

No. 681,415.

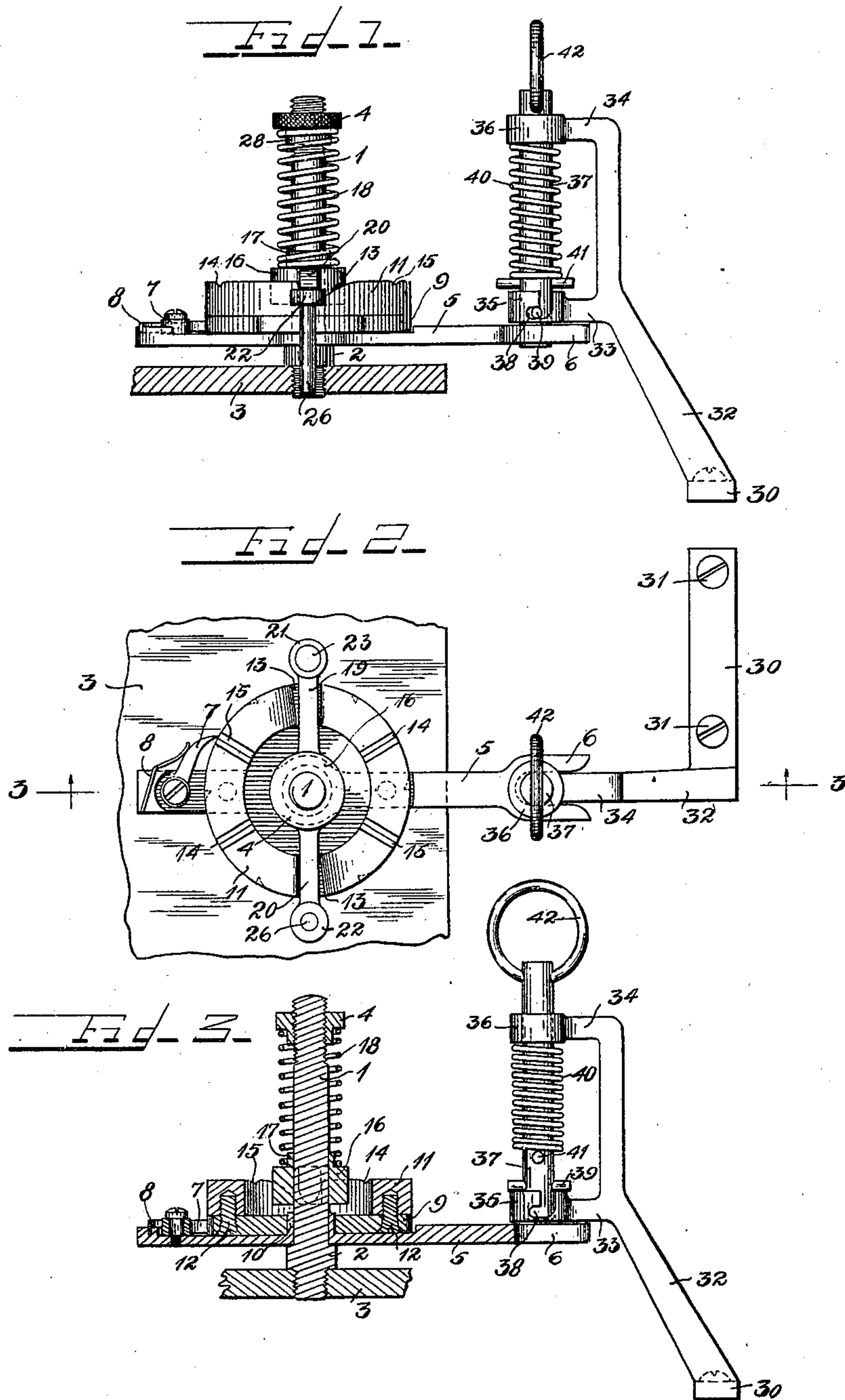
Patented Aug. 27, 1901.

E. D. FRIEDLANDER.  
KNITTING MACHINE.

(Application filed Dec. 15, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES  
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May Label.

