

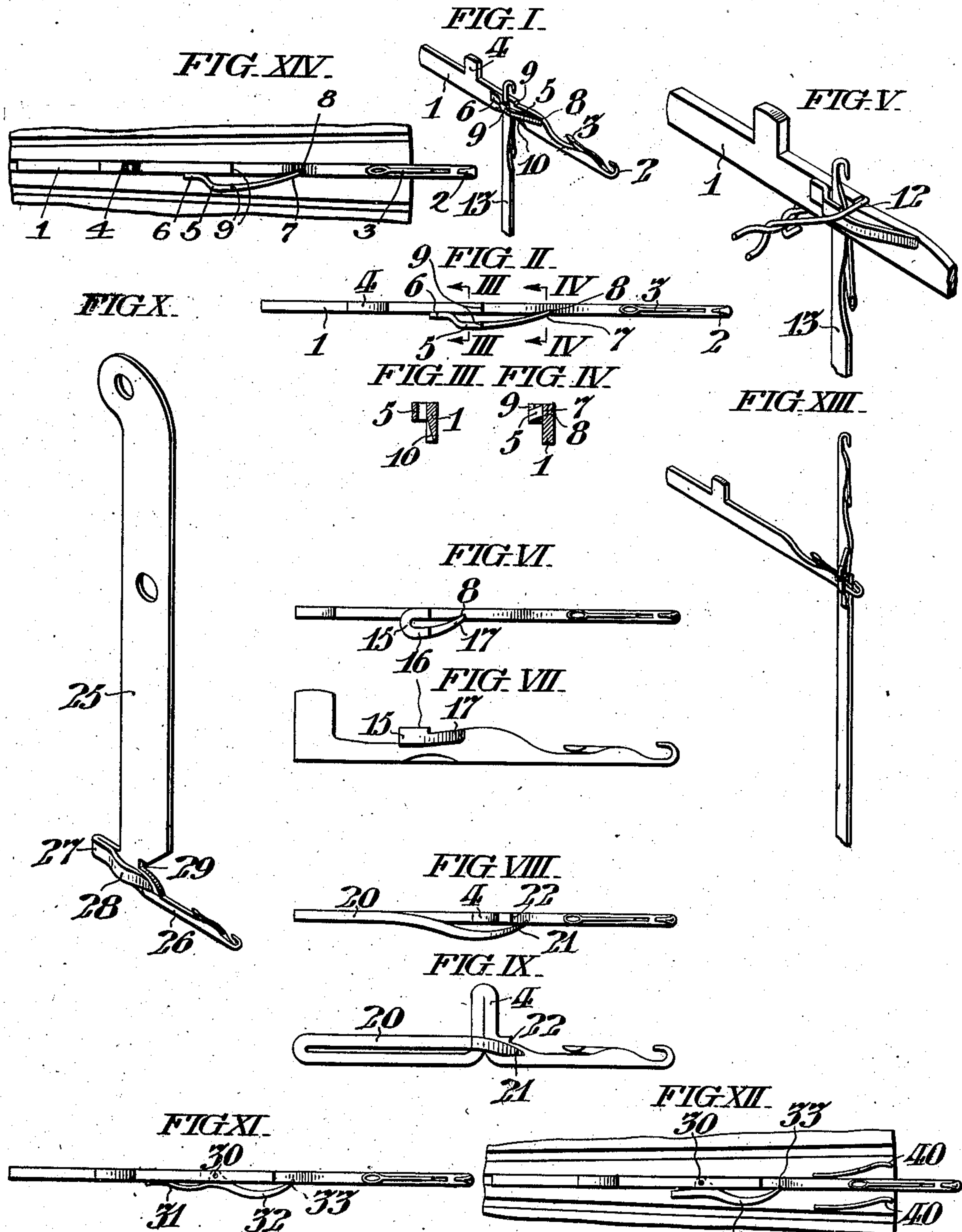
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A. FOSTER.

TRANSFERRING DEVICE FOR KNITTING MACHINES.

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WITNESSES:

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TRANSFERRING DEVICE FOR KNITTING-MACHINES.

