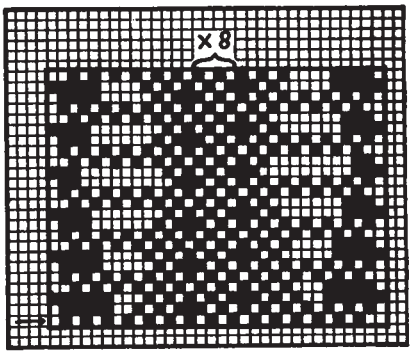


Fig.117

entering threads are drawn between the 2 by 4 warp rib, as used for the interlacing of the edges of the fabric, to the center portion of the structure which interlaces with the taffeta weave. Above the weave is given a plan, showing the interlacing of right and left hand situated entering threads, in connection with its two entering picks. The filling is shown in outlines (shaded) the entering threads and the regular warp-threads being shown in black.

Fig. 116 shows a fabric sketch in which two entering threads form a geometrical figure. Fig. 117 shows the weave-plan for the fabric, face up in the loom.

In connection with fabric sketch Fig. 118, one entering thread is used, the same resting in a *zig-zag* position on the face of the fabric structure. This entering thread is placed into the lower shed on such places where said entering thread has to interlace with the fabric structure, *i. e.,* in places indicated by letters of reference *e* and *f*.

Fig. 119[a] is the weave-plan for producing fabric sketch Fig. 118. The entering thread, shown at *e* in Fig. 118, interlaces with the fabric at the fourth pick of the weave, by means of being pulled in the lower shed (see *g* in Fig. 118). The filling is then entered, interlacing with taffeta, in the warp-threads up to and including pick 11, the entering thread being, on these picks, always raised.

At pick 12 (see *h* in Fig. 118), the filling is then made to interlace in taffeta up to the point to which the entering thread is to be pulled into the structure (see *f* in Fig. 118) and from there floats above the

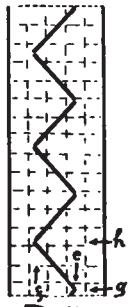


Fig.118

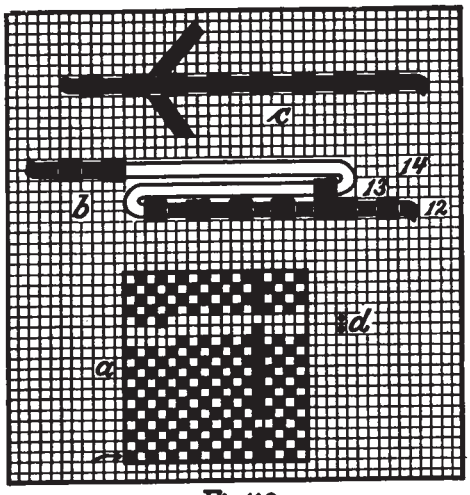


Fig.119

warp-threads. Pick 13 passes over all the body warp-threads, but under the entering thread.

Pick 14 rests above the entering thread, the latter being caught by pick 13 and 14, and in turn entered so far until the filling again interlaces with the body warp-threads (see *f-h* in fabric sketch 118).

These three entering picks thus referred to are shown in diagram Fig. 119[b] in detail. The portions of the filling shown in outline, draw themselves together.

On picks 13 and 14, the cloth take-up motion of the loom is automatically brought out of operation, in order to push these picks as close as possible in the shed, said two picks for this purpose being indicated by *d* at the right hand side of weave Fig. 119[a]. Pushing the three picks as close as possible together, they naturally will only occupy the space of one pick on the face of the fabric, as is shown in Fig. 119[c], and which will at once explain the interlacing of these entering threads in the body structure of the fabric, as shown in fabric sketch Fig. 118.

The best way of drawing-in these entering threads in the harness is to arrange them, so that picks 1 and 3 are entered in the direction in which the entering threads have to be pulled in, the tension of the filling in this way taking better hold upon the entering thread.

Fig. 120 is a fabric sketch showing two entering threads working in opposite directions on the face of a ribbon, forming in this way, a diamond pattern. To produce such an effect in the best possible manner, place the two entering threads where they will work the furtherest apart, *i. e.*, points indicated by *a* and *b* in Fig. 120. The drawing together of the two entering threads in the center of the fabric, is accomplished either by means of three or five picks, both arrangements equalling in effect one pick on the face of the fabric, the take-up device on the loom, at these

