Jan. 20, 1959 J. R. JOHNSON 2,869,126

MACHINE FOR STITCHING TERMINALS ONTO CARDS

Filed Jan. 30, 1957 3 Sheets-Sheet 1

FIG. 1

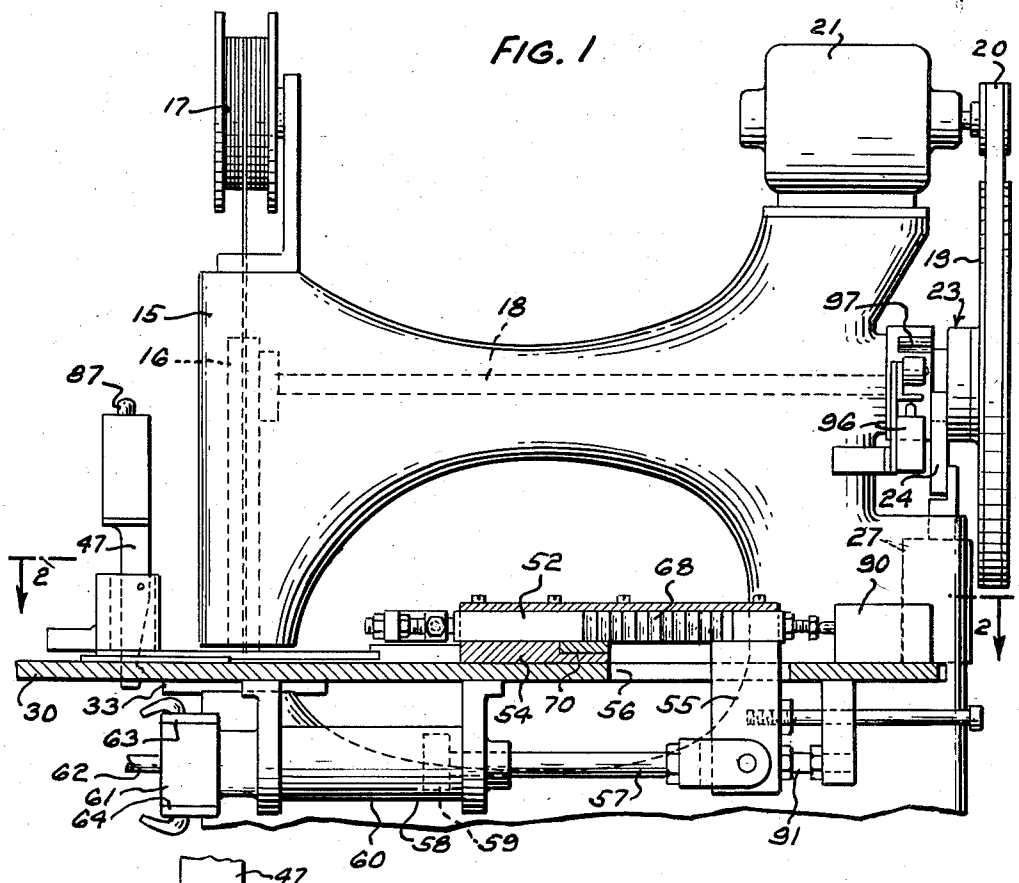


FIG. 3

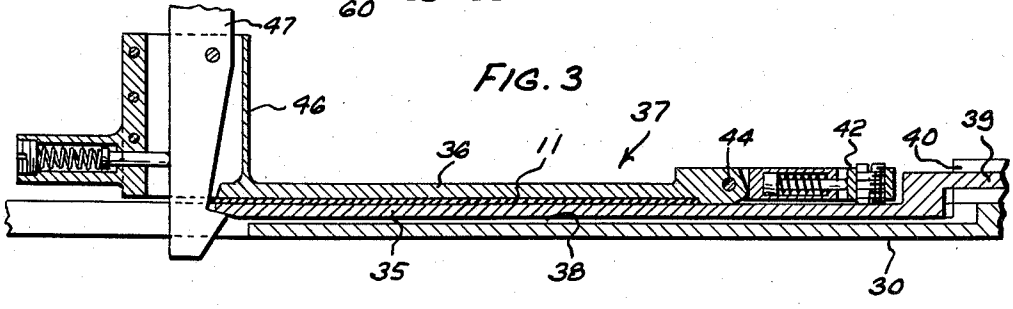
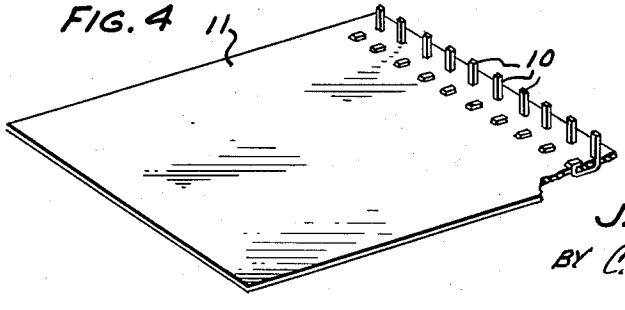


