F. Schott.

Straight Knitting Mach.

No. 22,135. Patented Nov. 23, 1858.

Fig. 1.

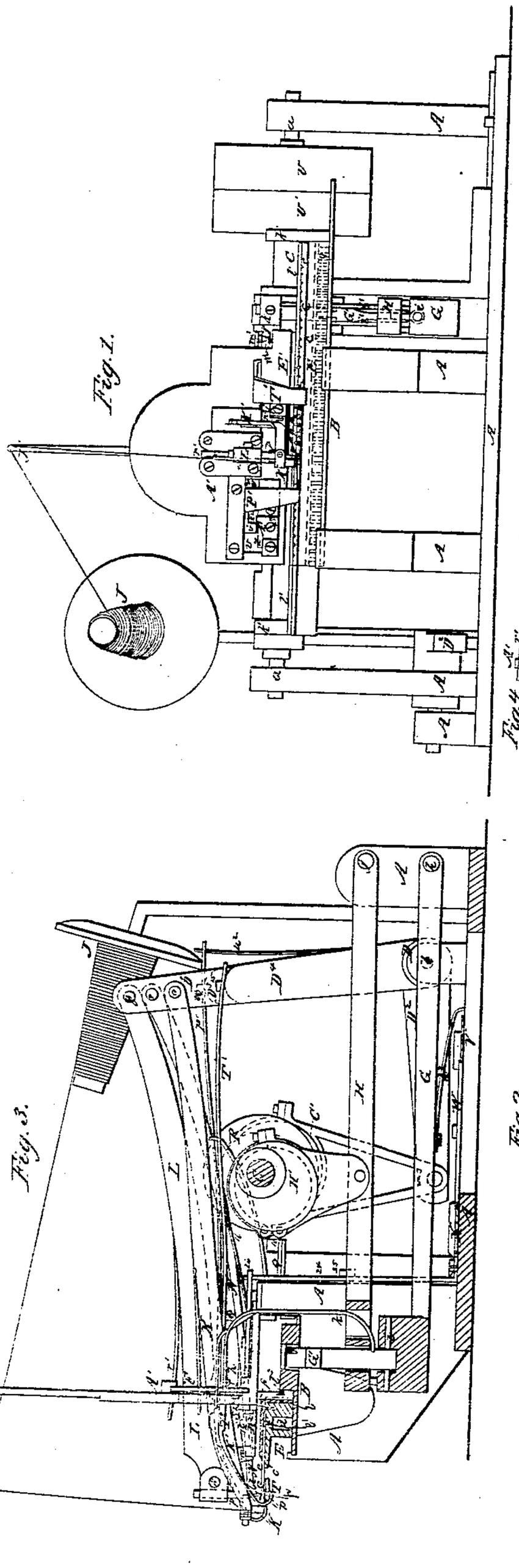


Fig. 2.

