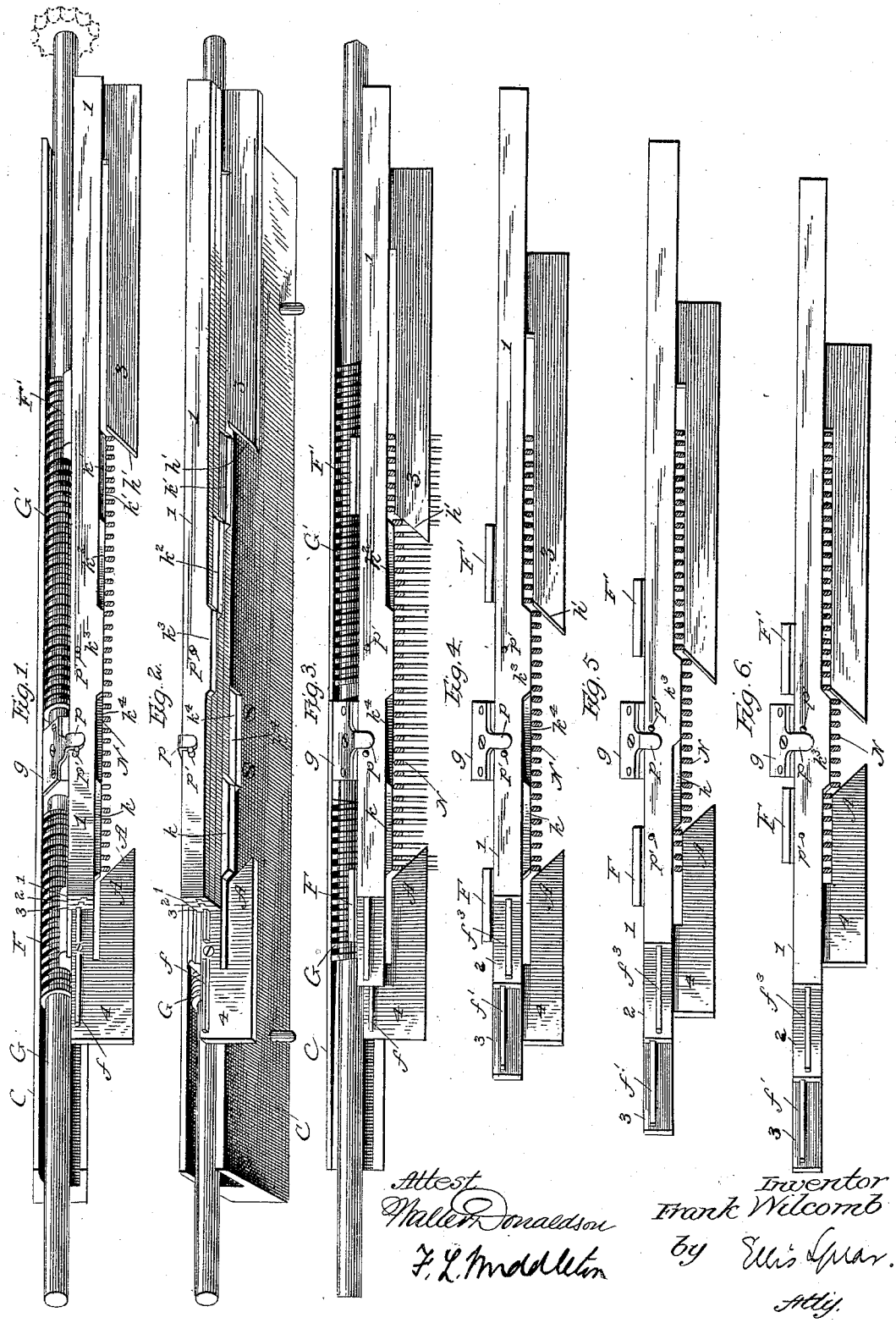
(No Model.) 2 Sheets—Sheet 1.

# F. WILCOMB.

## STRAIGHT KNITTING MACHINE.

No. 405,639. Patented June 18, 1889.