FIG. 4



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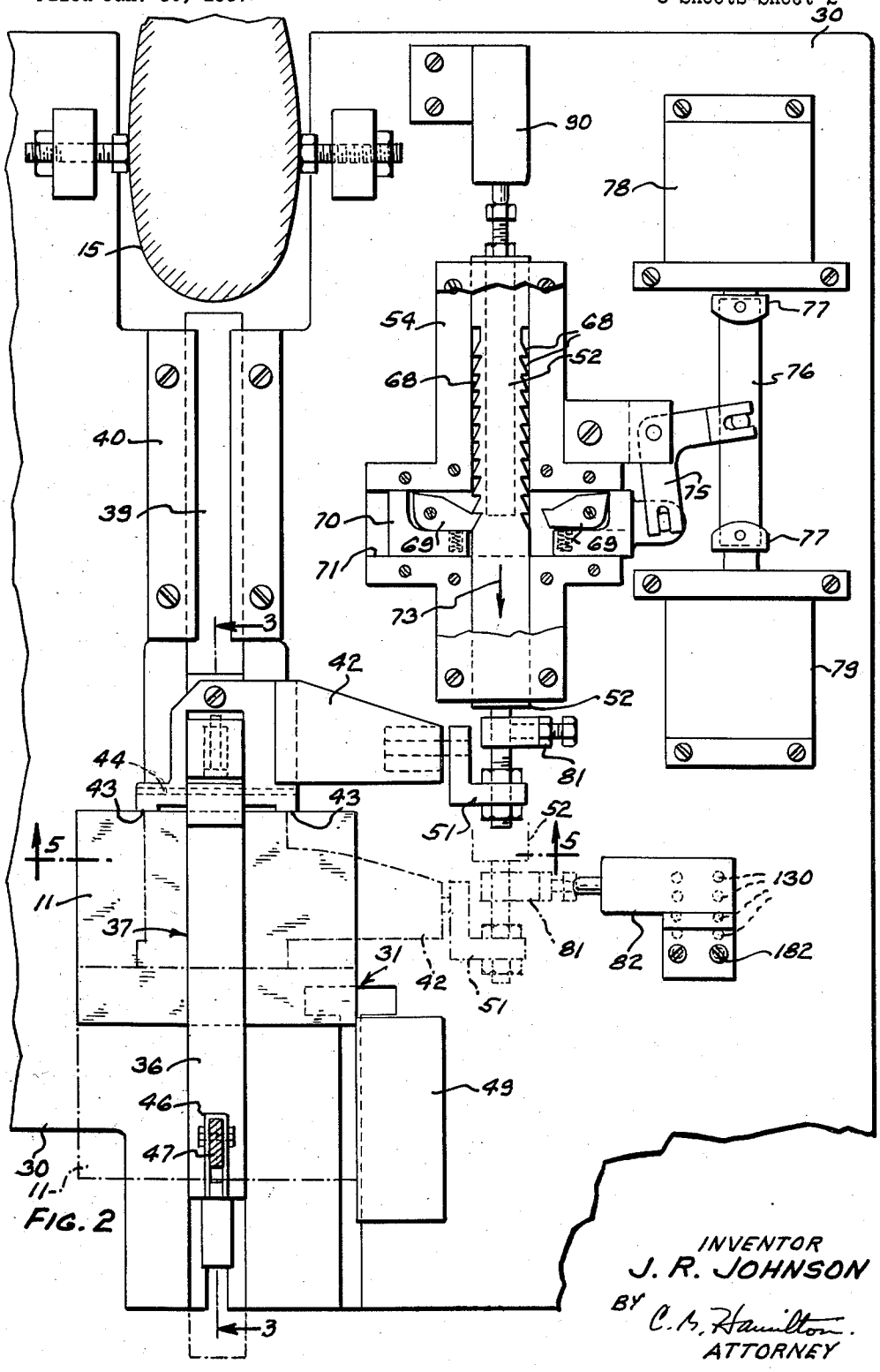

