No. 780,394. PATENTED JAN. 17, 1905.

H. L. WEIGERT.

STRAIGHT KNITTING MACHINE.

APPLICATION FILED MAR. 5, 1903.

2 SHEETS—SHEET 1.

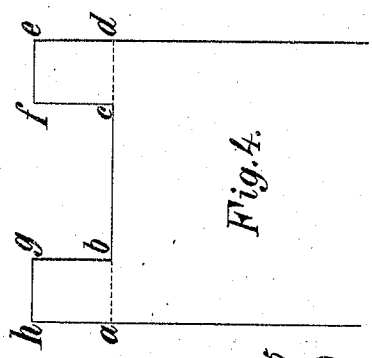


Fig. 4.

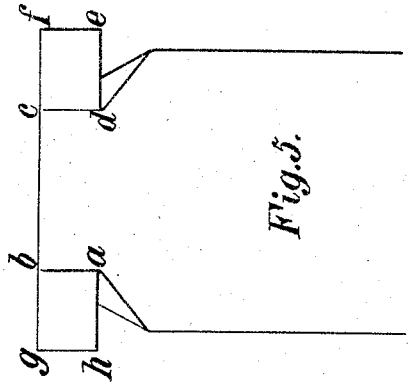


Fig. 5.

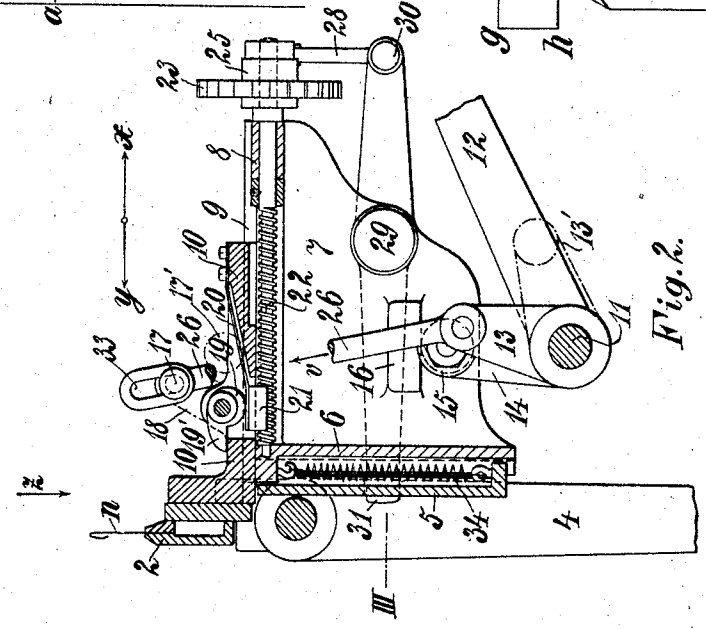


Fig. 2.

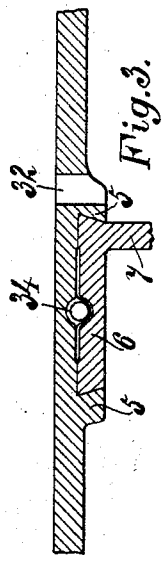


Fig. 3.

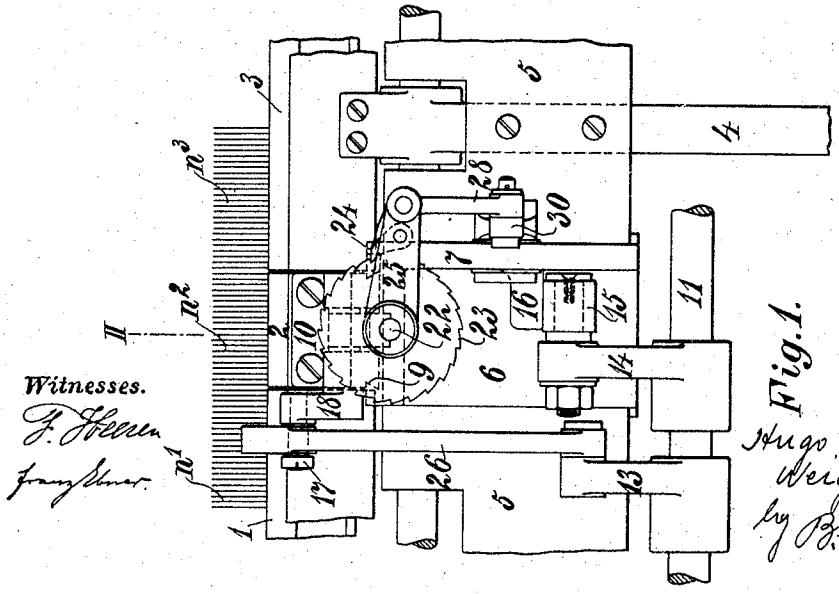


Fig. 1.