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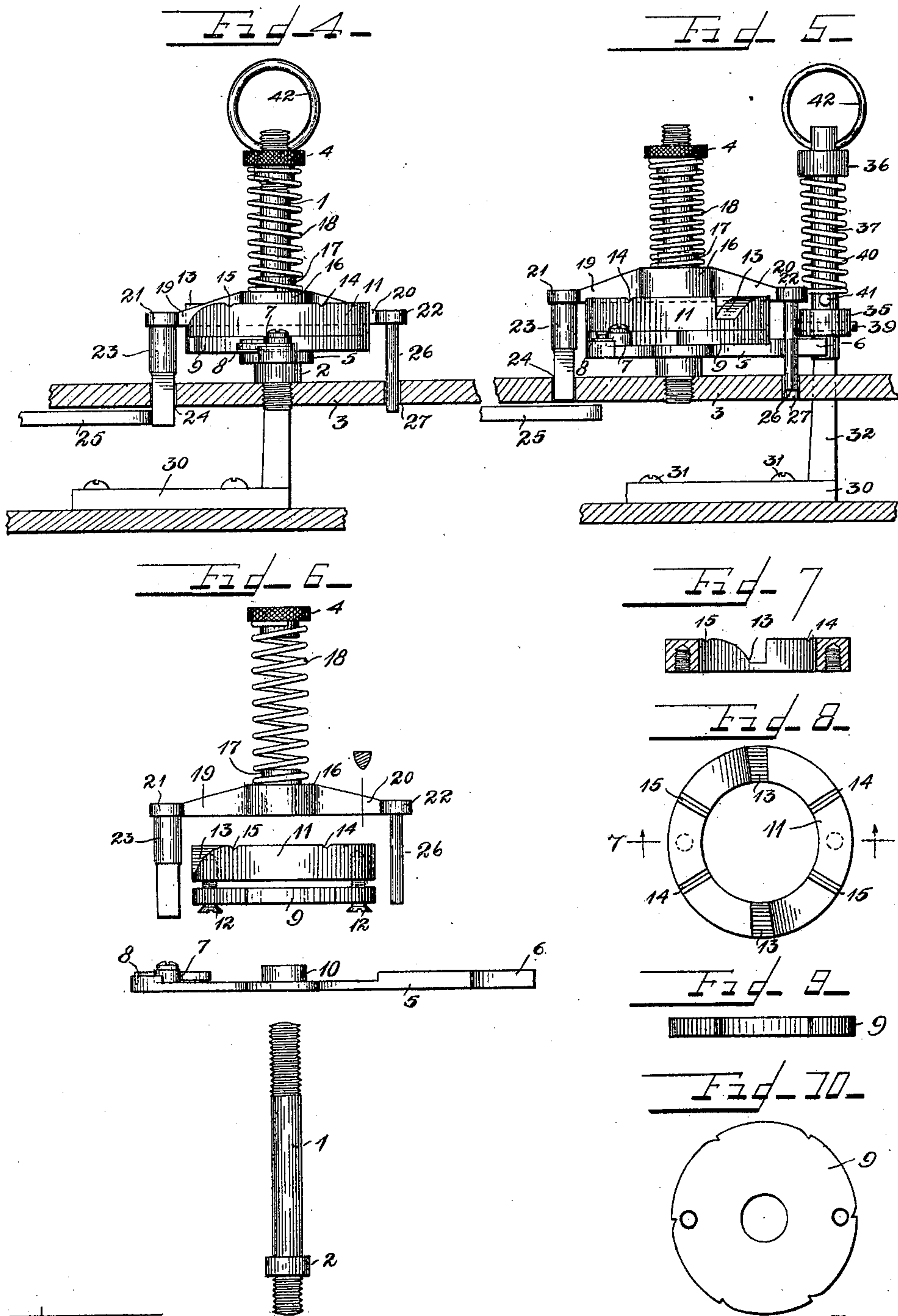
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(No Model.)

3 Sheets—Sheet 2.



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No. 681,415.