FIG. 2

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FIG. 5

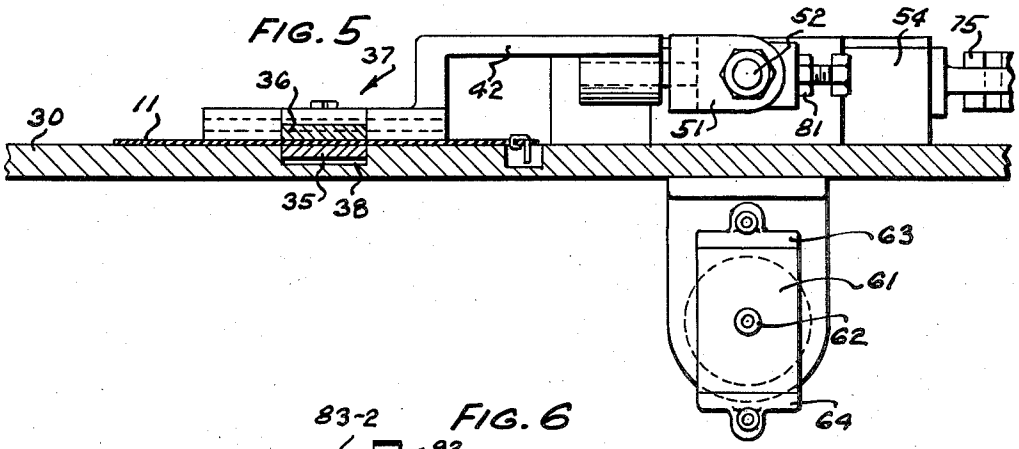
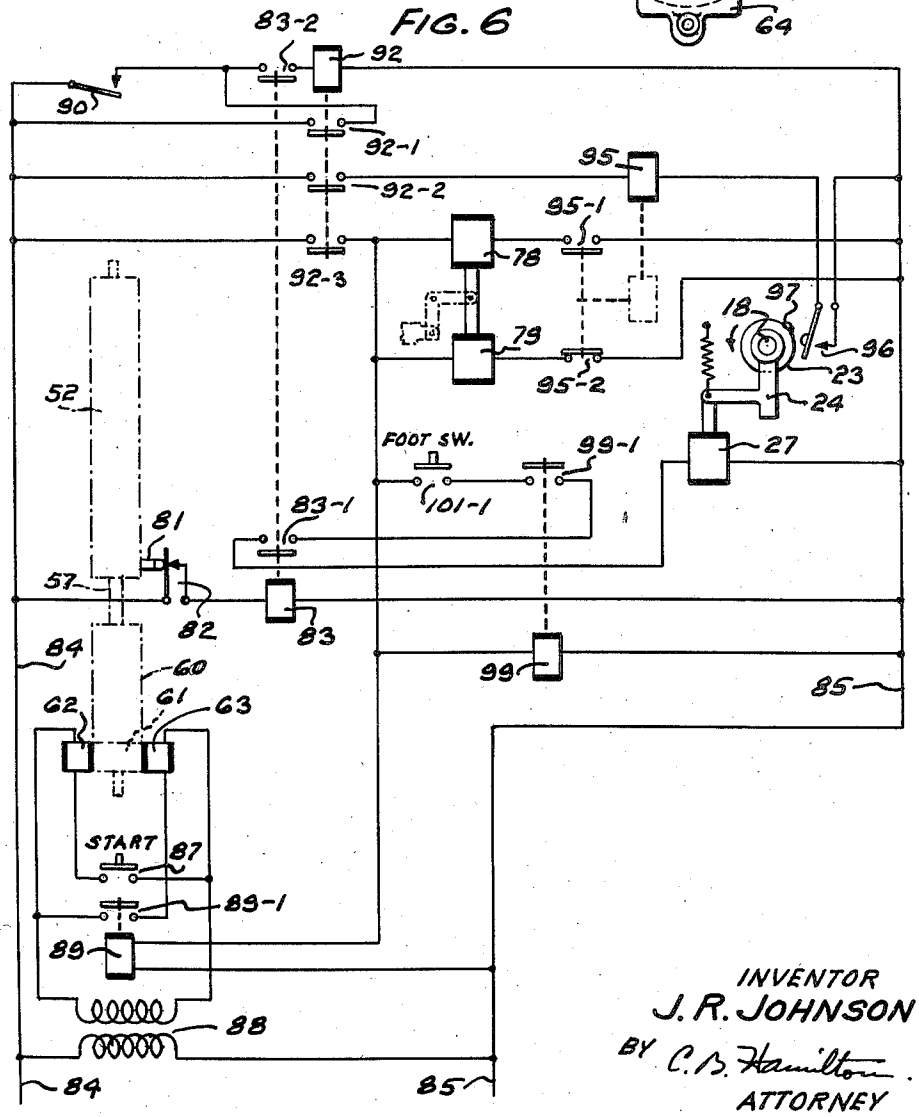


