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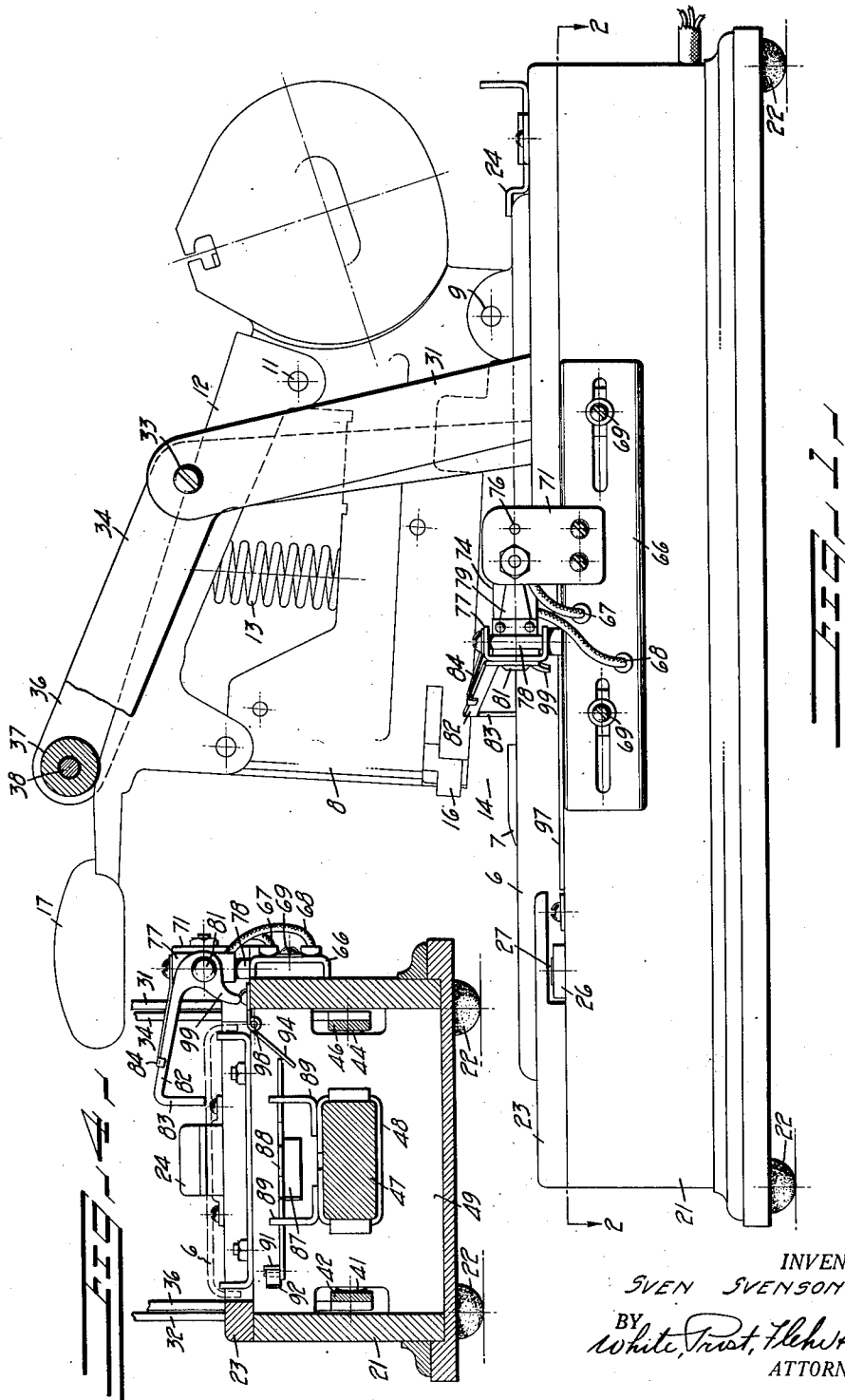
S. SVENSON

1,940,980

POWER ACTUATOR

Filed March 18, 1932

2 Sheets-Sheet 1



INVENTOR.