Attest
Walter Donaldson
F. L. Middleton

Inventor
Frank Wilcomb
by Ellis Spear.
Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

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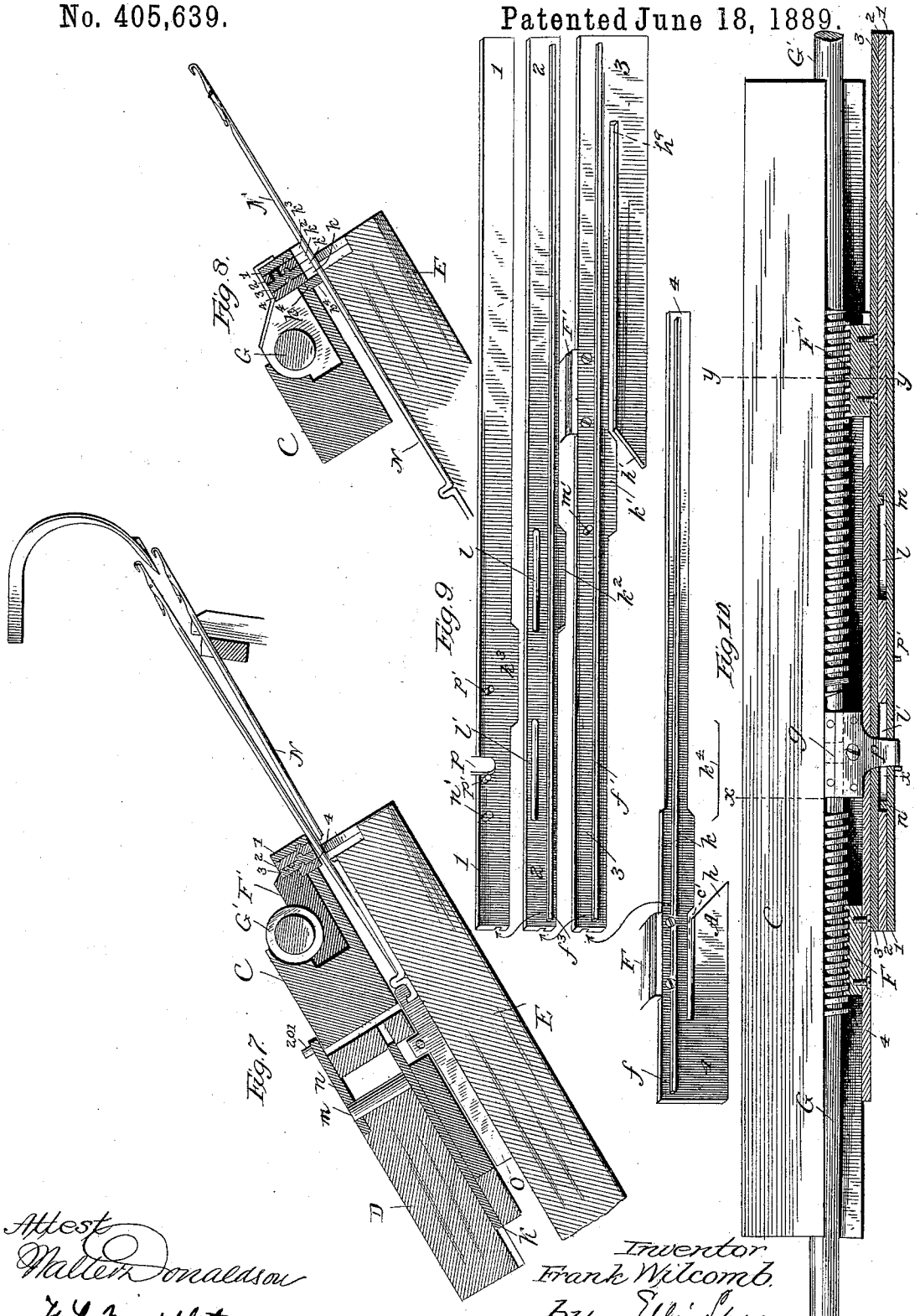


Fig. 8.

Fig. 7.

Fig. 9.

Fig. 10.

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# UNITED STATES PATENT OFFICE.

FRANK WILCOMB, OF PROVIDENCE, RHODE ISLAND.

## STRAIGHT-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 405,639, dated June 18, 1889.

Application filed November 10, 1888. Serial No. 290,463. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK WILCOMB, of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Straight-Knitting Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

The invention set forth in the following specification is an improvement in knitting-machines of that class in which the needles are in a straight row and are thrown out of work in narrowing.

The machine to which the invention has been applied is more clearly shown in Letters Patent of the United States granted to me the 12th day of October, 1886, and numbered 350,795.

