July 16, 1946. J. J. OUSSANI 2,403,947

ELECTRIC FASTENER DRIVING MACHINE

Filed May 19, 1944 2 Sheets-Sheet 1

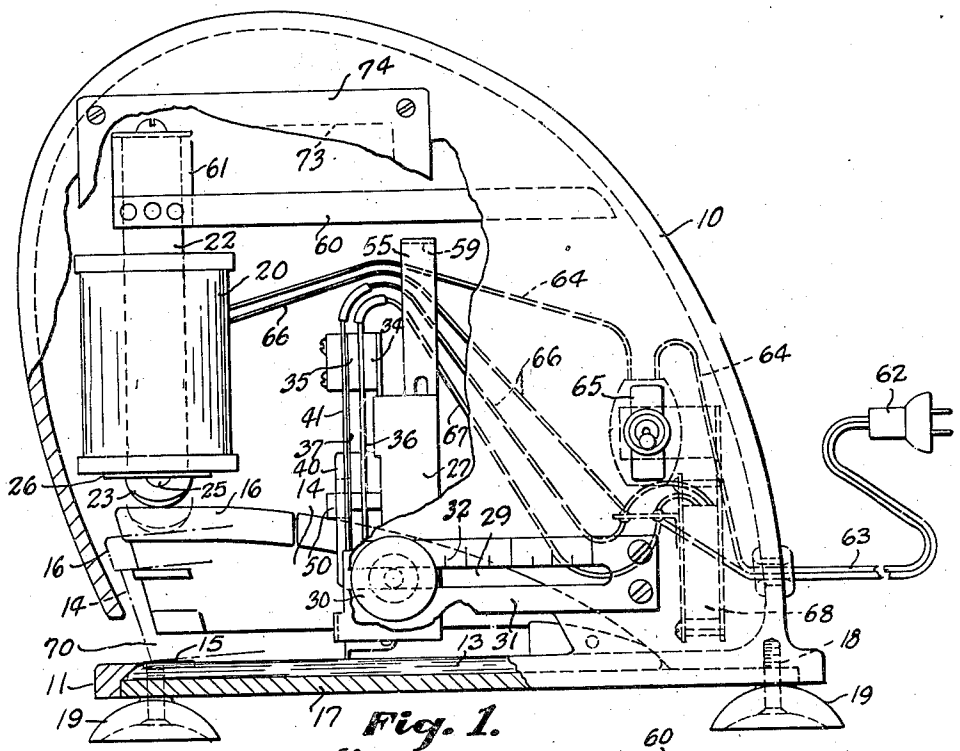


Fig. 1.

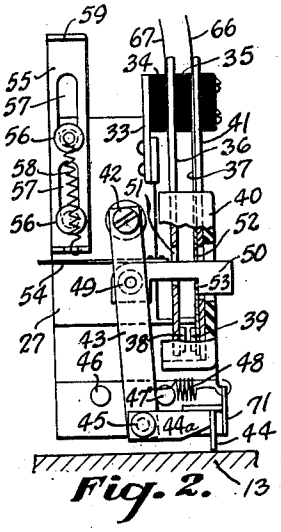


Fig. 2.

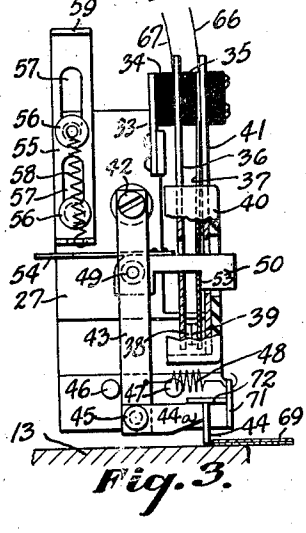


Fig. 3.

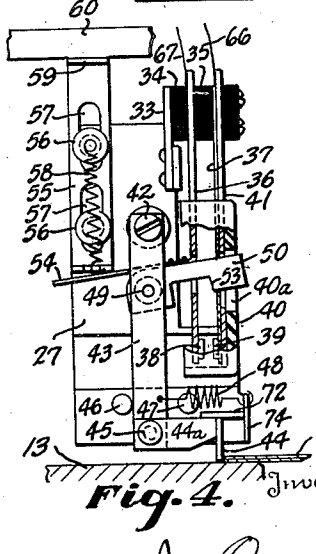


Fig. 4.

