(No Model.)

G. F. STURGESS.

RIGHT AND LEFT KNITTING MACHINE NEEDLE.

No. 578,428. Patented Mar. 9, 1897.

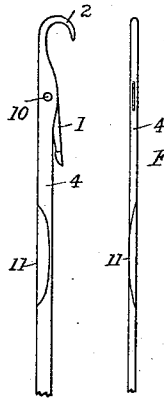
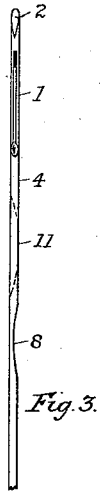


Fig. 2.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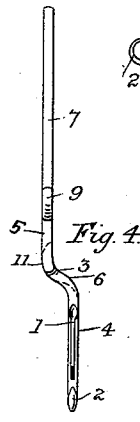
Fig. 4.

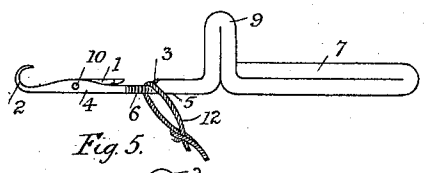
Fig. 5.

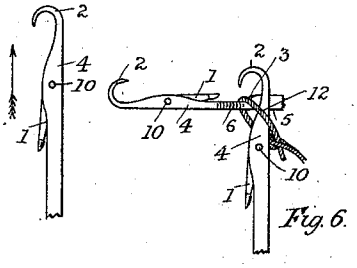
Fig. 6.

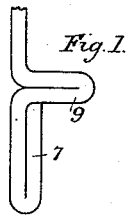
Fig. 1.

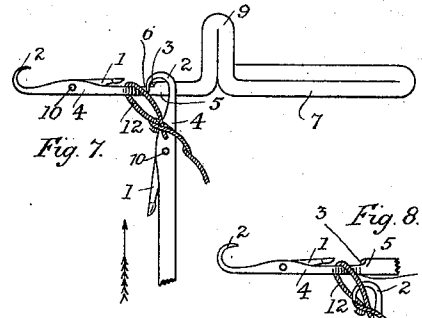
Fig. 7.

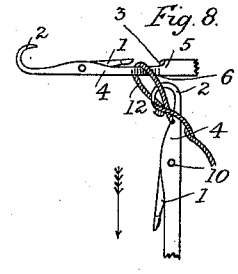
Fig. 8.

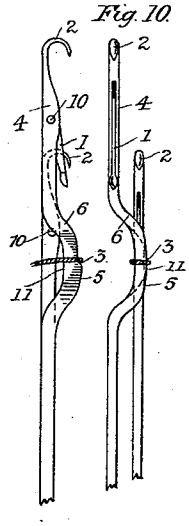
Fig. 9.

Fig. 10.

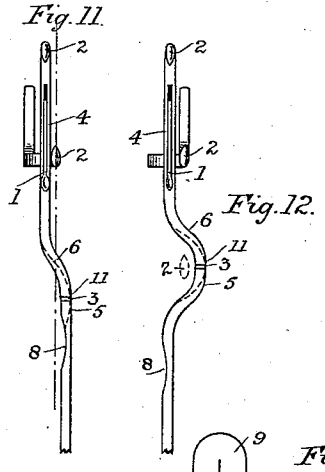
Fig. 11.

Fig. 12.

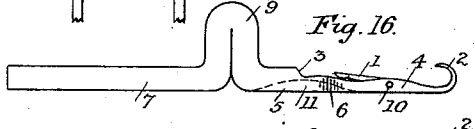
Fig. 16.

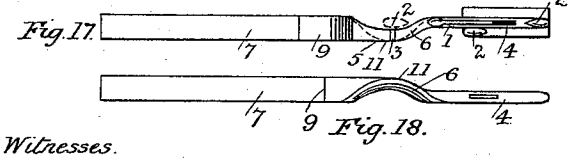
Fig. 17.

Fig. 18.

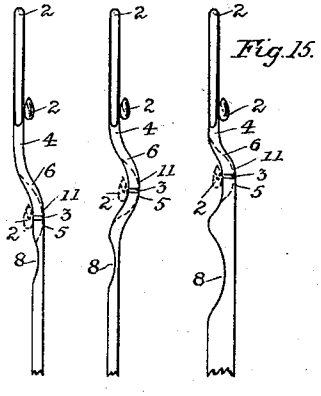
Fig. 13.

