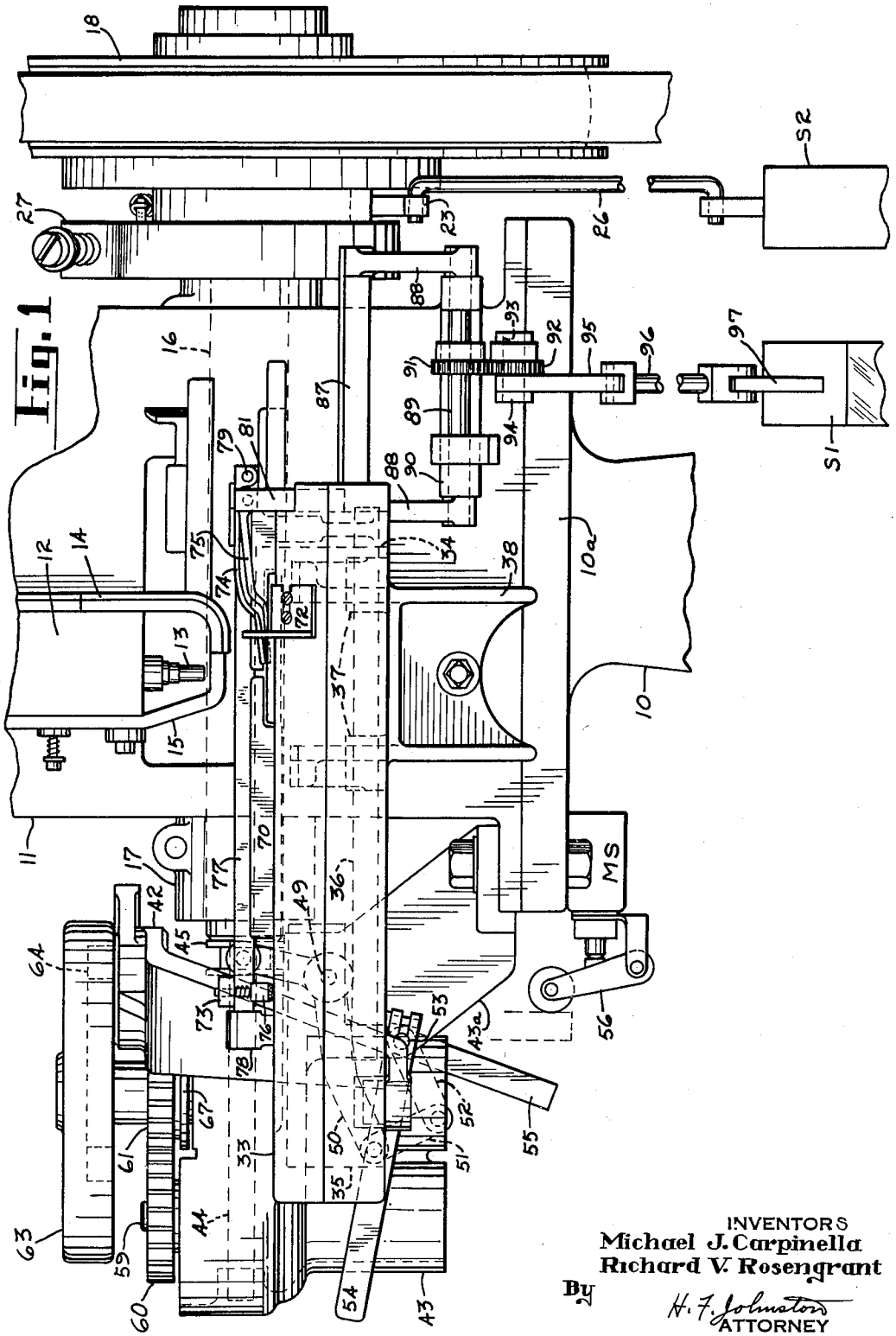
Feb. 14, 1956 M. J. CARPINELLA ET AL 2,734,653