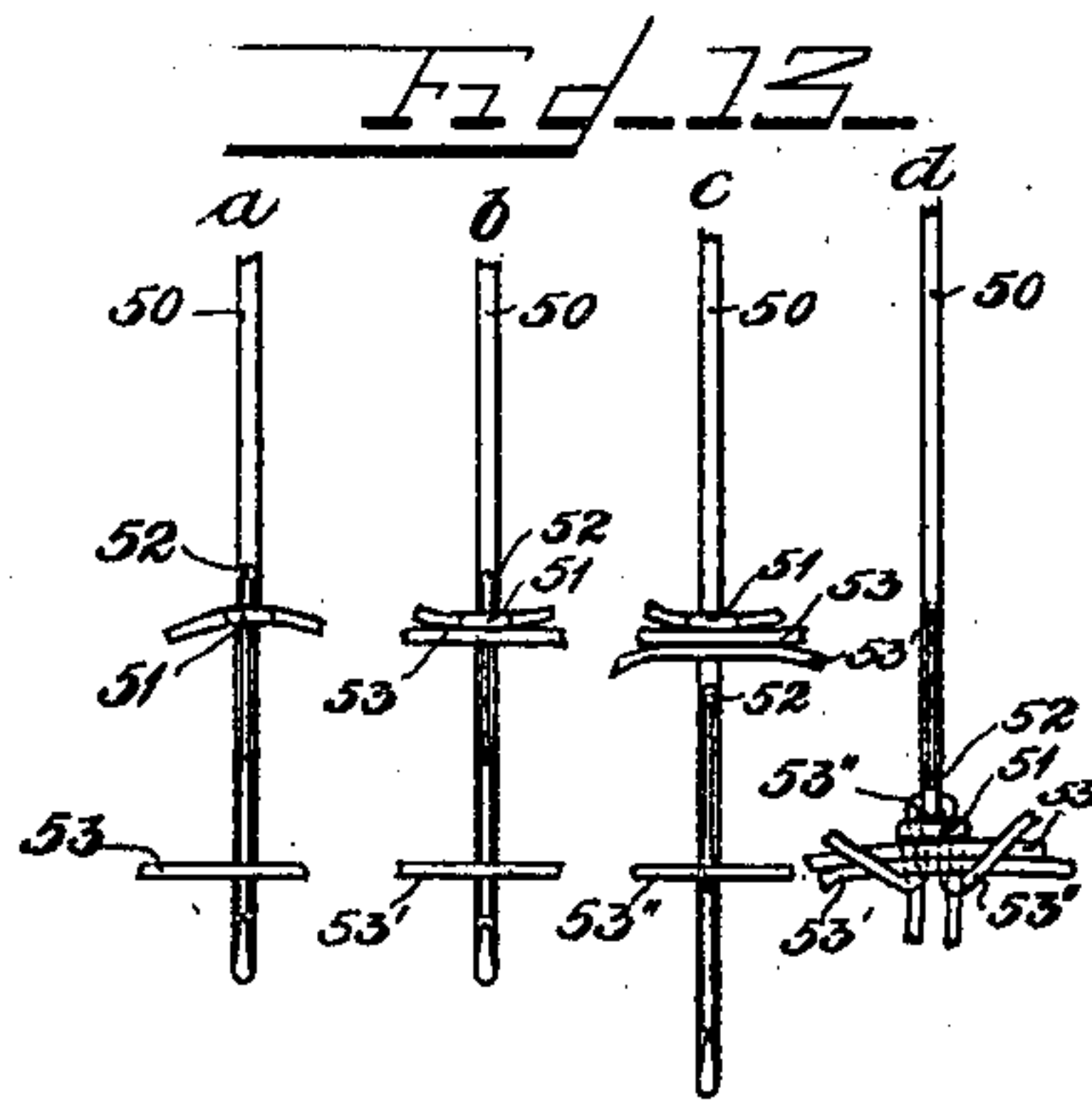
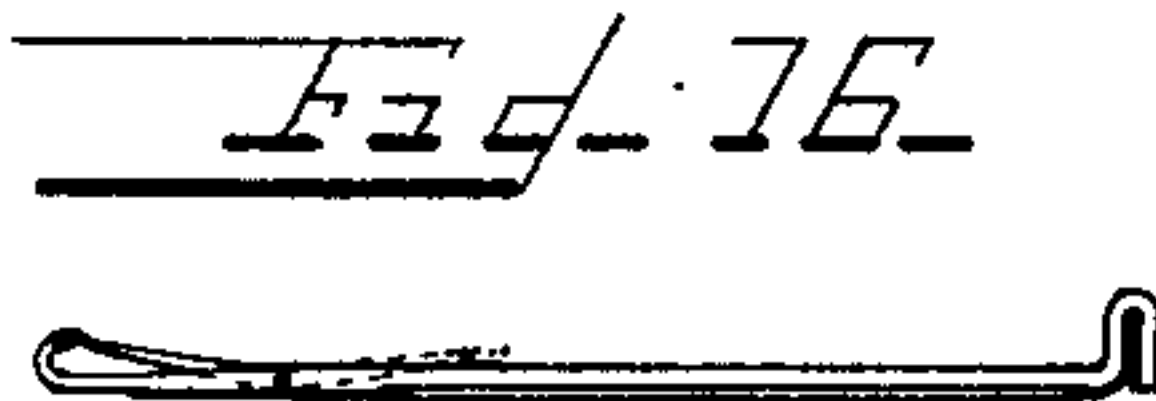
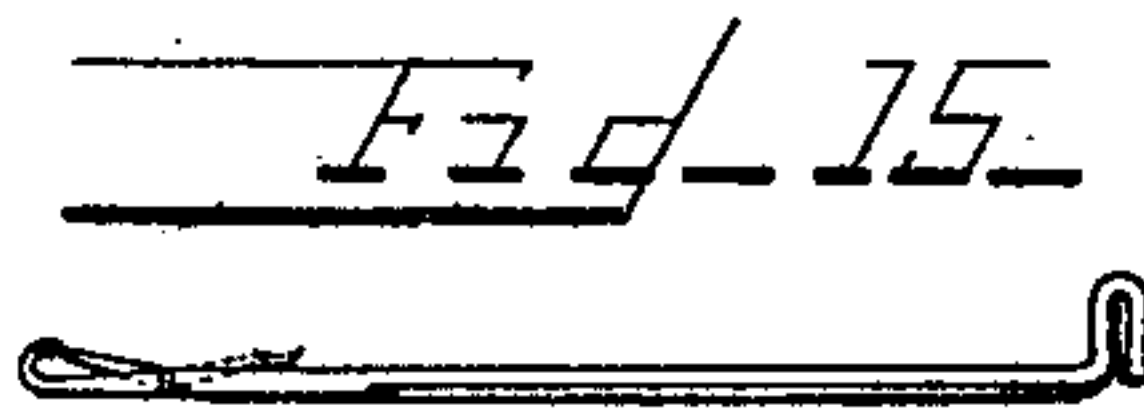
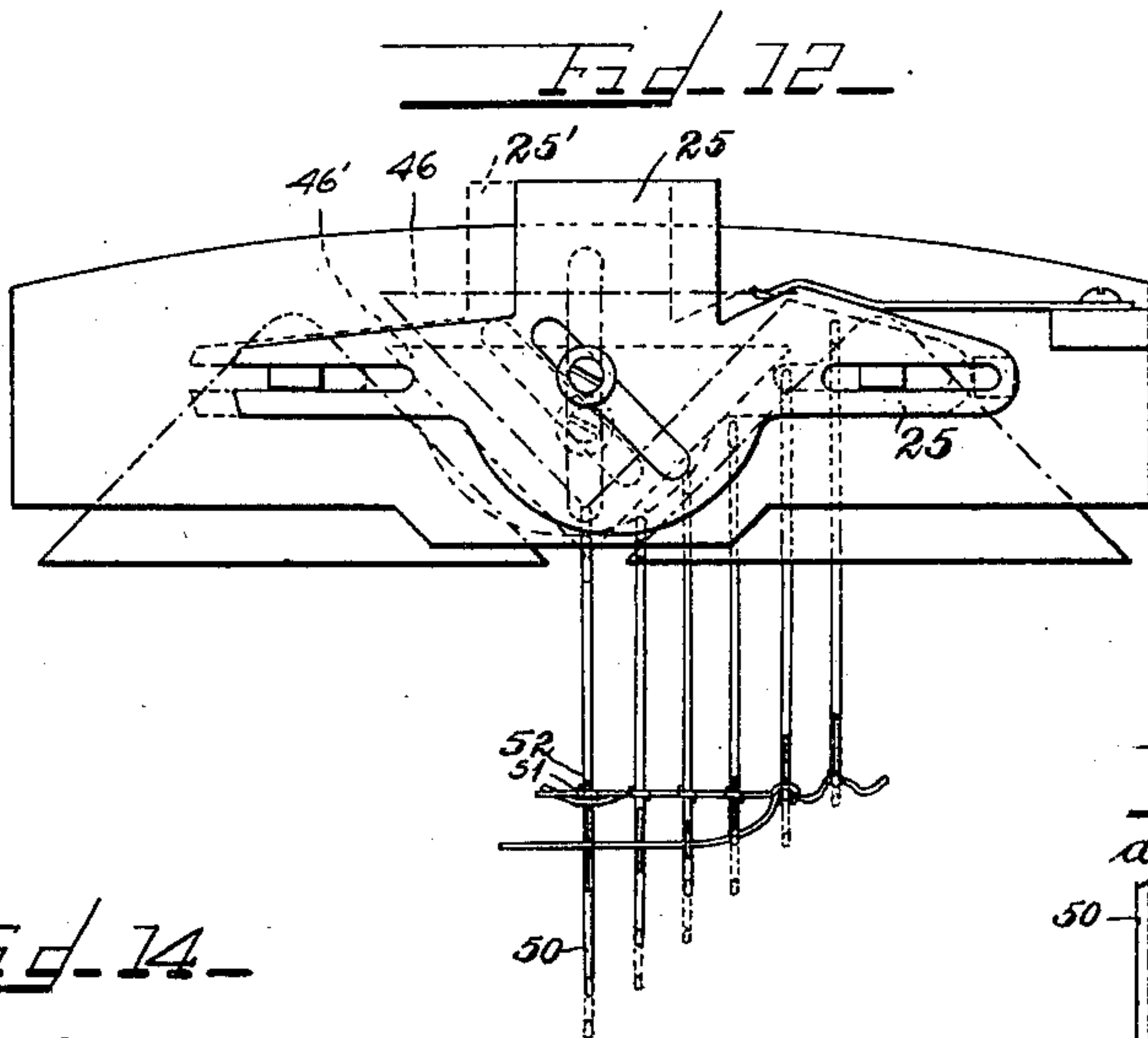
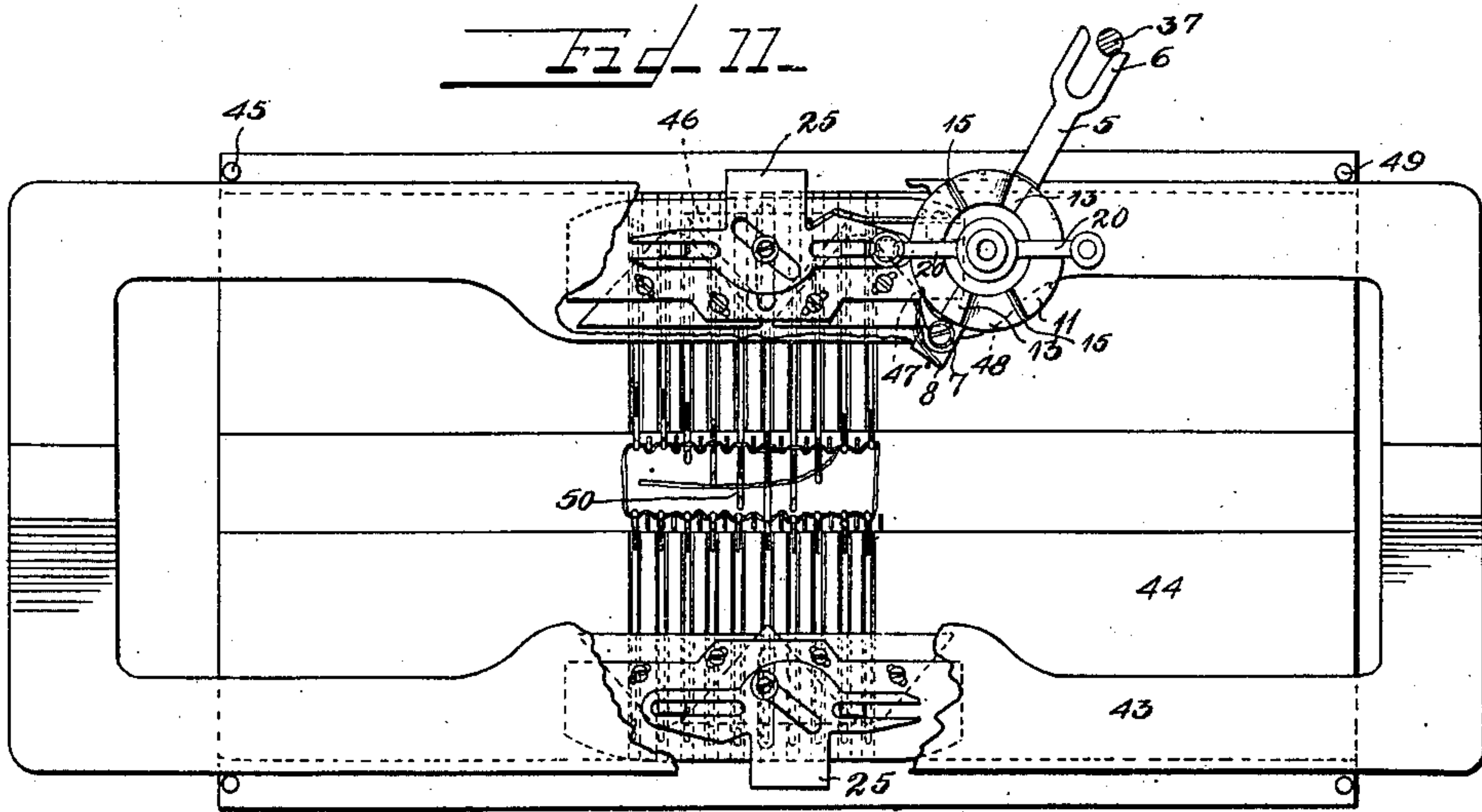
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(Application filed Dec. 15, 1899.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES—  
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# UNITED STATES PATENT OFFICE.

