

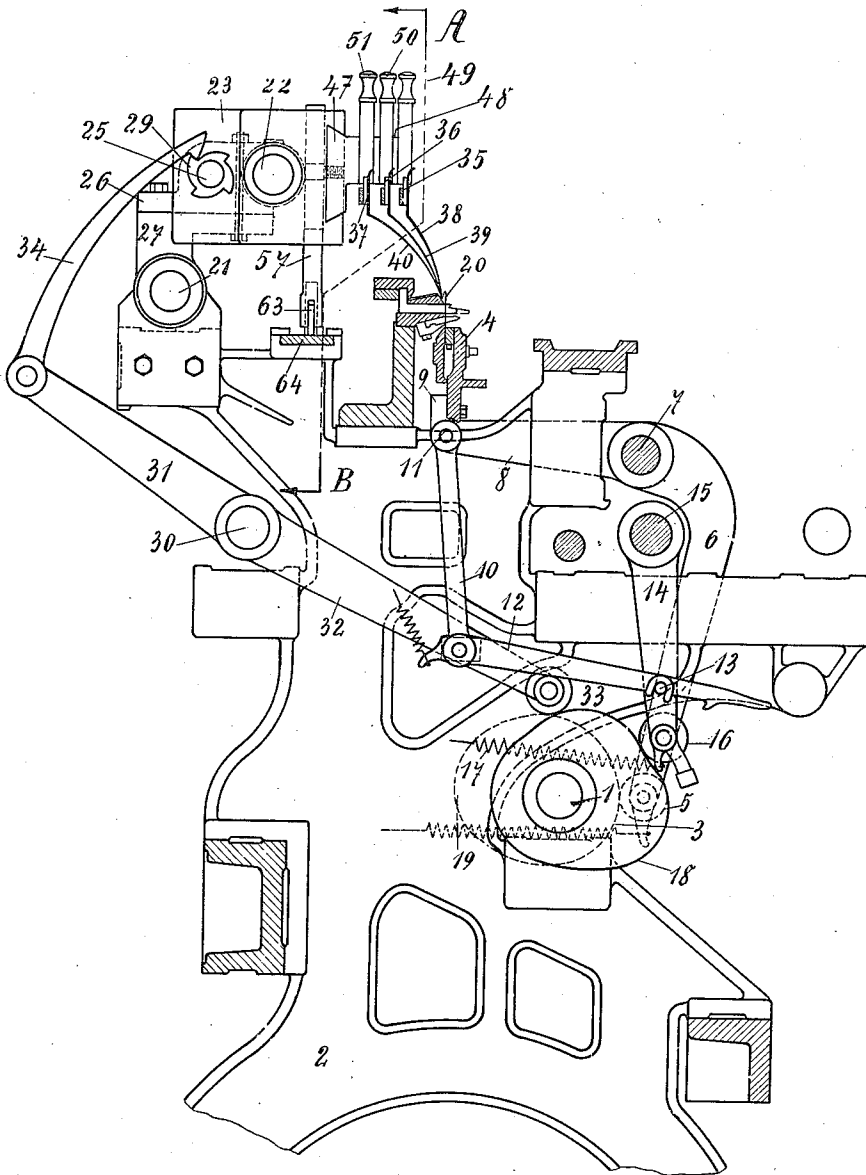
T. LIEBERKNECHT.
STRAIGHT HOSIERY FRAME.
APPLICATION FILED MAY 25, 1910.

981,663.

Patented Jan. 17, 1911.

5 SHEETS—SHEET 1.

Fig. 1



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5 SHEETS—SHEET 2.