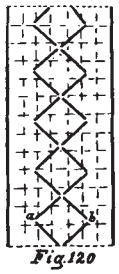


Fig.120

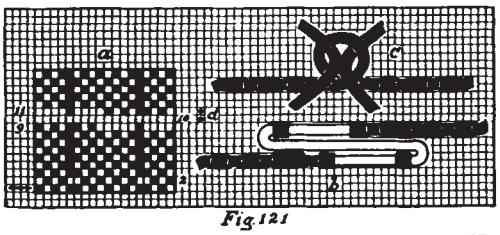


Fig.121

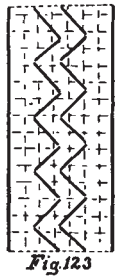


Fig.123

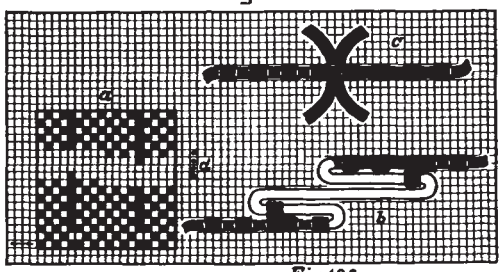


Fig.122

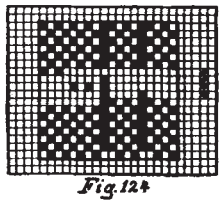


Fig.124

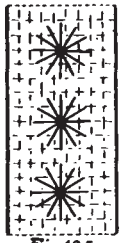


Fig.125

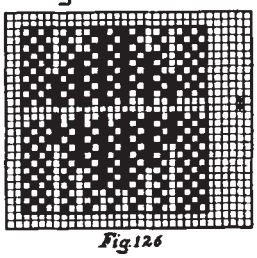


Fig.126

picks being arrested so as to equal the introduction of only one pick with reference to the take-up of cloth roller.

Fig. 121[a] shows us the weave for producing the fabric according to sketch Fig. 120, with three entering picks. On the second pick of this weave, both entering threads are secured to the fabric by means of being pulled into the lower shed. Pick 9, of Fig. 121[a] is the first pick of the three entering picks. The filling, entering from the left, interlaces in taffeta until coming to the point where the entering threads have to be drawn into the fabric, passing after this below the right hand situated entering thread, surrounding then, in union with pick 10, this entering thread as situated on the right hand side of the design.

Pick 10, in unison with pick 11, loops around the left hand situated entering thread; pick 11 forming in the body of the fabric the continuation to pick 9.

Fig. 121[b] shows these three entering picks. On account of the tight tension given the filling, and the temporary arresting of the cloth take-up for these three picks, the latter will show in the fabric as one pick. Fig. 121[c] illustrates the position these three picks occupy in the woven fabric, illustrating at the same time the loop, *i. e.*, securing of the two entering threads to the body structure of the ribbon.

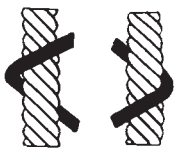


Fig.127

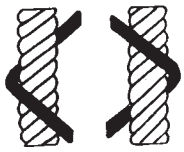


Fig.128

The entering threads which rest in the center of the ribbon, must be added in the advance-reed, the body warp being threaded regularly. Fig. 121[d] shows the two picks where the cloth take-up is thrown automatically out of action.

Fig. 122[a] shows us the weave necessary for producing fabric shown in sketch Fig. 120 with five entering picks. The second and the third entering pick loop with the entering warp-thread as situated at the left hand side, the third and fourth entering pick looping with the entering thread as situated at the right hand side of the fabric, a procedure clearly shown in diagram 122[b]. Portions of threads, shown in outline are compressed in the loom, resulting in the appearance shown in diagram Fig. 122[c], the compressing of the five picks into apparently one, on the face of the fabric being accomplished by means of temporarily arresting, at these five picks, the take-up motion of the cloth roller. Using five picks produces a smoother interlacing of the entering threads compared to that of using only three. Fig. 122[d] indicates the four picks where the take-up of the cloth roller is thrown out of action.

Fig. 123 shows us two entering threads resting parallel with each other on the face of the ribbon. Either entering thread must be connected to the fabric by means of a separate pick, as shown in weave plan Fig. 124.

Fig. 125 shows us a sketch for a ribbon, executed with six entering threads, all of which, as shown in weave Fig. 126 are drawn together in the middle of the ribbon by means of three entering picks. The entering threads must, in connection with this pattern, on account of their different interlacing in the fabric structure, be divided into 3 warps @ 2 threads.

If using for the entering threads a yarn showing prominent sharp twisted spirals, place the entering loops of the filling so that the latter will not be caught in the spirals of the entering threads.

Fig. 127 shows proper looping of a left and a right hand situated entering thread having right hand twist spirals.


Fig.129


Fig.130

Fig. 128 shows proper looping of a left and a right hand situated entering thread having left hand twist spirals.

Fig. 129 shows wrong looping of two entering threads having right hand twist spirals.

Fig. 130 shows wrong looping of two entering threads having left hand twist spirals.

(*To be continued.*)

Novelty in Fabric Structure for Shoe Tops.