EDWARD D. FRIEDLANDER, OF CHICAGO, ILLINOIS.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,415, dated August 27, 1901.

Application filed December 15, 1899. Serial No. 740,446. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD D. FRIEDLANDER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Knitting-Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to knitting-machines, and has for its object the automatic formation of fancy stitches and open patterns on tubular seamless fashioned fabrics—for example, as mittens and stockings.

Generally speaking, the main feature of my invention in its preferred embodiment is the introduction of an auxiliary stopping device fastened, preferably, to the carriage-frame of the machine and having in its preferred construction a vertically-movable stop-shaft actuated by cam mechanism to drop at regular intervals through a hole in said carriage-frame, thereby adjusting the position of the lock-bar, which in turn determines the position of cams, these cams again bringing into play long-latched needles, which I preferably employ, which needles on account of their long latches do not come forward sufficiently under the ordinary adjustment to be enabled to form loops. My attachment by operating on the lock-bar and effecting thereby adjustment of the cams and needles enables me to bring these long-latched needles into play.

I will describe my invention more particularly with reference to the accompanying drawings, which illustrate the preferred embodiment thereof, in which—

Figure 1 shows the attachment in elevation, the stop-shaft being down. Fig. 2 is a plan view thereof. Fig. 3 is a sectional view taken on line 3 3 of Fig. 2. Fig. 4 is another elevation showing the stop-shaft down and engaging the lock-bar. Fig. 5 is the same elevation as Fig. 4, the cam mechanism having been revolved. Fig. 6 is a disassembled view of the various parts comprising the attachment. Fig. 7 is a section through the cam-ring, taken on line 7 7 of Fig. 8. Fig. 8 is a plan view of the cam-ring. Fig. 9 is an elevation of a ratchet-cylinder I employ in connection with the attachment. Fig. 10 is a

plan view thereof. Fig. 11 shows my attachment in position on the carriage-frame of an ordinary Lamb machine and its effect on the working of the needles. Fig. 12 is an enlarged view showing the V-cams and the effect of the stop-shaft on the said V-cams and needles. Fig. 13 shows the successive steps undergone by the long-latched needles. Fig. 14 shows a pattern it is possible to obtain by the attachment of my invention; and Figs. 15 and 16 are side elevations of short and long latched needles, respectively.