Fig. 2

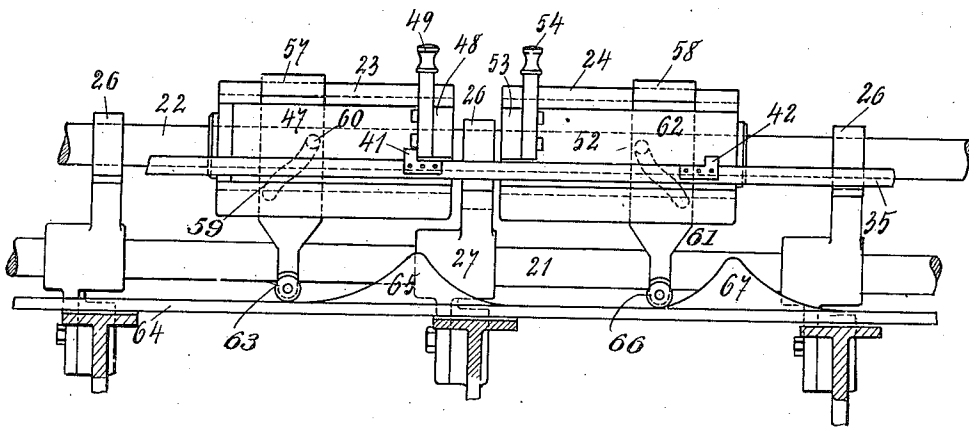
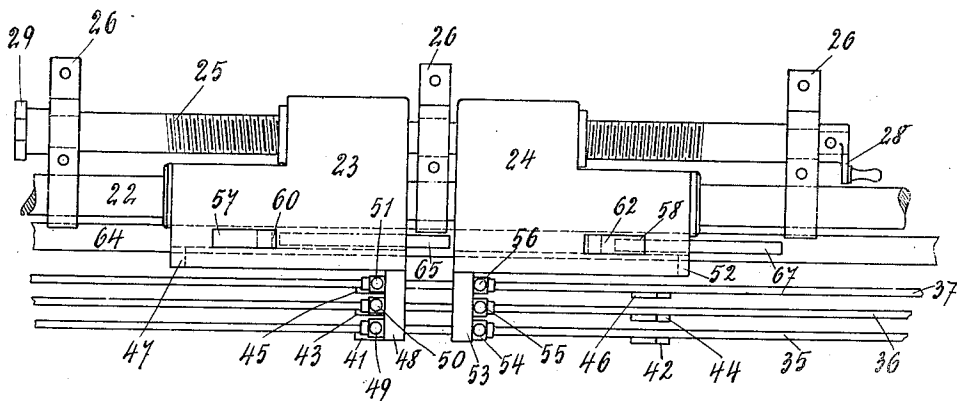


Fig. 3



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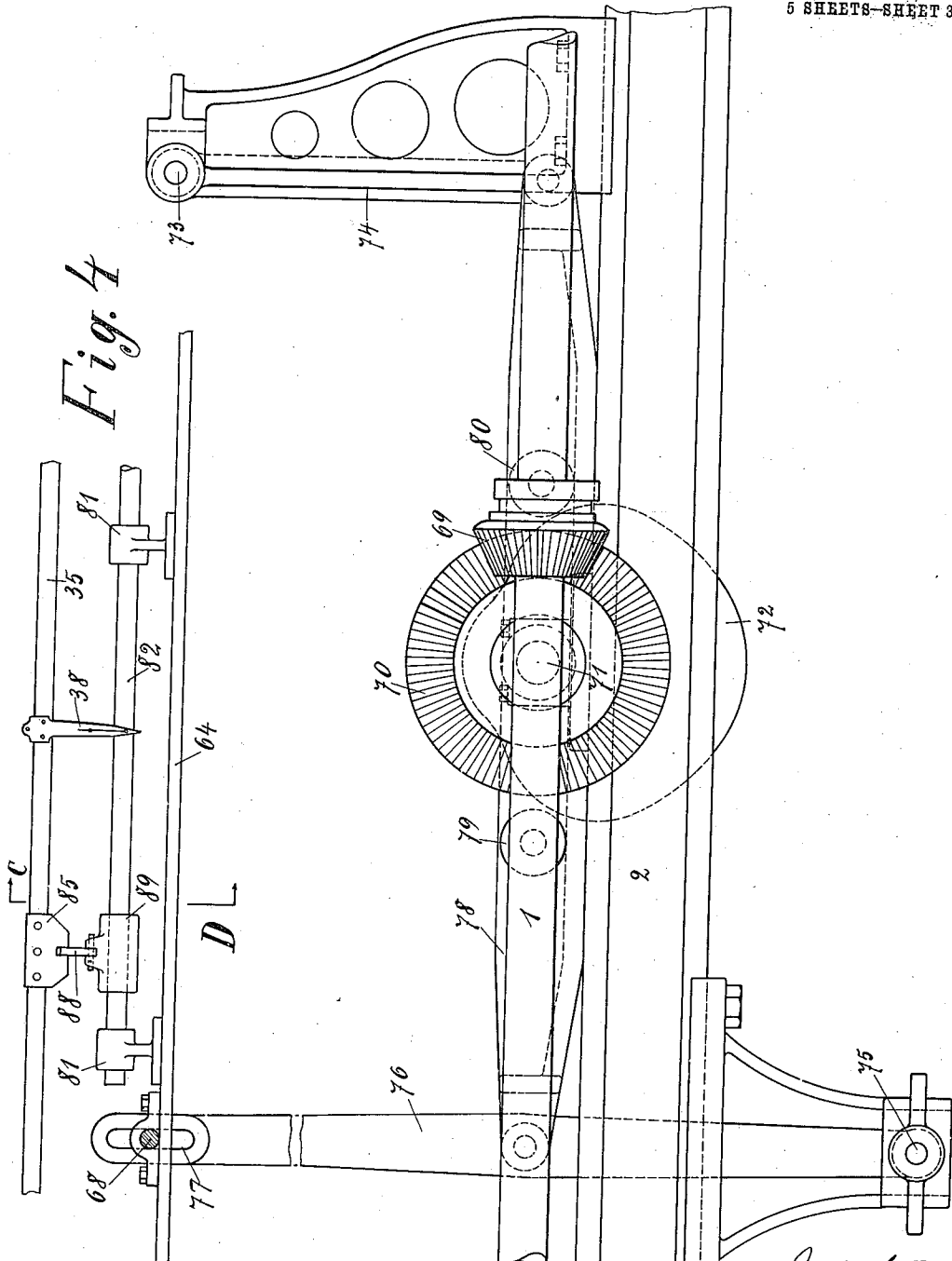
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5 SHEETS-SHEET 3.



