

B. T. STRING.  
BUTTON SEWING MACHINE.

(Application filed July 17, 1900.)

3 Sheets—Sheet 1.

(No Model.)

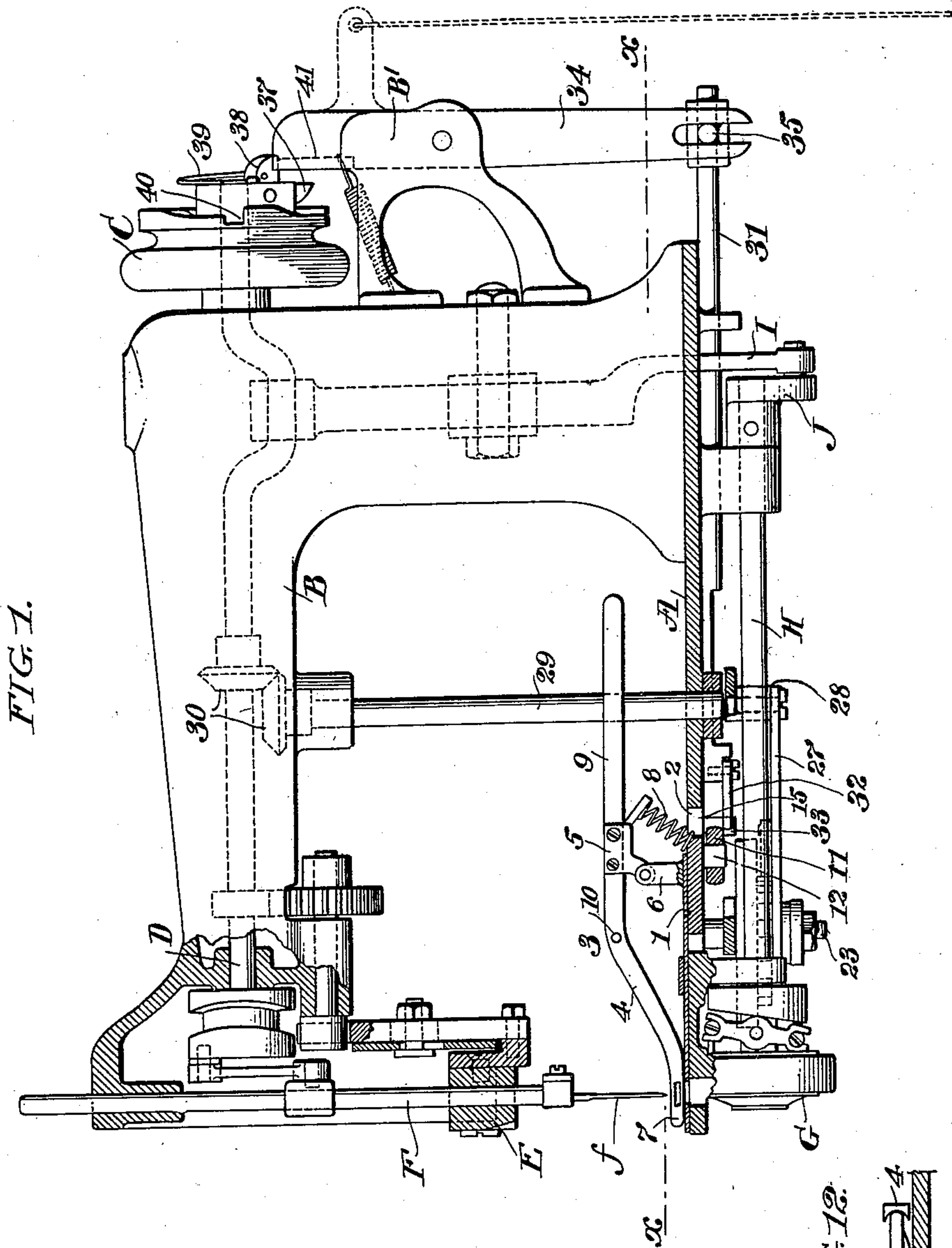


FIG. 1.

FIG. 11.

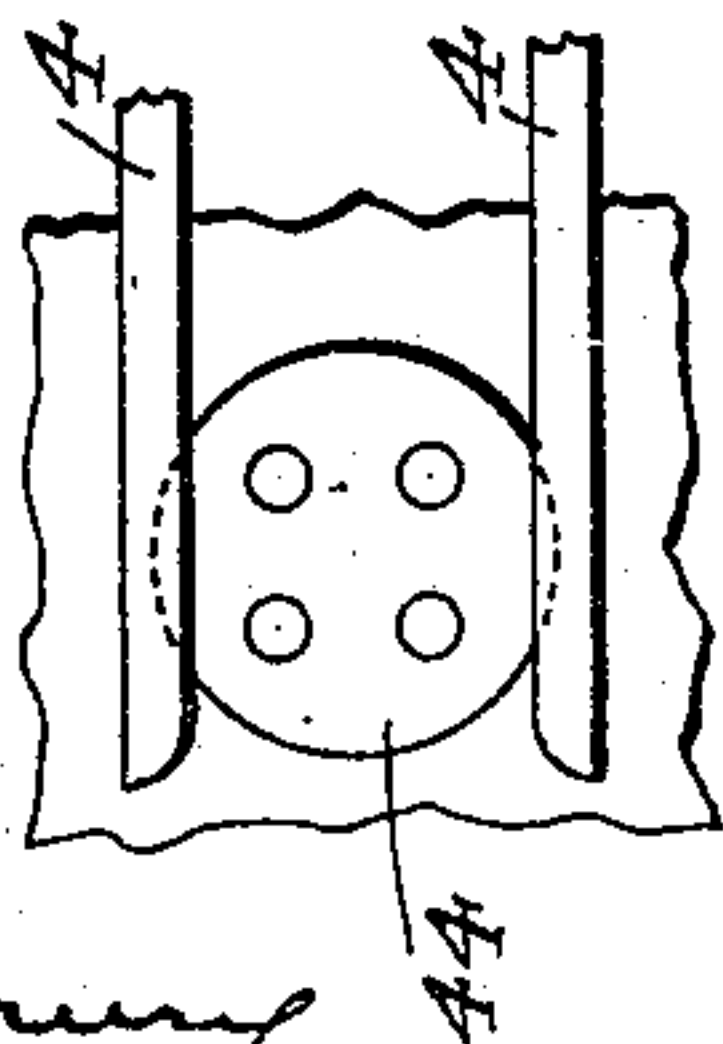


FIG. 13.