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ELECTRIC FASTENER DRIVING MACHINE

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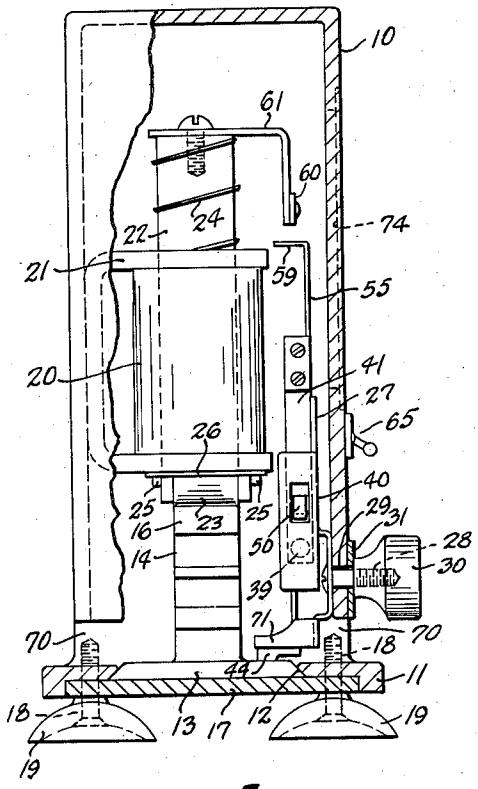


Fig. 5.

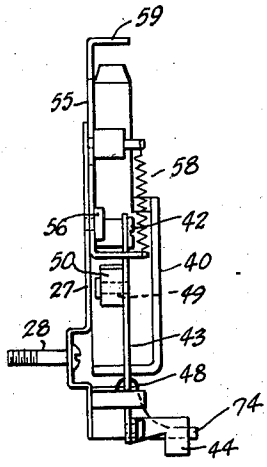


Fig. 6.

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ELECTRIC FASTENER DRIVING MACHINE

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Application May 19, 1944, Serial No. 536,296

8 Claims. (Cl. 1—3)

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This invention relates to fastener driving machines, and more particularly to a machine of this type which may be operated by an electric power device controlled by the articles into which the fastener is to be driven, and has for an object to provide an improved simplified construction of an electrically operated stapling or fastener driving machine which is automatically set into operation by insertion of the articles to be stapled into the stapling position.

It is also an object of the invention to provide an improved and simplified control mechanism for the electrical operating device.

With the foregoing and other objects in view I have devised the construction illustrated in the accompanying drawings forming a part of this specification. It is, however, to be understood the invention is not limited to the specific construction and arrangement shown but may embody various changes and modifications within the scope of the invention.

In these drawings:

Fig. 1 is a side elevation of the machine with parts of the housing broken away to more clearly show the construction;

Fig. 2 is a side elevation of the control mechanism with parts broken away and shown in section to more clearly illustrate the construction, the parts being in the normal position preparatory to driving a fastener;

Fig. 3 is a similar view showing the control mechanism shifted by the article into which the fastener is to be driven to set the electrical device into operation;

Fig. 4 is a similar view showing release of the control to prevent repetition of the fastener driving operation until the work has been removed from the driving position;

Fig. 5 is a partial front elevation and partial section showing the driving mechanism in elevation, and

Fig. 6 is a rear elevation of the control mechanism.

The machine comprises a housing 10 including a base portion 11 provided with an elongated opening having inclined side edges 12 in which is mounted the base 13 of any suitable type of fastener driving machine, such as a stapling machine the upper housing of which is shown at 14. This machine may be of any suitable type, that shown being the type of machine shown in Polzer Patent No. 2,240,911, May 6, 1941, and is of the type in which the housing 14 is pivoted adjacent its rear end portion on the base 13 and has a vertically reciprocating driver or plunger,

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not shown, cooperating with an anvil 15 on the base 13 for driving and setting substantially U-shaped staples, the plunger being operated by a lever 16 mounted at the upper part of the housing. The stapling or fastener driving position is shown in the broken lines of Fig. 1. The side edges of the base 13 are inclined to fit the walls 12 and the base is held in this opening by a suitable clamp plate 17 seated in a recess in the under side of the base 11 and held therein by any suitable means such as the screws 18. This effectively holds the stapling or fastener driving machine in proper position in the housing, but permits its ready removal for inspection or repair by merely removing the plate 17. The screws 18 may also be used to fasten resilient or cushion feet to the underside of the housing, such as the rubber cups 19.

