

(Specimens.)

2 Sheets—Sheet 1.

H. J. HOPE.
WOVEN PILE FABRIC.

No. 547,608.

Patented Oct. 8, 1895.

Fig. 1.

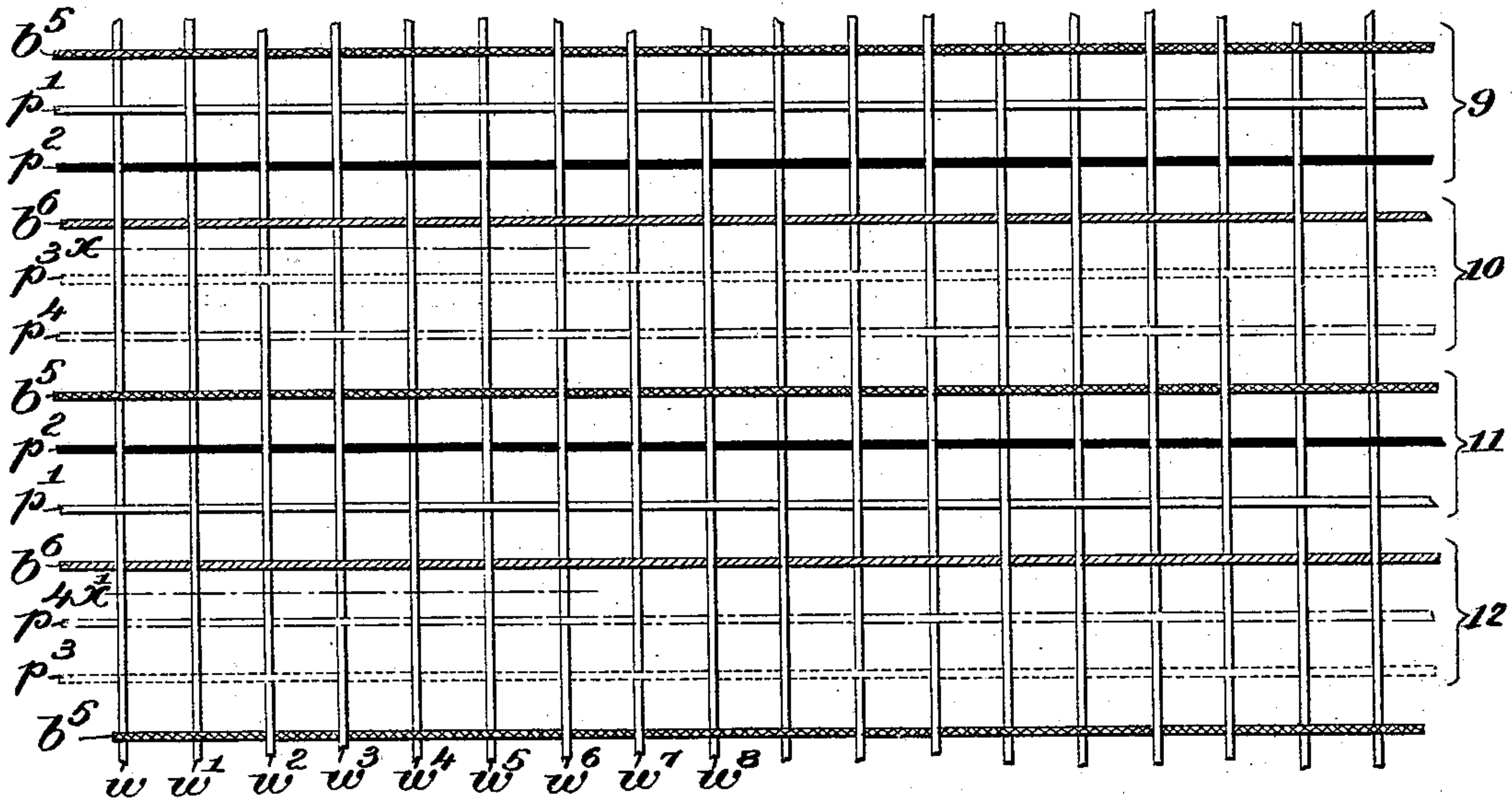


Fig. 2.