Witnesses.

F. Heeren

Franz Steiner.

Inventor

Hugo Louis Weigert

by B. Singer atty.

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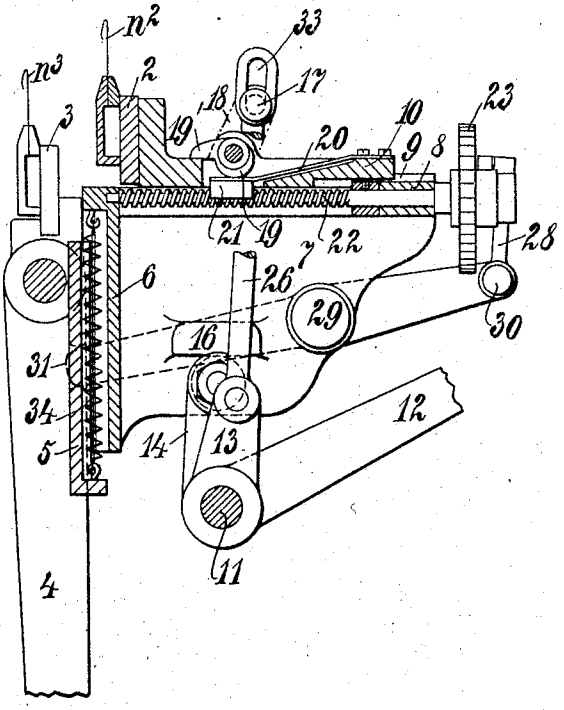
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2 SHEETS—SHEET 2.

Fig. 6.



Witnesses.

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No. 780,394. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

HUGO LOUIS WEIGERT, OF THUM, GERMANY.

STRAIGHT-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 780,394, dated January 17, 1905.

Application filed March 5, 1903. Serial No. 146,308.

To all whom it may concern:

Be it known that I, HUGO LOUIS WEIGERT, a subject of the German Emperor, and a resident of Thum, in the Kingdom of Saxony and Empire of Germany, have invented certain new and useful Improvements in Straight-Knitting Machines, of which the following is a specification.

This invention relates to a knitting-frame with its frame-needle bar divided into three parts and the middle one of the latter adapted to be thrown out of action toward the front. By means of this improvement the manufacture of stockings is considerably facilitated, accelerated, and rendered cheaper.

This invention also provides means for knitting a complete stocking on one machine without removal, thereby doing away with the necessity of a variety of machines such as heretofore used for making the various parts of the stocking. In this way the cost of the knitting plant and of production will be greatly reduced.

My improvements are represented in the annexed drawings, it being noted that the knitting-machine remains the same as before, my structure being simply attached thereto.

Figure 1 is a front view of my device. Fig. 2 is a vertical cross-section seen from the side on the line II of Fig. 1. Fig. 3 is a horizontal cross-section on the line III of Fig. 2. Figs. 4 and 5 diagrammatically indicate the heel part of a stocking accommodated on the machine during two different moments of the work. Fig. 6 is a repetition of Fig. 2 in a different position of the working parts.