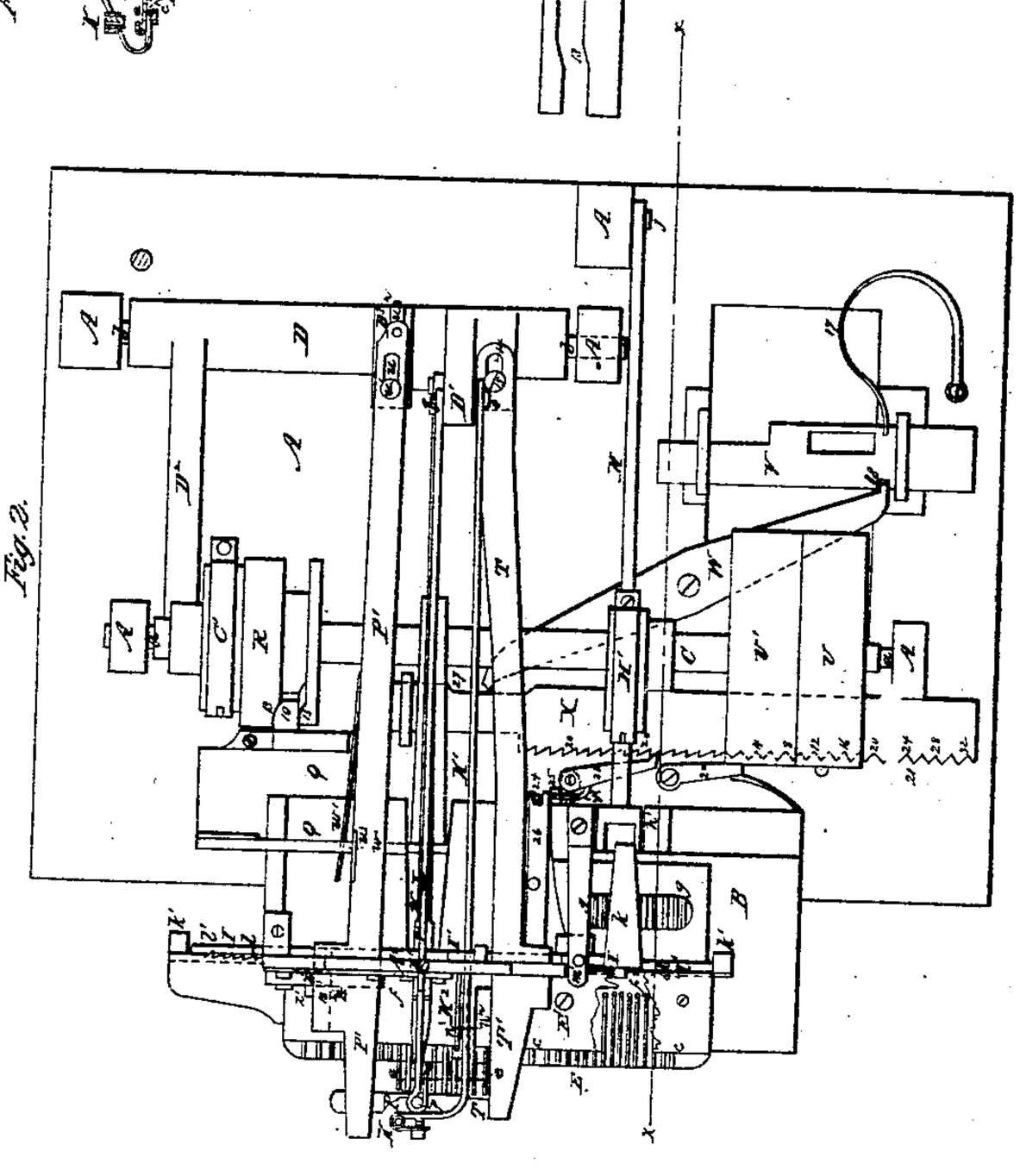


Fig. 3.

Fig. 4.

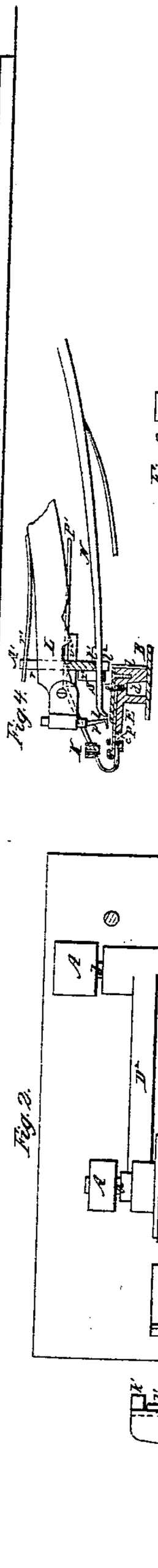
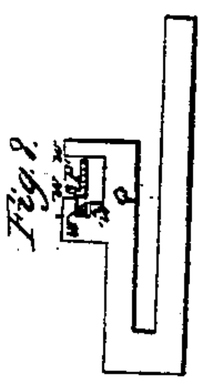


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.



