May 26, 1931. R. E. PETERSON 1,807,170

STAPLING MACHINE

Filed Oct. 28, 1929 2 Sheets-Sheet 1

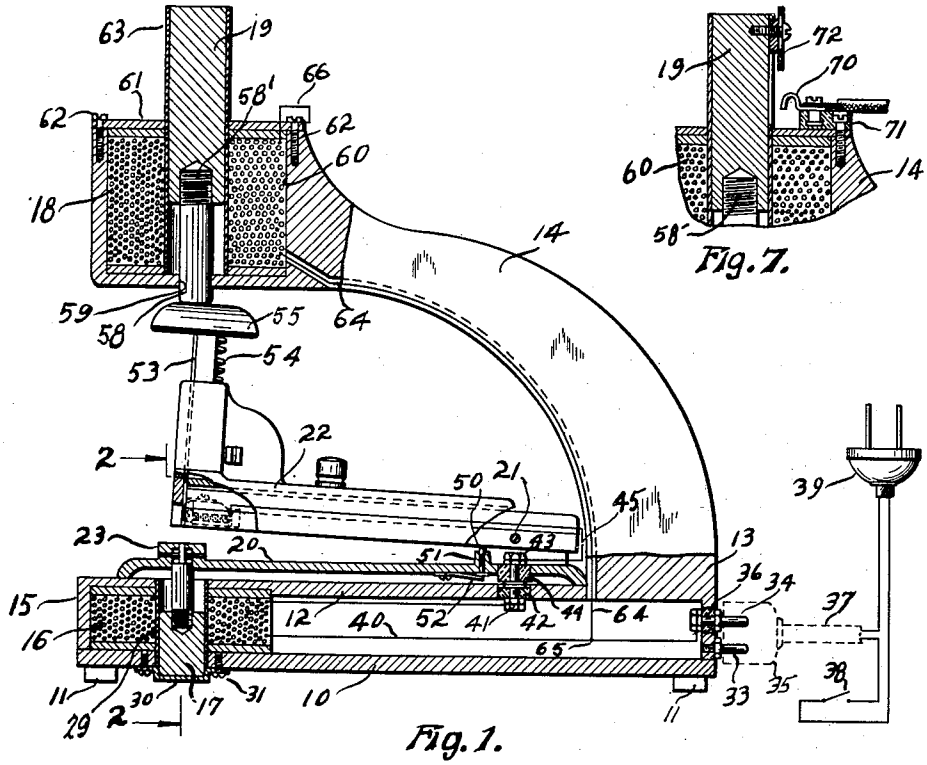

Fig. 1.

Fig. 7.

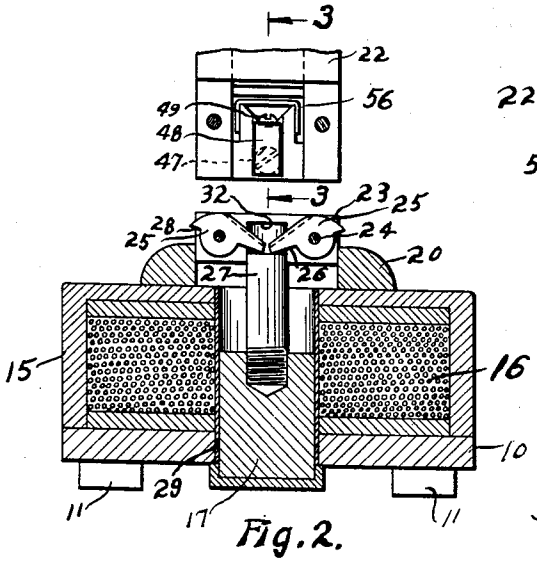

Fig. 2.

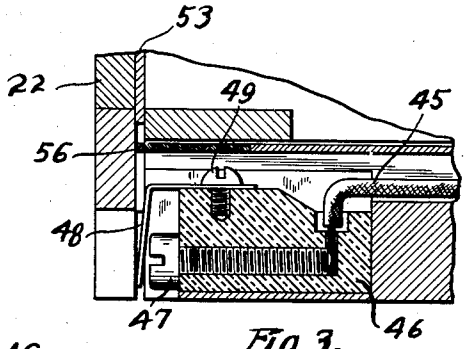

Fig. 3.