SVEN SVENSON

BY *White, Frost, Fleck & Lothrop*
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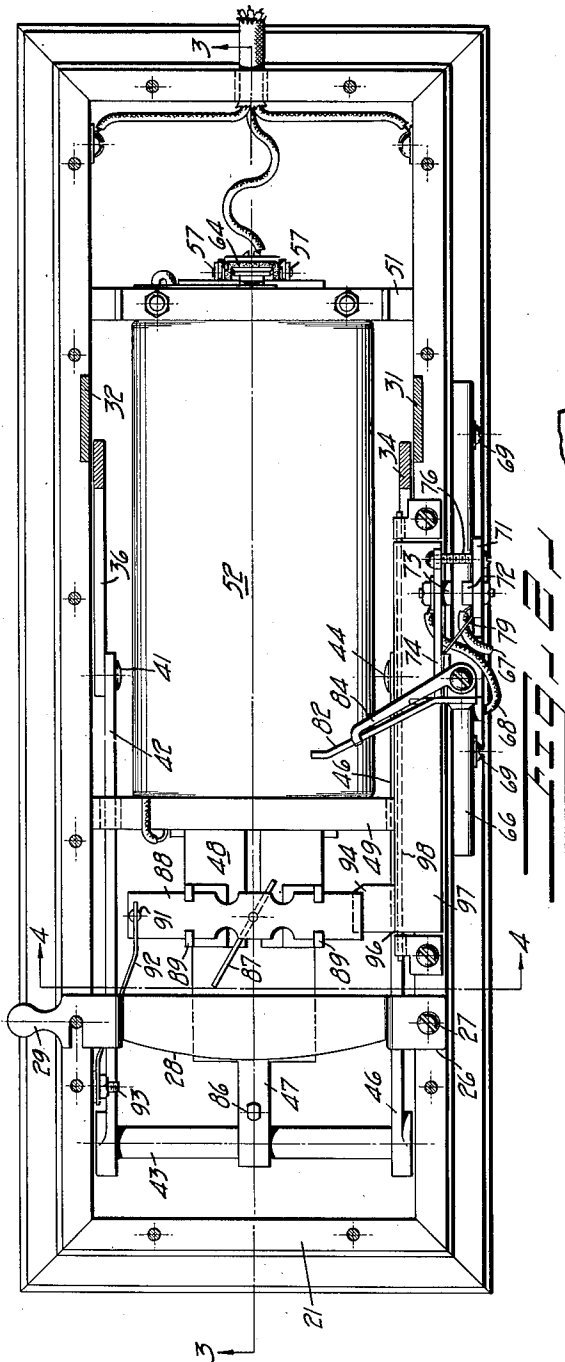
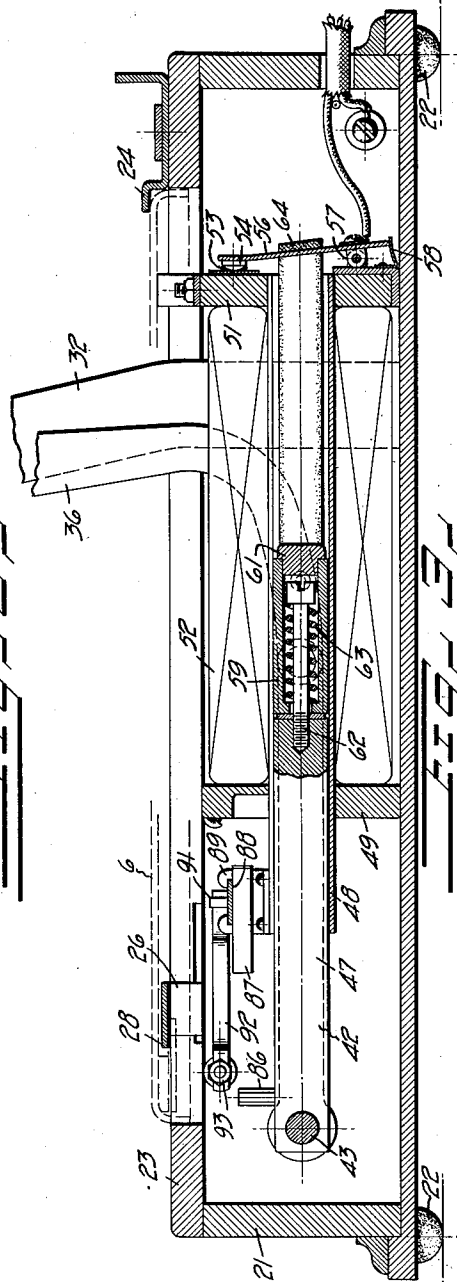
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UNITED STATES PATENT OFFICE