The sole change in the construction of the knitting-frame consists in the knitting-frame bar shown in the drawings being divided into three parts 1 2 3, (see Figs. 1 and 2,) while formerly the knitting-frame bar was composed of one sole part on each division. Both side parts 1 and 3 remain attached to the guide-lever 4 in precisely the same manner as was formerly the case with the whole bar; but the middle part has been adapted to be thrown out of action. The remaining mechanisms (represented in Figs. 1 and 2) serve for the purpose of engaging and disengaging the middle part 2. This mechanism is as follows: The guide-lever 4 is that well-known lever the lower end of which is pivoted so that the upper part of the lever 4 may swing to and fro in the direction of the double arrow $x\ y$, Fig. 2. To this upper end of the lever 4 the needle-bar 1 3 is fastened. A vertical prismatic guide 5 is attached to this well-known guide-lever, wherein the slide-rest 6 7 8 may be rectilinearly conducted up and down. The slide-rest is normally drawn down by a spring 34 so far that the bottom edge of the slide 10 rests on the top edge of the prismatic guide 5 and that all the needles $n'\ n^2\ n^3$ stand at the same height. On the surface of this slide-rest 6 7 8 a second prismatic guide 9 is arranged, providing a slide 10 with horizontal guide. It is this slide 10 to which the middle part 2 of the needle-bar is fastened. Consequently it is possible to move the slide-rest 6 7 8 to and fro in the direction of the arrow $x\ y$ on removing the slide 10. Fig. 2 shows the middle part 2 moved totally to y. Fig. 6 shows it moved totally to x, and it is also possible to move it vertically up and down by means of the prismatic guide 5.

Around a shaft 11, journaled in the machine-frame, a hand-lever 12 is rotatably arranged. Upon the same shaft 11 at each division a connecting-rod lever 13 and a roller-lever 14, respectively, are arranged. When the hand-lever 12 is in the position shown in Figs. 1 and 2, the roller 15, rotatably journaled on lever 14, bears under a peg 16, cast to the side wall 7 of the slide-rest 6 7 8. In this position the slide-rest 6 7 8, with all the mechanisms situated upon it, is prevented from accompanying the lever 4 when the latter is moved down by means of the well-known mechanisms of the knitting-frame for providing the frame-needles n with their working movement. The frame-needles $n'\ n^3$, attached to both side parts 1 and 2 of the needle-bar, work on without interruption, and only the frame-needles n^2, which are fastened to the middle part 2, remain back and cannot partake in the action. As, however, not only the roller-lever 14, but also the connecting-rod lever 13, is rigidly connected, on the lever 12 rising the connecting-rod lever 13 has moved from the position shown in full lines in Fig. 2 and has moved

the connecting-rod 26, pivoted thereto, upward in the direction of the arrow *v*. This upward movement is brought about by a spring. (Not shown in the drawings.) In consequence thereof the upper end of the rod 26 has moved from its position 17′ to 17, and the lever 18, rigidly connected to the eccentric 19, has turned around so far that the eccentric-peg 19′ comes to lie upon the upper edge of the slide 10. The eccentric 19 presses against the half-nut 21, fastened to the end of the spring 20. This half-nut 21 fits upon the thread of the screw-spindle 22. Consequently at this moment when the hand-lever 12 has been moved upwardly the roller 15 has been supported against the peg 16 and the half-nut 21 at the same time has been pressed against the screw-spindle 22. The slide-rest 6 7 8 therefore cannot be moved with the guide-lever 4 downward, but is forced to remain in its highest position, and at the same time the slide 10 has been connected so as to be governed by the screw-spindle 22. This screw-spindle is acted upon by means of a ratchet arrangement consisting of the following parts: the ratchet-wheel 23, click 24, ratchet-lever 25, connecting-rod 28, and the reversing-lever 30 31, oscillating around the pivot 29, fixed to the slide-rest 6 7 8. The back end 31 of said reversing-lever catches into the hole 32 of prismatic guide 5, visible from Fig. 3. When, therefore, the lever 4 is moved downward in the direction of the arrow *z*, as is visible from Fig. 6, and the roller 15 at the same time prevents the slide-rest 6 7 8 and the lever-pivot 29 from taking part in this movement, the lever end 31 is taken along downward and the lever end 30 presses the ratchet-lever 25 upward by means of the connecting-rod 28 and the click 24 turns the ratchet-wheel 23 on for the pitch of a tooth. The ratchet-wheel 23 being rigidly connected to the screw-spindle 22, the latter is turned on also, and as the half-nut is pressed down by the eccentric 19 the slide is moved forward for a corresponding small distance in the direction of the arrow *x*. The teeth of the ratchet 23 and the pitch of the spindle 22 are so adjusted that every time the lever end 31 swings downward the slide 10 moves forward in the direction of arrow *x* for a distance corresponding to one row of loops of the stocking.