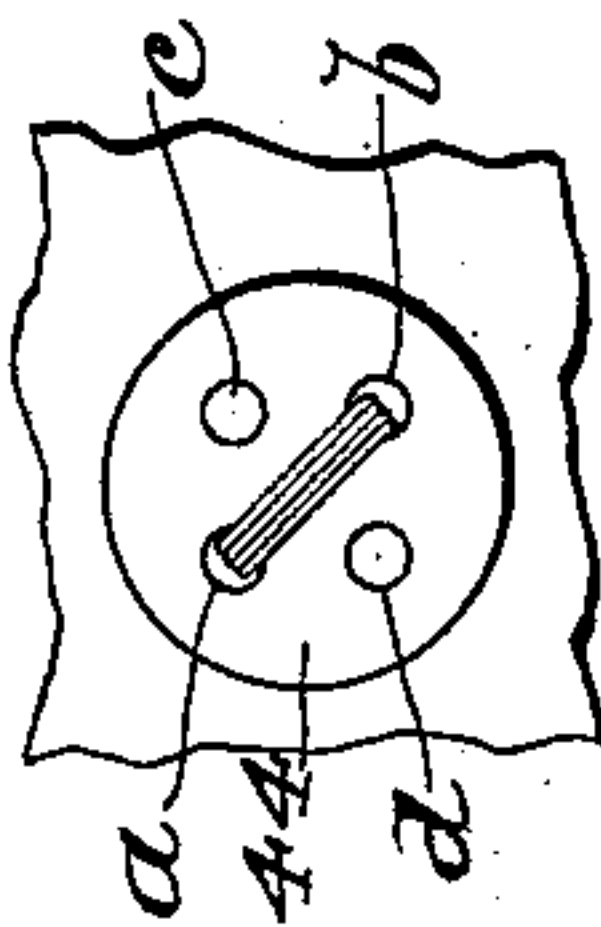


FIG. 14.

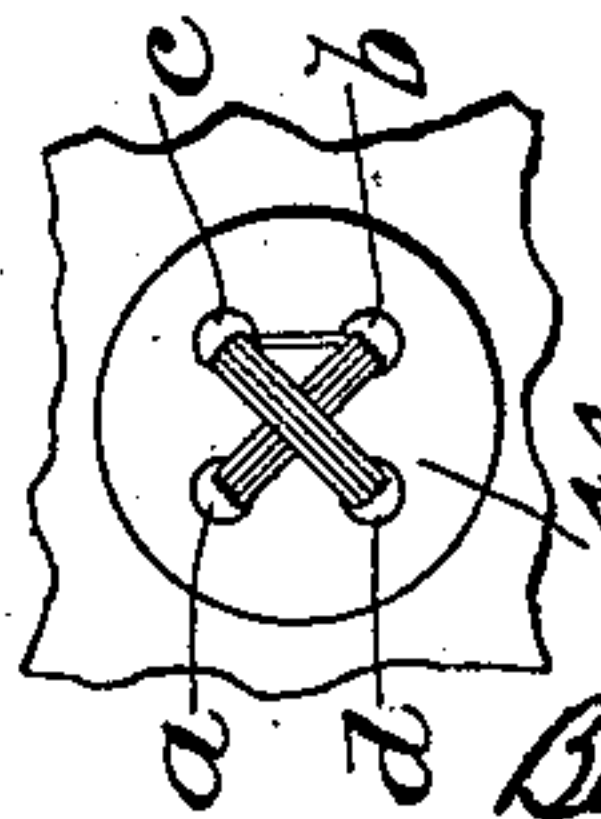


FIG. 12.



WITNESSES.

Henry Drury  
R. M. Kelly.

INVENTOR.