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5 SHEETS—SHEET 4.

Fig. 5

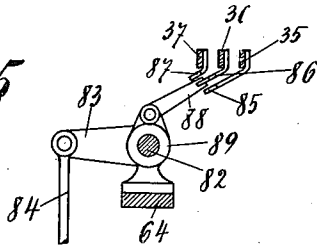
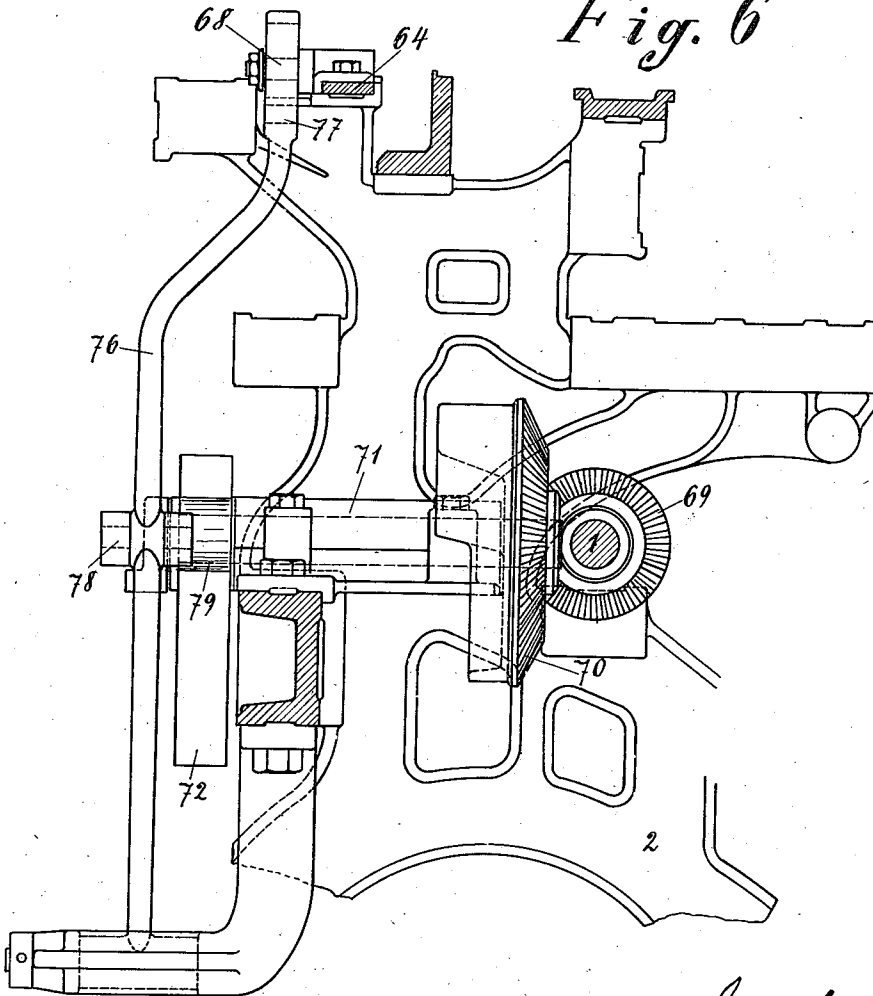


Fig. 6



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5 SHEETS—SHEET 5.