UNITED STATES PATENT OFFICE.

FREDERICK SCHOTT, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **22,135**, dated November 23, 1858.

To all whom it may concern:

Be it known that I, FREDERICK SCHOTT, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a front view of a machine with my improvements. Fig. 2 is a plan of the same. Fig. 3 is a vertical section of the same in the plane indicated by the line *x x* of Figs. 1 and 2. Fig. 4 is a sectional view, taken in a plane parallel with Fig. 3, of the parts by which the knitting operation is performed. Fig. 5 is a longitudinal vertical section of the sliding carriage which carries the needle-bed. Fig. 6 is a projection of the cam which operates the sinker or reliever. Figs. 7 and 8 are views of some of the details of the machine.

Similar letters and numerals of reference indicate corresponding parts in the several figures.

This invention has principally for its object the production of stockings and other knitted fabrics of a closer or more compact texture than those ordinarily produced by machinery.

It consists in a series of improvements in those kind of straight-knitting machines in which the needle-bed has a movement back and forth to present the needles, one or more at a time, in regular succession into an operative relation with one or more feeders or thread-conductors and a corresponding number of stitch-hooks.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A A A′ is the frame of the machine containing straight horizontal ways in which works the sliding carriage B, which carries the needle-bed E, and having suitable heads or standards to contain the centers *a a* and *b b*, between which the rotary main shaft C and the rock-shaft D are supported, and being otherwise suitably constructed to support and sustain the working parts of the machine.

The needle-bed E may be made of cast-iron or other metal, and is bolted to the carriage B. It has planed or otherwise made in its upper horizontal surface a number of parallel notches *c c* for the needles to lie in, and at the rear of each notch *c* a hole *d* is drilled vertically. The shanks of the needles *e e*, instead of being perfectly straight, like those commonly employed, have their extremities bent at a right angle to the principal portion of the shank, as shown at *e′* in Figs. 3 and 4, to enter into the holes *d d* in the bed, which holes are shown in Fig. 2, where a portion of the top clamping-plate E′, by which the needles are secured, is broken away to expose them, and many of the needles are omitted. The top clamping-plate E′, which lies over the top of all the needles on the bed E, is secured to the bed by a suitable number of screws *f f*, which make it clamp the needles firmly in the grooves while the bent portions *e′ e′*, entering the holes *d d*, both prevent the possibility of the needles turning in or being moved longitudinally in the grooves. This method of securing the needles in place provides greater convenience for replacing broken or damaged needles. The needles I employ are of a well-known kind, hooked, but without elastic beards, and grooved in their upper surfaces. To provide for the longitudinal movement of the needle-bed, the carriage B is made with a rack *g g*, having a number of notches equal to the number of notches *c c* provided in the bed for needles, the centers of said notches being at a distance apart equal to the centers of the needles, and this rack is operated upon to move said slide and the needle-bed by the following means, which constitute in part one of my improvements:

G is a lever arranged below and transversely to the slide B and shafts C and D, said lever being attached at its rear end by a horizontal fulcrum-pin *h* to the rear portion of the framing and having its front end, which is situated directly under the slide B, fitted to slide between upright guides *h′ h′*.

G′ is a dog, pivoted to the front end of the lever G by a pivot *i*, passing horizontally and transversely through said lever. The cog-like point of this dog is of such form as to enter and fit the notches of the rack *g g*. Part of said dog is made taper in a lateral direction, as shown at *i′ i′* in Figs. 1 and 5, and this taper portion passes through a fork or slot in a lever H, which is attached at its rear end to the framing by a fulcrum-pin *j*, and is con-

nected with an eccentric H′ on the main shaft C of the machine. This lever also works between the guides h' h', as great accuracy and rigidity are required in its movement.

h^2 is a spring placed under the lever G and acting to force it upward and force the dog into the rack g g.

k is a curved spring attached to a bar I, which is arranged in guides above and parallel with the needle-bed. This bar is moved longitudinally to a limited extent in the same direction as the needle-bed, as the latter completes its movement in either direction, by being struck by one of two upright stops k' k', attached to and projecting upward from the needle-bed.