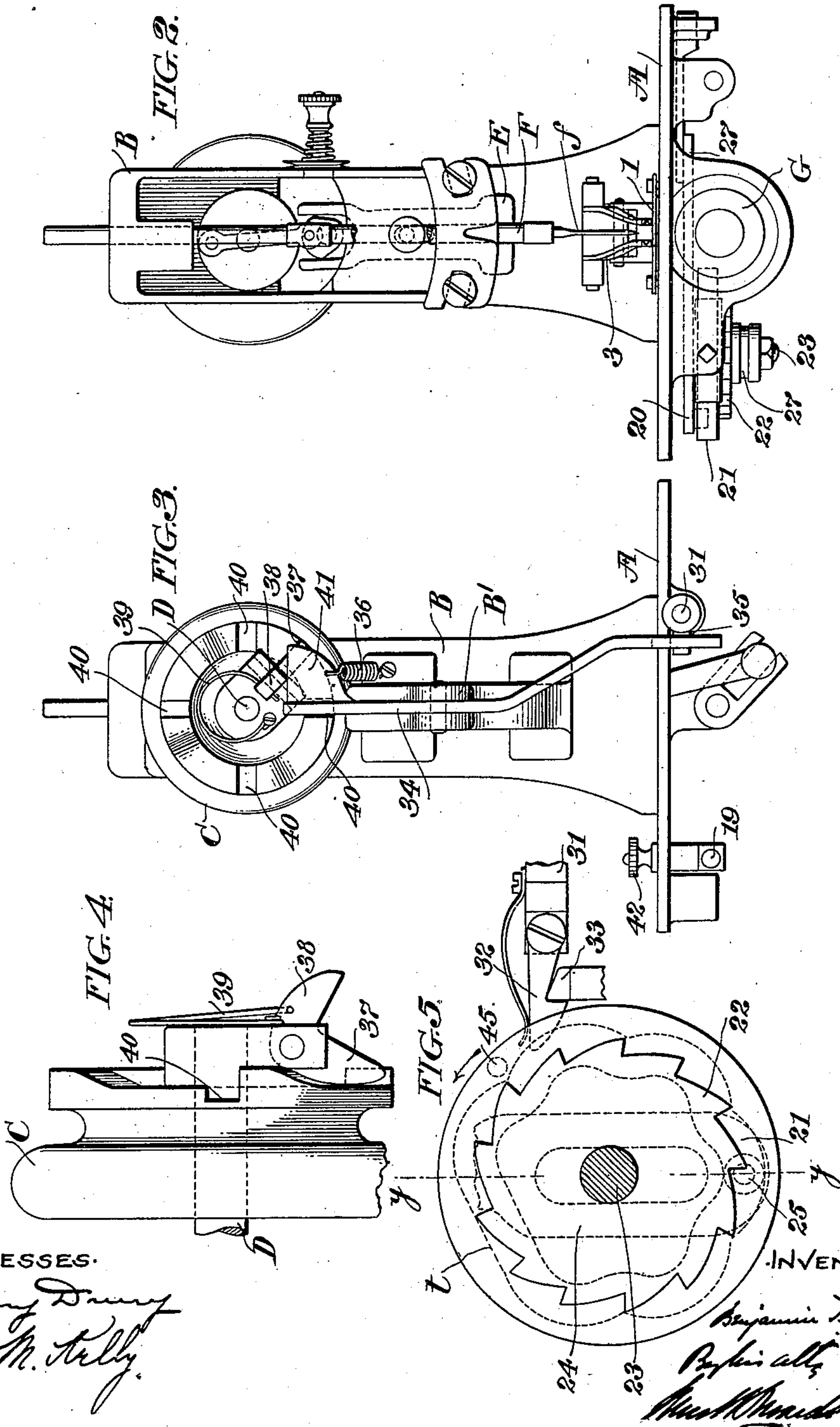
Benjamin T. String  
By his atty  
M. M. Maudslayi

**B. T. STRING.**  
**BUTTON SEWING MACHINE.**

(Application filed July 17, 1900.)

(No Model.)

3 Sheets—Sheet 2,



WITNESSES.

*Henry Denny*  
*R. M. Kelly*

INVENTOR.

*Benjamin T. String*  
*Perkins atty*  
*Wm. H. H. H. H. H.*

B. T. STRING.  
BUTTON SEWING MACHINE.

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3 Sheets—Sheet 3.

FIG. 6.