This invention relates especially to the mechanism for raising the needles out of work in narrowing and returning them to work in widening in the operation of knitting fashioned goods. It includes means for operating, for the purpose specified, on the ends of the row of needles.

In the accompanying drawings I have shown fully the improved construction herein claimed by me, and, in connection therewith, old parts shown in my aforesaid patent, to which these new parts are directly connected and to which they are more directly related.

In the drawings, Figure 1 represents a front or inner face view of the apparatus in perspective, with the needles in section; Fig. 2, a similar view of the apparatus partly turned and without the needles. Figs. 3 to 6, inclusive, illustrate the different successive positions of the needle-raising slides, as fully explained hereinafter. Fig. 7 shows a section on line *y y* of Fig. 10. Fig. 8 is a section (in part) of Fig. 10 on line *x x*. Fig. 9 shows the slides separated. Fig. 10 is a top view, partly in horizontal section.

In Figs. 7 and 8 of the drawings the means for raising the needles out of work are shown in their relation to the needle-bed and the needles. The needle-bed E is shown in section. Two needles N N are shown resting on this. The rear end of each needle is in engagement with a jack O, which has a stud *o* projecting into the groove or needle-path. An ordinary slide-bar D is shown in Fig. 7, with the slot for the stud *m*, which projects through the slot from the cam K, in which the stud is set. I have also shown the plate *n*, with its stud 201. These parts are all as set forth in my patent aforesaid.

Over the front edge of the needle-bed is placed a cap-piece C, which is fixed and supported on said bed. Its front edge is grooved to receive nuts F F′, which are adapted to slide in these grooves. In the same cap-piece, and lying partly in the same recess, are two threaded shafts G and G′. They are provided with bearings at their inner ends in the block *g*, fixed to the cap-piece. The threaded portions of the shafts fit snugly in the groove in the cap-piece, as shown in Fig. 7, and they turn therein freely but independently, and carry the nuts back and forth, according to the direction in which the shafts are turned. The nuts are fixed to the needle-raising slides, respectively, which lift the needles out of work. The shafts are turned independently and by hand or machinery, the latter, as indicated in Fig. 1, which shows in dotted lines on the right-hand end of the right-hand shaft a sprocket-wheel, by means of which the shaft may be turned through any suitable means. While I have shown this shaft and the nuts engaging therewith for the needle-raising slides, I do not limit myself to their use in respect to the improved slides shown in connection therewith and now to be described. The purpose of these needle-raising slides is to provide for raising the needles or throwing them out of action at both ends of the rows of needles for fashioning on both sides of the fabric. I have shown in the drawings a special form for fashioning stockings, which require greater scope of the fashioning devices on the front; but this is not an essential feature of the invention. It will be understood that the active needles must be held down by the slides to their work and must be uncovered as fast as the needle-raising point or points are advanced to raise them out of work. The construction provides for this progressive uncovering or releasing of the needles down to the last narrowing or toe of the stocking.

The main slides carrying the needle-raising points have been already referred to in connection with the nuts which directly carry