No. 885,150.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT FOSTER, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Transferring Devices for Knitting-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

At certain points in certain knitting operations it becomes necessary that loops held upon the needles be transferred to other needles. Devices for accomplishing this are called "transferring devices," and a number of such devices are well known. It is also old in the art to employ a loop-opener attached to or formed upon the needle which holds the loop to be transferred so arranged that when the needle carrying the loop is thrust forward to the proper extent, the loop is expanded laterally and forwardly and in such expanded position lies in such position in relation to the needle, that if a transfer point, or preferably another needle to which the loop is to be directly transferred is projected alongside the first mentioned needle in proper relation to it, it will receive the loop and hold it while the first mentioned needle is withdrawn, the loop-opener being so constructed as to permit the proper relative motion of the two needles. Such loop-openers may be used in machines adapted to knit both rib and plain tubular fabric as a continuous operation. In these machines the top being of ribbed knitting requires the use of a dial plate carrying horizontal needles, while the body of the stocking, being plain knitting, is knit wholly on the vertical needles. It is therefore necessary at the point of transition from one variety of knitting to the other to transfer all of the loops held upon the dial needles to the corresponding vertical cylinder needles. To accomplish this all of the dial needles may be provided with loop-openers. At the proper point in the operation all the dial needles are projected so as to bring these loop-openers into play to expand their loops. Thereupon, the cylinder needles which are to receive these loops are advanced until they enter the loops. The dial needles are then withdrawn leaving the loops upon the cylinder needles alone.

A difficulty has been experienced in connection with the employment of these loop-openers by reason of the space which they occupy alongside of the needle to which they are attached. In order to make room for them when the needles are retracted in prior machines employing loop-openers, the walls of the grooves which receive the needles, have been cut away. The difficulty with this expedient is that when the needles are projected they lose the lateral support from the walls of the needle groove which is desirable in all forms of knitting operations, and which is particularly desirable in connection with transferring operations, where the utmost precision in the alinement of the needles is required. In order to prevent the cutting away of the walls of the needle grooves, it has been proposed to make the loop-openers so yielding and to construct them in such fashion that when the needles are retracted the loop-openers are sprung into the needle grooves. But this is objectionable because of the extreme flexibility (and therefore fragility) which must be given to the loop-openers and because of the additional friction thus put upon the needle. According to my invention I employ needles which in cross section have a greater depth than usual, and so construct the loop-opener that it is coincident with only the upper and projecting portion of the shank of the needle. By employing with such needles grooves of the usual depth, the loop-opener will entirely overhang the needle wall of the groove so that the needles are supported and held in alinement during the entire length of the grooves the walls of which reach to the knitting edge of the needle cylinder or dial plate, and yet when retracted the loop-openers are not received within the needle grooves, but pass over or overhang one of the walls. In connection with the construction of a loop-opener which thus overhangs the wall of the needle groove, I have devised a number of forms of needles provided with said loop-openers which are of convenient construction and which I will show and describe. In a number of them a feature is the integral construction of the needle and its loop-opener by the turning back upon itself of the wire or strip of which the needle is formed or a portion of it.

I will now describe a number of forms of loop-openers embodying my invention, and will explain their operation as applied to the transfer operation which I have just described; but it must be understood that my invention is neither limited to the particular forms or embodiments which I have illustrated in the drawings, nor to the application which I have explained, but is much broader both in its scope and application, the only limitations upon the same being fully expressed in the claims.

In the accompanying drawings, Figures I, and II, show respectively in perspective and in plan, one form of my loop-opener as applied to a dial needle. In both the needle is somewhat enlarged, more so in Fig. II, than in Fig. I. Figs. III, and IV, are sectional views taken respectively along the lines III, III, IV, IV, in Fig. II. Fig. V, is an enlarged view illustrative of position of the expanded loop at the time of its reception upon the needle to which it is to be transferred. Figs. VI, and VII, are respectively a plan and an elevation of a dial needle with a different form of loop opener. Figs. VIII, and IX, are similar views of another form of my invention. Fig. X, shows one way of applying my invention to a dial needle mounted on a pivoted jack. Fig. XI, shows in plan still another form of my invention. Fig. XII, shows a portion of a dial plate carrying a needle fitted with my invention in an alternative form in which part of the operating devices are attached to the dial plate. Fig. XIII, shows my invention as applied to a cylinder needle. Fig. XIV, shows a portion of a dial plate carrying a dial needle of the construction illustrated in Figs. I, and II.