Fig. 7

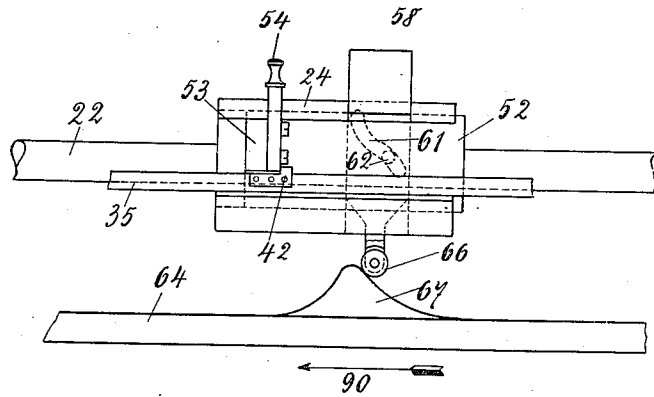
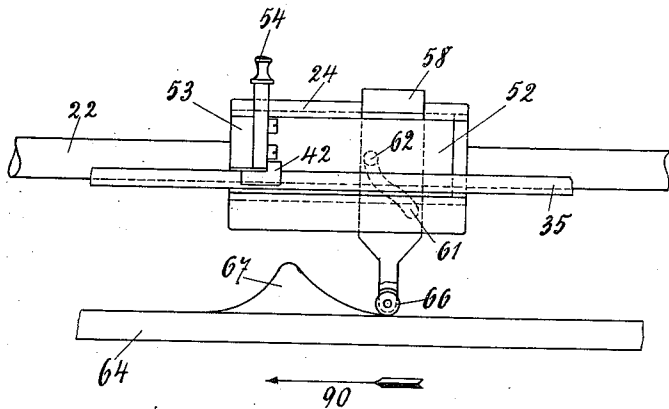


Fig. 8



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UNITED STATES PATENT OFFICE.

THEODOR LIEBERKNECHT, OF HOHENSTEIN-ERNSTTHAL, GERMANY.

STRAIGHT HOSIERY-FRAME.

981,663.

Specification of Letters Patent.

Patented Jan. 17, 1911.

Application filed May 25, 1910. Serial No. 563,388.

To all whom it may concern:

Be it known that I, THEODOR LIEBERKNECHT, a citizen of the Empire of Germany, residing at Hohenstein-Ernstthal i. S., in the Empire of Germany, have invented a new and useful Straight Hosiery-Frame, of which the following is a specification.

My invention relates to improvements in straight hosiery frames adapted to simultaneously produce a number of like hosiery pieces, whereby the shocks or blows produced by the yarn guide bars striking the known shiftable stops are considerably softened or nearly annihilated, so that the machines can be driven at a greater speed than hitherto and consequently their output will be increased. I provide the straight hosiery frame with two main slides guided in the frame proper and operated by a screw-spindle with right- and left-handed threads. Each main slide is provided with a subsidiary slide guided in it parallel to the yarn guide bars. On each subsidiary slide as many adjustable stops are provided, as there are yarn guide bars, each stop being adapted to come in contact with one lug on any of the yarn guide bars and to move with same while retarding it, until both stop. In each main guide moreover a controlling slide is guided in a direction at right angles to the yarn guide bars and the controlling slide is provided with a crooked slot, in which a pin on the subsidiary slide engages. I further provide the machine with a cam bar parallel to the yarn guide bars, which cam bar is guided in the frame proper and has two cams, over which rollers at the lower ends of the two controlling slides can roll, so that by the cams the controlling slides can be alternately raised and lowered, while at the same time by the controlling slides the subsidiary slides are longitudinally moved in one and the other direction.