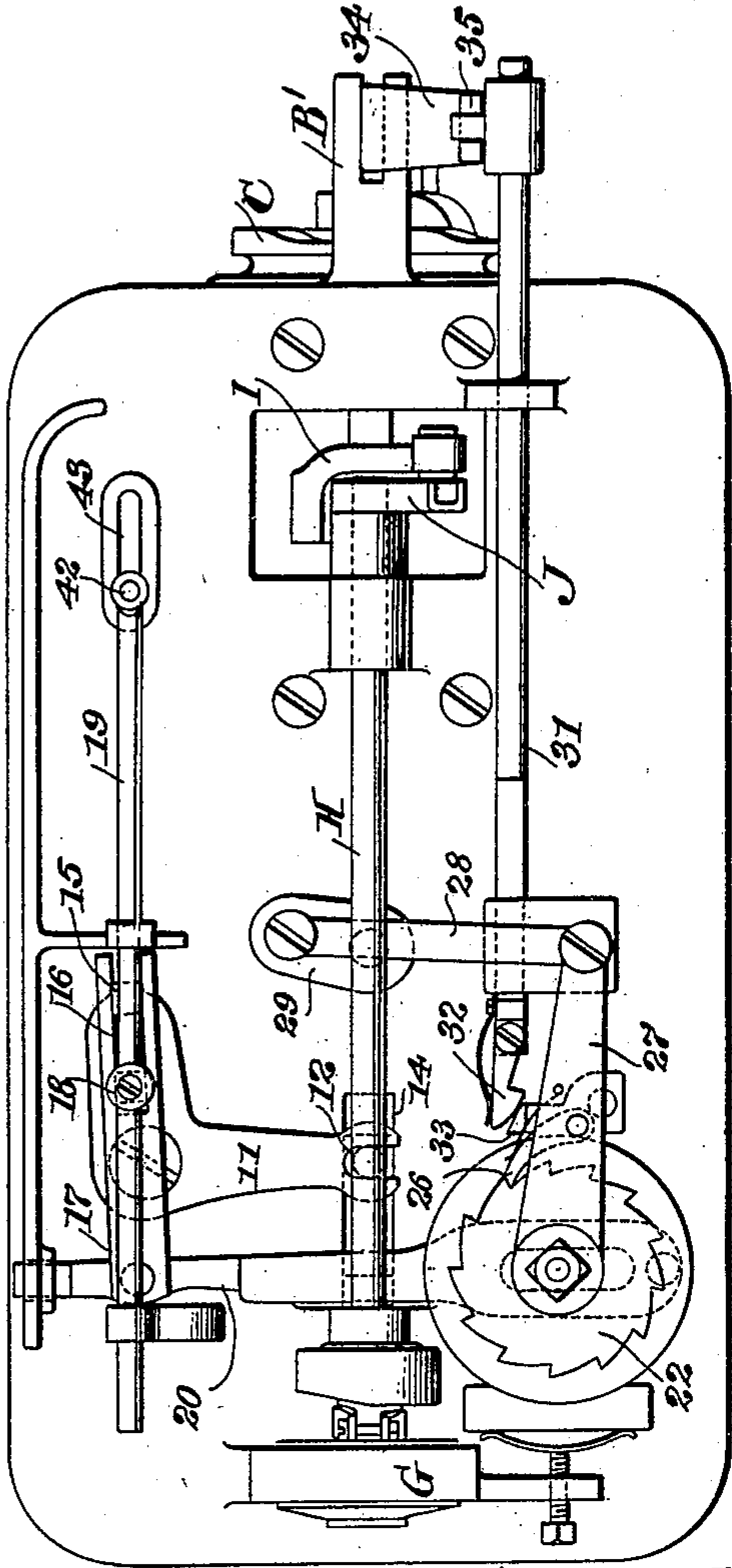


FIG. 7.

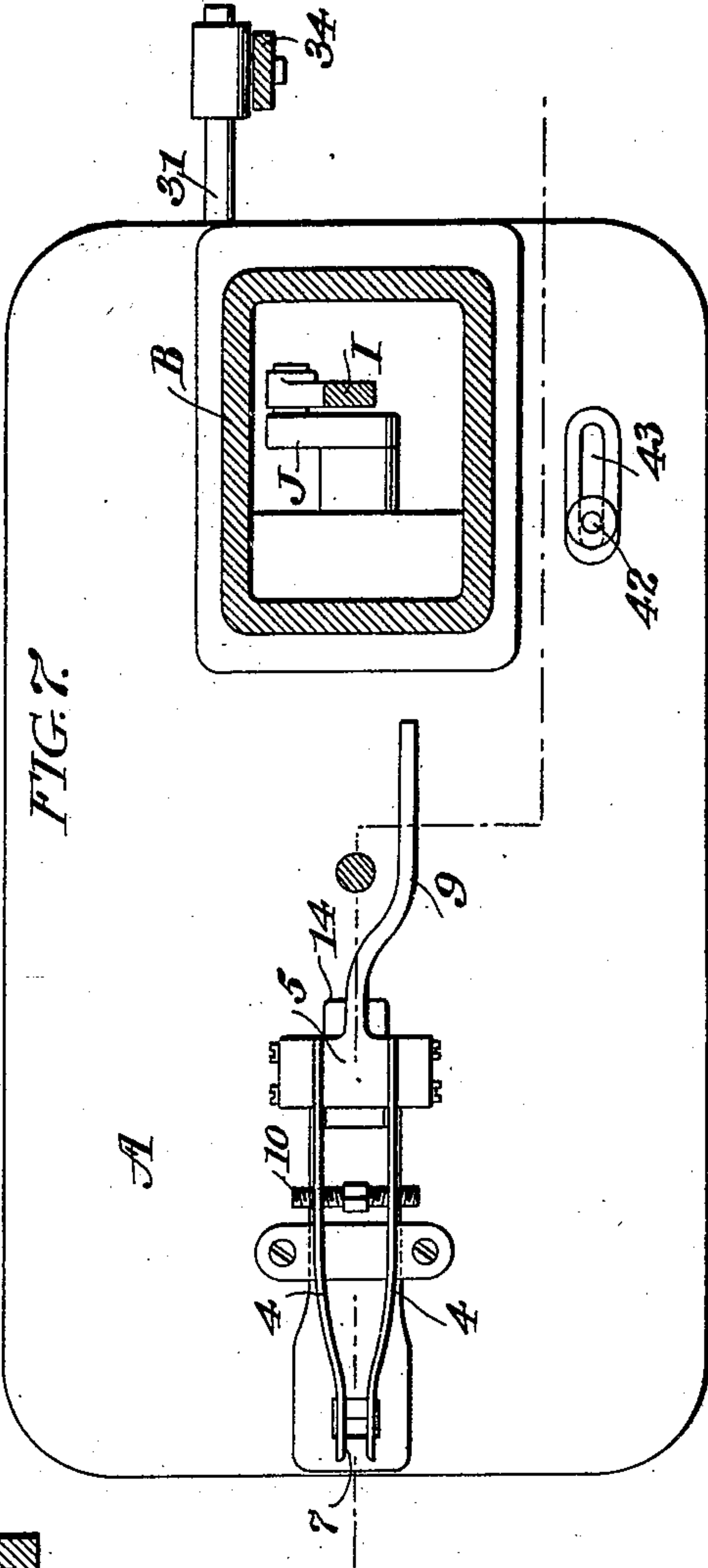


FIG. 10.

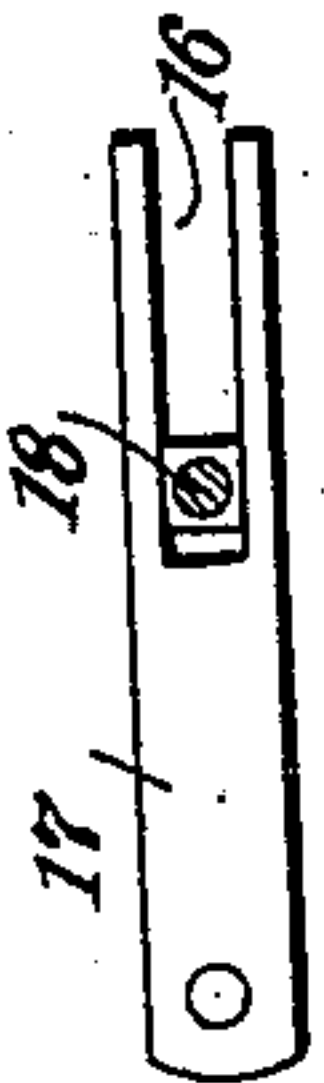


FIG. 9.