I will first describe the form of my invention illustrated in Figs. I—V. The dial needle 1, is provided with a hook 2, latch 3, and hub 4. These are of any convenient construction. On one side of the shank of the needle is attached the loop-opener 5, the construction of which appears clearly from the drawings. Its base 6, is attached by soldering or otherwise to the side of the needle. Its central portion lies more or less parallel to the needle but separated from it by a distance at least sufficiently great to permit the insertion of a knitting needle between them. The free end 7, of the loop-opener lies against the side of the needle being received within a depression 8, formed thereon for the purpose of preventing any possible engagement between the end of the opener and the loop slipping on the needle. The upper edge of the shank of the needle and the upper edge of the loop-opener parallel thereto are one or both of them (preferably both), provided with notches 9, 9. Beneath the loop opener the adjacent side of the needle is provided with a bevel 10.

It will be noted that the needle 1, is some-

what deeper in cross section than usual, so that its entire lower half may be received within the groove of a dial plate and yet permit the loop-opener 5, which is attached to the upper portion of the side of the shank of the needle and coincides wholly with this part (see particularly Figs. III, and IV), to overhang the wall of the needle groove as shown in Fig. XIV, thus permitting the free retraction of the needle into its groove, notwithstanding the maintenance of the supporting function of the groove clear to the edge of the dial plate.

The operation of the device thus described will best be understood by a consideration of Fig. V. Here the dial needle 1, carries the loop 12, which it is desired to transfer to the corresponding cylinder needle 13. To effect this the dial needle is thrust forward until the edge of the loop is engaged by the notch 9, whereby the loop is thrown forward from the web to which it is attached in a forwardly distended position, and lies diagonally across the shank of the needle. By the same movement the loop-opener 5, has been forced within the loop and distends it laterally so that it lies in the diagonal position shown in the drawing. The cylinder needle 13, is now thrust up so that its terminal hook is above the dial needle. By this motion the cylinder needle is forced through the loop, and at the same time between the loop-opener 5, and the side of the dial needle, the space between the two being sufficient to permit this. Thereupon the dial needle is retracted to its normal position. As this movement occurs the loop-opener is withdrawn from the loop; its free end 7, yielding to permit the passage of the cylinder needle. As soon as the withdrawal of the dial needle has been effected, the cylinder needle may be lowered to its normal position, and will carry the loop within its latch.

Referring now to Figs. VI, and VII, there will be seen a substantially equivalent loop-opener formed upon a dial needle, but of different construction. In this case the loop-opener is not formed of a separate piece, as before described, but is produced by cutting a part of the upper portion of the dial needle free, and turning it back so as to form the bight 15, the parallel edge 16, and the free end 17, which latter, as before rests within the depression 8, correspondingly formed in the side of the dial needle.

The integral form of construction thus provided is desirable on the score of economy of construction and strength. At the same time the construction accords with the principle which I have above explained having the loop-opener coinciding only with the upper part of the comparatively deep dial needle leaving the entire lower portion free to run within its groove while the loop-opener overhangs the groove.

Another form of loop-opener of convenient construction is shown in Figs. VIII, and IX. Here the dial needle is formed of a single flattened wire. Below the hub 4, the wire is bent upon itself to form a tail 20, and the end of the wire passing to one side of the hub is flattened to form the free edge 21, of the loop-opener. In this case the notch 22, is shown formed only upon the main body of the dial needle. The operation of this form of loop-opener is similar in all respects to that which has been described, and it embodies the principle which I have referred to, in that the loop-opener is coincident with only the upper part of the needle, the lower part being free to run within a dial groove of the usual length and construction.

In Fig. X, I have shown a construction of my device which is especially applicable to dial needles which are mounted upon pivoted jacks. Such a jack 25, is here shown having the dial needle 26, attached to its lower end. At the rear of the dial needle the metal of the jack is projected to form a tail 27, which returns upon itself with an outward and inward bend to form the loop-opener 28; which is coincident with only the upper part of the lower end of the needle and the free end of which is in contact with the side of the needle. Here the required notch 29 is provided by the recessed junction between the dial needle and the jack.

In Fig. XI, I have shown a pivoted form of loop-opener. Here the dial needle is of substantially the same shape as before, but the loop-opener consists of a short lever pivoted centrally at 30, either within or on top of the dial needle, with a projecting spring tail 31, and a loop-opening portion 32, the free end 33, of which is received within a depression on the side of the needle, as before.