The operation is as follows: The stocking, Fig. 4, at first is knitted up to the row of loops *a b c d* in the usual and well-known manner, the hand-lever 12 being at its lowest position. The frame-needles n' n^2 n^3, fastened to the three parts 1 2 3 of the needle-bar, up to this moment form a single straight row, because the spring 34 holds the middle part 2 fast at its lowest position in regard to 1 3, and all the needles work in precisely the same manner as on a common knitting-frame. The upper end of the rod 26, which is provided with a slot 33 on the upward and downward movement of the slide-rest 6 7 8, allows the pin 17 to play up and down in the slot 33. However, at the moment the row of loops *a b c d*, Fig. 4, was completed the workman attending the machine will move the lever 12 up into the position visible from Figs. 1 and 2. The roller 15 rests below the peg 16, and consequently prevents the slide-rest 6 7 8 from moving down also, and at the same time the eccentric 19 presses the half-nut 21 upon the screw-spindle 22, and the lever end 31 is taken downward by the lever 4, the spring 34 thereby being extended. In consequence thereof the click 24 moves the ratchet-wheel 23 on by a tooth—*i. e.*, the slide 10, together with the middle part 2 of the frame-needle bar, is pushed forward for one row of loops in the direction of the arrow *x*, Fig. 2. The row of loops *a b* and *c d*, Fig. 4, is accomodated upon those frame-needles *n* which are fastened in the side parts 1 and 3 of the needle-bar, and the row of loops *b c* hangs upon the frame-needles n^2 attached to the disengageable middle part 2. These latter frame-needles do not partake of the looping any more. The row of loops *b c* moves back each time by a division of loops in the direction of the arrow *x* when a new row of loops is formed. In this manner the work goes on till the last rows of loops *e f* and *g h* have been knitted in the two heel parts of the stocking. The middle part 2 of the frame-needle bar during this time must have moved so far in the direction of the arrow *x* as is indicated by the length *c f*, *b g*—that is, the position of the mechanism in Fig. 6. At this moment the machine is stopped and the working interrupted for a short time and the workman attending the machine presses back the hand-lever 12 downward again into its non-working position. The eccentric 19 allows the half-nut to become detached from the screw, and while the spring 34 draws the slide-rest 6 7 8 down to its lowest position the slide 10 is moved back from the position Fig. 6 to the position Fig. 2—*i. e.*, in the direction of the arrow *y*—so that all the needles *n*, attached to the three needle-bars 1 2 3, again form a straight line. This moving back of the slide 10 the attendant may do by hand. The row of loops *g h* and *f e* are now taken off the frame-needles n' and n^3, only the rows of loops *b c* which are accommodated upon the needles n^2 remain on their needles, and the two rows of loops *b g* and *c f*, Fig. 4, are now run on those needles n' and n^3 from which the rows of loops *g h* and *f e* were just taken off. The stocking on the machine then fully resembles Fig. 5 of the drawings—to-wit, the rows of loops *g h*, *b c*, *c f* form a single straight line. From this moment the work is continued in the well-known way—*i. e.*, the foot part of the stocking is linked on. This takes place in just the same way as explained at the commencement of the specification—*i. e.*, as on a common knitting-frame and as if a

division of the needle-bar into three parts 1 2 3 had never taken place.

Having now fully explained my invention, I declare that what I claim is—

1. In a knitting-frame the combination of a guide-lever bringing about the working movements of the frame-needles, a needle-bar the middle part of which is movable to and fro in a horizontal direction, of a slide-rest, upon which the movable middle part of the needle-bar rests, and means for moving said slide-rest in a vertical direction to and fro, substantially as set forth.

2. In a knitting-frame, the combination of a needle-bar provided with a separate middle part, of an automatic feeding device for said middle part consisting of a pivoted lever adapted to be operated by the frame, a rod pivoted to said lever, a ratchet-lever provided with a pawl and pivoted to said rod, a ratchet-wheel secured to a screw-spindle and engaging said pawl, a spring-held half-nut adapted to engage said screw, an eccentric for causing said half-nut to engage said screw, and a slide moved by said half-nut and carrying the separate part of the needle-bar.

3. In a knitting-machine, the combination of a separable needle-bar part, an automatic feeding device for moving said part in a horizontal direction, a manually-operable device for throwing in a stop for a vertically-guided slide-rest for said part and simultaneously throwing a half-nut into engagement with a screw for operating said automatic feeding device, whereby the needle-bar part is moved a small distance forward as each new row of loops is formed, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HUGO LOUIS WEIGERT.

Witnesses:
MORRIS LIPMAN,
FREDERICK J. SIETZMAN.