MACHINE FOR SETTING AND SPACING FASTENER ELEMENTS ON GARMENTS

Filed Feb. 21, 1951 5 Sheets-Sheet 1

Fig. 1



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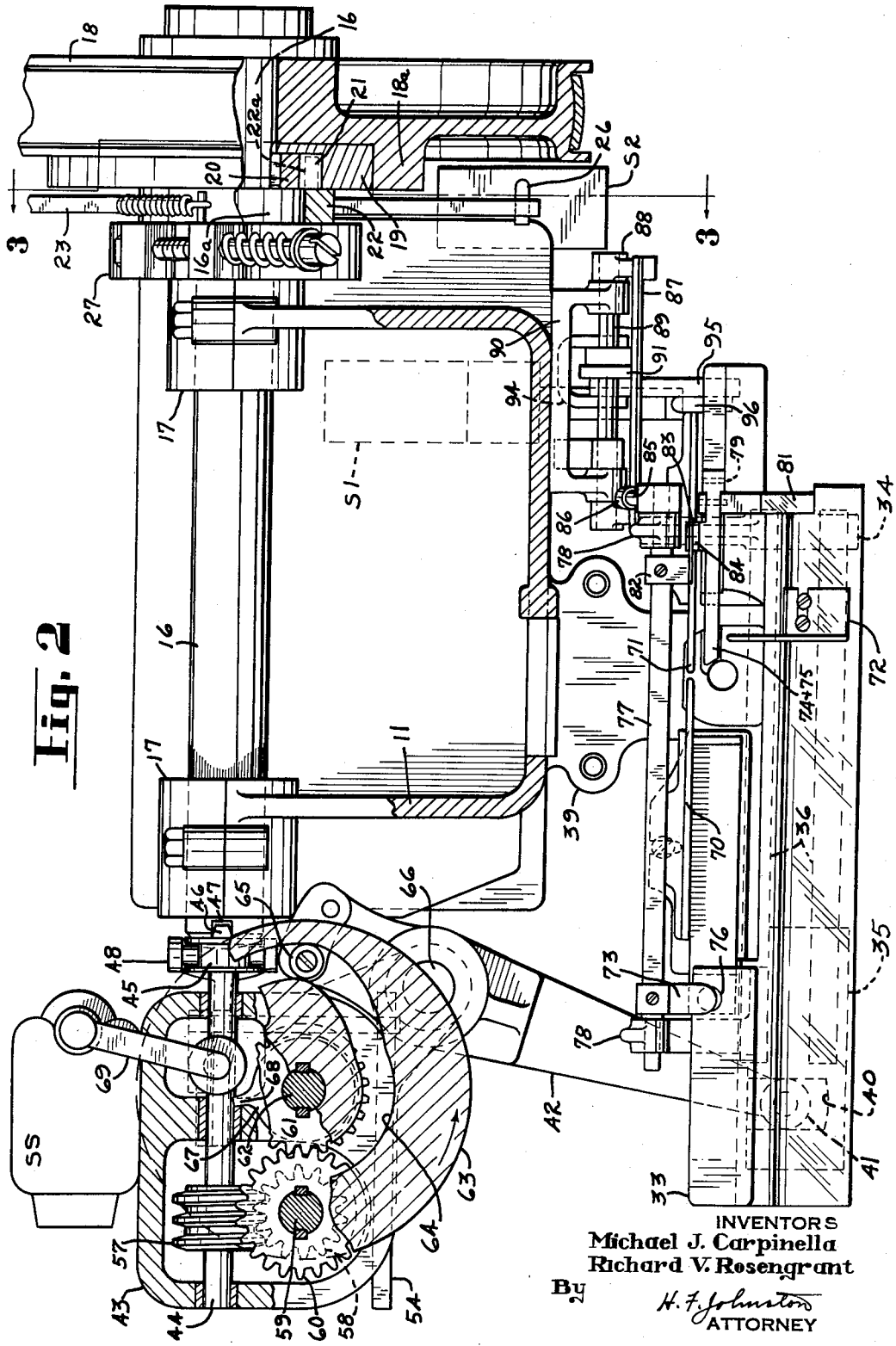
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MACHINE FOR SETTING AND SPACING FASTENER ELEMENTS ON GARMENTS