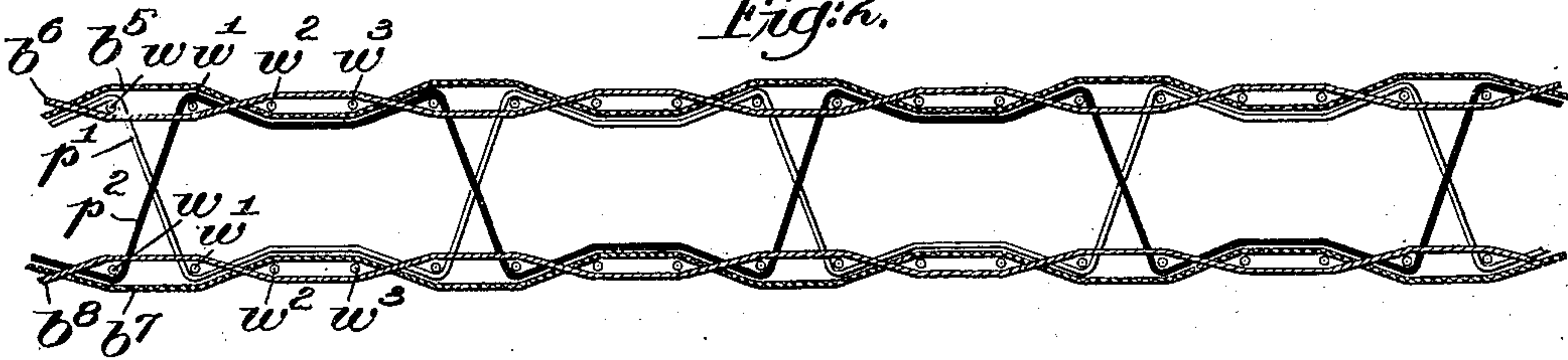


Fig. 3.

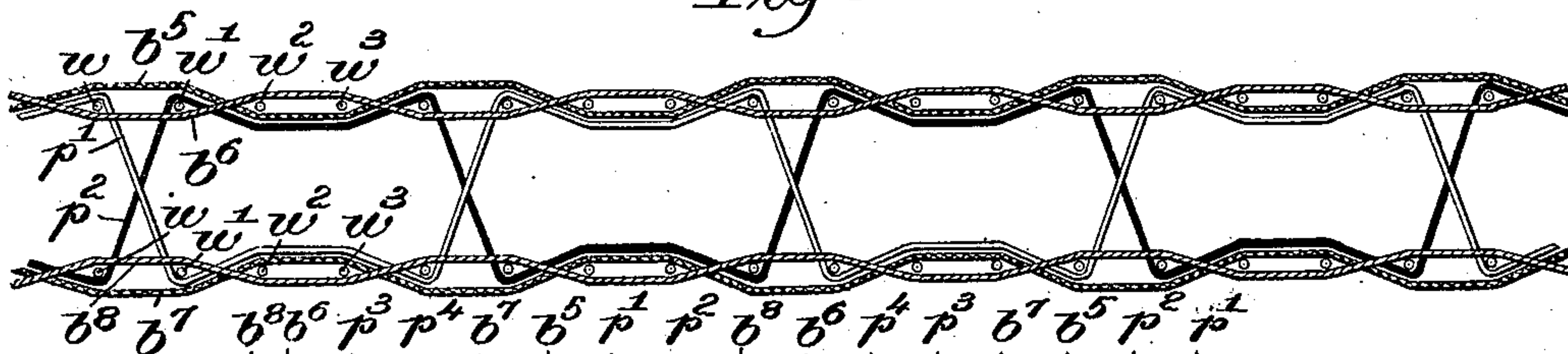
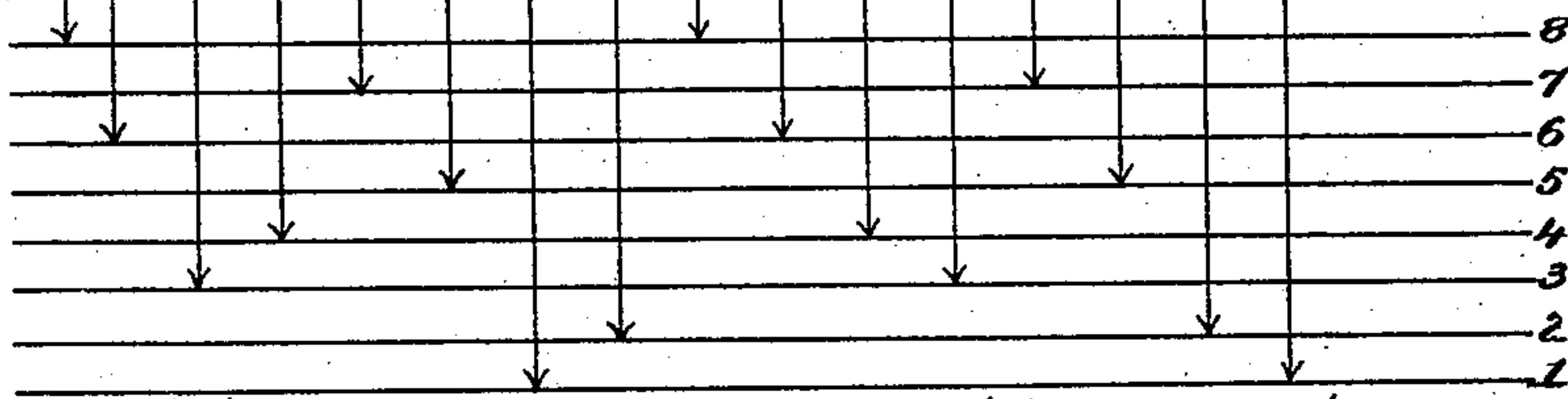