The electrical device for operating the fastener driving machine comprises a solenoid 20 mounted within the housing by any suitable means such for example as the bracket 21 secured to the side of the housing. This solenoid is mounted over the fastener driving machine 14 and operates an armature plunger 22 carrying a roller 23 adapted to engage the top of the operating lever 16 on the staple driving machine. This plunger is normally held in its uppermost position by a spring 24, and its upward movement is limited by stop means 25 acting against a rubber or similar cushion washer 26 embracing the plunger at the lower end of the solenoid. It will be understood that as the plunger is forced downwardly by energization of the solenoid the roller 23 depresses the lever 16 and the housing 14, as indicated in the broken line position of Fig. 1, to drive a staple or other fastener into work such as superposed sheets of paper which may have been inserted between the housing and the anvil 15. The fastener driving machine shown is of the type driving a substantially U-shaped wire or similar staple with prongs driven through the work and clinched by the anvil.

The control mechanism for the solenoid comprises a carrier 27 mounted in the side wall of the housing in a manner to be adjusted backwardly and forwardly as desired. In the present instance the carrier is mounted on a screw 28 passing through an elongated slot 29 in the side of the housing with a clamping knob 30 on the screw to clamp the carrier in any desired adjusted position. It is also preferred to mount on the outer side of the housing a gauge plate 31 provided with a scale 32 to indicate the position of the carrier and more particularly the distance of

a control abutment carried thereby from the staple driving point for a purpose presently to be described. It will be evident that by loosening the knob 30 the carrier may be adjusted to any position along the slot 29 in the side of the housing and then clamped or secured in any adjusted position.

The automatic control mechanism for the solenoid is carried by the carrier 27. This carrier may be a sheet of metal or similar material. Mounted in a suitable support 33 on this carrier in suitable insulating blocks 34 and 35 is a pair of conducting strips 36 and 37. With this mounting the strips are insulated from the carrier 27 and from each other. The strip 36 is a fairly rigid strip carrying an electrical contact 38 while the strip 37 is a flexible resilient spring strip carrying a contact 39 opposite the contact 38 and normally held in spaced relation thereto by resilient action of the spring strip 37, as shown in Figs. 2 and 4. These contacts are partially enclosed in a housing 40 of insulating material carried by a supporting strip 41 at the front of the conductor strip 37. This also acts as a limit stop to limit forward movement of the strip 37.

Pivoted on the carrier 27 at 42 is a depending lever or arm 43 carrying at its lower end a movable abutment 44 normally resting on top of the base 13 of the fastener driving machine and this abutment is on the forward end of an arm 44a pivotally supported on the lever 43 at 45. This lever may swing between the two limit stops 46 and 47 and is normally held in forward position against the forward stop 47 by a light spring 48. Pivotally mounted on this lever 43 at 49 is a pawl 50 of insulating material, this pawl extending through openings 51 and 52 in the conductor strips 36 and 37 respectively, and also through a guide opening 40a in the housing 40. This pawl is recessed on its under side to form a shoulder 53 normally engaging the forward side of spring strip 37, as indicated in Figs. 2 and 3. Mounted on and extending rearwardly from the pawl 50 is a yieldable spring strip 54. This strip is rigid enough to operate pawl 50 and extends to a position under a vertically movable slide 55 mounted on the carrier 27. This slide is secured by the guide rivets 56 passing through elongated slots 57 in the slide, permitting the slide to have limited up and down movement. The slide is normally held in its upper position by a spring 58. At its upper end this slide has a laterally extending portion 59 lying under a horizontally extending bar 60 carried by the solenoid plunger 22, it being secured thereto by any suitable means such as the bracket 61. As the solenoid plunger 22 is forced downwardly under action of the solenoid this bar 60 is carried downwardly with it and engages the lateral extension 59 of the slide 55 to depress this slide for a purpose presently to be described. The bar 60 is of such a length and is so located as to engage the extension 59 and depress the slide under such action of the solenoid plunger in all positions of the carrier 27.

Electrical power for operating the solenoid may be supplied from any suitable outlet from the house wiring system, such for example as an attachment plug cap 62 adapted to be plugged into any standard outlet with leads 63 extending to this machine. One lead 64 is connected to any suitable snap switch 65 mounted on the side of the housing 10 and to one end of the solenoid 20. The other end of the solenoid is connected

by lead 66 to the conductor strip 37, and another lead 67 leads from the conductor strip 36 back to the other lead in the cable 63. A condenser 68 is preferably connected across the conductors 36 and 37 to prevent arcing at the contacts 38 and 39 when the circuit is broken.