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Fig. 2



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Fig. 3

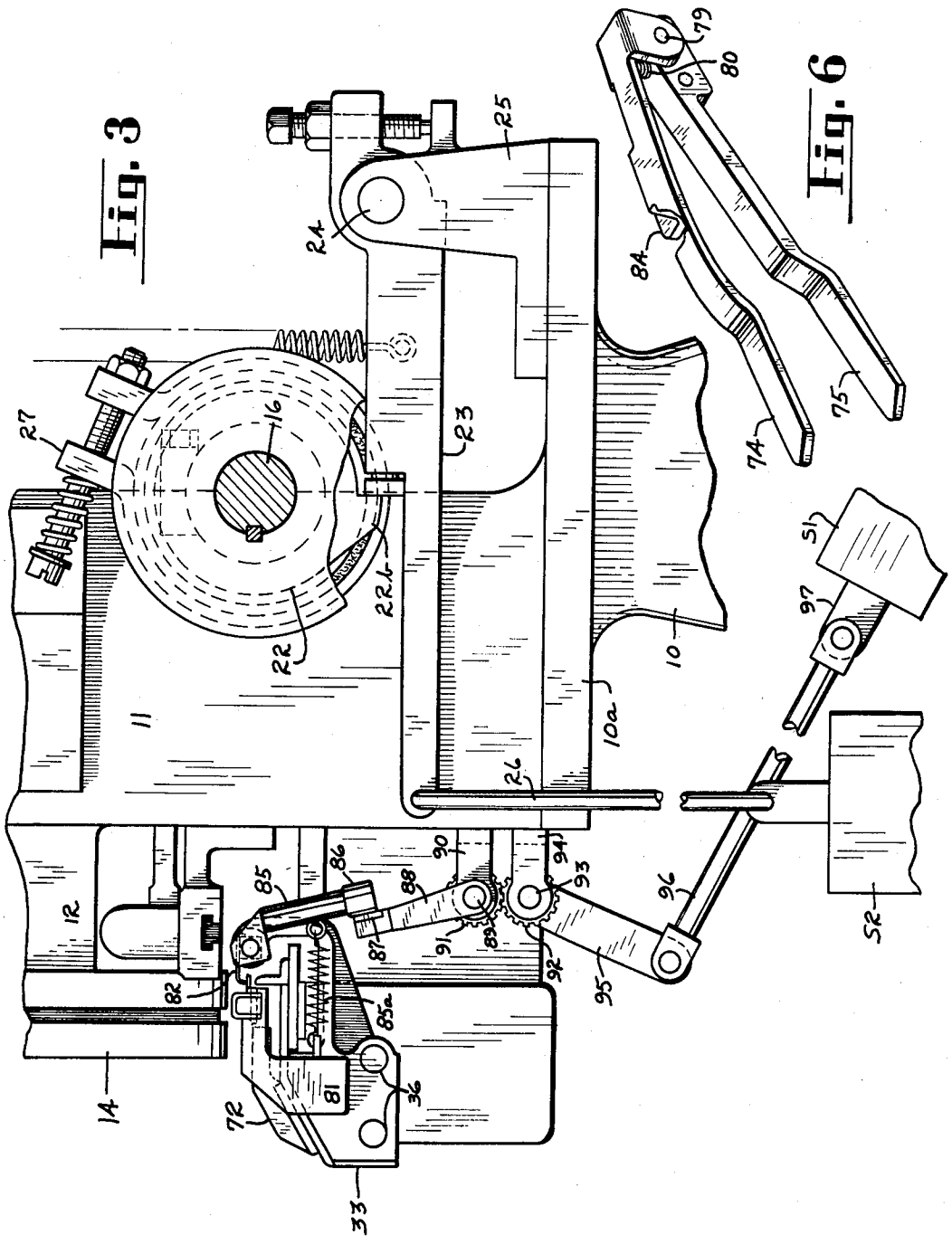


Fig. 6

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MACHINE FOR SETTING AND SPACING FASTENER ELEMENTS ON GARMENTS

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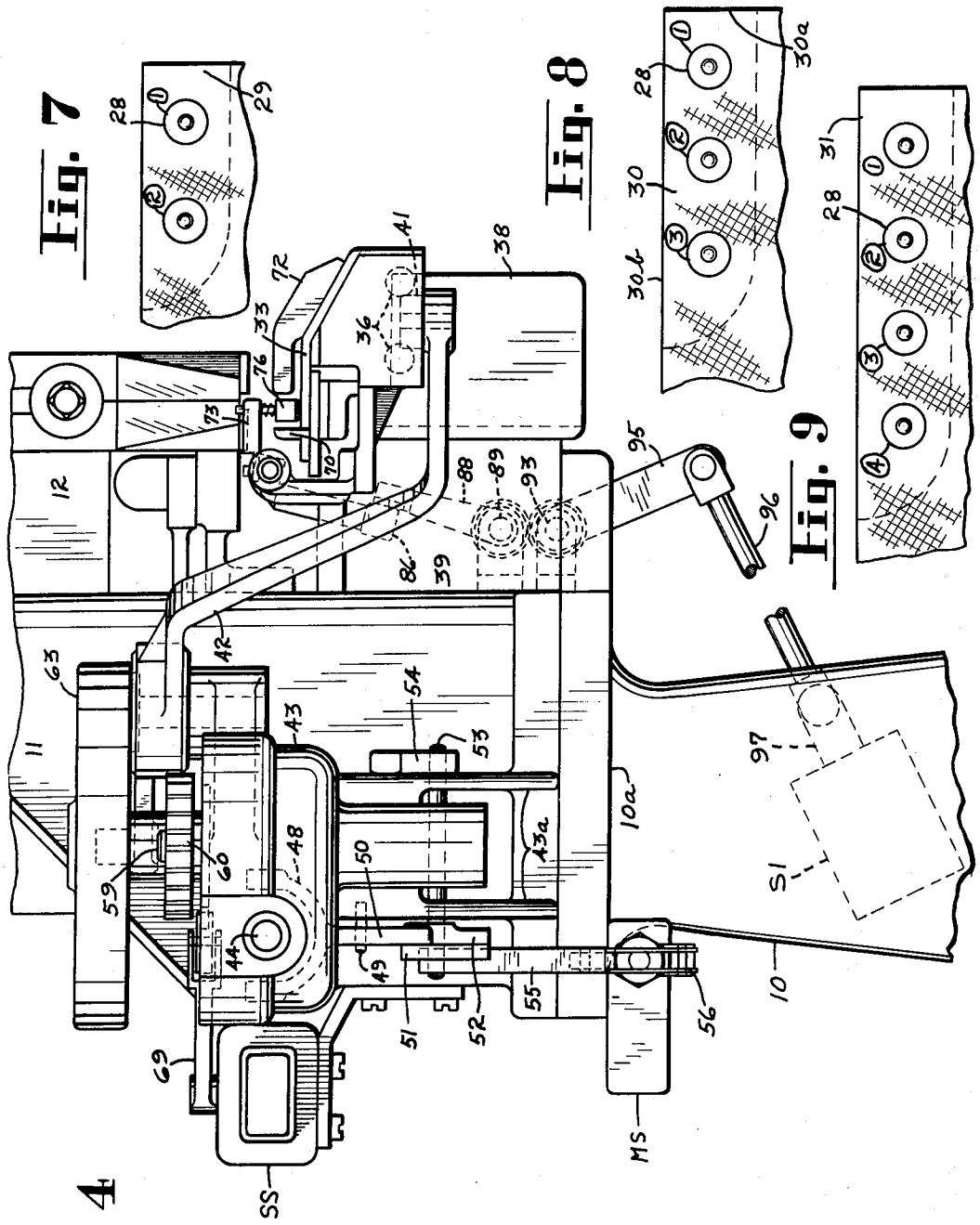