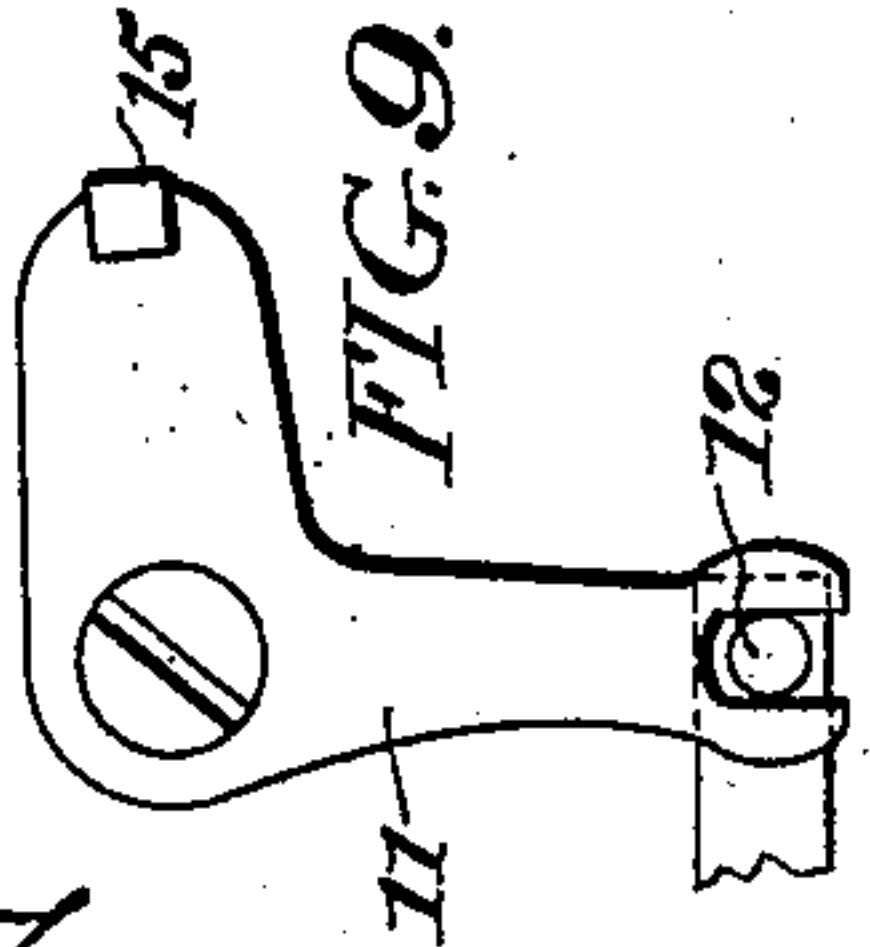
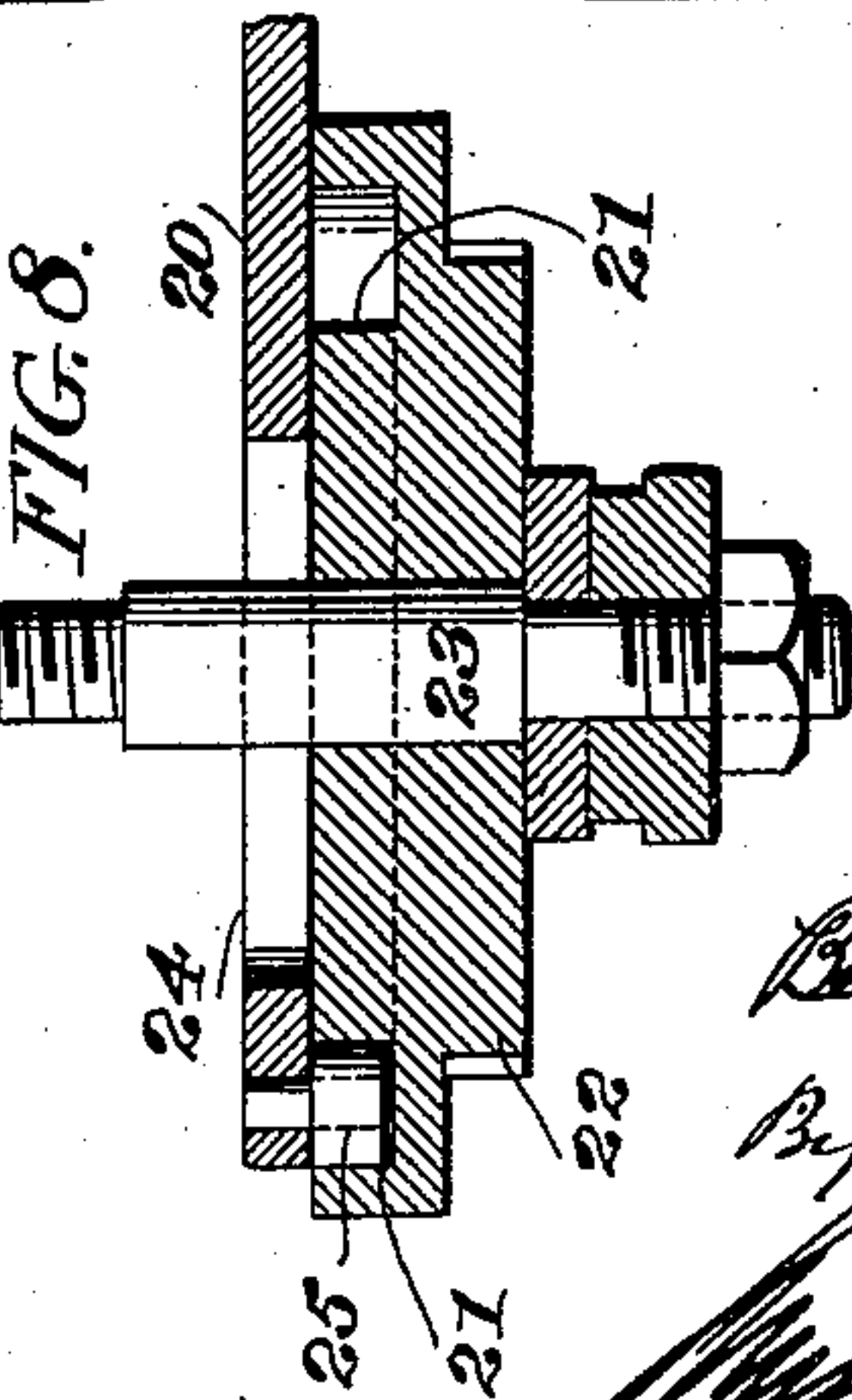


FIG. 8.