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POWER ACTUATOR

Sven Svenson, San Francisco, Calif.

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10 Claims. (Cl. 1—2.2)

My invention relates primarily to means using a source of power such as electricity, for actuating devices such as staplers and the like which are designed primarily for hand operation.

5 An object of my invention is to provide means for operating a mechanism, such as a stapler for instance, by electricity.

Another object of my invention is to provide a power actuator which can be utilized in conjunction with a standard type of hand operated stapler.

Another object of my invention is to provide an electrically operated stapler in which the sheet to receive the staple controls the operation of the power mechanism.

15 A further object of my invention is to ensure suitable power for actuation of the stapler before the cycle of the machine is permitted to be completed.

20 The foregoing and other objects are attained in the embodiment of the invention shown in the drawings, in which

Figure 1 is a side elevation of a power actuator in accordance with my invention, a stapling machine being shown in conjunction therewith.

25 Figure 2 is a cross section, the plane of which is indicated by the lines 2—2 of Figure 1.

Figure 3 is a cross section, the plane of which is indicated by the lines 3—3 of Figure 2.

30 Figure 4 is a cross section, the plane of which is indicated by the lines 4—4 of Figure 2.

In its preferred form, the power actuator of my invention is utilized in conjunction with a stapling machine and includes a base to which the stapling machine is held, together with an electrically operated actuator on the base connected to move the stapling machine and controlled by the insertion into the stapling machine of a sheet to receive a staple.

40 Although the power actuator of my invention is particularly described herein in conjunction with a stapling machine, it can be utilized in conjunction with various other hand operated mechanisms. Furthermore, I have chosen for illustration herein a hand stapling machine now available on the market, and known as the "Bates", but various other kinds of stapling machines can be utilized as well.

The stapling machine shown herein includes 50 a frame 6 on which is mounted a stapling anvil 7. Also mounted on the frame 6 is a stapling head 8 secured by a transverse pivot 9. Mounted by a pivot 11 on the head 8 is an actuating lever 12 designed to be moved from the position shown 55 in Figure 1 to a depressed position in which the

lever 12 approaches the stapling head 8 and the stapling head 8 closely approaches the frame 6. A coil spring 13 is interposed between the stapling head 8 and the lever 12 to urge them apart while suitable springs (not shown) bias the stapling head 8 into the position shown in Figure 1, spaced away from the frame 6 to provide a slot 14 between the anvil 7 and the stapling mechanism 16.

In the usual operation of the hand stapler, a sheet is placed in the slot 14 and the handle 17 is depressed a suitable distance, bringing the stapling mechanism 16 into contact with the supposed sheet and piercing the sheet with a staple which is clinched on the anvil 7.

In accordance with my invention, I provide 70 a mechanism or actuator for operating by electricity, the stapling machine described. To this end, I provide a base 21, provided with feet 22 to rest on any suitable support and forming a housing for the major portion of the operating mechanism. The base is provided with a cover 23 removably secured thereto, and preferably recessed in its upper part to receive the frame 6 of the stapling machine. The frame 6 is held in removable relationship with the cover 23 by a latch 24 which is fastened to the cover 23 slidably to engage or release the frame 6 and by a second latch 26 which is pivoted to the base 21, as at 27, and is provided with a lip 28 for engagement with the frame 6. The lever 28 projects from the side 85 of the base 21 to afford a handle 29.