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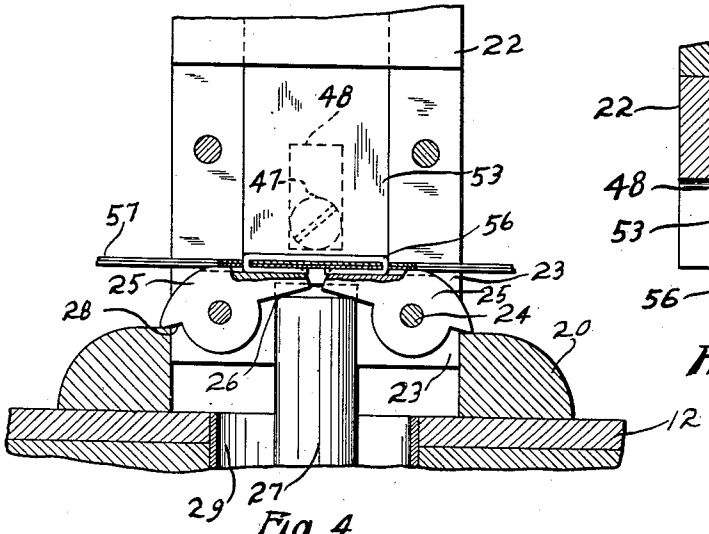

Fig. 4.

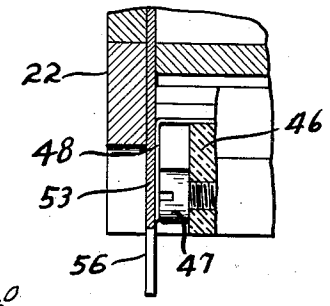

Fig. 5.

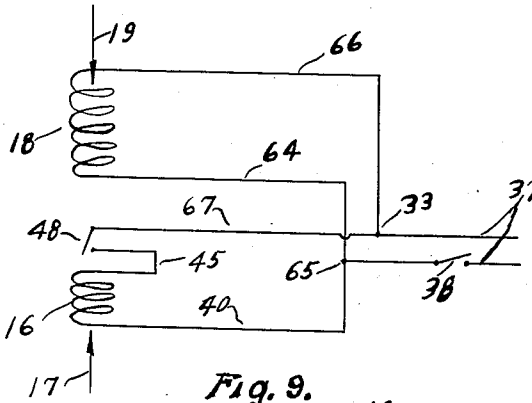

Fig. 9.

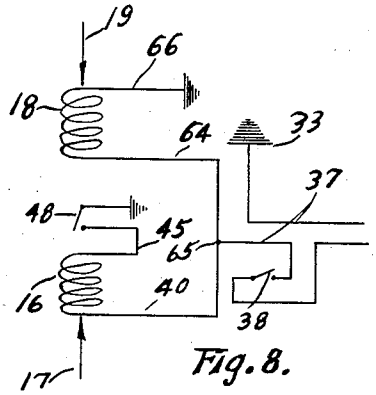

Fig. 8.

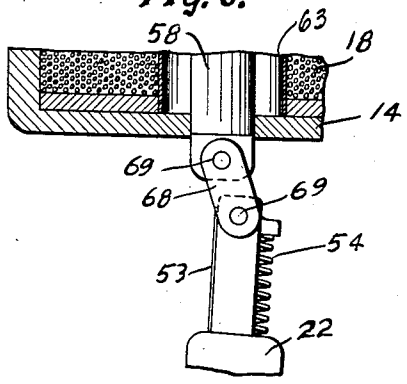

Fig. 6.

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1,807,170

UNITED STATES PATENT OFFICE

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STAPLING MACHINE

Application filed October 28, 1929. Serial No. 402,817.

This invention relates to an operating device for stapling machines, tag affixing machines, seals and other similar devices, and has for an object to provide an electrically operated device, operable by the mere closing of a circuit therethrough, which will be of simple and easily manipulated construction, which may be used on a desk or table in an office, or secured to a bench in a factory; and which may be used as a separate operating means for operating small machines used in the office or factory particularly of the type of stapling machines, tag affixing machines, numbering machines, eyelet or riveting machines, dating machines and the like, which are ordinarily sold as complete units and include a hand operated means. These machines are sold complete and in a large percentage of offices may each be operated only a few times a day, but if they are operated more or less continuously or a large number of times either by hand or by an auxiliary foot operating means they are exceedingly tiring to the operator. This is true as there must either be a long movement of the operating member to secure light operation or there must be a short movement with a heavy operation. Either one is very tiring when continued for any length of time. The foot power machines now on the market for operating this type of devices have a foot throw of from six to ten inches.

It is, therefore, an additional object of the invention to provide a device that may be operated indefinitely without unduly tiring the operator.