WITNESSES:

*Henry D. String*  
*R. M. Kelly*

INVENTOR.

*Benjamin J. String*  
By his atty

*Wm. M. Maudslayi*



# UNITED STATES PATENT OFFICE.

BENJAMIN T. STRING, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
CLARENCE R. MULLEN, OF PHILADELPHIA, PENNSYLVANIA.

## BUTTON-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 706,124, dated August 5, 1902.

Application filed July 17, 1900. Serial No. 23,916. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN T. STRING, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Button-Sewing Machines, of which the following is a specification.

My invention relates to button-sewing machines; and it consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

In sewing buttons by machinery it is desirable to produce the diagonal stitches usual to hand-sewing. Heretofore this result has not been accomplished without the employment of very complicated mechanism and a multiplicity of parts. It is the object of my invention to provide a button-sewing machine of simple construction capable of producing the diagonal stitches.

In carrying out my invention I employ with any ordinary vibrating-needle machine a reciprocating button-carrier movable transversely to the line of vibration of the needle in combination with devices for reciprocating the carrier provided with means for temporarily interrupting the reciprocation of the carrier during one or more vibrations of the needle, whereby the stitching is transferred from one pair of diagonal eyes to the other without stopping the machine.

My invention also relates to the means for imparting this interrupted reciprocation to the button-carrier, and for this purpose I employ a cam device operated from the main driving-shaft and provided with means for interrupting the reciprocation during a vibration of the needle.

My invention also relates to a stop-motion device for automatically arresting the machine after a given number of stitches, and embraces improvements whereby such stop-motion device is controlled by the cam device by which the interrupted reciprocation is imparted to the carrier.

In the accompanying drawings, Figure 1 is a side elevation of a button-sewing machine embodying my invention with parts in vertical section. Fig. 2 is a front end elevation of the machine. Fig. 3 is a rear end elevation of the same. Fig. 4 is a detail view of

part of the stop-motion mechanism for arresting the machine after a given number of stitches. Fig. 5 is a detail view of part of the button-carrier-operating and stop-motion-controlling devices. Fig. 6 is an inverted plan view of the machine. Fig. 7 is a horizontal sectional plan view on the line *x x* of Fig. 1. Fig. 8 is a vertical sectional view on the line *y y* of Fig. 5. Figs. 9 and 10 are detail views of parts of the button-carrier-operating devices. Figs. 11 and 12 are respectively plan and end views enlarged of the button and button-carrier jaws, illustrating the manner in which the button is supported; and Figs. 13 and 14 are plan views of the button, illustrating the manner in which it is sewed to the fabric.

So far as my improvements are concerned they may be applied to any vibrating-needle machine, that shown being merely selected for purposes of illustration.

A is the base-frame, B the overhanging arm, and C the driving-pulley on the shaft D, which latter oscillates the vibrating head E and the needle-bar F and needle *f*, carried thereby.

G is the looper, operated through the shaft H, rod J, and crank I from the shaft D.

I shall now describe my improvements.

1 is a slide mounted on the base-frame A and movable thereon longitudinally in suitable guides 2.

3 is the button-carrier mounted on the slide 1. As shown, the button-carrier consists of two spring-arms 4 4, carried by a head 5, hinged to a pedestal 6 on the slide 1, the arms extending forward and downward and terminating in a spring-jaw 7 beneath the needle *f*. A spring 8, bearing on the head 5, normally depresses the carrier.

9 is a lever carried by the head 5, by means of which the carrier may be elevated when desired.

The spring-arms 4 4 may be drawn together or separated to regulate the size of the jaw 7 to suit buttons of different diameters by means of a right-and-left screw 10, engaging the arms 4 4. (See Fig. 7.) While this construction of the button-carrier is desirable, it may be varied without departing from the invention.



11 is a bell-crank lever pivoted under the base-frame A and having one arm provided with a jaw engaging a lug 12 on the slide 1, projecting through a slot 14 in the base-frame. The other arm of the lever 11 is provided with a lug 15, which engages a jaw 16 in a lever 17, pivoted to an adjustable pivot 18, carried by a rod 19. The other arm of the lever 17 is pivoted to a slide 20, which is operated by a cam 21. By adjusting the rod 19 in its bearing the pivot 18 of the lever 17 may be adjusted in the jaw 16 to adjust the leverage and the throw of the bell-crank 11 and slide 1. The rod 19 may be adjusted by a pin 42, carried by it and projecting through a slot 43 in the base-frame. As shown, the cam 21 consists of a wavy cam-groove in a ratchet-disk 22, journaled on a pivot 23 under the base-frame. The slide-rod 20 is provided with a slotted yoke 24, embracing the pivot 23, and with a lug or roller 25, engaging the cam-groove 21. The rotation of the cam 21 through the ratchet-disk 22 will reciprocate the slide 20, and thereby reciprocate the slide 1 and button-carrier 3. The number of reciprocations is determined by the number of cam projections or irregularities in the cam 21, and to produce a period of intermission in the reciprocation of the slide 20 the cam projection at one point, as at *t*, Fig. 5, is omitted.