Fig. 4.



Witnesses. 12

Fred S. Greenleaf.
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11

10

9

Inventor:

Herbert J. Hope
by Crosby & Gregory attys.

(Specimens.)

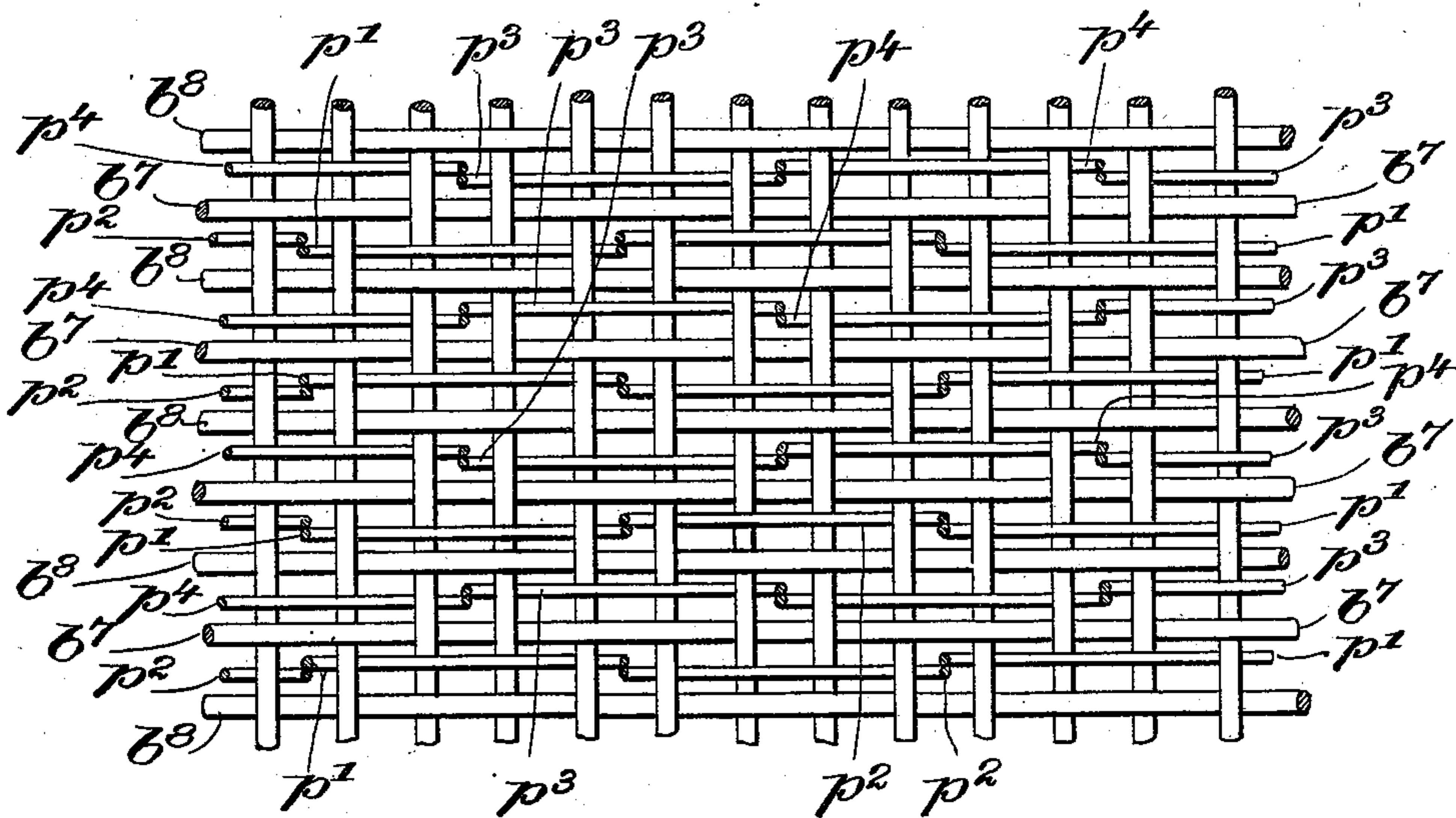
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Fig. 5.