Like characters of reference indicate like parts throughout the several figures.

I have illustrated my invention as applied to the well-known Lamb knitting-machine; but I do not wish to be limited to the precise form of machine employed.

A bar 1, preferably round, is provided near one end with a collar 2, the part below said collar being preferably threaded for screwing it into the carriage-frame 3. Said bar is threaded also at its other end for engaging the thumb-screw 4. The actuating member or bar 5 is rotatably mounted between its ends on bar 1 and rests against collar 2. This actuating member 5 preferably has a fork-shaped end 6, the other end bearing a pawl 7, a spring 8 serving to press pawl 7 against the ratchet member 9, which is preferably rotatably mounted upon bearing 10, said bearing forming in this instance an integral part of member 5. A cam-ring 11 or plate may be fastened to the ratchet 9 by means of the screws 12 and is provided with a pair of deep slots 13 and two pairs of shallow slots 14 and 15, preferably arranged radially.

A hub 16 is loosely mounted upon bar 1 and is vertically movable thereon, its position being determined by the cam-slots 13, 14, and 15. Integral with said hub are a projection 17 (which serves as a bearing for a coiled spring 18) and also two horizontal arms 19 and 20, said arms preferably terminating in eyes 21 and 22. A stop-shaft or detent 23 is riveted into eye 21, said detent being preferably squared at one end and passing through inlet 24 in the carriage-frame 3 to engage with the lock-bar 25, controlling the needle-actuating V-cams. A guide-shaft 26 is riveted into eye 22 and passes through hole 27 in the carriage-frame 3. This guide-shaft, in con-



junction with detent 23, prevents the stopping mechanism from bodily rotating. A projection 28 on thumb-screw 4 serves as the other bearing for spring 18, which being held  
 5 in compression between said thumb-screw and the hub 16 keeps arms 19 and 20 pressed upon the cam-ring 11. The arms 19 and 20 are preferably of wedge-shaped section, as shown in section in Fig. 6, to engage slots  
 10 14 and 15, thereby preventing the ring-cam from revolving while the actuating-arm 5 oscillates.

The improved attachment may be thrown into and out of service by means of a device  
 15 which is preferably secured to the stationary frame of the machine. This device preferably contains a horizontal member 30, secured to the stationary frame by screws 31, and an upright piece 32, which terminates in a fork,  
 20 the arms 33 and 34 of which are enlarged at their ends to form guides 35 and 36 for the post 37. A slot 38 accommodates a pin 39, thus allowing post 37 to be lowered into operative engagement with fork 6, as shown in  
 25 Fig. 1, said pin 39 serving to hold said post in either its depressed position in engagement with the fork or in an elevated position out of engagement with the fork. A spring 40 is held between guide 36 and another pin  
 30 41, passing through post 37, and maintains compression on said post. A ring 42 enables the operator to put the post into or out of operative engagement with the fork 6. I have shown the slots spaced at sixty degrees intervals on the ring-cam. They may, however,  
 35 be spaced at various angles, and the number thereof may be varied, depending on the pattern desired.

The applicability of my invention to the well-known Lamb knitting-machine may be readily understood with reference to Figs. 11 and 12. In Fig. 11 the carriage 43 is indicated as traveling over the needle-bed 44 in the direction of the arrow, the fork 6 being  
 45 in the act of coming into engagement with post 37. The arms 19 and 20 are shown resting in slots 14, the stop-shaft or detent 23 being thus out of engagement with lock-bar 25, which bar upon striking stop-post 45 before beginning the stroke was moved its normal distance, thus opening the movable V-  
 50 cam 46 to its limit, an operation well understood by those skilled in the art. When the carriage has completed its stroke in the direction of the arrow, arm 5 of the attachment will have oscillated sixty degrees, moving pawl 7 from tooth 47 to tooth 48 of the ratchet 9. Lock-bar 25 will in the usual way strike stop-post 49 and lock the V-cam. On the  
 60 back travel of the carriage (contra arrow) arm 5 again engages post 37 and is oscillated sixty degrees back to its former position. At the same time pawl 7, engaging tooth 48, revolves the ratchet, with the ring-cam, sixty degrees, this operation dropping arms 19 and  
 65 20 into the deep slots 13, thus bringing stop-shaft 23 into working position. Now when