It is another object of this invention to provide an electrically operated device of the solenoid and armature type which may be used to operate the standard type of hand operated machine, or for operating a special stapling machine having movable anvils which may be operated by the electrical device to first insert the staple and then move the anvils to fasten the staple. It is, also, a further object to make this special stapling machine easily removable and replaceable so that any of the other type of office machines above mentioned may be put in place and operated by the electrically operated device without the necessity of making any mechanical or electrical changes in construction in the device.

With the foregoing and other objects in view, this invention comprises certain constructions, combinations and arrangements of parts as set forth, disclosed and claimed in the following specification as considered in connection with the accompanying drawings.

In the drawings:

Fig. 1 is a partly sectionalized vertical view of one embodiment of this invention.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 2 on an enlarged scale.

Fig. 4 is an enlarged fragmentary portion of Fig. 2 with the plunger and anvils in staple fastening position.

Fig. 5 is a fragmentary portion of Fig. 1 taken on the same plane as Fig. 3 showing how the staple inserting plunger closes a switch as it reaches the depressed position.

Fig. 6 is a fragmentary view showing a modification of the operating plunger.

Fig. 7 is a sectional view of the upper part of the machine showing a modified switch control for the anvils.

Fig. 8 is a diagram of the electrical circuit for operating the device, and

Fig. 9 is a diagram of a slightly modified circuit for operating the device.

The device illustrated comprises a base or support 10 of any suitable material, metal being used in the form shown, which may rest on its feet 11 on top of a table or other surface. Secured to the base 10 is the hollow support 12 from one end 13 of which an arched arm 14 projects upwardly thereover. The other end 15 of support 12 contains a solenoid 16 and armature 17 while the arm 14 also contains a solenoid 18 and armature 19, as will be later described.

As illustrated in the drawings, the machine to be operated is similar to one of the standard types of stapling machines comprising a base 20 to which is pivotally mounted at 21 a housing 22. The base 20 carries a block 23 in which are mounted on pins 24 a pair of movable anvils 25. The ends 26 of anvils 25

rest on a plunger 27 which is secured to armature 17 by any suitable means as by threading it into the armature while shoulders 28 may be formed on the anvils 25 to limit their pivotal movement, and when the solenoid 16 is excited by a current therethrough as later described, the armature 17 will be raised to raise the plunger 27 and swing the anvils 25 upwardly about their pivots 24 as shown in Fig. 4. It will be noted that plunger 27 and armature 17 reciprocate in a tube 29 of some non-magnetic material such as brass in the base 10 and hollow support 12, there being a cap 30 affixed to the bottom of base 10 by screws 31 to hold the armature in position when the circuit through its solenoid is open. Also, it will be noted that when the stapling machine is removed from the device, the plunger 27 will remain in base 10 until it is separately removed therefrom, either by unscrewing it from armature 17 or by lifting both the plunger and the armature up out of the guide tube 29. Affixed through end 13 of hollow support 12 are a pair of binding posts 33 and 34 affording contacts for a receptacle plug 35, to which lead wires 37 connect to a switch 38 and an attachment plug cap 39 for inserting in a power circuit receptacle such as any outlet receptacle in the house or office wiring system. One post 33 may be grounded to the support 12, and the other post 34 is insulated therefrom as at 36 and has a lead wire 40 leading therefrom through solenoid 16 to a binding post 41 through support 12 and insulated therefrom as at 42. A similar post 43 which may rest on post 41 as shown is affixed in base 20 of the stapling machine and is insulated therefrom at 44, has a lead wire 45 passing through housing 22 to an insulation block 46 where it is held by a screw 47. A spring leaf switch 48 is also affixed by a screw 49 to the lock 46 for a purpose about to be described.

The housing 22 is held upwardly about its pivot 21 away from the base 20 by the plunger 50 operating through a boss 51 in base 20 and urged upwardly by a leaf spring 52 affixed to the bottom of the base 20. The housing 22 contains the usual vertically reciprocating plunger 53 operative against the action of spring 54 and may be surmounted by the hand knob 55. Depression of plunger 53 serves to set the individual staple 56 through sheets of paper or other articles 57 in a manner about to be described. The staples shown are the usual U-shaped staples. As plunger 53 is depressed, it pivots the housing 22 downwardly until it rests on the papers 57 on block 23. Then the plunger travels down and pushes a staple 56 down before it in the usual manner until the prongs of the staple pierce the papers and start to close as their ends come into contact with the inclined top edges of anvils 25. As the paper is being penetrated by the staple, the plunger 53 comes into contact with switch 48 and presses switch 48 in contact with screw 47 just as the paper is completely pierced. This will close the circuit from lead wire 45 to the housing 22 and thus to the ground 12, completing the circuit through solenoid 16, and operating the armature 17 to raise the plunger 27 against the ends 26 of anvils 25 to fold or clinch the ends of staple 56 securely against the bottom of papers 57 as shown in Fig. 4.

