

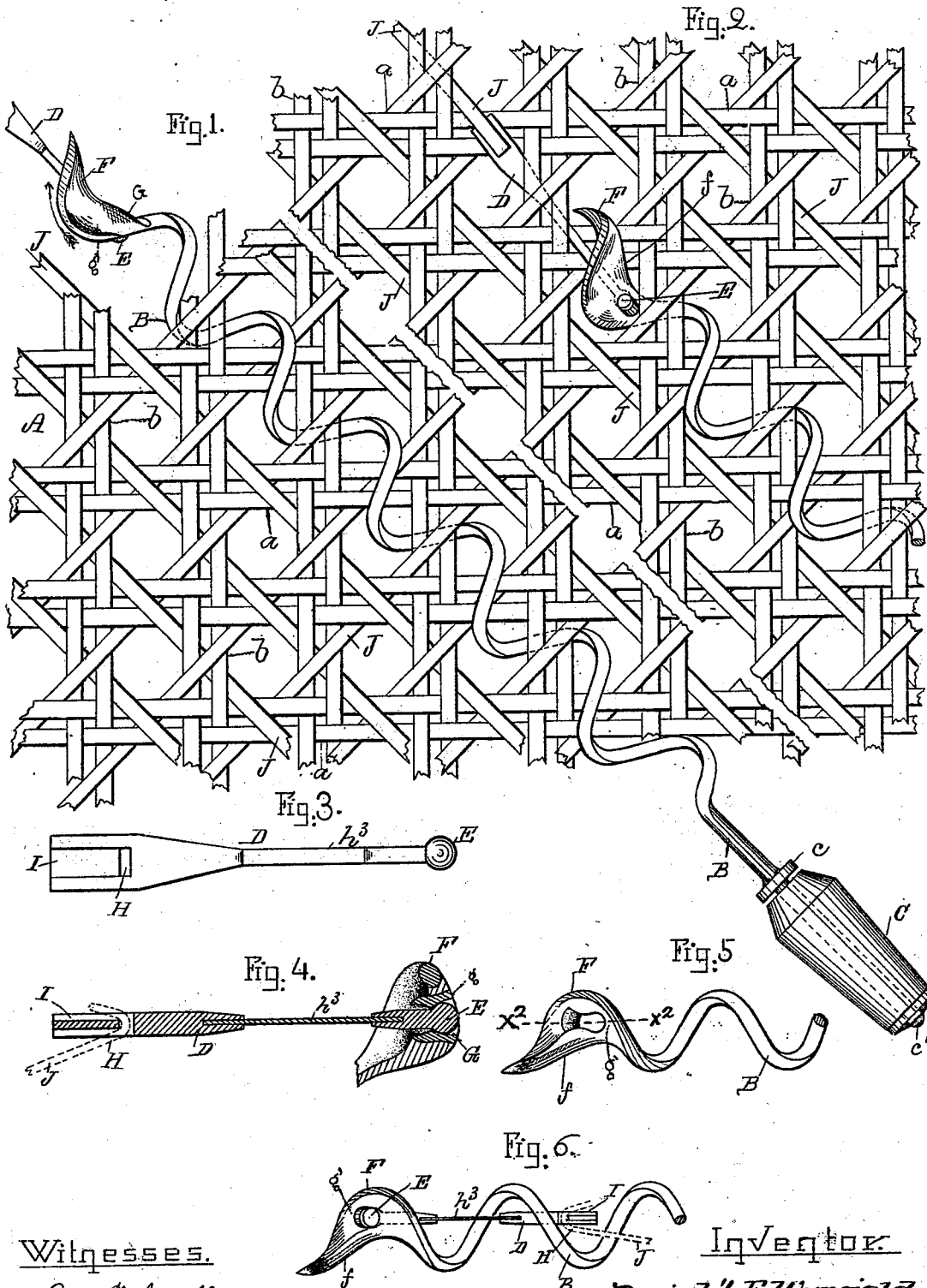
(No Model.)

D. E. WARFIELD.

DEVICE FOR WEAVING DIAGONAL STRANDS INTO CANE FABRICS.

No. 517,082.

Patented Mar. 27, 1894.



Witnesses.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR WEAVING DIAGONAL STRANDS INTO CANE FABRICS.

SPECIFICATION forming part of Letters Patent No. 517,082, dated March 27, 1894.

Application filed April 25, 1893. Serial No. 471,777. (No model.)

To all whom it may concern:

Be it known that I, DWIGHT E. WARFIELD, a citizen of the United States, residing in the city and county of Worcester and State of Massachusetts, have invented new and useful Devices for Weaving Diagonal Strands into Cane Fabrics, of which the following is a specification, like letters indicating like parts on the drawings.