the lock-bar strikes stop-post 45 instead of assuming its normal position it is checked by the stop-shaft 23 and takes the position  
 70 25', as shown by dotted lines in Fig. 12. As a result V-cam 46 is also checked—i. e., does not open to its normal extent, but assumes the position 46'. This position of the cam will bring into play the long-latched needles  
 75 50—i. e., the needles will be moved forward far enough to allow the thread thereon to pass the end of the latch, (shown most clearly in *c*, Fig. 13, and dotted portion in Fig. 12,) and thus upon the return of the needle closing  
 80 the latch and forming the stitch. The successive steps of the stitch are shown in Fig. 13. Suppose the stop-shaft to be down—i. e., arms 19 and 20 in slots 13—and the lock-bar to have just struck stop-post 45. This,  
 85 as before described, brings the long-latched needles into play, and upon feeding with thread an ordinary loop 51 will form on the needle. During this revolution of the carriage arms 19 and 20 are lifted out of the  
 90 slots, as before described, and settle into slots 15, at the same time raising stop-shaft 23 out of engagement with lock-bar 25. The lock-bar upon again striking post 45, being no longer checked by the stop-shaft 23, will open  
 95 wide V-cam 46. During the next revolution needle 50 will not advance far enough to allow loop 51 to pass beyond latch 52, and feeder-thread 53, Fig. 13, instead of being pulled through loop 51 upon the return of the needle is simply caught by the hook and held  
 100 on the needle, as shown in *b*. Before the revolution is completed arms 19 and 20 will have passed to slots 14, and as the V-cams pass over the needles during the following revolution  
 105 the feed-thread, now 53', is again simply held on the needle, which now holds one loop and two threads. Before the completion of this third revolution arms 19 and 20 will have  
 110 dropped into the deep slots 13, and upon again striking post 45 lock-bar 25 will be checked. Needle 50 will now advance sufficiently, and loop 51, together with threads 53 and 53', passes beyond latch 52. Upon the return of the needle the latch is closed, and feeder-  
 115 thread, now 53'', is pulled through loop 51, the threads arranging themselves as shown in *d*, Fig. 13, and the stitch formed, as better shown in the pattern, Fig. 14. As before stated, the pattern depends upon the number and arrangement of slots on the ring-cam and also upon the number of long-latched needles used and their spacing among the ordinary shorter-latched needles.

In my attachment one cam can be easily replaced by another cam representing another pattern, and other modifications may be made. I do not therefore wish to be limited to the precise construction shown and particularly described; but,  
 125

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. In a knitting-machine, the combination  
 130



with cam mechanism having a movable cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and short and long latched needles actuated by the cam mechanism, substantially as described.

2. In a knitting-machine, the combination with cam mechanism having a movable V cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and long and short latched needles actuated by the cam mechanism, substantially as described.

3. In a knitting-machine, the combination with cam mechanism having a movable cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and needles actuated by the cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, and a detent having a portion adapted for engagement with the said notches and brought into engagement with a part cooperating with said cam-block, when the last aforesaid portion engages a deep notch, substantially as described.

4. In a knitting-machine, the combination with cam mechanism having a movable cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and needles actuated by the said cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, said detent

being manually adjustable to be placed within and withdrawn from the path of said arm, and a detent having a portion adapted for engagement with said notches and brought into engagement with a part cooperating with said cam-block when the last aforesaid portion engages a deep notch, substantially as described.

5. In a knitting-machine, the combination with cam mechanism having a movable cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and long and short latched needles actuated by the cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet, and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, and a detent having a portion adapted for engagement with the said notches and brought into engagement with a part cooperating with said cam-block when the last aforesaid portion engages a deep notch, substantially as described.

6. In a knitting-machine, the combination with cam mechanism having a movable V cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and needles actuated by the cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, and a detent having a portion adapted for engagement with said notches and brought into engagement with a part cooperating with said cam-block when the last aforesaid portion engages a deep notch, substantially as described.

7. In a knitting-machine, the combination with cam mechanism having a movable V cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and long and short latched needles actuated by the cam mechanism, the



said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, and a detent having a portion adapted for engagement with said notches and brought into engagement with a part cooperating with said cam-block when the last-foresaid portion engages a deep notch, substantially as described.

8. In a knitting-machine, the combination with cam mechanism having a movable cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and long and short latched needles actuated by the cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, said detent being manually adjustable to be placed within and withdrawn from the path of said arm, and a detent having a portion adapted for engagement with said notches and brought into engagement with a part cooperating with said cam-block when the last-foresaid portion engages a deep notch, substantially as described.

9. In a knitting-machine, the combination with cam mechanism having a V cam-block for actuating the needles, of a reciprocating carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and needles actuated by the cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, said detent being manually adjustable to be placed within and withdrawn from the path of said arm, and a detent having a portion adapted for engagement with said notches and brought into engagement with a part cooperating with said cam-block, when the last-foresaid portion engages a deep notch, substantially as described.

10. In a knitting-machine, the combination with cam mechanism having a movable V cam-block for actuating the needles, of a reciprocating carriage supporting the cam-

block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing the cam-block to assume an intermediate position, and needles actuated by the cam mechanism, the said third device comprising a swinging arm 5, a pawl carried thereby, a ratchet operated by the pawl, a cam-plate 11 actuated by the ratchet and provided with shallow and deep notches, a detent brought into engagement with the swinging arm by the carriage in its travel, said detent being manually adjustable to be placed within and withdrawn from the path of said arm, and a detent having a portion adapted for engagement with said notches and brought into engagement with a part cooperating with said cam-block, when the last-foresaid portion engages a deep notch, substantially as described.

11. In a knitting-machine, the combination with cam mechanism having a movable cam-block for actuating the needles, of a movable carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device adapted, in cooperation with said cam-block, to cause the said cam to assume an intermediate position, and needles of equal length actuated by the cam mechanism, substantially as described.