Fig. 4

Fig. 7

Fig. 8

Fig. 9

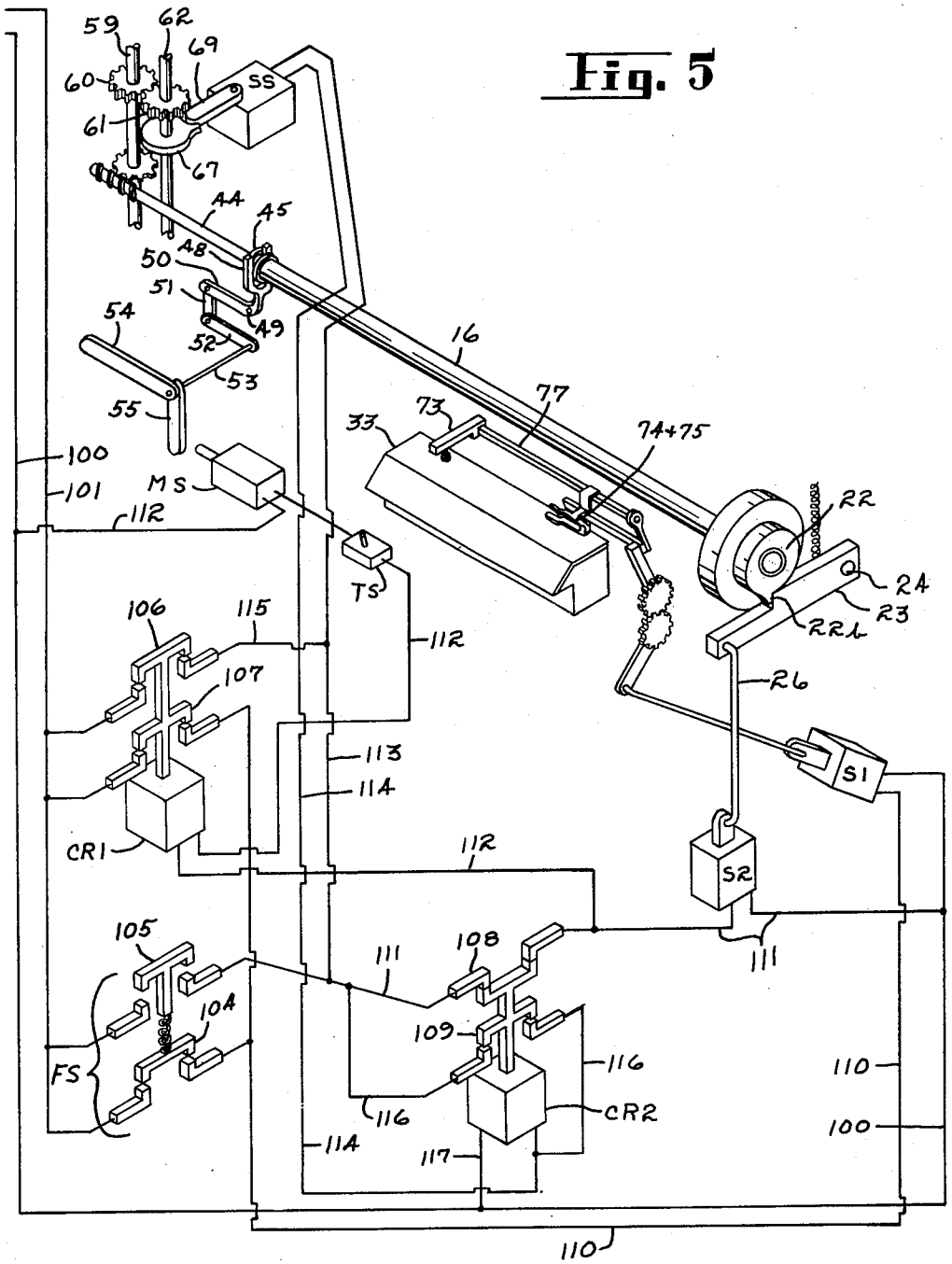
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Fig. 5



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2,734,653

MACHINE FOR SETTING AND SPACING FASTENER ELEMENTS ON GARMENTS

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Application February 21, 1951, Serial No. 212,136

4 Claims. (Cl. 218—6)

This invention relates to improvements in machines for setting fasteners and is especially intended for use in factories for attaching two, three and four snap fasteners to a garment such as men's shorts.

One of the objects of the invention is to provide a gauging unit to be attached to a fastener setting machine which can be quickly adapted to set either a single fastener and then stopped or to set either two, three or four fasteners in predetermined spaced relation and stopped at the end of each cycle.

In considering the most common instance where three fasteners are attached to the front of a garment in predetermined spaced relation, it has been found that there are objections to a work support table which starts at one end, travels toward the other end and then starts at that end and reverses the operation. This is because there is likely to be an accumulation of errors in spacing so that the socket and stud parts of the snap fasteners will not always register properly.

In our improved machine when attaching three fasteners the garment is placed on a support table or carriage and positioned relative to the setting station of the machine so that first the middle fastener is attached, then the table shifts to attach one of the end fasteners, then shifts across to the other end fastener and finally back to the middle position. This enables the operator to put the garment into the machine always in the same position and at the most convenient location and at the same time avoids accumulation of errors in spacing.