Witnesses,
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Inventor:
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UNITED STATES PATENT OFFICE.

HERBERT JAMES HOPE, OF SANFORD, MAINE.

WOVEN PILE FABRIC.

SPECIFICATION forming part of Letters Patent No. 547,608, dated October 8, 1895.

Application filed June 25, 1894. Serial No. 515,630. (Specimens.)

To all whom it may concern:

Be it known that I, HERBERT JAMES HOPE, a subject of the Queen of Great Britain, residing at Sanford, in the county of York, State of Maine, have invented an Improvement in Woven Pile Fabrics, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

In the production of plush fabric, especially that in which the fabric is woven double or with two sets of backing-warps connected by a series of pile-warp threads carried by several harness-frames, said pile-warp threads being severed substantially midway the two woven backs or foundations, great trouble has been experienced due to the appearance of objectionable transverse creases or lines of separation appearing at the pile-face of the fabric when cut and extending longitudinally across the same, and to finish this class of plush for market it has always been considered necessary to crush the pile to thereby enable it to better cover the spaces referred to.

I have experimented to produce a plush fabric by the method of double weaving which when cut should not show the objectionable transverse furrows referred to. In the production, as now commonly practiced, of this class of fabric, the pile-warp threads, which are incorporated with the backing-warp threads by the weft, are arranged in pairs and the threads of the pairs are passed from one to the other sets of backing-warps in regular order, so as to unite the pile-warp threads and body-warp threads, the weave being such that if all the pile-warp threads should be woven with but one set of body warp and weft and drawn solidly into one fabric the face of the fabric would present a herring-bone pattern, requiring eight picks for the two inclines of the pattern—that is, four picks for one angle and four picks for the next or opposite angle of the herring-bone, and so on; or, in other words, supposing that four sets of pile warps worked in pairs are being incorporated with four sets of backing-warps arranged in two different horizontal planes to thus make two fabrics, said pile-warp threads will be reed into the four harness-frames uni-