The spring k, above mentioned, is notched at its lower extremity to take hold of the dog G′ sufficiently to move it in a lateral direction. The lever H, by the motion it derives from the eccentric H′, is caused to strike the top of and depress the lever G far enough to draw the tooth of the dog G′ out of the rack g g, and by the same descending movement the slot or fork in said lever H is moved so far down the taper portion i i of the dog G′, the upper part of which fits said slot or fork, as to leave the latter free to move sidewise to some extent in either direction, and according as the bar I has been last moved to the left or right the spring k throws the dog against the left or right side of the slot or fork in the lever H, and thereby causes its point, as the lever G is lifted by its spring h^2 when the lever H rises, to enter a notch in the rack g g to the left or right of the notch from which it was withdrawn by the depression of the lever G. As the lever H continues to rise after the dog has entered the rack g g, its slot or fork in passing up the taper portion brings the dog to a vertical position, and thus causes it to move the carriage B a distance equal to the distance between the centers of the needles. This action, taking place once during every revolution of the main shaft C, moves the needle-bed a corresponding number of times, such motion being in either direction according to the position of the bar I, which carries the spring k, and as this bar is shifted when the needle-bed has been moved far enough in one direction the said movement is reversed.

The operation of the dog is illustrated in Fig. 5, where it is shown in black outline as having been just raised by its lever G high enough to enter the rack, and in red outline as having been moved laterally by the continued ascent of the lever H. The length of movement of the carriage B and needle-bed in either direction is made variable according to the width of the piece of work to be knitted by shifting the two stops k' k' nearer together or farther apart, and to provide for such shifting the stops are formed with horizontal stems l l, which are fitted to enter into a groove in the back of the needle-bed, and each of said stems is provided with a tooth l' to enter into one of a series of ratchet-like notches l^2 in the back of the bed, one half of said notches being inclined in one direction and the other half in the other direction, and the width of said notches being equal to the distances between the centers of the needles. The stems l l are held in the groove in the back of the needle-bed by springs l^3 l^3, which keep the teeth l' l' in the ratchet-notches, said springs being attached to the stems l l and bearing against a projection on the back part of the carriage; but these springs allow the stops to be readily shifted.

Fig. 7 is a top view of one of the stops k' k' and its appendages. The farther apart the stops k' k' are the longer will be the travel of the carriage and needle-bed, and vice versa. The bar I is held in either of the two positions it occupies by a spring-catch m', which engages in one of two notches m m in its upper edge.

J is the cop or bobbin which supplies the yarn, which latter is represented in blue tint.

J′ is a guide which conducts the yarn to the feeder or yarn-leader K. This feeder or yarn-leader K is like that used in other knitting-machines and is attached to a bar K′, which is connected by a pin o to an arm D′ on the rock-shaft D. The rock-shaft derives motion through the connection of an arm D^2, attached to it, with an eccentric C′ on the main shaft C. The feeder-bar K′ passes through a slot in an upright piece I′, which is rigidly attached to the sliding bar I, and it has a small tongue n on its under side, which works in one of two grooves n' n^2 in a stationary bracket K^2, which I call the "safety-guide," attached to the front of the upper portion A′ of the framing of the machine. This safety-guide is one of my improvements. Its grooves n' n^2 stand parallel with the needles, or very nearly so. The tongue n works in the left-hand groove n' when the needle-bed is moving from left to right and in the right-hand groove n^2 when the needle-bed is moving in the opposite direction, and thus keeps the feeder K always on the proper side of the stitch-hook p, which takes the loops from the needles and produces the stitches. The feeder-bar K is shifted to shift the feeder from one to the other side of the stitch-hook by the movement of the bar I when the latter is shifted at the end of the movement of the needle-bed in either direction, as hereinabove specified. The shifting of the bar I takes place while the feeder is drawn back, and the tongue n is drawn back clear of both grooves n' n^2, and thus the tongue is allowed to pass from opposite one notch to opposite the other. The lateral movement of the feeder is permitted by allowing a little play in the joint at o. The object of the grooved safety-guide K^2 is to prevent any possibility of the feeder getting foul of the needles in its operation.