Means are provided for longitudinally reciprocating the cam bar and for periodically and yieldingly connecting the cam bar with any of the yarn guide bars. The said crooked slots in the two controlling slides and the said two cams are so shaped, that shortly before the end of any stroke of the yarn guide bar then in motion the respective subsidiary slide is first moved through a certain distance in a direction opposite to that of the yarn guide bar and the motion of the subsidiary slide is then reversed at

the moment that its respective stop is about to come in contact with the corresponding lug of the yarn guide bar, so that the shock or blow produced by the lug striking the stop is considerably softened or annihilated, the more so, since by the stop moving with the subsidiary slide in the same direction the motion of the lug and of its bar is gradually retarded, until both stop at the moment that the motion of the yarn guide bar is reversed. The said screw-spindle with right- and left-handed threads serves for feeding the two main slides in opposite directions during the widening or narrowing of the goods, in other words for varying the stroke of the yarn guide bar.

I will now proceed to describe my invention with reference to the accompanying drawings, in which—

Figure 1 is a vertical central cross section through a Cotton type straight hosiery frame provided with the improvements according to my invention, only so much of the machine being shown as is necessary for giving a sufficient idea. Fig. 2 is a vertical longitudinal section through the broken line A—B in Fig. 1 and shows the middle part of the machine. Fig. 3 is a plan view of the parts shown at Fig. 2. Fig. 4 is a front elevation of the parts in the middle portion of the frame. Fig. 5 is a vertical cross section through the line C—D in Fig. 4, seen in the direction of the arrows. Fig. 6 is a vertical cross section through the straight hosiery frame on a line to the left of the parts shown in Fig. 4, only those portions of the mechanism required to illustrate the invention being shown. Fig. 7 is a detail view of some of the parts shown in Fig. 2, with the cam bar in another position, and Fig. 8 is a similar view and shows the cam bar in a third position.

Similar characters of reference refer to similar parts throughout the several views.

In the drawings I have shown for example a straight hosiery frame of the known Cotton's construction, which is adapted to simultaneously produce a number of like goods. A cam shaft 1 is mounted in the frame 2 to turn and is arranged to be driven from some countershaft by means of gearing (not shown) and carries various cam disks, of which only a few are shown at Fig. 1. The cam disks 3 are adapted to operate the machine needle bar 4 by means of rollers 5, arms 6, a rocking shaft 7 and arms 8.

The frame needle bar 4 is fastened on the upper short arms 9 of two-armed levers 9, 10, which are mounted to rock on pins 11 at the free ends of the arms 8, while their lower long arms 10 are pivotally connected by rods 12 with pins 13 on arms 14 fastened on a rocking shaft 15. The arms 14 carry rollers 16 and are therewith pressed by helical springs 17 against the periphery of cam disks 18 on the cam shaft 1, while the above mentioned rollers 5 are pressed by helical springs 19 against their cam disks 3. In this manner the frame needle bar 4 can be raised and lowered by the parts 3, 5, 6, 7, 8 and rocked about the pins 11 as usual.

The frame needles are denoted by 20, but I do not further describe them, nor the sinkers working them, as they are immaterial to my invention.

Two parallel horizontal rods 21 and 22 are provided in the frame 2 and two opposite main slides 23 and 24 are mounted on the upper rod 22 to longitudinally move. The two main slides 23 and 24 form nuts of a horizontal left- and right-handed screw-spindle 25, which is mounted to turn in three bearings 26, 26 loose on the rod 22. The bearings 26, 26 are rigidly connected with three supports 27, 27, which are loose on the lower rod 21. The middle bearing 26 is assumed to be located in the middle of the hosiery frame, and it will be seen, that by the three bearings 26, 26 and the three supports 27, 27 the two main slides 23 and 24 are prevented from turning on the rod 22. The screw-spindle 25 carries at the right end in Fig. 3 a hand-crank 28 and at the left end a ratchet wheel 29 with four teeth. Loose on a shaft 30 forming part of the hosiery frame is a two-armed lever 31, 32, of which the upper arm 31 carries a long pawl 34 engaging the ratchet wheel 29 and the lower arm 32 carries a roller 33 adapted to roll on one of the cam disks 3. It will be understood, that by means of the pawl 34, the ratchet wheel 29 and the screw-spindle 25 the two main slides 23 and 24 can be fed toward one another to control the traverse of the yarn guides when narrowing the goods and after finishing the goods or their portions the two main slides can be returned to their initial position by turning the hand-crank 28. Three yarn guide bars 35, 36, 37 parallel to the two rods 21 and 22 and to the series of frame needles 20 are shown to be provided, which are mounted in the frame 2 to longitudinally reciprocate and carry yarn guides 38, 39, 40 (Fig. 1), of which only one 38 is shown in Fig. 4. The yarn guide bars 35, 36, 37 have fastened on them near their middle two lugs each, viz. 41 and 42 on the bar 35, 43 and 44 on the bar 36, 45 and 46 on the bar 37. A subsidiary slide 47 is horizontally guided in one main slide 23 and has an arm 48, on