formly in the regular order of 1 2 3 4, 1 2 3 4, &c., entirely across the loom, each of said pile-warp threads remaining in one back for four picks and then being carried at the fifth pick to the other back, where it remains for four picks, and is then taken again to the other back, each thread of each serial set of pile-warp threads always occupying the same position with relation to the other threads of the remaining sets of pile-warp threads. The double fabric so produced is separated into two fabrics by cutting the pile-warp threads centrally between the woven backs, and when the fabric is subsequently washed, dyed, and sheared the pile-loops held by the weft in the back separate and form furrows across the fabric, the furrows being most marked in the line of each fourth pick, for in that line occurs the change of angle of the herring-bone. In my experiments to obviate the appearance of these transverse furrows in the fabric I have discovered that by simply changing the order of reeding in of the pile-warp threads into the heddles of the harness-frames—i. e., that instead of reeding the four sets of pile-warp threads into the harness-frames in the order 1 2 3 4, 1 2 3 4 across the loom, such order of reeding in being the one now used, so far as I am aware, for weaving mohair plush—I reed in said pile-warp threads alternately in the order 1 2 3 4, 2 1 4 3, 1 2 3 4, 2 1 4 3, &c., across the loom, so that at some parts of the width of the fabric the pile-warp threads in No. 1 harness-frame may lie at the right of the threads of No. 2 harness, and at other parts of the width of the fabric the threads of No. 1 harness will lie at the left of the threads of No. 2 harness, such new order of reeding in of the pile-warp threads resulting in a more uniform spacing of the tufts or loops of pile on the weft-threads, effecting a better crossing of the loops of pile, and breaking up the tendency of the loops in the finished fabric to separate and thus show cross-furrows.

I shall herein describe my invention as practiced by the employment of four sets of pile-warp threads in four harness-frames; but it will be understood that more than that number of pile-warp threads and harness-frames may be used in pairs, so long as the order of reeding in in pairs of alternate sets

are reversed, as described, at different portions of the width of the fabric or loom, such reeding in instead of producing a herring-bone under the conditions described producing a regular diagonal from selvage to selvage.

Figure 1 is a diagram showing the outer side of the back of one fabric with the backing and pile warp threads separated, but united by weft in accordance with my invention. Figs. 2 and 3 represent longitudinal sections of the double-woven fabric in the lines x and x' , Fig. 1, to show the reverse reeding in of the pile-warp threads of one pair of threads. Fig. 4 is a diagram showing the reeding in of the warps into the harness-frames and the relation of the warps to the dent-spaces. Fig. 5 is section through between the two backs, taken on the line $x^2 x^2$, Fig. 2.

Referring first to Fig. 4, let 1, 2, 3, 4, 5, 6, 7, and 8 represent harness-frames having usual heddles, while the brackets 9, 10, 11, and 12 are drawn to indicate dent-spaces of the reed, each dent-space in this instance of my invention containing four threads; but it will be obvious that if more than four sets of pile-warp threads are used each set will have its own harness, or if more than four sets of backing-warp threads are used each will have its own harness, and consequently the number of threads in a dent-space may be varied without departing from my invention.

I have designated the four sets of pile-warp threads by the letters p' p^2 p^3 p^4 and the four sets of backing-warp threads by the letters b^5 b^6 b^7 b^8 , and, referring to Fig. 4, it will be seen that the pile warp p' is drawn into harness 1 and p^2 into harness 2, p' and p^2 constituting one pair, and that the pile warp p^3 is drawn into harness 3 and the pile warp p^4 into harness 4, p^3 and p^4 constituting the second pair, the pile warps p' p^2 being in one dent-space and the pile warps p^3 p^4 being in another dent-space. The dent-space 9, shown as containing the pile warps p' p^2 , is also shown as containing the body warps b^5 b^7 and the dent-space 10 the body warps b^6 b^8 , the body warps b^5 being reed through heddles of harness-frame 5, b^6 through heddles of harness-frame 6, b^7 through heddles of harness-frame 7, and b^8 through heddles of harness-frame 8. It will be seen in said Fig. 4 that the pile-warp threads are reed into the harness-frames 1 2 3 4, so as to stand in the two dents 9 10 in the order p' p^2 p^3 p^4 , but that a little farther along, as shown, in the next two dents 11 and 12 the pile-warp threads are reed into the harness-frames in the order p^2 p' p^4 p^3 , or that at some points of the width of the fabric the threads of harness-frame 1 lie at the left of threads in harness-frame 2 and at other points just the reverse, and it will also be understood that the backing warps are reed into the harness-frames and the dents 9 10 in the order b^5 b^7 b^6 b^8 , and they are reed in the same