This invention has for its object the production of a novel and efficient apparatus by which to introduce separate strands into woven fabric, having spaces or checks left between warp and weft, such for instance, as cane seat fabrics.

My invention consists essentially of a spiral needle pivoted or loosely mounted upon or with relation to a holder or carriage, said needle being adapted at its outer end to engage loosely a carrier to which the strand to be introduced into the fabric is suitably connected, said carrier becoming, therefore, a strand-carrier.

My improved needle has also a point-director which insures the correct entrance of the point of the needle into the meshes, checks, or open spaces formed by the warp and weft already laid in the fabric.

The needle constitutes an actuating device for the strand-carrier, and while the needle has a motion of rotation through one mesh and then another across the fabric, the carrier connected therewith rises and falls so that it goes under and over the strands bounding the spaces or checks, in one row of meshes, or in other words, the needle rotates about the longitudinal center of the carrier.

Figure 1 shows a piece of open-work or cane fabric with a needle therein ready to take with it the strand-carrier. Fig. 2 shows a piece of cane fabric with part of a needle as it will appear when putting a strand in place, the holder or carriage belonging to the said needle being omitted. Fig. 3 is a top view of a strand carrier enlarged. Fig. 4 is a longitudinal section of the carrier shown in Fig. 3 together with part of the end of the needle in the line x^2 , Fig. 5 the dotted line showing one end of a strand. Fig. 5 shows a part of the leading end of the needle in a different

view from that exhibited in any of the other figures. Fig. 6 shows a modification to be described.

A, represents a piece of cane fabric having warp strands a , and weft strands b , substantially at right angles to each other, and J represents other strands, commonly designated as diagonal strands, my invention being especially applicable for the introduction of the diagonal strands. The needle forming part of this my invention, and adapted to put in these diagonal strands, consists essentially of a spiral shank B provided with a point F adapted to engage loosely one end of a carrier D, said needle point having an eye, or opening represented at G, to co-operate with and loosely engage a part of the carrier D, and said needle will also preferably have a point-director, designated herein by the edge marked f , it by contact with the strands already laid insuring the correct entrance of the point of the needle into the open spaces between the warp and weft strands. Preferably the carrier D will have a ball-like or spherical end E, and at or near its opposite end will have a slot or eye H of suitable shape to receive one end of a strand J, the same being inserted in the said eye, as best represented in Fig. 4. The carrier at a point beyond said slot or eye is herein represented as cut or grooved, as at I, said groove receiving part of the strand, the side walls of the groove aiding in keeping the strand in place and avoiding friction. That portion h^3 of the carrier between the end E and that portion which is provided with the slot or eye H is herein shown as made thin and somewhat flexible so that the said carrier may the more readily have an up and down, or wave-motion as its leading end is being taken through the series of openings or meshes in which the strand connected therewith is to be permanently laid.

The eye or opening G in the end of the needle will preferably be larger at one end than at its other end, so that the ball-like or spherical end of the carrier may be passed readily into one end thereof and then be moved to the other end thereof and be there retained. The shape of the eye may be such as commonly used in connection with corset steels

and the like, but this invention is not limited to the particular shape of the eye or opening in the needle, nor to the particular shape of the end of the carrier fitting the same loosely; nor is it limited to the particular shape of the carrier so long as the connection between the needle and the carrier is a loose one and the carrier is adapted to receive and retain a strand, the needle having an opportunity to rotate while the carrier co-operating with it has a substantially straight movement.

The needle at or near its end most remote from its point is herein represented as provided with a shoulder *c* and a shank *c'* beyond it, which shank enters loosely a holder or carriage *C*, said holder or carriage serving to support the needle in its movements through the open spaces or checks of the fabric from one to the other side thereof, the power, whether of the hand or otherwise, manipulating the needle engaging the said holder or carriage, so that the needle is free to rotate in the holder or carriage as the said needle is moved longitudinally to enter one open space after another in the fabric.

The portion of the needle having the eye or opening may be made by placing next the spiral body at the rear of the point of the needle a suitable metallic eyelet, which may be connected with the body of the needle by soldering or brazing, one side of the eyelet and the solder so incorporated being suitably shaped to constitute the point-directing portion *f*, but this invention is not limited to the particular manner of providing the eye or opening to co-operate with the carrier, nor to the particular shape of the portion so added or formed to present a suitable eye or opening for the reception loosely of the carrier.