Fig. 14.

Fig. 15.

Witnesses.
Thomas Scott.
Walter Edwin Sturgess

Inventor.
George Frederick Sturgess.

UNITED STATES PATENT OFFICE.

GEORGE FREDERICK STURGESS, OF LEICESTER, ENGLAND.

RIGHT-AND-LEFT KNITTING-MACHINE NEEDLE.

SPECIFICATION forming part of Letters Patent No. 578,428, dated March 9, 1897.

Application filed December 30, 1895. Serial No. 573,848. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FREDERICK STURGESS, hosier's engineer, a subject of the Queen of England, residing at Overdale, Leicester, in the county of Leicester, England, have invented new and useful Improvements in Right-and-Left Knitting-Machine Needles, of which the following is a specification.

The object of this invention is to provide a needle that will by virtue of its construction give its own loop a side turn from the knitting-line and facilitate the linking of one loop around two needles, in order to avoid holes or menders in the fabric at the point of incorporation or withdrawal of a needle.

It consists of a right and left stemmed needle having a knitting-stem on the right and a linking-stem on the left side of its longitudinal axis, constructed in a manner that the said needle in sliding through the loop will first turn the loop to a side line and then carry it forward into position for linking onto an adjacent needle.

The invention further consists in cutting away the back of the needle to a knife-edge at a point level with the longitudinal line of travel of a rib-needle, in order that when a hook collides with a stem the needles may be guided off each other sidewise.

The invention also consists of a side bend in the stem forward of the needle-foot and in thinning some part of the needle-stem between the foot and the latch, in order that the needles when engaged with each other will yield sidewise.

The nature, features, and scope of my invention will be fully understood by the specification.

For the purposes of this specification the needles used for knitting the plain loops are termed "cylinder-needles," it being understood that they will also work in rectangular needle-beds.

The original drawings are on an enlarged scale.

Figures 1 and 2 are views in elevation of a cylinder-needle, showing the knife-edge at 11 to guide the rib-needle off sidewise should a rib and cylinder needle collide. The position of the knife-edge varies slightly in a right and left needle, owing to the curved construction of the stems. Fig. 3 is a view in elevation of a cylinder-needle, showing the stem thinned at 8 and having the knife-edge at 11 to allow the needle to yield sidewise when engaged with a rib-needle. Fig. 4 is a plan view of the upper face of a rib-needle with the hook to the observer, having the knitting-stem 4 on the right side and the linking-stem 5 on the left side. Fig. 5 is a view in elevation showing a horizontal rib-needle with a loop on its linking-stem and a vertical cylinder-needle about to penetrate it in its upward stroke. Fig. 6 is a view in elevation showing the loop, having been penetrated in the upward stroke, linked around two needles, the said loop being large enough to admit the whole hook of the cylinder-needle in its upward stroke, as is the case in loose fabric. Fig. 7 is a view in elevation showing a loop on the cross-bar 6 and how, when the loop is too small to admit the whole of the hook, the needle rises up the side of the loop between the needle and its loop, as is the case in tight fabric. Fig. 8 is a view in elevation showing how, after the needle has risen up the side of the tight loop, the point of the hook penetrates the loop and links it up in its downward stroke. Figs. 9 and 10 are views in elevation showing the linking-stem brought forward of the front line of the hook, as is necessary to accommodate some types of machine. The side stem overlaps the adjacent cylinder-needle and casts its loop over the longitudinal line of travel of the said adjacent cylinder-needle in a manner that the said adjacent cylinder-needle will penetrate and link up the said loop either in its upward or downward stroke, as mentioned. Fig. 9 is a side view, and Fig. 10 is a front view, of the knitted loop linked around two needles, having been penetrated by the adjacent needle in its upward stroke. Figs. 11, 12, 13, 14, and 15 are front elevations showing the rib and cylinder needles in position for knitting (see full lines of rib-hooks) and after the hook of the rib-needle has received and is receding with the loop. (See hooks in dotted lines.) In Fig. 11 the rib-needles shown in Fig. 4 are used. In Fig. 12 the rib-needle has its foot and shank brought back into line with the stem 4, as

aforesaid. In Figs. 13, 14, and 15 latchless needles are shown with my invention applied in the same manner. Fig. 16 is a side elevation; Fig. 17, a plan of the face, and Fig. 18 a plan of the under side of a modified rib-needle.