FIG. 6



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United States Patent Office 2,869,126
Patented Jan. 20, 1959

2,869,126

MACHINE FOR STITCHING TERMINALS ONTO CARDS

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Application January 30, 1957, Serial No. 637,284

2 Claims. (Cl. 1—92)

This invention relates to a machine for stitching terminals onto cards and is an improvement of the terminal applying machine disclosed in Patent 2,747,188.

An object of the present invention is to provide an improved machine for applying terminals to a card and for controlling the operation thereof.

A machine illustrating certain features of the invention may include a card holder for guiding a card for movement along a predetermined path relative to a reciprocable stitching head which is driven through a clutch controlled drive. The holder is moved by an air actuator from a card loading position to an initial operative position in response to manual actuation of a start switch, and in response to the arrival of the holder to this latter position the air actuator is reversed to return the holder to is loading position in a step by step movement in cooperation with a pawl and ratchet mechanism to stop the holder at different positions during which the terminals are stitched onto the cards. Also in response to movement of the card holder to its initial operative position, a clutch actuating mechanism actuates the clutch to connect the drive and actuate the stitching head, which in turn controls the actuation of the pawl and ratchet mechanism, and in response to movement of the card holder to its loading position after all of the terminals have been stitched to the card, the clutch actuating mechanism is rendered inoperative and thus stops the machine. A foot-actuated switch may be included in the clutch actuating mechanism to render it inoperative until the switch is closed by the operator and held closed during the terminal stitching operation.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings, illustrating a preferred embodiment thereof, in which

Fig. 1 is a fragmentary side elevational sectional view of the terminal stitching machine;

Fig. 2 is a fragmentary plan sectional view of the stitching machine taken on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary vertical sectional view of the machine taken on line 3—3 of Fig. 2;

Fig. 4 is a perspective view of a card showing a row of staples stitched thereto with the present stitching machine;

Fig. 5 is a fragmentary vertical cross-sectional view of the machine taken on line 5—5 of Fig. 2; and

Fig. 6 is a wiring diagram of the control circuit for the machine.

The present apparatus is designed to apply a row of terminals 10 to a card 11 along the margin of one edge thereof and comprises a stitching machine 15 having a vertically reciprocable stitching head 16 for forming the terminals 10 from a supply of wire 17. The stitching head 16 is actuated by a drive shaft 18 on which a pulley 19 is freely rotatably mounted and is rotated by a belt and pulley drive 20 from a motor 21. The pulley 19 is connectible to the shaft 18 through clutch 23. A clutch actuating member 24 is urged to a normal first position to disconnect the drive from the shaft 18, and this member 24 is actuated to a second position by a solenoid 27 (Figs. 1 and 6) to connect the drive to the stitching head. A horizontally disposed base plate

30 is secured to the machine 15 beneath the stitching head 16 for supporting a card feeding mechanism thereon. At a stitching station indicated at 31 in Fig. 2 the plate 30 is apertured to provide clearance for movement of the wire into engagement with an anvil 33 (Fig. 1) of the stitching machine which cooperates with the stitching head to clinch the terminals 10 onto the card 11.