12. In a knitting-machine, the combination with cam mechanism having a movable cam-block for actuating the needles, of a movable carriage supporting the cam-block, a device for moving the cam to a closed position when the carriage reaches one end of its travel, a second device for opening the cam when the carriage reaches the other end of its travel, a third device for intermittently causing said cam-block to assume an intermediate position, and needles of equal length actuated by the cam mechanism, substantially as described.

13. In a knitting-machine, the combination with a needle-bed, of short and long latched needles, cam mechanism provided with a cam-slot for engaging said needles and effecting their travel, means adapted to open or close said cam-slot when the cam mechanism has reached the extent of its travel in either direction, and means for controlling the operation of the aforesaid means to prevent the cam-slot from being fully opened, thereby to cause the long-latched needles to form stitches, substantially as described.

14. In a knitting-machine, the combination with a needle-bed, of short and long latched needles, cam mechanism provided with a cam-slot for engaging said needles and effecting their travel, means adapted to open or close said cam-slot when the cam mechanism has reached the extent of its travel in either direction, and automatic means for intermit-



tently controlling the operation of the afore-  
said means to prevent the cam-slot from be-  
ing fully opened, thereby to cause the long-  
latched needles to form stitches, substantially  
5 as described.

15. In a knitting-machine, the combination  
with a needle-bed, of short and long latched  
needles, cam mechanism provided with a cam-  
slot for engaging said needles and effecting  
10 their travel, means adapted to open or close  
said cam-slot when the cam mechanism has  
reached the extent of its travel in either di-  
rection, and automatic means for intermit-  
tently controlling the operation of the afore-  
15 said means to prevent the cam-slot from be-  
ing fully opened, thereby to cause the long-  
latched needles to form stitches, said means  
comprising a lock-bar 25 and a cam-actuated  
detent, substantially as described.

20 16. In a knitting-machine, the combination  
with a needle-bed, of short and long latched  
needles, cam mechanism provided with a cam-  
slot for engaging said needles and effecting  
their travel, means adapted to open or close  
25 said cam-slot when the cam mechanism has  
reached the extent of its travel in either di-  
rection, and automatic means for intermit-  
tently controlling the operation of the afore-  
said means to prevent the cam-slot from being  
30 fully opened, thereby to cause the long-latched  
needles to form stitches, said means compris-  
ing a lock-bar 25, stops 45 and 49, a detent 23,  
and a cam-block for controlling the position  
of said detent, substantially as described.

35 17. In a knitting-machine, the combination  
with a needle-bed, of short and long latched  
needles, cam mechanism provided with a cam-  
slot for engaging said needles and effecting  
their travel, means adapted to open or close  
40 said cam-slot when the cam mechanism has  
reached the extent of its travel in either di-  
rection, and automatic means for intermit-  
tently controlling the operation of the afore-  
said means to prevent the cam-slot from  
45 being fully opened, thereby to cause the long-  
latched needles to form stitches, said means  
comprising a lock-bar 25, stops 45 and 49, a  
detent 23, a cam-block for controlling the po-

sition of said detent, and ratchet mechanism  
for shifting said cam, substantially as de- 50  
scribed.

18. In a knitting-machine, the combination  
with a needle-bed, of short and long latched  
needles, cam mechanism provided with a cam-  
slot for engaging said needles and effect- 55  
ing their travel, means adapted to open or  
close said cam-slot when the cam mechanism  
has reached the extent of its travel in either  
direction, and automatic means for intermit-  
tently controlling the operation of the afore- 60  
said means to prevent the cam-slot from be-  
ing fully opened, thereby to cause the long-  
latched needles to form stitches, said means  
comprising a lock-bar 25, stops 45 and 49, a  
detent 23, a cam-block for controlling the po- 65  
sition of said detent, ratchet mechanism for  
shifting said cam, and a post 37 adapted to  
actuate said ratchet mechanism, substantially  
as described.

19. In a knitting-machine, the combination 70  
with a needle-bed, of short and long latched  
needles, cam mechanism provided with a cam-  
slot for engaging said needles and effecting  
their travel, means adapted to open or close  
said cam-slot when the cam mechanism has 75  
reached the extent of its travel in either di-  
rection, and automatic means for intermit-  
tently controlling the operation of the afore-  
said means to prevent the cam-slot from being  
fully opened, thereby to cause the long-latched 80  
needles to form stitches, said means compris-  
ing a lock-bar 25, stops 45 and 49, a detent 23,  
a cam-block for controlling the position of said  
detent, ratchet mechanism for shifting said  
cam, a post 37 adapted to actuate said ratchet 85  
mechanism, and means coöperatively associ-  
ating said post with said ratchet mechanism,  
substantially as described.

In witness whereof I hereunto subscribe  
my name this 9th day of December, A. D. 90  
1899.

EDWARD D. FRIEDLANDER.

Witnesses:

GEORGE L. CRAGG,  
JACOB FRIEDLANDER.