In the preferred mode of operating with my apparatus, a strand *J* will be connected with the carrier *D* at the slot or eye *H*, and the point of the needle will be inserted in the first space or check of that row of spaces or checks into which the strand is to be laid, and the needle will then be moved longitudinally, the pressure of the needle, and especially the point-directing portion *f* thereof, against the strands already in place, causing the needle to rotate as the holder or carriage is moved longitudinally, said needle in its movements revolving in the holder or carriage thus worming itself through the meshes or checks to the opposite edge of the fabric; it going through one mesh or check after another in that line of meshes or checks which is to receive the strand, the needle, when its point has been passed through the said row of meshes or checks to be filled, being made to engage the carrier, the needle as it is withdrawn from the fabric being rotated in the opposite direction by contact with the strands already laid, the leading end of the carrier being passed over and under the warp and weft strands, as best represented by the needle in Fig. 2, the carrier taking the strand

with it, it being supposed that that needle is being retracted from the position of the needle represented in Fig. 1.

Viewing Fig. 2 when the point-directing portion *f* of the point of the needle is in contact with some of the weft strands, it will be seen that the said portion *f* will insure the correct entrance of the point of the needle into one mesh or check after another when the needle is being moved in the direction of the arrow on the needle in Fig. 1, which would not be the case if the said point-directing surface was omitted.

While I have shown the holder or carriage in Fig. 1 as adapted to be engaged by hand, yet this invention is not limited to reciprocating the holder or carriage by hand, since it is obvious that any motive power may be used for that purpose which will move the holder or carriage to insert and withdraw the needle, such for instance, as any of the devices now commonly employed for reciprocating needles in looms using needles for the introduction of weft. As the point of the needle passes over and under the weft and warp strands, the carrier loosely connected with it has given to it a wave motion so that it also passes under and over the warp and weft strands in the proper manner to lay the diagonal strand connected to it, in the row of meshes or checks through which needle is being moved.

In my invention the needle makes a passage for itself without racking or twisting the fabric.

While I prefer to let the needle draw the carrier through the row of meshes or checks, yet the eye or opening *G* in the needle may be of such shape that the carrier may be reversed as in Fig. 6 to let the carrier lie inside the spirals, and in such event the needle may push the carrier with its attached strand through the meshes or checks.

After each diagonal strand has been inserted, the carrier *D* may be readily disengaged from the head of the needle and be supplied with another strand and be then re-engaged with the needle as before described, the needle having been put into position to co-operate with another row of spaces or checks.

The point of the needle will preferably extend just beyond the center of the spirals so as to engage in its revolutions a strand already in position. The proper diameter, however, for the spiral needle, and its spread or distance between coils, may be readily adapted to the requirements of spaces or checks of different sizes, and this can be found by experiment, yet for the ordinary sizes which seldom run below seven-sixteenths inch in diameter, or above fifteen-sixteenths inch in diameter, the standard of measure which is obtained by measuring from center to center of each space or check may be taken to be as follows:—twelve - sixteenths inch measurement, ten-sixteenths inch diameter of spiral,

one and one-eighth inches spread. Eleven-sixteenths inch measurement, nine-sixteenths inch diameter of spiral, one and one-sixteenth inches spread. Ten-sixteenths inch measurement, eight-sixteenths inch diameter of spiral, one inch spread, and so on.

The diameter of wire to be used in forming the needle will depend somewhat upon the fineness of the cane fabric, but generally will be one-eighth inch.

The side walls of the recess I of the carrier by co-operating with the edges of the strand J aid in keeping it in proper line with the carrier, and also lessen the liability of breaking the strand where it is put through the slot or eye H.

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

1. A spiral needle having an eye, and a directing surface, said eye and directing surface being side by side, combined with a strand carrier loosely held in said eye, to operate, substantially as described.

2. A spiral needle, combined with a strand-carrier loosely connected therewith, whereby the needle may rotate while the strand-carrier with a strand is being passed through the meshes or checks of the fabric, substantially as described.

3. A spiral needle having an eye or opening, combined with a strand-carrier loosely connected therewith and having a strand-receiving slot or eye, and grooved or recessed, to receive a portion of the strand and act to keep the same in line with the carrier, substantially as described.

4. A holder or carriage adapted to be reciprocated, and a spiral needle rotatable freely in or with relation to said holder or carriage in one and then in an opposite direction during the introduction and withdrawal of the needle, combined with a strand-carrier loosely connected to said spiral needle, the latter revolving about the longitudinal center of the strand-carrier, substantially as described.

5. The combination of a spiral needle having an inwardly curved point and an eye or opening back of said point, with a strand-carrier having a ball-like or spherical head and connected loosely with said eye, substantially as described.

6. A spiral needle having an inwardly curved point and an eye or opening back of said point; and a holder or carriage to receive loosely the shank of said needle to thus enable the needle, while being moved in the direction of the row of meshes or checks to be provided with a strand, to be rotated by pressure against the strands then in place, the point of the needle passing alternately over and under the strands then in place, combined with a loosely connected strand-carrier having a ball-like or spherical head, of flexible body, and a portion provided with a slot or eye for the reception of the strand to be put into the fabric, said needle in operation revolving about said carrier, substantially as described.

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Witnesses:

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