The card is clamped between a lower member 35 (Fig. 3) and an upper member 36 of a holder 37 which is slidably mounted on the plate for guiding the marginal portion of the card in a straight line beneath the stitching head 16. The lower clamping member 35 is in the form of an elongated flat bar disposed in a slot 38 in the plate 30 and the member 35 has a rearwardly directed upwardly offset portion 39 slidably mounted in a guide 40 on the base plate 30. A bracket 42 fixed to the bar 39 has a pair of gaging surfaces 43 for positioning the forward edge of the card 11 and carries a pin 44 on which the movable clamping bar 36 is pivoted. A hollow mounting bracket 46 is fixed to the free end of the upper clamping member 36 for pivotally supporting a handle and latching member 47, the hooked lower end of which cooperates with the lower clamping member 35 to latch the upper member 36 in closed position. A gage member 49 on the plate 30 serves to locate the card 11 in proper position laterally on the holder.

The bracket 42 on the holder 37 is connected through connector members 51 to a ratchet bar 52 of a pawl and ratchet mechanism for imparting a step by step movement to the card to properly space the terminals 10 thereon. The ratchet bar 52 is slidably mounted in a guide 54 fixed to the base plate 30 and has a depending arm 55 (Fig. 1) which projects through a slot 56 in the plate 30 and the guide 54 and is connected to one end of a piston rod 57 of a pneumatic actuator 58 secured to the bottom of the base plate 30. A piston 59 to which the rod 57 is secured is reciprocable within a cylinder 60 of the pneumatic actuator by admission of compressed air to opposite ends of the cylinder under control of a valve 61 which is connected to a compressed air line 62 and is reversible under control of a pair of solenoids 63 and 64.

The ratchet bar 52 has two rows of ratchet teeth 68 which cooperate with a pair of holding pawls 69 pivotally mounted on a cross slide 70 which is slidably mounted in a guideway 71 in the guide 54 for reciprocable movement to effect the engagement of alternate pawls 69 with the rows of ratchet teeth 68. One arm of a bell crank 75 is connected to the cross slide 70; the other arm is connected to a link 76 which is connected to a pair of cores 77 of solenoids 78 and 79. These solenoids are adapted to be alternately energized while the ratchet bar is stressed for return movement in the direction of the arrow 73 to impart reciprocation to the cross slide 70 and stop the card holder in a plurality of predetermined positions while the terminals 10 are being stitched onto the card 11 in the holder.

With the card holder 37 in its normal inoperative or loading position as indicated in dotted lines in Fig. 2, an abutment 81 on the ratchet bar 52 engages and closes a normally open switch 82 which is connected in series with a relay 83 (Fig. 6) to power lines 84, 85 and the relay 83 is energized to open its contacts 83—1 and 83—2. With a card 11 clamped in the card holder 37, a start switch 87, mounted on the handle 47 of the card holder, is actuated manually and then released to energize the valve solenoid 62 for shifting the valve 61 and causing the pneumatic actuator to move the ratchet bar 52 and the card holder 37 with the card therein to their initial operating position shown in full lines in Fig. 2 with the card properly positioned relative to the stitching head

16 for receiving the first terminal. Movement of the card holder to the initial operating position opens the switch 82, thus deenergizing relay 83 and closing its contacts 83—1 and 83—2. The solenoid 62 is connected in series with the start switch 87 to the secondary of a transformer 88, the primary of which is connected to the power lines 84 and 85. The valve solenoid 63 is connected in series with contacts 89—1 of a time delay relay 89 to the secondary of the transformer 88. At the end of its movement the ratchet bar 42 closes a normally open switch 90 and is stopped by engagement of the arm 55 thereon with a stop 91 (Fig. 1). The switch 90 is connected in series with the contacts 83—2 and a relay 92 to the power lines 84, 85. The relay 92, which is energized in response to the closing of the switch 90, has three sets of normally open contacts 92—1, 92—2, 92—3, the contacts 92—1 of which serve to lock in the relay 92.

In response to the closing of the contacts 92—3 as a result of the movement of the card holder to its initial operating position as shown in Fig. 2, the relay 89 is energized and closes its contacts 89—1 after a five-second time delay to cause the energization of the valve solenoid 63 and the shifting of the valve 61. This admits compressed air to the opposite end of the fluid actuator 58 which urges the card holder 37 for return movement against one of the holding pawls 69. The step by step feeding movement of the card holder 37, effected by the movement of the cross slide 77 and the pawl 69 thereon, is controlled by alternate energization of the solenoids 78 and 79, the former being connected in series with the contacts 92—3 and the relay contacts 95—1 to the power lines 84, 85 and the solenoid 79 being connected in series with the contacts 92—3 and contacts 95—2 to the power lines 84, 85. Contacts 95—1 and 95—2 are alternately actuated to and from closed and open position by a ratchet type relay 95 which is connected in series with the contacts 92—2 and a normally open switch 96 to the power lines 84, 85. The switch 96 is mounted on the apparatus in a position to be actuated by a cam 97 on the drive shaft 18 to energize the relay 95 during each rotation of the shaft to actuate the contacts 95—1 and 95—2 alternately to effect the energization of the solenoids 78 and 79 alternately during successive revolutions of the drive shaft.