which three vertically adjustable stops 49, 50, 51 are shown to be provided about in the vertical planes of the three yarn guide bars 35, 36, 37. Another subsidiary slide 52 opposite to the first one 47 is guided in the other main slide 24 and has an arm 53, on which three vertically adjustable stops 54, 55, 56 are provided. The lug 42 of the yarn guide bar 35 is adapted to come in contact with the stop 54, whereby the bar is stopped, and the other lug 41 is adapted to come in contact with the stop 49 for stopping the bar 35. The two lugs 43 and 44 of the second yarn guide bar 36 are in a similar manner adapted to work with the stops 50 and 55, and the two lugs 45 and 46 of the third yarn guide bar 37 are adapted to work with the two stops 51 and 56 respectively. A controlling slide 57 is vertically guided in one main slide 23 and a second controlling slide 58 in the other main slide 24. The controlling slide 57 has a crooked oblique slot 59, in which a pin 60 on the subsidiary slide 47 engages. The other controlling slide 58 has an opposite slot 61, in which a pin 62 on the other subsidiary slide 52 engages. The controlling slide 57 carries at its lower end a roller 63, which is adapted to roll on a cam bar 64 and over a cam 65 provided on the latter. The other controlling slide 58 likewise carries at its lower end a roller 66, which is adapted to roll on the cam bar 64 and over a second cam 67. The two controlling slides 57 and 58 may be pressed downward by their own weight or by springs of any known kind (not shown).

The cam bar 64 is horizontally guided in the frame 2 and carries a pin 68 which is operated from the cam shaft 1 in the following manner. A small bevel wheel 69 splined on the cam shaft 1 meshes with a large bevel wheel 70 keyed upon a shaft 71, which turns in the frame 2 and has fastened on it at the rear end a cam disk 72. A suitable part of the frame 2 carries a pin 73 on which a link 74 is mounted to rock, and another part of the frame 2 carries a pin 75, on which a lever 76 can rock. At the upper end the lever 76 has a slot 77, in which the said pin 68 engages. The link 74 is pivotally connected with the lever 76 by a rod 78 carrying two rollers 79 and 80 which are adapted to simultaneously roll on the periphery of the cam disk 72 from opposite sides. As the diameter of the large bevel wheel 70 is twice that of the small bevel wheel 69, it will be understood, that on every revolution of the cam shaft 1 the cam bar 64 will make one stroke in either direction. The parts 69, 70, 71, 72, 73, 74, 75, 76, 78, 79, 80 are substantially the same as similar parts of the yarn guide traverse mechanism to be found on any known Cotton's hosiery frame, the only difference being, that they actuate the cam bar 64 and not the known slide carrying

the yarn guide bars. The cam bar 64 carries several bearings 81, 81, in which a shaft 82 is mounted to rock, while it is in any known manner prevented from longitudinal motion, so that it is obliged to partake in the reciprocating motion of the cam bar 64. The right end of the shaft 82 in Fig. 4 passes through the nave of an arm 83 (Fig. 5) and is provided with a groove, in which a feather in this nave engages. The arm 83 is in any known manner prevented from endwise motion and is pivotally connected with a vertical rod 84, which is operated from any known device that ordinarily serves for periodically changing the connection shown at 85, 88, 89 from one yarn guide bar to any of the other yarn guide bars. The three yarn guide bars 35, 36, 37 have fastened on them inclined forks 85, 86, 87 respectively, into any of which an arm 88 fastened on a sleeve 89 can engage. The sleeve 89 is in any known manner prevented from turning on the shaft 82 and is frictionally held thereon, so that it normally moves together with the latter, but on being stopped in a manner to be described later on it can slide on the shaft 82.