In Fig. XII, I have shown another variant form of my invention. Here the loop-opener again consists of a lever pivoted centrally at 30, and curved to form the loop-opening portion 32, with the free end 33, received within a depression in the side of the dial needle. But in this case the spring tail is omitted and instead a spring or cam 40, is provided which is attached to the dial plate in such position that when the needle is properly thrust forward to open the loop the part 40, presses the loop-opener securely against the side of the needle, holding it there during the transfer operation. But when the dial needle is withdrawn the loop-opener slips away from contact with the part 40, thereby permitting its free edge to yield to permit of the passage of the vertical needle out from the loop-opener.

In the forms in which I have thus described my invention, it will be understood that the grooves of the dial plate receive only the lower edge of the dial needle; the upper portion thereof and particularly the loop-

opener, being without the groove and overhanging the edge. This is particularly shown in Fig. XII, and Fig. XIV but the relation of the other needles to the groove, in which they rest, is substantially similar.

In Fig. XIII, I have shown a loop-opener quite similar to that which is figured in Figs. I, to V, of the drawings, but here the opener is attached to one of the vertical or cylinder needles. This, of course, is to be employed for the purpose of permitting the transfer of a loop from such a cylinder needle to a dial needle; the operation is in all respects the same as heretofore described and needs no special description.

It will be understood that when, in the claims, I speak of a "loop-opener," I am not confining myself to a device having the formation or configuration of those which I have specially described. Many other forms of construction for such a device will readily suggest themselves to one skilled in the art. They all have, however, this principle in common, that when the needle to which they are attached is duly thrust forward they expand the loop which is upon the needle sufficiently to permit another needle, or transferring device, to be passed through the loop. They also yield to permit the withdrawal of the first named needle, when the second, or receiving needle, or transferring device, has been advanced to take the loop. To construct such a loop-opener in such a way that it is coincident with only the upper part of the shank of the needle, leaving the remainder of the needle free to run within and be supported by its needle groove, is the principle of construction and operation which characterizes my invention, and the configuration is a matter of selection depending upon the particular adaptation desired.

In the claims I use the expression "first needle," to designate the needle which first carries the loop to be transferred, and "second needle," to designate the needle to which this loop is to be transferred; but it should be understood that the latter phrase is not confined to a needle proper but should be construed broadly enough to include any transfer point upon which it is desired that the loop shall be placed.

It will also be understood that my invention is not limited in its application to knitting needles having pivoted latches but may be applied to needles of the spring variety.

Having thus described my invention, I claim:—

1. In a circular knitting machine, containing both dial plate and needle cylinder, the combination of a needle groove with its walls prolonged without interruption to the knitting edge; a needle received therein having a depth greater than that of the needle groove; and a loop opener attached to and partially parallel to the side of that part of the shank

of the needle which projects from the needle groove.

2. In a circular knitting machine containing both dial plate and needle cylinder, the combination of a needle groove; and a knitting needle received therein having a depth greater than that of the needle groove and having a rear portion bent upon itself and returned substantially parallel to the side of the shank of the needle to form a loop opener; such return portion being coincident with only the part of the shank of the needle which projects from the needle groove so as to leave the remainder of the needle free to be received within and supported by the needle groove.

3. In a circular knitting machine containing both dial plate and needle cylinder, the combination of a needle groove; and a dial needle attached in angular relation to the end of a pivoted jack, said dial needle having a depth greater than that of the needle groove, a portion of the end of the jack being bent forward parallel to and coincident with only the part of the side of the shank of the needle which projects from the needle groove,

leaving all the remainder of the needle free to be received within and supported by its needle groove in the dial plate.

4. In a circular knitting machine containing both dial plate and needle cylinder, the combination of a needle groove; a needle received therein having a depth greater than the needle groove; a loop opener attached to and partially parallel to the side of that part of the shank of needle which projects above its needle groove, and which when the needle is received within its groove overhangs the walls thereof; in combination with a projection upon the upper side of the wall of the groove, which when the needle is thrust forward, coöperates with the side of the loop opener and holds it pressed against the side of the needle as it performs its function of opening the loop.

In testimony whereof, I have hereunto signed my name, at Philadelphia, Pennsylvania, this 22nd day of February, 1906.

ALBERT FOSTER.

Witnesses:

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JAMES H. BELL.