A time delay relay 99 is connected in series with the relay contacts 92—3 to the power lines 84, 85 and is energized in response to closing of the contacts 92—3 to close its contacts 99—1 after a 1/10 second time delay. The contacts 99—1 are connected in series with the clutch actuating solenoid 27, contacts 83—1, a pair of normally open contacts 101—1 of a foot operated switch 101, and the contacts 92—3 to the power line 84, 85. Thus, when the card holder 37 is in its initial operative position and the operator closes the foot switch 101, a circuit is completed to energize the solenoid 27 which actuates the clutch and connects the drive to actuate the stitching head 16 and stitch one terminal for each rotation of the shaft, and to actuate the switch 96 for each rotation thereof to effect the alternate actuation of the solenoids 78 and 79 and the step by step feeding movement of the card holder and the card therein. When the card holder 37 has returned to the loading position and the last terminal 10 has been stitched to the card, the abutment on the card holder engages and actuates the switch 82, thereby energizing the relay 83 and opening the contacts 83—1 and 83—2 thereof to deenergize the clutch solenoid 27 and cause the clutch to disconnect the drive from the shaft 18.

The switch 82 is adjustable on the base plate 30 to vary the location of the loading position and to control the number of terminals 10 stitched onto a card 11. The switch is held in its different positions by screws 182 which engage in sets of threaded apertures 183 in the plate 30.

The foot switch 101 is adapted to be locked in closed position if desired, in which case the full cycle of operation of stitching the terminals 10 to a card 11 is completed automatically in response to the manual actuation of the start switch 87.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a machine for stitching terminals to a card, a reciprocable stitching head, a drive for said stitching head, a clutch for connecting the drive to said stitching head, a card holder mounted for guiding a card through a predetermined path relative to the stitching head, power means for moving said holder in one direction from a loading position to an initial operative position and for moving said holder in a reverse direction to said loading position, means including a manually actuated switch for effecting the actuation of the power means to move the holder to said initial operative position, means responsive to the movement of the holder to the initial operative position for effecting the actuation of the power means to move the card holder in the reverse direction, pawl and ratchet means for stopping the card holder in different positions during its movement in the reverse direction, clutch actuating means, means operable in response to movement of said card holder to said initial operative position for rendering said clutch actuating means operative to connect the drive to said stitching head, means responsive to the actuation of said stitching head for actuating said pawl and ratchet means to effect a step by step feeding movement of the holder, and means operable in response to movement of said card holder to said loading position for rendering said clutch actuating means inoperative.

2. In a machine for stitching terminals to a card, a reciprocable stitching head, a shaft for actuating said stitching head, drive means for rotating the shaft, a clutch for connecting the power means to said shaft, a card holder, means mounting the card holder for movement along a predetermined path relative to the stitching head, a pneumatic actuator for moving the card holder in one direction from a loading position to an initial operative position and for moving the card holder in a reverse direction to the loading position, means including a manually actuated switch for effecting the actuation of the pneumatic actuator to move the card holder to said initial operative position, means responsive to the movement of the card holder to the initial operative position for effecting the actuation of the pneumatic actuator to move the card holder in the reverse direction, pawl and ratchet means for stopping the card holder in different positions during its movement in the reverse direction, clutch actuating means, means operable in response to movement of said card holder to said initial operative position for rendering said clutch actuating means operative to connect the drive means to said shaft, a cam on said shaft, means for actuating said pawl and ratchet means, control means operated by the cam for rendering said pawl and ratchet actuating means operable to effect a feeding movement of one step of the card holder for each actuation of the stitching head, means including a stop switch actuated in response to movement of the card holder to said loading position for rendering said clutch actuating means inoperative, and means for adjusting the position of said stop switch to vary the location of said loading position and number of terminals applied to the card.

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