The stitch-hook p is attached to a bar L, which is attached by a pin q to the arm D′ of the rock-shaft, and the said bar passes through

a slot r in the upper portion A of the framing of the machine, the sides of which slot serve to prevent any lateral deviation from its proper line of movement, and the bottom of which serves as a guide by which, in connection with a proper curved profile form of the lower side or edge of the stitch-hook bar, the stitch-hook is caused to derive, in addition to its advancing and retreating movements, proper vertical movements to enable it to take the loops from the bodies of the needles and carry them over the points thereof. The stitch-hook bar is kept in contact with the bottom of the slot r by a spring r', attached to the said bar and working against the top of the slot r.

N is what I call the "needle and stitch-hook protector," which constitutes one of the parts of my invention, the same consisting of a bar having its front extremity bent slightly downward, as shown at t in Figs. 3 and 4, and pointed to enter the grooves in the tops of the needles. This protector N is attached at its rear end by a pin s to the arm D′ of the rock-shaft D, and it works through a slot t^2 in the upper part of the framing, its point being directly behind the stitch-hook. Its upper edge is made with a projection t' and is held up by a spring N′, applied below it, against the top of the slot in the framing through which it passes. The connection with the arm D′ of the rock-shaft causes the protector to advance and retire with the stitch-hook, and the working of its upper edge in contact with the top of the slot t^2 causes it in its advances with and close upon the heel of the stitch-hook to descend at the same time with the said hook, and to lay its point t in the groove of the needle on which the stitch-hook is operating, in which condition it continues to advance while the hook lifts the stitch, thereby sustaining the needle against the upward strain produced upon it by the lifting of the stitch and preventing it from being bent thereby, and also preventing its point being caught by the point of the stitch-hook as the latter passes over it in throwing off the stitch. As soon as the point of the stitch-hook has passed over the point of the needle the protector rises and continuing its advance with the stitch-hook, passes over the hook of the needle.

P is what is variously termed the "sinker and reliever," but which may be here termed the "reliever," consisting of a pointed tongue attached to a bar P′, which is connected by a slot-and-pin connection u u' with the top of an arm D^3 of the rock-shaft D and by a spring u^2 with the back of the said arm, the said spring exerting a tendency to draw it back as far as permitted by the slot u. The said bar P′, which may be called the "reliever-bar," works through a slot v in the part A of the framing, which slot is wider than the reliever-bar and deeper than its general thickness; but on a portion of the bottom of the bar there are two projections v' and v^2, one near each side, which, when in the slot, make the bar fit therein so as to be only capable of a horizontal movement. The said reliever-bar is also received in a fork w in a slide Q, which works parallel with the needle-bed, and has attached to its left side a spring w', which enters a notch w^2 in one side of the fork w and acts with a tendency to throw down the left-hand side of the bar, and thus raise the point of the stitch-hook.