Our improved machine when started up, automatically carries through the entire operation of attaching two, three or four fastener parts and then stopping to allow the garment to be removed and replaced by a new one. The attaching and table shifting operations are initiated in our improved machine merely by pressing an electric foot switch.

Another object of the invention is to provide electrical means for clamping the garment in place on the table and for controlling the drive clutch, all initiated by the foot switch and stopped automatically upon completion of a full cycle.

Another object is to provide means for maintaining current to the garment holding solenoid and the clutch solenoid upon release of the foot switch, the circuit being broken only upon completion of the full cycle of operations.

The invention is an improvement upon the Huelster et al. application, Serial No. 738,124, filed March 29, 1947, now Patent 2,646,185.

Another object is to provide a gripping means that will hold the garment upon the table carriage of the gauging unit and permit one edge of the garment to be held by the gripping means so as to approach relatively close to the setting station without the gripping means interfering with the setting tools of the machine and to provide automatic operation of said gripping means.

The novel features of this invention will be best understood when taken together with the accompanying

drawings in which certain embodiments of the invention are disclosed and in which,

Fig. 1 is a front elevational view of the gauging unit showing portions of the standard fastener setting machine to which it may be applied and showing the gauging unit in position for setting the end fastener of the garment.

Fig. 2 is a plan view of the gauging machine with parts of the construction broken away and in section and with parts omitted for the sake of clarity.

Fig. 3 is a right end sectional view taken on line 3—3 of Fig. 2 showing the clutch arm in locked position when the machine is at rest.

Fig. 4 is a left end view of the mechanism.

Fig. 5 is a diagrammatic view of the electrically controlled units showing their relative connections with the necessary mechanical elements of the gauging unit.

Fig. 6 is a perspective view of the special alligator jaws for gripping the edge of a garment, and

Figs. 7, 8 and 9 are plan views of garment constructions showing a series of snap fastener elements attached to a portion of a garment in the order of two, three and four elements.

In the drawings the numeral **10** represents the support pedestal of a fastener attaching machine. Said pedestal is provided with a bed place **10***a* upon which is mounted a frame **11** having a head **12** within which is vertically operated a setting plunger **13** in line with the setting station of the machine. One of the elements of a fastener member may be fed through tracks **14** from a hopper (not shown) and forced into a set of jaws **15** in line with the plunger **13**. A main drive shaft **16** rotates in bearings **17** on the frame **11** and supports on one end a one-way drive pulley **18** with an intermediate clutch of conventional construction.

The pulley **18** rotates freely upon one end of shaft **16** and is provided with a hub **18***a* within which is secured a clutch ring **19** cooperating with a clutch driven member **20** keyed to shaft **16**. Between the ring **19** and driven member **20** is the usual wedging spaces within which operate clutch rollers **21** under the control of fingers **22***a* projecting from a clutch cage **22** rotatable on an enlarged portion **16***a* of shaft **16**. The drive pulley and associated clutch mechanism is of the same general type illustrated and described in the aforementioned Huelster et al. application. The clutch cage **22** is formed with a detent **22***b* that cooperates with a clutch arm **23** having one end pivoted at **24** on a bearing block **25** mounted on bed plate **10***a* (see Fig. 3). The opposite end of the arm **23** is connected by a rod **26** under the control of a solenoid S2 to be more fully explained later. A brake mechanism generally indicated by numeral **27** is associated with shaft **16** to prevent the shaft and attaching mechanism from over-riding due to the momentum of the operating parts upon the release of the clutch at the end of the machine cycle of operations.

The gauge operating table carriage

Figs. 7, 8 and 9 show portions of a garment such as one side of a fly front construction of a pair of shorts to which a series of snap fastener elements **28** may be attached, and showing 2, 3 and 4 elements attached to garment portions **29**, **30** and **31**, respectively. The present machine is set up to attach three fastener elements **28** on the garment portion **30** of the type as shown in Fig. 8. The garment portion **30** is supported upon a workpiece support table or platform carriage **33** mounted to move across the front of the machine in both directions for each cycle of the machine operations. The table carriage is provided with spaced brackets **34** and **35** in which are attached a pair of guide rods **36**, the latter slidably engaging in spaced bearings **37** formed as a part of a box-like

bracket 38 attached to a projection 39 extending forwardly from the machine frame 11. One end of the table 33 is formed with an elongated socket 40 within which operates a roller bearing 41 supported on one end of a lever 42 that operates the table 33 from a gear and cam drive now to be described.

Gear and cam arrangement

In operating the table 33 from the main drive shaft 16, a gear and cam housing 43 is secured to the left end of the frame 11, as viewed in Figs. 1 and 2, and supports a supplemental shaft 44 in suitable bearings therein in line with the main shaft 16. The suppelemental shaft 44 may be selectively keyed to the main shaft 16 by a clutch thimble 45 slidable on shaft 44 and having a key connection 46 with a cross slot 47 in the adjacent end of the main shaft 16. The thimble 45 is slidably operated on the shaft 44 by a yoke 48 pivoted on the housing 43 at 49 and having an extension arm 50 connected to a link 51 in turn connected to a lever 52 fixed to a shaft 53 journaled in a pair of ribs 43*a* formed as a part of the housing 43. A hand operated lever 54 is secured to the shaft 53 in front of the housing 43 so as to be easily accessible to the operator. Another lever 55 is also connected to shaft 53 and extends downwardly in line with a switch operating arm 56 for controlling a normally closed microswitch MS located under the bed plate 10*a*. The purpose of this switch will be described later.