This needle is shaped by cutting away the metal at the part shown and is adaptable for coarse-gage machines.

I may say in order to clearly show the working of the invention it has been necessary to draw the knitted loops on a very much enlarged scale, for, while the hook in its downward stroke would penetrate and pierce into a very small loop on the linking-stem, it would be impossible to demonstrate in this specification how the loop was penetrated unless the loop is drawn an abnormal size relative to the said knitting-stem. Those needles having an arrow are supposed to be moving in the direction of the arrow. I refer to the right and left stems when looking at the latch-face of a needle lying horizontally, with its hook pointing toward me, as seen in Fig. 4. It is understood that my needle may be made with the knitting-stem on the left and the linking-stem on the right.

The longitudinal axis of the needle is represented by the dotted vertical line, as seen in Fig. 11, and the width of the needle refers to the dimensions between the left outside line and the right outside line of the needle, looking at Fig. 4. The right and left needle has the following usual parts: latch 1, hook 2, shoulder 3, knitting-stem 4, shank 7, foot 9, and pivot 10; also, the following improved parts: cross-bar 6, linking-stem 5, thinned part 8, and knife-edge 11. Bar 6 is that part of the stem that crosses the axis and forms the junction of the two stems where the needle-stem deviates from one line to another line, and at this junction the width of the needle is greater than the width or gage of the knitting-stem 4. Stem 4 is the knitting-stem and is the fore part of the needle. Stem 5 is the linking-stem and is in the rear of stem 4, although the two stems are on lines parallel to each other and situated on that part of the needle forward of the foot.

The needle is formed either out of steel wire of normal gage by cramping to the required shape (see Figs. 4, 9, 10, 11, 12, 13, and 14) or by cutting out of a steel blank of greater width than the normal gage. (See Figs. 15, 16, 17, and 18.) The former are for fine-gage machines, while the latter are best suited for coarse-gage machines, where there is room for a broad needle trick. By this construction of needle the knitting-stem 4 of one needle rides in the axis-line of a neighboring needle, and vice versa, and in the longitudinal travel of the needle the adjacent needle can slide either in front of or in the rear of the cross-bar 6 and pass from right to left of the needle, and vice versa.

When in front of the cross-bar 6, (see Figs. 11 and 12,) the adjacent cylinder-needle would be sliding on the left side of the rib-needle for the purpose of knitting, and when in the rear of the cross-bar 6 it would be sliding on the right side of the rib-needle for the purpose of linking a loop. (See Figs. 5, 6, 7, 8, and 17.)

To merely cut a piece out of the side of the stem of a needle of normal gage will not allow one needle to pass from the right to the left side of its neighboring or adjacent needle in this manner. The knitting-stem must be put outside the axis-line after the manner of this invention.

The foot 9 and shank 7 may be of any style of make or take the form of a jack, soldered to the other parts of the needle in the ordinary manner. In the rib-needle, Figs. 4 and 11, the foot and shank are continuations of the left stem 5.

In Figs. 9, 10, 12, and 14 the left stem 5 is again brought back across the axis, bringing the foot and shank into line with the right stem 4 to allow the hook and latch to ride in the same trick of the needle-bed as the shank and foot as is desirable when applying my needle to some types of machine. In some of the figures the foot and shank are omitted as unnecessary.

To prevent a rib-hook jamming on the back of a cylinder-needle should they collide, I cut the back of the stem away to a knife-edge 11. This guides the rib-needle off and prevents damage. As a further precaution against damage I thin the stem of the cylinder-needle between the hook 2 and foot 9 at 8. This thinning of the needle-stem makes the needles yield sidewise when engaged with each other. In very small rib-needles where the length of stem will not allow of it this thinning of the stem is omitted.

At every course knitted a loop may be looped around two needles. It will therefore be seen that a needle may be incorporated or withdrawn, when required, without making menders in the fabric.