Fig. 8 is a front view of the slide Q and a transverse section of the reliever-bar, showing the form of the fork w and notch w'. The reliever-bar P′ has movements of three different kinds, which combine to produce the necessary movement of the reliever, viz: first, advancing and retiring movements produced by the arm D^3, spring u^2, and an inclined projection Z in front of the slot u, and, second, lateral horizontal movements produced by a grooved cam R on the rotating shaft C, and third, lateral oscillating movements produced by the action of the spring w', under the control of the projections v' and v^2, and two stationary inclined planes Z′ Z^2, attached to the framing. The slide Q has attached to it an anti-friction roller 10, which works in the groove in the cam R. This cam produces during every revolution three movements of the reliever-bar and holds it stationary for a time between the said movements, as will be readily seen by examining its projection shown in Fig. 6, the first of these movements commencing with the time when the reliever is under the needles, and being produced by the longest inclination 11 of the groove and drawing it to the left away from before the loop which is to be taken off its needle by the next advance of the stitch-hook, the second movement taking place after the reliever has been placed in front of the bends of the needles, and being produced by the next inclination 12, and causing the reliever to move to the right and behind the heel of the stitch-hook preparatory to its descent between the stitch-hook and the needles to catch the loop which is on the stitch-hook and carry it under the needles, and the third movement is to carry the projection v' of the bar over the short upper inclined plane Z^2 for the purpose of depressing the point of the reliever preparatory to its being drawn back under the needles by the movement of the arm D^3, and it is produced by the smallest inclination 13. The movement produced by the arm D^3 is simply the retirement of the reliever under the needles and its advance therefrom. The projection v', which is shorter than v^2, falls over the edge of the slot u when the advance of the reliever-bar by the arm D^3 is completed, and permits the spring w' to depress the left-hand side of the said bar, which throws down the heel of and raises the point of the reliever to prepare it for the movement produced by the inclination 12 of the cam, which passes it behind the stitch-hook and over the top of the loop thereon. The projection v', when it passes over the front

of the slot u, is in front of the inclined projection Z, which stands out horizontally in front of the part A′ of the framing, and the said projection v' is held against Z by the spring u^2, and the last-mentioned lateral movement of the reliever-bar causing v' to move along Z causes the bar to advance slightly and bring the reliever very accurately to a sufficiently forward position to enable it to pass between the fronts of the needles and the heel of the stitch-hook. The first Z′ of the two inclined planes Z′ Z^2, which operate in combination with the spring w', raises the left side of the reliever-bar as the second inclination 12 of the cam moves it laterally, and it is thereby caused to depress the point of the reliever upon the stitch far enough to hold the said stitch while the stitch-hook is drawn out by its own retiring motion, and allows the reliever to remain stationary while the stitch-hook is drawn out, after which the movement of the reliever-bar, produced by the third inclination 13 of the cam, causes the projection v' to pass up the short inclined plane Z^2, and to raise the left side of the bar and depress the point of the reliever far enough to allow it to pass under the needles with the receding movement of the bar. The inclined planes Z′ Z^2 are both formed in one plate S, which is bolted to the front of the part A′ of the framing below the slot w.

T is what I term the "retainer," which is for the purpose of keeping the other loops back on the needles while the stitch-hook is drawing one loop forward to take it over the hook of its respective needle. This retainer consists of a straight piece of metal attached to a bar T′, which may be caller the "retainer-bar," and which, like the reliever-bar P′, is curved to allow the needles to pass it as the needle-bed moves along. The retainer-bar is attached to an arm D^4 of the rock-shaft D by a slot-and-pin connection 14 15, and it slides through a slot in the part A′ of the framing. It has simply a backward and forward motion, remaining stationary under the needles, till the stitch-hook, with the stitch, has passed over it, and then advancing some distance and becoming stationary again till the hook has been relieved of the stitch, when it moves back again. It is enabled to remain stationary between its advancing and retreating movements by the play of the slot 14 on the pin 15, and is kept stationary by a friction-spring 16, applied below it.

U U′ are the fast and loose pulleys on the main shaft C of the machine, which receive the driving-belt through which the machine derives motion.