them. That on the left hand of the figures showing side views is marked 4, and is the slide which raises the needles to narrow on the front or upper side of the stocking to form the toe on that side. It is fixed to the nut F, which is moved by the screw G. It has a spline $f$ on its face, which fits a groove in the rear face of the slide 3. A lifting-point A forms between its upper edge and the opposite edge of the slide a slot $c'$, into which the needles raised by the inclined point of A are received. In front of the point is a bearing-face $k$, which, when the slide 4 is in place, rests upon the needles next the end of the row and holds them down. The rest of the slide is cut away above and below quite to the other end. The slide 3, Fig. 9, is like slide 4 in general form. It has a groove on its rear face, into which the spline of slide 4 fits. It has a spline $f'$, an inclined point $h'$, and an open slot $h^9$ between the point and the under edge of the slide to receive the needles raised by the point. This slot is longer than that of the needle-raising slide 4, for the reason that this acts to throw out stitches for the rear side of the stocking, which requires the most narrowing. A bearing-edge $k'$ is located just in front of the point, which is reversed in position to the point 4. The slide 3 is fixed to the nut F', and is moved by the screw G'. These two slides so far described are needle-raising and needle-covering slides, or slides having in addition to the needle-raising points the bearing portions $k$ and $k'$, respectively, which hold down the needles not out of work. In addition to these I use other slides, in number corresponding to the kind of work to be done on the machine—that is to say, according to the pattern of the article. In this case I have shown two of such slides, which I call "covering-slides." They are shown detached, but in relative location in Fig. 9, and are marked 1 and 2. This figure shows the pieces lifted from their place, and the connection between the splines and grooves indicated by arrows. Slide 2 is in general form like slide 3, except that it has no raising-point. It has a spline $f^3$ on its face and a groove in the rear, which fits the spline of slide 3. It has also a bearing $k^2$, arranged in advance of bearing $k'$ when in normal position, as shown in Fig. 9. There is also a slot $l$ in this slide, which, when the slide is in place on the slide 3, receives a pin $m'$, set in slide 3, as shown in Fig. 9, so that when slide 3 has advanced to bring the bearing $k'$ behind the bearing $k^2$ the pin will be at the end of the slot, and will then take the slide 2 along with it, thus uncovering the needles raised by the slide-point and covering only those in advance. The slide 2 has also a slot $l'$, which receives the pin $n'$ of a slide 1. This slide is like slide 2, except that its bearing part $k^3$ is in the same relatively-advanced position as compared with slide 2, and when the latter slide advances sufficiently to bring its bearing behind $k^3$ all the slides move together, and then advance behind a fixed bearing on the bed, similar to the one on the slides. The slide 4, moving from the other end in an opposite direction, moves in front of the fixed bearing $k^4$ on the bed and behind the slides from the other end, moved to the position just above described. All the slides being in this position, one behind another, and all resting on the same needles, the needles which are covered thereby are down, and those only, the others having their ends raised out of work.

It will be plain that the loose connection formed by the pins and slots might be varied by the substitution of other known devices for the same purpose, it being necessary only that there should be a certain amount of lost motion of one before the next is moved.

The central block, in which the ends of the shafts are journaled, is provided with a clip $p$, which extends down over the outer slides and secures them in place.

Figs. 1 and 2 of the drawings show the slides back at both ends and in the position occupied when the needles are all in work. Fig. 2 is partly turned to show the bearings on the slides and the fixed bearings all in their extended position. Fig. 3 shows slide 3 advanced to raise seven needles shown in its slot, and with its bearing $k'$ behind $k^2$. Fig. 4 shows slides 3 and 2 advanced. So far the narrowing is wholly on one side—the rear of the stocking. In Fig. 5 the needle-raising slides are shown as advancing simultaneously on both sides, as is required in narrowing at the toe. In Fig. 6 the position of the slides shown is the extremity of their advance, and all the needles are out of work excepting those which are under the fixed bearing $k$. The splined connection between the slides is most convenient; but they may be held otherwise in proper relative position. Pins $p'$ $p'$ in the face of the front slide limit the movement of this slide and through it the others by the said pins coming in contact as the slide moves in one direction or the other, with the end of a projection extending into the path of the pins, and this projection may be the end of the clip $p$, as shown, or a projection from the frame.

I claim—

1. In combination with the needles of a knitting-machine, a slotted slide having needle-raising point and bearing-surface, a second slide arranged alongside of the first slide and having a bearing for the needles, means for moving the first slide, and means for moving the second slide after movement of the first, substantially as described.

2. A slide for raising the needles of a knitting-machine out of work, having a needle-raising point and slot and a bearing-surface for the needles, in combination with a series of needle-holding slides having bearing-surfaces to hold down the needles, all the slides being loosely connected, and a fixed bearing-surface on the needle-bed, all substantially as and for the purpose explained.

3. Slides for raising the needles of a knitting-machine out of work—one arranged at each end of the row and each having a needle-raising point and slot—a cap with a bearing for the needles fixed to the needle-bed, and bearings or slides moved by the needle-lifting slides, all substantially as described.

4. In combination with the needle-raising slide of a knitting-machine, a threaded shaft and a nut connected to the slide, substantially as described.

5. In combination with the needles of a knitting-machine, a pair of slides—one arranged at each end of the row and each provided with a needle-raising point—a slot to receive the inactive needles, and a bearing for holding the needles down, and a fixed bearing-surface, substantially as described.

6. In combination with the needles of a knitting-machine, a slide having a needle-raising point and slot and bearing-surface, and a second slide having a bearing for the needles, and a connection between the first and second slides, whereby the former moves the latter and the bearings of both are made to rest on the same needles, substantially as described.

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

FRANK WILCOMB.

Witnesses:
DANIEL MCNIVEN,
MILLARD F. MUNROE.