order opposite the dents 11 12, or, in other words the reeding in of the body-warp threads into the harnesses is uniform; but the reeding in of the pile-warp threads is reversed alternately across the fabric, so that instead of reeding in in the order 1 2 3 4, 1 2 3 4 they are reed in, as stated, in the order 1 2 3 4, 2 1 4 3, &c.

Referring to Fig. 1, representing one side of the fabric, I have employed the four brackets 9 10 11 12 to represent the dent-spaces, and I have designated the threads from the different harness-frames by different letters; but inasmuch as the threads b^5 and b^7 work in pairs and b^6 and b^8 in pairs, b^5 and b^6 appearing in one fabric and not in the other, the backing warps b^7 and b^8 are not shown in Fig. 1, and they could not be shown in such a figure because they lie, it is supposed, exactly under the threads b^5 b^6 ; but they are shown in Figs. 2 and 3. Referring to Fig. 1, it will be noticed that the pile-warp threads p' p^2 p^3 p^4 are reed in in the order 1 2 3 4 in the heddles and through the dents 9 10, but that at a little distance farther along in the width of the fabric said pile-warp threads in the same harness-frame are so placed in the heddle-eyes as to occupy different relative positions, or they are reed in in the order p^2 p' p^4 p^3 , or, in other words, in the dent 9 the thread p^2 of harness-frame 2 is at the left of the thread p' of harness-frame 1, while farther along to the right, opposite space 11, the pile warp p^2 in harness-frame 2 is at the right of the pile-warp thread p' in harness-frame 1, such reeding constituting reverse reeding in.

Figs. 2 and 3 show longitudinal sections of the fabric in the lines x x' at one side of the pairs of threads p' p^2 , and said figures show the different relative positions of the said threads at different places in the fabric, and it will be seen that in Fig. 2, p' is behind p^2 , whereas in Fig. 3, p^2 is behind p' . In Fig. 5, which is a horizontal section taken between the two backs, the different relative positions of the threads p' , p^2 , p^3 , and p^4 are clearly shown, the reversing of the order of such threads, as p^2 , p' , p^4 , and p^3 , being also distinctly shown. It will also be noticed that each warp-thread remains four picks in the back of one fabric, then goes to the other back and remains four picks, the warp-threads p' p^2 being crossed in pairs.

The drawings do not show a section representing the pile-warp threads p^3 and p^4 , but said pile-warp threads would be turned from one to the other back about the weft-threads w^2 w^3 .

The arrangement of the pile-warp threads in the harness-frames in the order 1 2 3 4 constitute what I shall designate as "regular" pairs, and the arrangement of said threads or the reeding thereof in the order 2 1 4 3 as "reversed" pairs.

This invention is not necessarily limited to the particular order of reeding in of the back-

ing warps, and the backs of the fabrics may be woven together or united by the weft in any usual or suitable weave, my invention residing wholly in the manipulation of the pile-warp threads irrespective of the particular weave in the backing-warps.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A double pile fabric consisting of two woven backs composed of backing warp threads and weft threads, and pairs of regular and reversely arranged pile warp threads united alternately at intervals one thread of each pair to both backs by the said wefts, the reversal of the arrangement of the pairs of the sets of pile warp threads at intervals

across the fabric preventing the formation of longitudinal furrows between the standing pile, substantially as described.

2. A pile fabric consisting of a back composed of backing warp threads and weft threads, and pairs of regular and reversely arranged pile warp threads united to said backing wefts, to form the standing pile, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERBERT JAMES HOPE.

Witnesses:

GEO. W. GREGORY,
EMMA J. BENNETT.