It has been common in the manufacture of shoes for many years to employ in the construction of the top, or as frequently called the *upper,* textile fabrics of various kinds as a substitute for leather. In view of

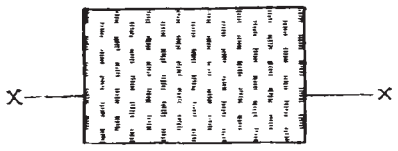


Fig. 1

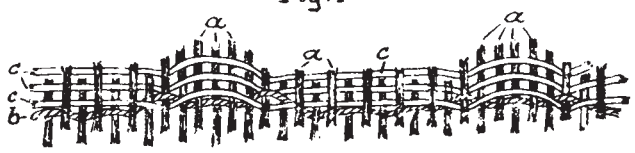


Fig. 2

the rough usage to which it is likely to be exposed, the cloth employed for this purpose must be durable, *i. e.,* have good wearing qualities. The cloth should also at all times present an attractive appearance. To produce a fabric which is able to withstand exposure to the weather, and the wear and tear to which a shoe upper must necessarily be subject, and at the same time to display and preserve an ornamental aspect, has been heretofore a question of much study and in general of unsatisfactory solution. Where the ornamental appearance of the cloth has been attained it has been at the sacrifice to the wearing qualities of the upper; again where the cloth has been of the durable character desired the decorative quality has been dispensed with.

To overcome this trouble, the inventor of the new fabric structure, D. W. Northrop of Brookline, Mass., suggests to utilize for the cloth of a shoe upper, a combination of woolen or worsted yarns with cotton yarns, together with additional threads of fibre silk to give a spotted and brilliant effect to the goods and to re-inforce the cloth and preserve its durability. These materials are to be united so as to present on the face of the goods a woolen or worsted background, displaying at regular intervals spots of fibre silk, and on the back of the goods a surface largely of cotton.

Of the accompanying illustrations, Fig. 1 is a view of the face of the new fabric structure, showing the arrangement of the spots of fibre silk; Fig. 2 is an enlarged view of portion of Fig. 1 showing the arrangement of the yarns; Fig. 3 is a cross section on line *x-x* of Fig. 1.

Referring to the illustrations Figs. 2 and 3, letters of reference *a* indicates the warp, *b* and *c* the filling. The warp yarns *a* are preferably of woolen or worsted and in the completed fabric substantially cover the

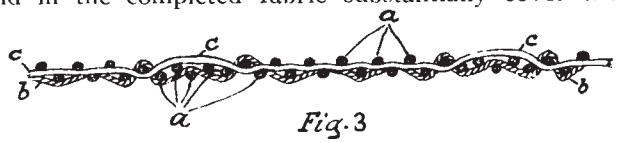


Fig. 3

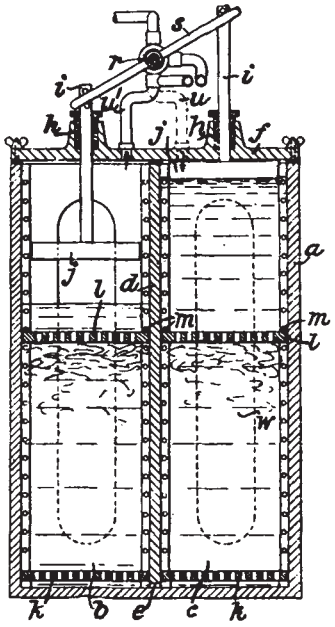
spaces between the spots and form the background on the face of the goods, furnishing in turn a wearing and protective surface. The filling yarn *b* is preferably cotton or linen and woven to form a lining and in a large part a backing for the cloth, also to furnish the necessary strength and resiliency to the fabric. Picks *c* are fibre silk, laid as shown to produce a spotted appearance upon the face of the goods, serving as an ornament to the cloth as well as to add greatly to its durability.

Dyeing and Bleaching Apparatus.

Textile materials such as cotton in various stages of manufacture, fabric, wood pulp or other cellulose fibres, to be bleached, or dyed, or both, are in the new apparatus, and which is a late invention by O. and E. H. Sumner, Netherton Road, St. Margaret's-on-Thames, Middlesex, England, subjected in the presence of the treating-liquid, to a varying air pressure. The apparatus, as seen from its section given in the accompanying illustration, comprises two compartments adapted to be charged with both material and liquid, the liquid alternately rising and falling therein.

The compartments *b, c,* form one receptacle *a,* or may be separate, with suitable pipe connections. The compartments communicate through a slot or perforations *e* at the foot of the partition *d* and below the perforated false bottoms *k* provided.

The material to be treated having been placed in the compartments *b, c* and covered by perforated plates *l,* held by pins *m,* the treating-liquid is introduced and the apparatus closed with a cover *f.* An air-pump, working continuously in one direction and connected through suitable three-way valves having



concentric plugs and pipes u, u^1 to the compartments *b, c,* is then started, withdrawing air from one compartment and forcing it into the other, simultaneously causing the rise and fall, respectively, of floats *j,* one in each of the two compartments. A single float may be used, in one of the compartments.

The vertical rod *i,* attached to each float passes through a stuffing-box *h* in the cover *f*; this rod is connected through a lever *s* with the spindle *r* of the three-way valves, so reversing the incidence of the pressure and suction when either float reaches the top of the compartment. The operation is repeated each time this occurs.

While the employment of a pump is preferred the movement of the air may be effected in any way. The control of the cocks may be manual instead of automatic. Inspection windows *w* may be provided in either or both compartments.

The increase in imports of coal-tar colors from Germany rose from 404,000 pounds in November, 1913, to 938,000 pounds in November last; those from Switzerland increased from 66,000 to 116,000 pounds.