The operation is as follows:

Assuming that superposed sheets of paper 69 are to be stapled, the carrier 27 is adjusted along the slot 29 to a desired position depending on the distance it is desired that the staple be driven from the edge of these sheets, and the carrier is secured in this position. The operator will then insert the sheets 69 in the slots 70 in the sides of the housing 10 and between the stapling machine housing 14 and the base 13 over the anvil 15 until their edges engage the movable abutment 44, as indicated in Fig. 3. The pawl 50, as will be seen from this figure, is in its lowest position, resting on the bottom edge of the opening 52 in the spring strip 37 and with its shoulder 53 at the forward side of the strip. The papers 69 are moved backwardly and by engagement with the abutment 44 shift the lever arm 43 backwardly from the position of Fig. 2 to the position of Fig. 3 against the top 46. This movement of the lever 43 carries with it the pawl 50 which therefore shifts the spring strip 37 backwardly and with it the contact 39 carrying it into engagement with the contact 38. This closes the circuit through the solenoid which forces downwardly the plunger 22 which in turn acting through the roller 23 depresses the housing 14 and operating lever 16 of the fastener driving machine and operates it in the usual manner to drive a staple through the work and clinch it. As the plunger 22 moves downwardly it carries with it the bar 60 which engages the extension 59 on slide 55 and shifts this slide downwardly against the extension 54 on the pawl 50. This raises the forward end of the pawl releasing the spring strip 37, as shown in Fig. 4, permitting this spring strip to immediately spring forwardly carrying the contact 39 away from the contact 38 and opening the circuit through the solenoid. This therefore prevents a repeat operation of the solenoid and prevents the driving of a second fastener, and requires that before another fastener can be driven the work 69 be removed from the abutment 44 to permit the lever 43 to be swung forwardly under action of the spring 48 to again permit the pawl 50 to engage over the front side of the strip 37 preparatory to the next driving operation, as shown in Fig. 2. Immediately the circuit is broken the plunger 22 is shifted upwardly under action of the spring 24 carrying with it the bar 16 and releasing the slide 55 which is also shifted upwardly under the action of the spring 58 to release the pawl 50 and permit it to assume its normal position, in order to again energize the solenoid to set another fastener. This action must be permitted and then the abutment 44 and the lever 43 again shifted backwardly under action of the work to be fastened in order to energize the device to again function to drive another fastener.

The carrier 27 is preferably provided with a guard 71 forwardly and above the abutment 44, and there also may be a guide 72 above the abutment. Access may be secured to mechanism within the housing through an opening 73 in the side wall of the housing covered by a suitable cover plate 74 recessed into the outer surface of the housing.

It will be understood from the above that any suitable type of fastener driving machine or stapling machine may be operated by the electrical device and the fastener or staple may be driven at any desired position from the edge of the work, of course within the limits of the machine, depending on the position to which the carrier 27 and the abutment 44 are adjusted. It will also be understood that the electrical apparatus is prevented from a repeat operation by a single set of contacts so that a second fastener will not be driven until the work has been removed and again inserted to a new desired position for receiving another fastener, and that this control operates immediately to break the circuit and prevent a repeat operation as soon as the first operation has been completed. It will also be seen that the device is of very simple construction, involving a minimum number of parts and therefore will be reliable and effective in operation with minimum liability of failure or getting out of order.

Having thus set forth the nature of my invention, I claim:

1. An electrically operated fastener driving machine comprising a housing, a fastener driving device mounted in the housing including fastener driving means and a movable member for operating it, electrical means for operating said device comprising a solenoid mounted over the device provided with an armature plunger engaging said member, a carrier, one side wall of the housing being provided with an elongated slot, means for mounting the carrier including means extending through the slot permitting adjustment of the carrier to different positions along the slot and a hand grip on said latter means for clamping the carrier in adjusted positions, a control switch for the electrical device mounted on the carrier, a movable abutment mounted on the carrier adapted to be shifted by the articles to be operated upon as they are inserted to fastening position, means operated by shifting of the abutment to close the switch to operate said electrical means, and means operated by the electrical means to cause opening of the circuit to prevent continued operation.

2. An electrically operated fastener driving machine comprising a housing including a base provided with an elongated opening, a fastener driving device including a base seated in said opening, means for securing said latter base, a movable abutment adapted to be shifted by the articles to be operated upon as they are inserted to fastening position, an electrical means for operating said device, a pair of normally separated contacts connected with said electrical means and a source of current, a support for said abutment, a catch carried by said support and adapted to engage one of said contacts on movement of the support by the abutment to shift said contact to engage the other contact to close the circuit to the electrical means, means operated by operation of the electrical means to release the catch, and means to shift the contact to open the circuit on release of said catch.