Projecting from opposite sides of the base 21 are uprights 31 and 32, each of which at its upper end is provided with a pivot pin 33 piercing the central portion of one of two levers 34 and 36, 90 which at their upper end are fastened to a roller 37. The roller is adapted to bear on the lever 12 of the stapling machine and is journaled on a through pin 38 fastened in each of the levers 34 and 36. When the levers 34 and 36 are rotated 95 in unison about their pivot points 33, the roller 37 being in engagement with the lever 12, depresses the lever and actuates the stapling machine, which returns under the urgency of the spring 13 and likewise returns the levers 34 and 36 to original position. 100

At its lower end, the lever 36 is pivoted, as at 41, to a link 42, extending within the base 21 to a cross pin 43, while the lever 34 is similarly connected by a pivot pin 44 to a link 46, extending 105 to the other end of the cross pin 43. In order to reciprocate the cross pin 43 and correspondingly actuate the levers 34 and 36, I provide an electromagnetic means.

Included in this means is a plunger 47, sliding 110

within a non-magnetic shell 48 supported in a pair of transverse walls 49 and 51 spanning the interior of the base 21. The plunger 47 at one end is joined to the cross pin 43 and reciprocates between the position shown in Figure 3 and a position within an electrical coil 52 interposed between the walls 49 and 51. When the coil 52 is energized, the plunger 47 moves into the position within the coil, while when the coil is deenergized, the spring 13 acting through the levers 34 and 36 and the cross pin 43 causes the plunger to return to the position shown in Figure 3.

In accordance with my invention, I provide means for breaking the circuit to the coil 52 when the plunger 47 has completed its movement into the interior of the coil 52 and likewise for maintaining the circuit to the coil 52 closed until the plunger 47 is entirely in its position within the coil, so that a complete operation is effected once it has been initiated. To this end, there is included in the circuit to the coil 52 a pair of contacts 53 and 54, respectively. The contact 53 is mounted on the transverse wall 51 while the contact 54 is mounted at one end of a lever 56, pivoted as at 57 on the wall 51 and at its lower end riding over a leaf spring 58 secured to the wall. The contour of the leaf spring 58 is such that the lever 56 is biased either into a position with the contacts 53 and 54 in abutment or is biased into a position with the contacts 53 and 54 spaced apart.

In order that the contacts 53 and 54 may be opened when the plunger 47 has completed its reciprocation into the interior of the coil 52, and so that the contacts may not be separated until such movement is completed with sufficient force or speed to ensure a proper operation of the stapling machine, I preferably mount on the end of the plunger 47 within the coil 52 an inertia member 59 which preferably is fabricated of non-magnetic material and at its free end carries a bumper 61 adapted to engage the lever 56. The member 59 reciprocates on a stud 62 fastened into the end of the plunger 47. A spring 63 is confined between the member 59 and the head of the stud 62 so that ordinarily the member is held in close relationship with the plunger 47, but as the plunger completes its reciprocating movement into the interior of the energized coil 52, the inertia member 59 continues such movement even against the urgency of the spring 63 and in an amount dependent upon the rapidity with which the plunger operates.

When the bumper 61 is propelled with sufficient force, it proceeds to abut the lever 56 and causes a disengaging movement of the contacts 53 and 54, of sufficient magnitude so that the spring 58 holds the contacts in spaced position. When the circuit through the coil 52 is broken, and the plunger 47 is returned to its original position, the lever 56 is again moved to a location in which the contacts 53 and 54 are in abutment, preferably by means of a flexible strap 64, which forms a loop about the lever 56 and is fastened to the end of bumper 61.

Additionally to control the energization of the coil 52 and to secure actuation of the stapling machine upon the interposition in the slot 14 of a sheet to receive a staple, I preferably mount at one side of the base 21 a longitudinally adjustable support 66 which carries leads 67 and 68 in series with contacts 53 and 54 and with the coil 52. These leads 67 and 68 preferably are of sufficient flexibility or are arranged in any suitable fashion to conduct the current despite

longitudinal movement of the support 66 for purposes of adjustment. The support 66 is preferably supported and held by a pair of screws 69 passing into the side of the base 21.