In order to render the machine readily changeable to set a different number of fasteners in different sequences on garments, a double set of gear arrangements is provided in the gear housing 43. A worm 57 is keyed on the supplemental shaft 44 and drives a worm gear 58 keyed to a stub shaft 59 vertically journaled in the gear housing 43. A spur gear 60 is keyed to shaft 59 for driving a complemental spur gear 61 keyed to a cam shaft 62 also vertically journaled in gear housing 43. A box cam 63 is keyed to the shaft 62 and is formed with a cam groove 64 within which operates a roller 65 carried on the adjacent end of the table operating lever 42, the latter being pivoted on shaft 66 mounted on the gear housing 43. The opposite end of the lever 42 carries the roller 41 that engages the table 33 as previously described.

In order to stop the cycle of machine operations at the proper time, a switch-control cam 67 is mounted on cam shaft 62 below the spur gear 61 and is provided with a projection 68 that is adapted to contact a switch lever 69 on control or stop switch SS for every revolution of the cam 63. Operation of the lever 69 by the cam 67 closes the switch SS which controls the solenoid S2 through the two relays CR1 and CR2 to stop the cycle of machine operations as will be more fully explained later.

Garment holding fingers and guides

In order to hold the garment upon the support table 33 as it travels from one position to another, provision is made of a pair of holding fingers that hold the garment against the table top and travel with the table through its cycle of operations. Also guides or locating plates are provided that serve to set the garment in proper position on the table relative to the setting station to receive the first fastener setting. To this end a pair of guide plates 70 and 71 are adjustably secured to the top of the table carriage 33 which plates are arranged longitudinally with respect thereto and are capable of being adjusted laterally relative to said table top. It is against these plates 70 and 71 that the longitudinal edge of the garment is set in gauging the proper spacing of the fasteners inwardly with respect to the longitudinal garment edge. Another locating plate 72 is also attached to the table 33 positioned crosswise thereof and capable of being adjusted longitudinally relative to said table top. The plate 72 serves to properly set the end of the garment relative to the setting station of the machine.

The garment is clamped against the top of table 33 by a pressure finger 73 and a pair of alligator jaws 74 and 75, upper and lower, respectively. The finger 73 is provided with a cushion pad 76 so as to compensate for the various thicknesses of the garment material that may be supported upon the table carriage. The finger 73 is mounted upon a square rod 77 which is located in back of the table carriage 33 and has its ends journaled in a pair of spaced bearing brackets 78 attached to and travelling with the table carriage 33.

The alligator jaws 74 and 75, as best shown in Figs. 1, 2 and 6, have their free ends bent downwardly to lie close to the table top so as to grip opposite sides of the cloth as near to the setting station as possible when the table is moved to one end of its stroke. The jaws 74 and 75 are pivoted together by pin 79 and are normally held in open position by an interposed expansion spring 80. The jaws 74, 75 as a unit are pivoted on a bracket 81 projecting upwardly from the table carriage 33. In order to hold the jaws shut against the opening influence of the spring 80 a contact finger 82 is adjustably mounted on square rod 77 and has a lateral extension 83 that cooperates with a lug 84 projecting rearwardly from the upper jaw 74.

The operation of the finger 73 and jaws 74, 75 is under the control of the square rod 77. The right end of this rod 77 as viewed in Figs. 2 and 3 has an arm 85 secured thereto. The arm 85 supports a roller 86 on its free end that engages against a longitudinal bar 87 attached to the end of a pair of spaced arms 88 keyed to a shaft 89 pivoting in a bracket 90 attached to the front of the frame 11. The roller 86 is held in tension against the longitudinal bar 87 by a spring 85*a* anchored to the arm 85 and a stationary part of the machine. The shaft 89 is rotated by a pair of gears 91, 92, one of which is secured to said shaft 89 while the other is secured to a stub shaft 93 journaled in a bracket 94 secured to the front of the frame 11 immediately underneath bracket 90 (see Fig. 3). The shaft 93 in turn is operated by a lever 95 secured thereto and having its free end attached to a rod 96 that is operated by a plunger 97 in solenoid S1. It is to be noted that when the solenoid S1 is operated to draw the plunger 97 inwardly, the bar 87 will be swung rearwardly or to the right as viewed in Fig. 3 and rotating the square shaft 77 to operate the pressure finger 73 and alligator jaws 74 and 75 to hold the garment against the top of the table carriage 33. The garment will be continuously held during the entire cycle of operations by reason of the roller 86 on arm 85 being held by tension and in continuous engagement with the bar 87 during the travel period of said carriage.

Electrical control

The electrical control for operating the machine is best shown in Fig. 5. The main circuit lines are indicated by numerals 100 and 101. Line 100 leads directly to solenoid S1, and 101 leads directly to a double contact foot switch FS that may be placed on the floor adjacent the pedestal 10 of the machine. The foot switch FS, in the embodiment shown is a two stage switch which has two independent switches 104 and 105, the lower switch 104 being set to close ahead of the upper switch 105. The electrical circuit also includes two contact relays CR1 and CR2, both of which control two double make and break switches, CR1 having switches 106 and 107 that are both normally open and CR2 having switches 108 and 109, switch 108 being normally closed and switch 109 being normally open.