To depress plunger 53, the solenoid 18 supported in pocket 60 in arm 14 has a plunger 58 depending from its armature 19 through an opening 59 in the bottom of the pocket to rest on knob 55 on plunger 53, the plunger 58 being threaded to armature 19 at 58'. The pocket 60 is covered by a cap 61 affixed to arm 14 by screws 62 and a sleeve 63 of non-magnetic material such as brass, extends up through the cap to guide the armature 19. A lead wire 64 is connected to wire 40 at 65 and leads through the solenoid 18 to the wire 66 grounded at one of the screws 62 to arm 14. In the circuit shown in Fig. 9, if it be undesirable to ground the circuits through the device as shown in Fig. 7, the lead wires 66 leads back to post 33 instead of each being grounded, and the circuit through switch 48 likewise has a lead wire 67 which may be attached to screw 49 for instance, leading back to post 33, it being understood that post 33 will be then insulated similarly to post 34 if necessary.

In the modification shown in Fig. 6, the plunger 58 is connected to plunger 53 by a connecting link 68 pivoted thereto by removable pins 69.

In operation, the device may be set up at any convenient place and plug 39 is inserted in a convenient outlet receptacle. The sheets of paper 57 are placed on block 23 beneath plunger 53 and the switch 38, which may be a push button or any other type of switch, is held temporarily closed. This closes the circuit via lead 64 to solenoid 18 to excite the solenoid and draw down the armature 19. Armature 19 depresses plunger 53 as it is drawn down, to pivot housing 22 about pivot 21 until it contacts with the paper on block 23 as spring 54 is stronger than spring 52. The plunger 53 then moves downwardly in the housing 22 and presses the prongs of a staple 56 through papers 57 and against the inclined top edges of anvils 25. As plunger 53 approaches the bottom limit of its movement, it contacts with switch 48 to press it against the screw 47 and thus close the circuit through wire 48 through the solenoid 16 in the base. When solenoid 16 is excited, it will raise its armature 17 to raise plunger 27 and pivot anvils 25, as previously described, to turn the prongs of staple 56 against the under side of the papers as shown in Fig. 4 to securely fasten papers 57 together. It will be noted that the armature 19 has its move-

ment blocked before it can become centralized in the solenoid 18 and hence the solenoid will continue to exert a pulling force thereon, and hence it will hold the plunger 53 and housing 22 down against the block 23 as long as the circuit is closed therethrough, thus holding it firmly in position when the plunger 17 in the lower solenoid 16 rises to pivot the anvils 25 and secure the staple fast in the paper. The plunger 17 in solenoid 16 may be similarly formed to insure its properly operating the anvils 25.

If it be desired to operate another office machine, such as a dating or tag fastening machine or the like, the stapling machine herein shown may be lifted out of place. To do this, the base 20 need only be lifted until the well 32 in block 23 is above plunger 27. If the form in Fig. 6 is used, then pins 69 will be removed to remove links 68. When this is done, the machine may be removed for there is no mechanical connection between post 41 in support 12 and post 43 in base 20, there being merely an electrical contact therebetween formed by placing post 43 in physical contact with post 41.

Another machine having a depressible hand knob may be then placed on support 12 with its hand knob under plunger 58. Then when switch 38 is closed, the hand knob of this machine will be depressed and the machine operated by the solenoid 18. If another machine is substituted in which no use will be made of solenoid 16, its armature 17 may be plucked out temporarily if it interferes with the placing of the machine on support 12, but this will not interfere with the operation of solenoid 18 and the machine then in place thereunder. Should the substituted machine have its hand knob come lower than knob 55, plunger 58 may be either partially unscrewed at 58′ to adjust its length, or it may be completely unscrewed and a longer plunger of appropriate length may be substituted therefor.

In Fig. 7 is shown a somewhat different construction in which the switch for controlling the lower solenoid 16, corresponding to switch 48, is placed on the arm 14. This switch may be a spring finger 70 insulated from the arm 14 by an insulating block 71 and connected to the lead wire 45. Mounted on the armature 19 is another contact and adjustably secured to the armature by a screw 73 in a slot in the contact so that the contact may be adjusted up or down to close the circuit at the proper time. There may be a slot in sleeve 63 for the mounting for contact 72. As the armature moves down 72 engages 70 at the proper time to excite coil 16, the contact 72 being grounded by the armature.

The operating switch 38 may be operated by hand or foot means and as it merely involves the closing of a simple switch, it will be obvious this device may be used indefinitely without tiring the operator.