Projecting from the support 66 is an insulating bracket 71 carrying a stationary contact 72, connected to the lead 67. Adapted to abut the contact 72 is a contact 73 mounted on a lever 74, the free end of which is guided on a stud 76 projecting from the bracket 71 and the pivoted end of which forms a frame 77 rotatable on a pin 78 fixed in the support 66. A leaf spring 79 is interposed between the lever 74 and the bracket 71 in order to bias the contacts 72 and 73 apart.

In order that the contacts 72 and 73 can be closed to complete a circuit through the coil 52 upon the interposition of sheet into the slot 14, I preferably mount on the frame 77, by means of a pivot pin 81, a lever 82 which is provided with an arm 83 depending into the path of a sheet being inserted into the slot 14. A leaf spring 84, held by the pin 78 urges the lever 82 downwardly against the frame 6 of the stapling machine. As a sheet is inserted into the slot 14, it abuts the depending arm 83 of the lever 82 and causes rotation of the frame 77 about the pin 78. Thus the lever 74, against the urgency of the spring 79, causes the contacts 73 and 72 to abut and to complete the circuit through the leads 67 and 68 in series with the abutted contacts 53 and 54 and the coil 52.

The coil being energized, the plunger 47 is reciprocated, the levers 64 and 66 are operated, and the lever 12 of the stapling machine is depressed to cause the stapling mechanism 16 to force a staple through the sheet in the slot 14 and to clinch the staple against the anvil 7. Towards the conclusion of this operation, the inertia member 59 strikes the lever 56 and breaks the contacts 53 and 54 so that under the urgency of the spring 13, the lever of the stapling machine 12 and the levers 34 and 36 return to their original position together with the plunger 47 and the inertia member 59. The flexible strap 64 again closes the contacts 53 and 54, and if the stapled sheet has been withdrawn prior to this time, the contacts 72 and 73 are pressed apart due to the urgency of the spring 79 and no further action transpires.

If it should so occur, however, that the sheet is not withdrawn from a position against the depending arm 83 prior to the time that the contacts 53 and 54 are again placed in abutment by the strap 64, I provide means for positively preventing more than one closure of the contacts 72 and 73 for one insertion of a sheet and for positively opening the contacts at the conclusion of a single stapling operation. To this end, there is provided mechanism for lifting the lever 82 from its ordinary position, depressed by the spring 84, so that if the inserted sheet is not withdrawn, the arm 82 will fall on the top of the sheet in a position with the contacts 72 and 73 open.

Projecting upwardly from the plunger 47 is a pin 86. In the path of the pin 86 is a cam track 87, fastened on a transverse slide 88, confined for transverse translation in guides 89 projecting from the shell 48 of the plunger 47. At one end, the slide 88 carries a slotted pin 91 within which the free end of a leaf spring 92 is confined. The other end of the leaf spring 92 is fastened, as at 93, to the base 21 so that the slide 88 is normally held in a central position by the leaf spring 92

but can be translated against the urgency of the spring in either transverse direction. The other end of the slide 88 is in the path of movement of a lug 94 projecting radially from the hub 96 of a plate 97 extending along one edge of the base 21 and rotatably mounted on a pivot rod 98 secured to the base. The plate 97 is adapted, when rotated, to contact with a projection 99 on the lever 82.

When the plunger 47 is reciprocated in the coil 52, the projecting pin 86 on the plunger contacts with the cam track 87 and causes the slide 88 to be translated away from the lug 94 against the urgency of the leaf spring 92. The projection 86 travels far enough to ride over the end of the cam track 87 and as the slide 88 springs back under the urgency of the spring 92, the projection 86 is in a position on the other side of the cam track.