The circuit to solenoid S1 is completed by line 110 leading therefrom to line 101 through switch 107 of contact relay CR1 or through switch 104 of foot switch FS. The circuit is made through solenoid S2 by line 111 connected to main circuit 100 and passing through the normally closed switch 108 of contact relay CR2 and through switch 105 of foot switch FS to line 101. The circuit through contact relay CR1 is made by line 112 connected to line 111 and passing through a manually operated toggle switch TS and microswitch MS (previously described

in connection with the clutch control for supplemental shaft 44) to line 100. Contact relay CR2 is controlled by stop switch SS previously described in connection with the gear and cam arrangement. A line 113 ties in with line 111 and leads to stop switch SS. Another line 114 leads from stop switch SS to contact relay CR2 and from CR2 to main line 100 via line 117. A shunt line 115 connects into line 113 and through switch 106 of CR1 to main line 101.

Operation of machine

In the operation of the machine and table shifting mechanism for properly gauging the position of the garment to a setting station of the machine and in setting fasteners on said garment, a garment will first be placed upon the table carriage 33 and arranged in proper location for the first fastener setting operation by lining up the garment edges with locating plates 70, 71 and 72. Specifically in this application the upper edge 30*a* of the garment 30 will be abutted against the plate 72 and the longitudinal edge 30*b* of the garment will be abutted against the plates 70 and 71.

In starting the machine the toggle switch TS will first be thrown to closed position to tie the outside current from main line 100 through line 112 and normally closed microswitch MS, relay CR1, normally closed switch 108 and line 111 to normally open switch 105. This will allow the circuit to be completed to relay CR1 when switch 105 is closed. The operator will then start the cycle of machine operations by first stepping on the foot switch FS and pressing it to its first contact stage whereby current will pass through switch 104 from main line 101 to line 110 and solenoid S1 that functions to press the pusher finger 73 and alligator jaws 74 and 75 against the table top to hold the garment in position.

Pressing the foot switch FS farther to a second stage even momentarily will pass current from line 101 through switch 105 into line 111 through the normally closed switch 108 of CR2 and through solenoid S2 to line 100. Actuation of solenoid S2 will trip lever 23 to release clutch 22 and start the cycle of operations. Closing the second stage switch 105 of the foot switch FS will also energize contact relay CR1 through line 112, and switches TS and MS leading to main line 100. This will close both switches 106 and 107, switch 107 serving to keep the circuit closed to the solenoid S1 through line 110 to hold the finger 73 down and keep the jaws 74 and 75 clamped together. Switch 106 keeps line 113, connected to main circuit 101 through line 115, supplying current to solenoid S2 through line 111, switch 108, and to main circuit 100 to continue the cycle of operations in spite of the fact that the foot switch FS may be disengaged by the operator, this being effected because contact relay CR1 is kept energized by current from this circuit branching from switch 108 through line 112.

The cycle of operations will continue until the switch control cam 67 on shaft 62 contacts switch arm 69 and momentarily closes stop switch SS that, through closed switch 106, lines 115, 113, 114 and 117, will energize contact relay CR2. This will close switch 109 and open switch 108 of contact relay CR2. Opening the latter switch 108 deenergizes solenoid S2 to return the clutch lever 23 and stop the clutch 22 that controls the main power shaft 16 and also denergizes contact relay CR1 to open switches 106 and 107. Opening switch 107 will, of course, deenergize solenoid S1 and release the garment gripping finger and alligator jaws. Opening of the switch 106 assures that solenoid S2 and relay CR1 will not be energized when switch 105 is released to deenergize CR2 and thereby allow switch 108 to close again. If perchance the operator should fail to release the foot control switch FS until after the cycle of operations is complete, the cycle would not repeat because of the fact that CR2 remains energized while FS is held down by power from line 101 through switch 105, line 111, and supplemental line 116 through switch 109, relay CR2, line 117, back to main line 100, thereby maintaining switch 108 open, which prevents solenoid S2 being energized. Furthermore, with the switch FS held continuously closed the garment would not be released by reason of closed switch 104 keeping circuit closed to solenoid S1 through line 110.

When it is desired to operate the machine to set single fasteners, the cycling of the table carriage 33 may be stopped by the operator pressing the handle 54 downwardly which will operate clutch 45 to disconnect the supplemental shaft 44 from main shaft 16. In the operation of the handle 54 the lever 55 will open the microswitch MS and thus render the circuit relay CR1 inoperative whereupon the operation of the machine will be controlled by the foot switch FS at all times.

In making repairs or adjusting a machine for the desired operations it is sometimes desirable to have the table carriage cycle through only a portion of its movement. This can be accomplished by raising the handle 54 and having the clutch 45 engaged. This will, of course, close microswitch MS. Therefore, in order to render circuit relay CR1 inoperative, the toggle switch TS should be opened which will place the movement of the table carriage 33 in full control of the foot switch FS.

It will now be evident that the thing which controls the cycle of the machine is the operation of stop switch SS. If it is desired to have the machine attach two fasteners as in the case of Fig. 7, the main shaft 16 will need to make two complete revolutions to operate the attaching head twice while the cam shaft 62 is making one revolution. Accordingly, the proper set of spur gears 60 and 61 will be assembled in the gear box 43 which will accomplish that purpose and also a complementary cam to shift the table the desired distance for setting two fasteners. In determining the position of the fasteners on a garment construction of the above character it is customary to designate the fastener adjacent the upper garment edge as the No. 1 setting, the next one down as the No. 2 setting, and so on down the garment. In the case of only two fastener settings preference is given to setting up the machine to set the fasteners in the order of 2–1 and then back to 2 and the garment removed from the machine.