The ratchet-disk is operated by a pawl 26 on the lever 27, hinged to the pivot 23 and connected by a link 28 with a vertical crank-shaft 29, driven by bevel-gears 30 from the driving-shaft D in the overhanging arm B.

31 is a slide carried in suitable guides under the base-frame and provided in its outer end with a dog 32, adapted when the slide is projected forward to engage a fixed lug 33.

34 is a lever pivoted to a bracket B' at the rear of the arm B and engaging the outer end of the slide 31, as by a pin-and-slot connection 35.

36 is a spring normally holding the lever with its lower end outward, and consequently acting normally to retract the slide 31.

The pulley C is loose upon the shaft D and is connected thereby by a clutch device controlled by the upper end of the lever 34. As shown, this clutch device consists of a double dog 37 38, pivoted to the shaft C and acted upon by a spring 39 to throw one member 37 into normal engagement with a notch 40 in the pulley C. The other dog member 38 projects into position to be acted upon by a wing 41 on the lever 34. When the lever 34 is released by the slide 31 and its dog 32, the wing 41 will strike the dog member 38 and rock the dog upon its pivot and throw the member 37 out of engagement with the pulley C, thus stopping the shaft D and arresting the operation of the sewing-machine. When the rod 31 is projected, the dog 32 will engage the fixed stop 33, thus retaining the lever 34 out of action upon the clutch 37 38 and permitting it, under the action of the spring 41,

to engage the pulley C and make the driving connection with the driving-shaft D. The machine is then in operative condition. The button is placed between the jaws 4 4 of the carrier 3, which is elevated to admit the cloth, which is clamped between the carrier and the slide 1.

As the shaft D rotates the needle *f* is vibrated laterally, and simultaneously therewith the slide 1 and carrier 3 are reciprocated longitudinally or transversely to the movements of the needle. These movements are so timed that each movement of the slide and carrier will correspond with a movement of the needle, and consequently the needle will make a series of diagonal stitches through two of the button-eyes, the number of stitches being determined by the number of cam portions in the cam 21. After a given number of these diagonal stitches the low portion *t* of the cam is reached, and consequently the movement of the slide 1 and carrier 3 is interrupted for a period of time equal to one vibration of the needle, and consequently the needle on its next descent will enter a different button-eye and will then make a series of diagonal stitches between the second pair of button-eyes, after which the stop-motion mechanism is thrown into action to operate the clutch 37 38 and arrest the shaft D. This is effected by means of a lug or pin 45 on the ratchet-disk 22, which strikes the pivoted dog 32 and disengages it from the lug 33, thus releasing the lever 34 and permitting it to operate the clutch 37 38 in the manner described.

In the particular construction shown the cam 21 is provided with a cam-groove having six undulations and a concentric portion *t*, and the stop 45 is located on a line between the first and second raised portions beyond the low portion *t*. (See Fig. 5.)

Supposing the parts to be constructed and arranged in the position shown in Fig. 5, the slide 1 and carrier 3 is then in its rearmost position and the needle *f* is elevated. The needle *f* will first descend and enter the eye *a* in the button 44. (See Figs. 13 and 14.) As the needle ascends and vibrates to the opposite side the slide 1 and carrier 3 will be moved forward, and upon the next descent of the needle it will enter the diagonally opposite eye *b*. Upon the next ascent and vibration of the needle the slide and button-carrier will be moved back, so that when the needle descends it will again enter the eye *a*. These operations will be continued until three diagonal threads have been stitched between the eyes *a* and *b*. The low portion *t* of the cam will then be reached, and there will be no reciprocation of the slide and carrier, while the needle will vibrate, so that on its next descent it will enter the eye *c*, forming a single transverse stitch between the eyes *b* and *c*. As the reciprocations of the slide and carrier are resumed the needle will form a series of diagonal stitches between the eyes *c* and *d* until the pin 45 strikes the dog 32 and stops



the shaft D. The button and fabric are then removed, the rod 31 is reset, and the operation is repeated with a new button.

The stop and clutch devices are so arranged 5 that after the arrest of the slide-operating mechanism there will be one more vibration of the needle *f*, which will bring the needle into position in acting upon the next button to enter the opposite eye. Thus if the sewing 10 of the first button is commenced with the eye *a* the next button will be commenced with the eye *d*, and vice versa. This is not, however, necessary to the invention, and the parts may, if desired, be so timed that the 15 sewing of each button will commence with the same button-eye.

There will be one more vibration of the needle after the arrest of the slide-operating mechanism, as above stated, for the reason 20 that the pin 45 on the ratchet-disk strikes the pivoted dog 32 immediately after the follower 25 is about at the end of the concentric portion *t* of the cam 22. This timing of the parts permits a vibration of the needle while 25 the follower is in said concentric portion. In other words, there is time for one more vibration of the needle before the stop-motion comes into action.

The resetting of the lever 34 and rod 31 30 may be effected by hand or by means of a chain and pedal. (See dotted lines in Fig. 1.)

It will be understood, of course, that by varying the cam 21 the number of diagonal stitches produced in sewing each button may 35 be increased to any number desired.

I do not mean to limit myself to the particular details of construction that have been shown, as these may be varied in many ways without departing from the invention.

40 What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a button-sewing machine, the combination with stitch-forming mechanism and a button-holder, of means for imparting a vibratory movement to the needle-bar, and 45 means comprising a cam to impart a vibratory movement to the button-holder in a plane at substantially a right angle to the plane of vibration of the needle-bar and simultaneously therewith and to suspend the motions of said button-holder during the vibration of the needle-bar. 50

2. In a button-sewing machine, the combination with stitch-forming mechanism and a 55 button-holder, a slide-plate which is secured to the button-holder, and a cam for positively actuating said plate to impart to said holder a vibratory movement in a direction at substantially a right angle to the plane of movement of the needle-bar and simultaneously 60 with the vibratory movement of the needle-bar and for suspending the motions of said button-holder during the vibration of the needle-bar.