During return movement of the plunger 47, therefore, the pin 86 comes into contact with the other side of cam track 87 and causes a transverse translation of the slide 88 against the urgency of the spring 92 and into contact with the depending lug 94. The force of the slide 88 is such that the lug causes a rotation of the plate 97 around the pin 98 so that the plate comes into contact with the depending projection 99 of the lever 82 and causes rotation of the lever about its mounting pin 81. In this fashion the arm 83 of the lever 82 is lifted a sufficient distance to clear any sheet or sheets which may be interposed in the slot 14.

Upon further return movement of the pin 86, the pin leaves the end of the cam track 87 and the slide 88 is returned to its central position by the spring 92, thus permitting the spring 84 to urge the lever 82 back to its original position and through the projection 99 in contact with the plate 97 to rotate the plate and lug 94 around the pin 98 back to their original location as particularly illustrated in Figure 4.

It is to be understood that I do not limit myself to the form of the power actuator shown and described herein, as the invention, as set forth in the following claims, may be embodied in a plurality of forms.

I claim:

1. A power actuator for a stapling machine comprising a base, means for holding a stapling machine on said base, an actuating lever on said base, electrical means on said base for operating said lever, and means on said base adapted to be actuated by a sheet inserted into said stapling machine for controlling said electrical means.

2. A power actuator for a stapling machine comprising a base, means for holding a stapling machine on said base, an electrically operated plunger on said base for actuating said stapling machine, a circuit for energizing said plunger, contacts in said circuit adapted to be closed by a sheet being inserted into said stapling machine, and means dependent upon the speed of operation of said plunger for opening said circuit.

3. A power actuator for a stapling machine comprising a base, an actuating lever on said base, a plunger on said base for operating said

lever, an electrical coil for moving said plunger when energized, a circuit for energizing said coil, and means dependent upon the speed of operation of said plunger for opening said circuit.

4. An actuator for a stapling machine comprising a base, an actuating lever on said base, a plunger on said base linked to said lever, an electrical coil for moving said plunger, a circuit for energizing said coil, contacts in said circuit adapted to be closed by a sheet being inserted into said stapling machine, and means dependent upon the speed of operation of said plunger for opening said circuit.

5. An actuator for a stapling machine comprising a base, electrical means on said base for actuating said stapling machine, contacts for controlling said electrical means, a lever in the path of a sheet being inserted into said stapling machine for operating said contact, and means dependent upon the actuation of said stapling machine for moving said lever out of said path.

6. An actuator for a stapling machine comprising a reciprocating plunger for actuating said stapling machine, electrical means on said base for reciprocating said plunger in one direction, a lever in the path of a sheet being inserted into said stapling machine for energizing said electrical means, and means effective upon reciprocation of said plunger in the opposite direction for moving said lever out of said path.

7. An actuator for a stapling machine comprising a base, means for holding a stapling machine on said base, a lever on said base for actuating said stapling machine, a plunger for operating said lever, a coil in an electrical circuit for reciprocating said plunger, contacts in said circuit, means dependent upon the speed of reciprocation of said plunger for opening said contacts, additional contacts in said circuit, and a lever in the path of a sheet being inserted into said stapling machine for closing said additional contacts.

8. An actuator for a stapling machine comprising a base, means for holding a stapling machine on said base, a lever on said base for actuating said stapling machine, a reciprocating plunger for actuating said lever, a coil in an electrical circuit for reciprocating said plunger in one direction, contacts in said circuit, means dependent upon the speed of reciprocation of said plunger for opening said contacts, additional contacts in said circuit, a lever in the path of a sheet being inserted into said stapling machine for closing said additional contacts, and means effective upon reciprocation of said plunger in the opposite direction for moving said lever out of said path.

9. An actuator comprising a base, a plunger, an electrical coil for moving said plunger when energized, a circuit for energizing said coil, and means dependent upon the speed of operation of said plunger for opening said circuit.

10. An actuator comprising a base, a plunger on said base, an electrical coil for moving said plunger, a circuit for said coil, means for closing said circuit, and means dependent upon the speed of operation of said plunger for opening said circuit.

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