While the ordinary length of thrust is given to a needle, ordinary knitting proceeds on the knitting-stem 4 in the usual manner. By increasing the thrust of a needle the linking-stem 5 is brought into requisition and the loop 12 takes a side turn and slips onto and is thrust forward by the cross-bar 6 or shoulder 3 into the longitudinal line of travel of the adjacent needle, which links up the loop. If the loop is small and fits the needle, it will stop at the first bend of the cross-bar 6 and be penetrated by the hook on an adjacent needle in its downward stroke, as seen in Fig. 8.

If the knitted loop is very slack, it will slide still farther sidewise and slip by the curves of the cross-bar 6 entirely, and to prevent it going too far on the linking-stem the shoulder 3, cut in the needle, is provided, against which the loop will impinge. When a slack loop slides right across the axis, the loop will be penetrated by the needle in its

upward stroke, as seen in Figs. 5 and 6. With all the needles in their respective beds one-and-one fabric would be produced. To change the pattern to plain fabric, the knitting thrust of the rib set of needles is increased, causing their loops to take a side turn, thrusting them into line with the adjacent cylinder-needles, which link them up, as aforesaid. The rib-needles then have their loops thrown off and are withdrawn, plain fabric being then proceeded with until one-and-one pattern is again required, when the order of things is reversed.

It will be noticed in this case the change from one-and-one to plain pattern reduces the fabric to half the number of loops in width, and the change from plain pattern to one-and-one pattern again increases the width. To do this, the needles shown in Figs. 1, 2, and 3 are used as cylinder-needles, as there is no need for the rib-needles to link up the cylinder-loops, because the one and one commences the article and the holes made by the rib-needles commencing to knit are cut through, as the articles are severed at this point. The two patterns of fabric may, however, have the same width of loops simply by using every other rib-needle only, withdrawing every other cylinder-needle at the commencement of the one-and-one fabric and again incorporating them when the rib-needles are withdrawn for changing to plain fabric, that is, by replacing plain needles for rib-needles, and vice versa, as now obtains. In this case right and left needles (see Figs. 11 and 12) are used as cylinder-needles.

In Fig. 12 the rib-needle (dotted lines) is receding with the loop of the cylinder-needle in its hook preparatory to the cylinder-needle casting the said loop.

In my invention it is not necessary to take the loop off one needle to transfer it to another. It will therefore be seen that a needle may continue knitting after it has linked its loop onto an adjacent needle.

I have shown one way of making my invention without attempting to show the many forms of making, applying, and using the same.

Having now described the nature and object of my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A knitting-needle having a beveled part 11, substantially as and for the purposes set forth.

2. A knitting-needle having a reduced part 8 and a side bend in the stem forward of the needle-foot, substantially and for the purposes set forth.

3. A knitting-needle having a beveled part 11 and a reduced part 8, substantially and for the purposes set forth.

4. A knitting-needle having provisions for carrying its loop sidewise into line with the axis of an adjacent needle, substantially and for the purposes set forth.

5. A knitting-needle having provisions for carrying its loop sidewise into line with the axis of an adjacent needle, a beveled part 11 and reduced part 8, substantially and for the purposes set forth.

6. A knitting-needle having its knitting-stem diverted to a side line, forming a linking-stem parallel to but in the rear of the knitting-stem, whereby an adjacent needle may slide in the front of, or at the back of the junction of the two stems, substantially and for the purposes set forth.

7. A knitting-needle having a part of the stem for linking and a part of the stem for knitting, the knitting part being of less width, than the total width of the needle, substantially and for the purposes set forth.

8. A knitting-needle having a right stem and a left stem, connected to each other, whereby a loop thereon may take a side turn to the knitting-line of an adjacent needle for the said adjacent needle to link it up, substantially and for the purposes set forth.

9. A right-and-left knitting-needle, substantially as and for the purposes set forth.

10. A knitting-needle having a side stem disposed on a line outside the axis of the needle, substantially and for the purposes set forth.

11. A knitting-needle having a stem outside the axis of the needle, bent across the axis and continued on another line on the opposite side of the axis, substantially and for the purposes set forth.

Dated this 26th day of November, 1895.

GEORGE FREDERICK STURGESS.

Witnesses:
THOMAS SCOTT,
A. E. STEVENSON.