Having thus described this invention, what I claim is:

1. In a stapling machine, a movable plunger for driving the individual staples, movable anvils adapted to cooperate with the plunger to bend the prongs of the staples against the work, a solenoid, an armature operated by said solenoid having an operative connection with said plunger, a second solenoid, an armature operated by the second solenoid having an operative connection with the anvils, a switch for controlling the second solenoid and controlled by movement of the first armature and plunger, and a manually operated switch for controlling the first solenoid.

2. In a stapling machine, a vertically movable plunger for driving the individual staples, upwardly movable anvils below the plunger adapted to cooperate therewith to bend the prongs of the staples against the work, a solenoid, a movable armature operated by said solenoid and having operative connection with said plunger, a second solenoid below the anvils, an upwardly movable armature operated by said latter solenoid and having operative connection with the anvils, a switch for controlling the second solenoid controlled by operation of the plunger by the first solenoid, and a manually operated switch for controlling the first solenoid.

3. In a device for actuating stapling machines comprising a depressible actuating plunger and movable anvils to cooperate therewith, a base portion on which said machine may be placed, a solenoid and armature in said base, and a plunger projecting upwardly from said armature, said plunger being adapted to actuate the movable anvils on the closing of a circuit therethrough.

4. In a device for actuating stapling machines comprising a depressible actuating plunger and movable anvils to cooperate therewith, a base portion on which said machine may be placed, a solenoid and armature in said base, a plunger projecting upwardly from said armature, said plunger being adapted to actuate the movable anvils on the closing of a circuit therethrough, an arm associated with said base portion, and another solenoid and armature in said arm adapted to operate said depressible actuating plunger on the closing of a circuit therethrough.

5. In a device for actuating stapling machines comprising a depressible actuating plunger and movable anvils to cooperate therewith, a base portion on which said machine may be placed, a solenoid and armature in said base, a plunger projecting upwardly from said armature, said plunger being adapted to actuate the movable anvils on the closing of a circuit therethrough, an arm associated with said base portion, another

solenoid and armature in said arm adapted to operate said depressible actuating plunger on the closing of a circuit therethrough, and a switch in said device through which said first mentioned circuit passes said switch being actuated by said depressible actuating plunger to close said first circuit when the plunger is depressed.

6. In a device for actuating stapling machines having operating means comprising a depressible plunger and movable anvils, an arm projecting over said plunger and a base support for said machine, said arm having a solenoid and an armature over said plunger to depress said plunger when a circuit is closed through said solenoid, said plunger reaching fully depressed position before said armature can reach centralized position in the armature, a second solenoid and armature in the support underlying said movable anvils to actuate the same on the closing of a circuit through the support solenoid, and a switch associated with said plunger and actuable by said plunger when said knob is depressed, the support solenoid circuit passing through said switch whereby said support solenoid is actuated after said arm solenoid is actuated.

7. In a stapling machine, a movable plunger for driving the individual staples, means for operating the plunger, a movable anvil adapted to cooperate with the plunger to set the staples, a solenoid, an armature operated by the solenoid having an operative connection with the anvil, and a switch for controlling the solenoid and controlled by operation of the plunger.

8. In a stapling machine, a movable plunger for driving the individual staples, means for operating the plunger, a movable anvil adapted to cooperate with the plunger to set the staples, electrically controlled means for operating the anvil, and means controlled by operation of the plunger for controlling the electrical means.

9. In a stapling machine, a movable plunger for driving the individual staples, means for operating the plunger, a movable anvil adapted to cooperate with the plunger to set the staples, electrical means for operating the anvil, and means controlled by movement of the plunger for controlling the electrical means.

10. In a stapling machine, a movable plunger for driving the individual staples, means for operating the plunger, a movable anvil adapted to cooperate with the plunger to set the staples, an electrical means for operating the anvil, and a switch for controlling said electrical means operated by movement of the plunger.

11. In a stapling machine, a movable plunger for driving the individual staples, an electrical means for operating the plunger, a manually operated switch for controlling said electrical means, a movable anvil adapted to cooperate with said plunger to set the staples, an electrical means for operating the anvil, and means controlled by operation of the plunger for controlling the latter electrical means.

12. In a stapling machine, a movable plunger for driving the individual staples, means for operating the plunger, a movable anvil adapted to cooperate with the plunger to set the staples, a solenoid, an armature operated by the solenoid having an operative connection with the anvil, and a switch for controlling the solenoid and controlled by operation of the plunger.

In testimony whereof I affix my signature.

ROY E. PETERSON.