V is a horizontally-sliding belt-shipper for shipping the belt from the one pulley to the other. This belt-shipper has applied to it a spring 17, which always tends to move it in a direction to place the belt on the loose pulley U′, but it is locked in position to keep the belt on the fast pulley U till the proper time to throw it off by one extremity of a horizontal lever W, entering a notch 18 in its (the shipper's) front edge. The opposite extremity of the lever W rests against a sliding bar X, which is arranged parallel with the needle-bed, and a spring 19 serves to keep the said lever in contact with the bar X, and also to keep it in the notch 18 till the proper time for throwing off the belt. The bar X, which should be of considerable length, has on one part of its back edge a number of ratchet-notches 20 20, and on another portion a number of angular notches 21 21 of a corresponding width to the ratchet-notches 20 20, and of such form as to enable a spring-stop 22 engaging with any one of them to hold the bar when no considerable longitudinal pressure is applied to it, but to enable said stop to be forced out by any considerable pressure upon the bar in either direction longitudinally. The ratchet-teeth 20 20 are engaged by a pawl 23, attached to the lower end of a vertical lever 24, working on a fixed fulcrum 25. The upper end of this lever 24 enters a fork in the rear end of a horizontal lever 26, whose front end enters a hole in the sliding bar I. Every time the sliding bar I is moved to the right or to the left by the stops K′ K′ at the termination of the movement of the needle-bed in either direction and the completion of a course of loops the lever 26 is moved along with it, and the rear end of said lever moves the lever 24 in one or the other direction and moves the pawl 23 either in a direction to slide from one notch 20 to the next one, or to move the bar X according to the direction of its motion, making the pawl slide over a notch as the bar I is moved in one direction and move the bar X as the bar I is moved in the opposite direction, and hence the bar X is moved one notch after every second course of knitting is completed. The notches 21 21 are numbered in arithmetical progression 2 4 6 8, &c., or every second or fourth one may be numbered, so that each notch represents two courses of knitting, the numbers commencing so that as the bar X is moved by the pawl 23 the stop 22 passes from the notches of the higher to those of the lower numbers. On the back of the bar X there is a slight wedge-like projection 27, which, when the stop is in the zero-notch, holds the lever W out of contact with the shipper and leaves the latter unlocked.

The object of the levers, pawl, stops, and sliding bar X, above described, is to so set the machine as to stop after any desired number of courses have been knitted, and to effect this it is only necessary at starting to bring the bar X to a position in which the stop 22 engages with the notch 21, representing the desired number of courses, and to move the shipper to bring the belt on the fast pulley U. As the knitting proceeds, the bar X moves on without disturbing the shipper, till on the number of courses being completed and the zero-notch 21 arriving at the stop 22 the wedge-like projection comes into operation

on the lever W and throws it out of the notch 18 and leaves the shipper to be operated on by the spring.

As a substitute for the rod X, three wheels, or a single wheel with grooves turned to divide its rim into three parts, may be arranged to rotate on the same upright pin or axle, one wheel or rim having ratchet notches and being operated on by a pawl like 23, another having notches like 21, operated on by a stop 22, and the third having a projection like 27 to operate on the lever W.

In the machine described only one feeder and stitch-hook are used; but in carrying out my invention two or more may be used, as in other knitting-machines operating on the same principle.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the levers G and H, the dog G′, spring *k*, sliding bar I, adjustable stops *k′ k′*, and the eccentric H′, or its equivalent, on the main shaft, the whole operating, substantially as described, to effect the movement of the needle-bed in one and the other direction alternately.

2. The two-grooved safety-guide K^2, applied, in combination with the feeder, to operate substantially as and for the purpose herein specified.

3. The needle and stitch-hook protector N, applied and operating substantially as herein set forth.

4. The combination of mechanism to operate the sinker or reliever P, consisting of the cam R on the main shaft, the arm D^3 and spring u^2 on the rock-shaft, the spring *w*, applied to the reliever-bar P′, the projections *v′* v^2 on said bar, the stationary inclined projection Z on the frame, and the stationary inclined planes Z′ Z^2, the whole applied and operating substantially as herein set forth.

5. The combination of the bar X, or its equivalent, furnished with teeth 20 20 and 21 21, and a wedge-like projection 27, the pawl 23, operated by the movement of the needle-bed and the stop-lever W, the whole applied to operate substantially as described, in combination with a belt-shipper, to stop the machine as soon as any desired number of courses have been knitted.

FRED. SCHOTT.

Witnesses:
WM. TUSCH,
W. HAUFF.