The straight hosiery frame operates as follows: By turning the hand-crank 28 the two main slides 23 and 24 are moved away from one another into their initial position. When the machine is in working order and at a moment the arm 88 on the sleeve 89 engages the fork 85 on the front yarn guide bar 35 and the cam bar 64 is moved from right to left in the direction of the arrow 90 in Figs. 7 and 8, about in the middle of the stroke of the cam bar 64 the roller 66 of the right controlling slide 58 will occupy the position shown at Fig. 2, so that it is about to roll on the cam 67. Then it will raise the controlling slide 58 and at the same time the subsidiary slide 52 will be moved by its pin 62 engaging in the slot 61 of the controlling slide 58 in a direction opposite to that of the arrow 90. On about 70% of the stroke being completed, the roller 66 will be on the summit of the cam 67, so that the pin 62 engages in the deepest portion of the crooked slot 61 and consequently the subsidiary slide 52 occupies its extreme position on the right and its stop 54 will be but at a small distance from the lug 42 of the yarn guide bar 35, which latter has been moved along with the cam bar 64. Shortly afterward the roller 66 commences to descend, as is shown at Fig. 7, so that the pin 62 of the subsidiary slide 52 engages in the crooked slot 61 at a point above the lower end of the latter, which means, that the subsidiary slide 52 has been moved through a small distance in the direction of the arrow 90. At the same time by the cam bar 64 the front yarn guide bar 35 has also been moved forward in the same direction, so that

its lug 42 just comes in contact with the stop 54, as is clearly shown at Fig. 7. During the continued motion of the cam bar 64 in the direction of the arrow 90 the pin 62 of the subsidiary slide 52 will relatively move in the slot 61 of the controlling slide 58 upward, which means, that the subsidiary slide 52 will move more slowly in the direction of the arrow 90 than the cam bar 64 and the yarn guide bar 35 and consequently it will retard by its stop 54 and the lug 42 the yarn guide bar 35. At the moment that the roller 66 is about to leave the cam 67 (see Fig. 8), the pin 62 of the subsidiary slide 52 engages in the upper end of the crooked slot 61, so that both the stop 54 and the lug 42 will stop and the yarn guide bar 35 will be prevented from further moving, while the cam bar 64 may continue moving farther, before it stops and its motion is reversed. It is obvious, that in this manner any shock or blow between the stop 54 and the lug 42 can be avoided.

During the described motion of the cam bar 64 in the direction of the arrow 90, of course also the roller 63 of the left controlling slide 57 will have rolled over the left cam 65, so that the oppositely inclined slot 59 in the left controlling slide will by the pin 60 have moved the left subsidiary slide 47 first in the direction of the arrow 90 and afterward in the opposite direction. As, however, in the meantime the other lug 41 of the front yarn guide bar 35 remains out of reach of the stop 49, no effect will be produced by the left cam 65 during the stroke in the direction of the arrow 90. It is only during the stroke in the opposite direction, that the left cam 65 is able to produce a gradual and silent stoppage of the front yarn guide bar 35 by means of the stop 49 and the lug 41 in a similar manner as explained above with reference to the right cam 67. The sleeve 89 frictionally held on the shaft 82 permits it to vary the stroke of any of the yarn guide bars 35, 36, 37, while the stroke of the cam bar 64 remains constant, so that the goods can be widened or narrowed as usual. The ratchet wheel 29 on the screw-spindle 25 is fed one tooth forward by the pawl 34 for every revolution of the cam shaft 1, so that the two main slides 23 and 24 are simultaneously moved together through the distance of one or several pitches of the frame needles 20, as the case may be, whereby the stroke of any of the yarn guide bars 35, 36, 37 is gradually shortened as usual.

When by the mentioned known device the rod 84 (Fig. 5) is so actuated, as to move by the arm 83 and the shaft 82, the arm 88 of the sleeve 89 out of engagement with the fork 85 of the front yarn guide bar 35 into engagement with say the fork 87 of the rear yarn guide bar 37, the latter will be altered

nately and gradually stopped by the two adjustable stops 51 and 56 in a similar manner to that described above with reference to the front yarn guide 35.

5 When by turning the hand crank 28 the two main slides 23 and 24 are moved away from one another and brought into their initial position, and the cam bar 64 occupies its extreme right position, about as is shown at
10 Fig. 2, the rollers 63 and 66 of the two controlling slides 57 and 58 may occupy about the position shown at Fig. 2, so that at the end of the stroke of the cam bar 64 in the direction of the arrow 90 the right roller 66
15 will be on the right side of the cam 67 at a distance from the commencement of the cam, which distance may be about like the length of the cam 67. Then during the narrowing of the goods the distance of the two main slides 23 and 24 will be gradually diminished, until for the minimum distance of the
20 two main slides 23 and 24 and for the extreme left position of the cam bar 64 the right roller 66 is about above the commencement of the cam 67 on its right side in Fig. 2. In a similar manner the left cam 65 may be proportioned with regard to the right roller 63.