Now, when it is desired to set three fasteners, as in Fig. 8, the best results come from setting the fasteners in the order of 2–3–1 and back to 2 when the garment will be removed and accordingly the set of spur gears 60 and 61 will be selected which will allow the main shaft 16 to turn three complete revolutions while shaft 62 is making one revolution, and a suitable cam will be provided such as to perform the desired shifting of the table.

In setting four fasteners, as in Fig. 9, the best sequence is to set the fasteners in the order of 2–4–3–1 and returning back to 2. Accordingly, a set of gears and a cam will be selected which will allow the main shaft 16 to turn four times while shaft 62 turns once and the cam will be designated to shift the table to the desired four station positions at the right time.

While we have herein described and upon the drawing shown an illustrative embodiment of the invention, it is to be understood that the invention is not limited thereto but may comprehend other constructions and arrangements without departing from the spirit of the invention and details of parts.

We claim:

1. In a machine of the class described, a mechanism for automatically shifting a workpiece with respect to a fastener attaching station of the machine, said mechanism comprising a main drive shaft, a clutch drive for said shaft, a solenoid control for said clutch drive, a workpiece support table, table actuating means for shifting said table to a predetermined stop position for each revolution of said main shaft, an electric stop switch

actuated by said table actuating means upon a predetermined number of rotations of said shaft, a pair of electric relays designated first and second, said second relay arranged in circuit with said stop switch, a foot operated switch controlling said clutch solenoid through the normally closed switch of said second relay when deenergized, and said foot switch when initially closed completing a circuit through said first relay, said first relay maintaining a closed circuit to said clutch solenoid after release of said foot switch, and the closing of said stop switch energizing said second relay to break the circuit to said clutch solenoid after a predetermined number of shaft revolutions.

2. In a machine of the class described, a mechanism for automatically shifting a workpiece with respect to a fastener attaching station of the machine, said mechanism comprising a main drive shaft, a clutch drive for said shaft, a solenoid control for said clutch drive, a workpiece support table, table actuating means for shifting said table to a predetermined stop position for each revolution of said main shaft, means for holding a workpiece in alined position on said table, a solenoid control for said holding means, an electric stop switch actuated by said table actuating means upon a predetermined number of rotations of said shaft, a pair of electric relays designated first and second, said second relay arranged in circuit with said stop switch, a two-stage foot switch wherein closing of the first contact will energize said holding means solenoid and closing of the second contact will energize said clutch solenoid through said second relay when said second relay is deenergized and also actuate said first relay, said first relay maintaining a closed circuit to said solenoids regardless of the release of said foot switch, and the actuation of said stop switch enerizing said second relay to break the circuit to said clutch solenoid after a predetermined number of shaft revolutions.

3. In a machine of the class described, a mechanism for automatically shifting a workpiece with respect to a fastener attaching station of the machine, said mechanism comprising a main drive shaft, a clutch drive for said shaft, a solenoid control for said clutch drive, a workpiece support table, table actuating means for shifting said table to a predetermined stop position for each revolution of said main shaft, means for holding a workpiece in alined position on said table, a solenoid control for said holding means, an electric stop switch actuated by said table actuating means upon a predetermined number of rotations of said shaft, a pair of electric relays designated first and second, said first relay having a pair of contact switches being normally open when said relay is deenergized, said second relay arranged in circuit with said stop switch and having a single contact switch normally in closed position when said relay is deenergized, a two-stage foot switch wherein closing of the first contact will energize said holding means solenoid and closing of the second contact will energize said clutch solenoid through the normally closed contact of said second relay and also energizing said first relay to close the double contacts to maintain its circuits closed to both solenoids when the foot switch is released, and the actuating of said stop switch energizing said second relay to open the circuit to said clutch control solenoid and also to said first relay to open the circuits to said solenoids that are established independently of said foot switch.

4. In a machine of the class described, a mechanism for automatically shifting a workpiece with respect to a fastener attaching station of the machine, said mechanism comprising a main drive shaft, a clutch drive for said shaft, a solenoid control for said clutch drive, a workpiece support table, table actuating means for shifting said table to a predetermined stop position for each revolution of said main shaft, means for holding a workpiece in alined position on said table, a solenoid control for said holding means, an electric stop switch actuated by said table actuating means upon a predetermined number of revolutions of said shaft, a pair of double contact electric relays designated first and second, said first relay contact being normally open when the relay is deenergized, said second relay arranged in circuit with said stop switch and having one contact open and one closed when the relay is deenergized, a two-stage foot switch wherein closing of the first contact will energize said holding means solenoid and closing of the second contact will energize said clutch solenoid through the closed contact of said second relay and also energize said first relay to close its double contacts to maintain the circuits closed to both solenoids when the foot switch is released, and the actuating of said stop switch energizing said second relay to open the circuit to said clutch control solenoid and also to said first relay to open the circuits to said solenoids that are established independently of said foot switch, and the closed switch of said second relay maintaining a circuit to said second relay through said foot switch until the latter is released.

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