3. An electrically operated fastener driving machine comprising a housing including a base provided with an elongated opening having its edge surfaces inclined downwardly and outwardly, a fastener driving device including a base having similarly inclined surfaces at its outer upper edges seated against the first surfaces, means for retaining the latter base in this position, an electrical means in the housing for operating said

device, a movable abutment mounted in position to be shifted by the articles to be operated upon as they are inserted to fastening position, a control switch for said electrical device, means operated by movement of the abutment to close said switch to operate the device, and means operated by the electrical means to cause opening of the switch to prevent repeat operation of the device without return of the abutment to its original position.

4. An electrically operated fastener driving machine comprising a housing including a base, a fastener driving device mounted on the base including a vertically movable operating member, a solenoid mounted in the housing over said device, a vertically movable plunger operated by the solenoid including means to directly engage the operating member to shift it downwardly to drive a fastener, a movable abutment in the lower part of the housing adapted to be shifted by the articles to be operated upon as they are inserted to fastening position, a control switch for the solenoid, means operated by shifting of the abutment to close said switch to operate said plunger, and means operated by the plunger to cause opening of the switch to prevent repeat operation of the solenoid before the abutment returns to its original position.

5. An electrically operated fastener driving machine comprising a housing, a fastener driving device in the lower part of the housing including a depressible operating member, a solenoid mounted in the housing above said member, a vertically movable plunger operated by the solenoid, means operated by the plunger engaging said operating member, a longitudinally adjustable carriage, a movable abutment mounted on the carriage adapted to be shifted by the articles to be operated upon as they are inserted to fastening position, a pair of normally separated contacts on the carrier connected with said solenoid and a source of current, a catch on the carrier operated by movement of said abutment to shift one of the contacts to engage the other to close the circuit, a vertically movable slide mounted on the carriage adapted to release said catch, a longitudinal bar carried by the plunger over said slide and of a length so that it is adapted to shift said slide in all positions of the carrier to release the catch on operation of the plunger, and means for shifting the contact to open the circuit on release of said catch.

6. An electrically operated fastener driving machine comprising a housing, a fastener driving device mounted in the housing including a depressible operating member, a solenoid mounted over the device, a plunger operated by the solenoid including means to engage said operating member, a carrier, means mounting the carrier for horizontal adjustment in the housing, a movable abutment mounted on the carrier adapted to be shifted by the members to be operated upon as they are inserted in fastening position, a pair of normally separated contacts mounted on the carrier and connected with the solenoid to control its operation, a catch mounted on the carrier and adapted for shifting one of said contacts to engage the other to close the circuit to the solenoid, means connecting the abutment with the catch to shift the contact, a vertically movable release member mounted on the carrier adapted to release the catch, and a bar connected with the plunger and of a length to engage the release member in all positions of the carrier to release

the catch on operation of the plunger to permit the contact to move to open the circuit.

7. An electrically operated fastener driving machine comprising a housing, a fastener driving device in the housing, means for operating the device including an upright solenoid, a plunger operated thereby, a carrier mounted for horizontal adjustment in the housing, a pair of upright flat conductors mounted on the carrier including contacts, and one of said conductors being movable and including resilient means normally retaining the contacts in spaced relation, means electrically connecting said conductors with the solenoid, an upright lever pivoted to the carrier, a movable abutment carried by said lever in position to be shifted by the work articles as they are inserted in fastening position, a catch pivoted to said lever resting on a horizontal edge carried by the movable conductor and provided with a shoulder adapted to engage one side of the movable conductor to shift its contact to engagement with the other to close the circuit to the solenoid, a vertically movable member mounted on the carrier adapted to release said catch, and a horizontal bar connected with the plunger and of a length to engage said movable member in all positions of the carrier on operation of the plunger to release the

catch and permit the contacts to separate and open the circuit.

8. An electrically operated fastener driving machine comprising a housing, a fastener driving device mounted in the housing, an upright solenoid, a plunger operated by the solenoid to operate said device, a carrier mounted for horizontal adjustment in the housing, a pair of flat upright conductors carrying contacts, one of said conductors being resilient to normally maintain the contacts separated, said conductors being provided with aligned openings, a lever pivotally mounted on the carrier, a catch carried by said lever and passing through said openings, said catch having a shoulder to engage the resilient conductor to shift it, a movable abutment carried by the lever and adapted to be shifted by the work pieces when they are inserted to fastening position to shift the catch and the movable contact to engage the other contact to close the circuit to the solenoid, a vertically movable member mounted on the carrier adapted when depressed to release the catch to permit the contacts to separate, and a horizontal bar connected with the plunger and of a length to engage said vertically movable member in all positions of the carrier to depress said member on operation of the plunger.

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