25 The new mechanism described can be varied in many respects without departing from the spirit of my invention.

I claim:

1. In a straight hosiery frame, the combination with a frame, of two main slides
35 guided in said frame, yarn guide bars guided in said frame and having two lugs each, two subsidiary slides guided in said two main slides, a cam bar guided in said frame parallel to said yarn guide bars and
40 provided with two cams, means operated from said cam bar and its two cams for reciprocating said two subsidiary slides, stops on said two subsidiary slides, each stop being adapted to come in contact with one lug
45 of the corresponding yarn guide bar and to move with same while retarding it until both stop, a mechanism for feeding said two main slides in opposite directions, means for yieldingly connecting any of said yarn guide
50 bars with said cam bar, and means for longitudinally reciprocating said cam bar.

2. In a straight hosiery frame, the combination with a frame, of two main slides
55 guided in said frame, yarn guide bars guided in said frame and provided with two lugs each, two subsidiary slides guided in said two main slides parallel to said yarn guide bars and having each a pin, a cam bar
60 guided in said frame parallel to said yarn guide bars and provided with two cams, two controlling slides guided in said two main slides at right angles to said cam bar and adapted to bear on same and its two
65 cams, each controlling slide having an inclined slot opposite to that of the other con-

trolling slide which slot is adapted to guide the pin of the corresponding subsidiary slide, stops on said two subsidiary slides, each stop being adapted to come in contact with one lug of the corresponding yarn guide bar and to move with same while retarding it until both stop, a mechanism for feeding said two main slides in opposite directions, means for yieldingly connecting any of said yarn guide bars with said cam bar, and means for longitudinally reciprocating said cam bar.

3. In a straight hosiery frame, the combination with a frame, of two main slides guided in said frame, a screw-spindle with right- and left- handed threads mounted in said frame to turn and engaging said two main slides, means for feeding said screw-spindle, yarn guide bars guided in said frame and provided with two lugs each, two subsidiary slides guided in said two main slides parallel to said yarn guide bars and having each a pin, a cam bar guided in said frame parallel to said yarn guide bars and provided with two cams, two controlling slides guided in said two main slides at right angles to said cam bar, two rollers at said two controlling slides adapted to roll on said cam bar and its two cams, each controlling slide having an inclined slot opposite to that of the other controlling slide which slot is adapted to guide the pin of the corresponding subsidiary slide, stops on said two subsidiary slides, each stop being adapted to come in contact with one lug of the corresponding yarn guide bar and to move with same while retarding it until both stop, means for yieldingly connecting any of said yarn guide bars with said cam bar, and means for longitudinally reciprocating said cam bar.

4. In a mechanism of the character described, the combination with a frame, of a reciprocatory yarn guide bar mounted in the frame and provided with two suitably spaced lugs, two stops mounted on the frame and adapted to cooperate with the lugs on said yarn guide bar to limit the reciprocatory movement of said bar, and means for imparting a relative movement between each of said stops and the cooperating lug, independent of the movement of the yarn guide and in the direction of the length of said bar, as the bar approaches the limit of its travel in either direction, whereby the lug and stop will contact without appreciable jar or shock.

5. In a mechanism of the character described, the combination with a frame, of a reciprocatory yarn guide bar mounted in the frame and provided with two suitably spaced lugs, two stops mounted on the frame and adapted to cooperate with the lugs on said yarn guide bar to limit the reciprocatory movement of said bar, and means for alter-

nately reciprocating the stops in the direction of the length of the yarn guide bar as the bar approaches the limit of its movement in opposite directions to cause the lugs and stops to contact without appreciable shock.

6. In a mechanism of the character described, the combination with a frame, of a reciprocatory yarn guide bar mounted in the frame and provided with two suitably spaced lugs, two stops mounted on the frame and adapted to cooperate with the lugs on said yarn guide bar to limit the reciprocatory movement of said bar, means for simultaneously moving said stops in opposite directions, and means for alternately moving said stops in a direction opposite to

that in which the bar is moving, and toward the cooperating lug on said bar, the stop being returned to its previous position by the movement of said bar.

7. In a knitting machine having a traversing yarn guide, the combination of a bar for traversing said guide, friction driving means for traversing said bar, abutment stops to limit the traverse of said yarn guide, and means to cause said stops to move with the bar but at a less rate when the end of the traverse is approached to gradually check and stop said movement.

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