65 3. In a button-sewing machine, the combination with stitch-forming mechanism and a

button-holder, of means for imparting a vibratory movement to the needle-bar, means comprising a cam to impart a vibratory movement to the button-holder in a plane at substantially a right angle to the plane of vibration of the needle-bar and simultaneously therewith and to suspend the motions of said button-holder during the vibration of the needle-bar, and stop-motion devices to arrest 75 both the needle-bar and button-holder after a given number of reciprocations.

4. In a button-sewing machine, the combination with stitch-forming mechanism and a button-holder, of means for imparting a vibratory movement to the needle-bar, means 80 comprising a cam to impart a vibratory movement to the button-holder in a plane at substantially a right angle to the plane of vibration of the needle-bar and simultaneously therewith and to suspend the motions of said button-holder during the vibration of the needle-bar, stop-motion devices to arrest both the needle-bar and button-holder after a given number of reciprocations, means to 90 hold said stop-motion devices out of action, and means to automatically operate said means for holding the stop-motion devices out of action after a given number of reciprocations of the needle-bar and button-holder. 95

5. In a button-sewing machine, the combination with stitch-forming mechanism and a button-holder, of means for imparting a vibratory movement to the needle-bar, means 100 comprising a cam to impart a vibratory movement to the button-holder in a plane at substantially a right angle to the plane of vibration of the needle-bar and simultaneously therewith and to suspend the motions of said button-holder during the vibration of the needle-bar, power-transmitting connections between said means for vibrating the needle-bar and means for vibrating the button-holder, and a stop-motion for controlling said power-transmitting connections controlled by the 110 means for vibrating the needle-bar.

6. In a button-sewing machine, the combination with a vibrating needle, base-frame, and a driving-shaft carried by the overhanging arm, to vibrate said needle, of a reciprocating button-carrier movable transversely 115 on said base-frame to the line of vibration of the needle, a cam device to reciprocate said carrier provided with means to stop said reciprocation during a vibration of the needle, connections between said cam device and button-carrier located wholly below said base-frame, and power-transmitting connections between said cam device and the driving-shaft in the overhanging arm, embracing a 125 vertical shaft 29 extending between the base-frame and the overhanging arm.

7. In a button-sewing machine, the combination with a vibrating needle, of a reciprocating button-carrier movable transversely 130 to the line of vibration of the needle of a cam device for reciprocating said carrier provided



with means for stopping the reciprocation of said carrier during a vibration of the needle, a bell-crank lever 11 operatively connected with said carrier, a lever pivoted to said bell-crank lever, power-transmitting connections between said second lever and the cam device, and an adjustable fulcrum for said second lever whereby the throw of the bell-crank lever and the extent of reciprocation imparted to the carrier may be adjusted.

8. In a button-sewing machine, the combination with a vibrating needle, of a reciprocating button-carrier movable transversely to the line of vibration of the needle of a cam device for reciprocating said carrier provided with means for interrupting the reciprocation of said carrier during a vibration of the needle, the bell-crank lever 11 operatively connected with the carrier, the slide 20 operated by the cam device, and the lever 17 between the slide 20 and the bell-crank lever 11.

9. In a button-sewing machine, the combination with a vibrating needle, of a reciprocating button-carrier movable transversely to the line of vibration of the needle of a cam device for reciprocating said carrier provided with means for interrupting the reciprocation of said carrier during a vibration of the needle, the bell-crank lever 11 operatively connected with the carrier, the slide 20 operated by the cam device, and the lever 17 between the slide 20 and the bell-crank lever 11, said lever 17 having an adjustable fulcrum 18, substantially as and for the purposes described.

10. In a button-sewing machine, the combination with a vibrating needle, of a reciprocating button-carrier movable transversely to the line of vibration of the needle of a cam device for reciprocating said carrier provided with means for interrupting the reciprocation of said carrier during a vibration of the needle, the bell-crank lever 11 operatively connected with the carrier, the slide 20 operated by the cam device, and the lever 17 between the slide 20 and the bell-crank lever 11, said lever 17 having a fulcrum 18 carried

by an adjustable rod 19 substantially as and for the purposes described.

11. In a button-sewing machine, the combination with a vibrating needle and means to vibrate it, of a reciprocating button-carrier movable transversely to the line of vibration of the needle, and a cam device independent of the means for vibrating the needle adapted to impart a series of reciprocations to said carrier and provided with a portion *t*, adapted to temporarily interrupt the reciprocation of the carrier during the vibration of the needle.

12. In a button-sewing machine, the combination with a vibrating needle and means to vibrate it, of a reciprocating button-carrier movable transversely to the line of vibration of the needle, and a cam device independent of the means for vibrating the needle adapted to impart a series of reciprocations to said carrier and provided with a portion *t*, adapted to temporarily interrupt the reciprocation of the carrier during the vibration of the needle, a stop-motion adapted to arrest both the needle and button-carrier after a given number of reciprocations, and means controlled by the cam device to control said stop-motion.

13. In a button-sewing machine, the combination with stitch-forming mechanism, of a reciprocating button-carrier, a cam device adapted to impart a series of reciprocations to said carrier, provided with a portion *t* adapted to temporarily interrupt said reciprocations, a stop-motion adapted to arrest the machine after a given number of reciprocations, a rod 31 operatively connected with said stop-motion, and provided with a dog 32, a fixed lug 33 adapted to be engaged by said dog to retain the rod 31 and hold the stop-motion out of action, and a lug 45 carried by the cam devices adapted to disengage said dog and throw said stop-motion into action.

In testimony of which invention I have hereunto set my hand.

BENJAMIN T. STRING.

Witnesses:

CLARENCE R. MULLEN,  
ERNEST HOWARD HUNTER.