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SWITCH

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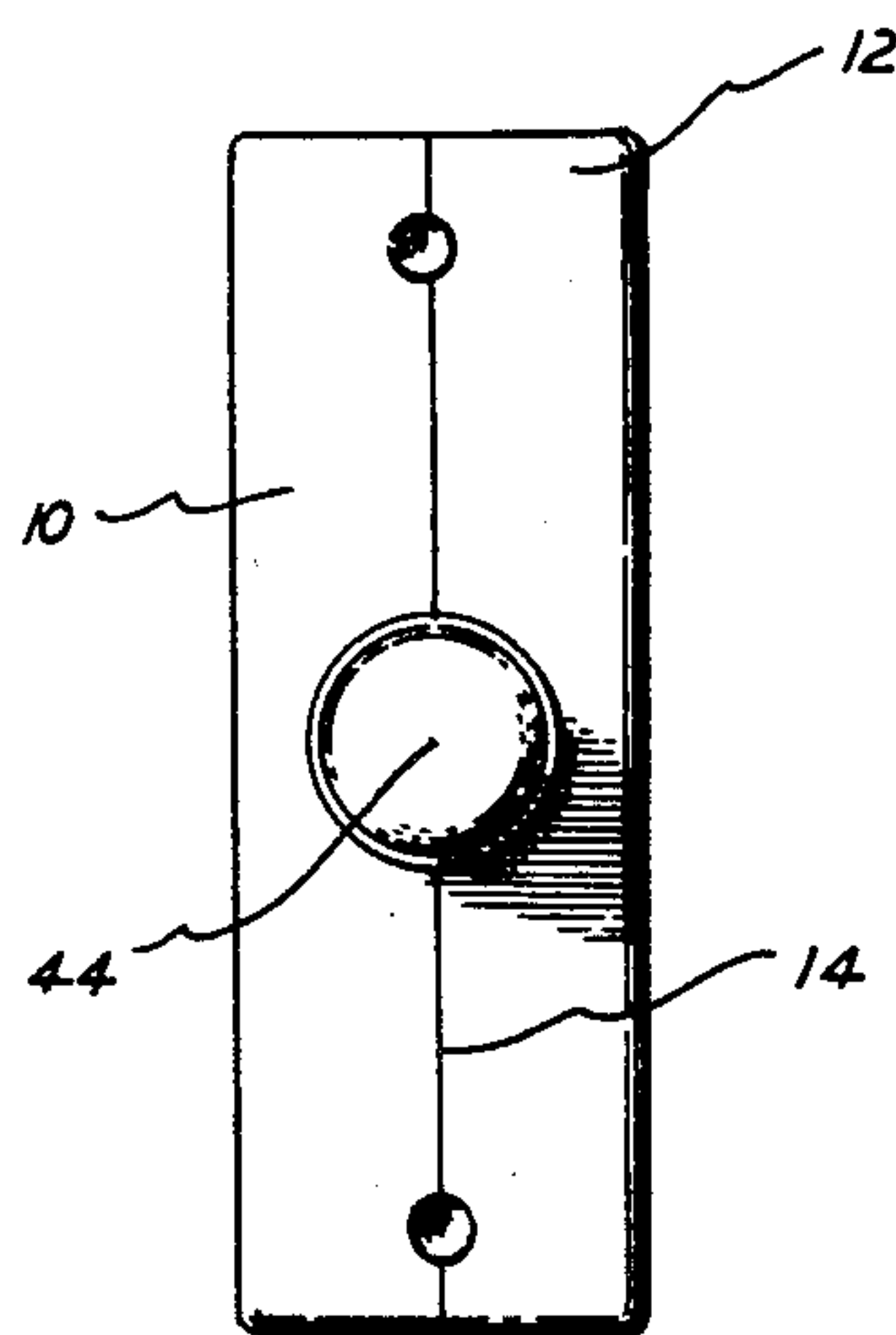
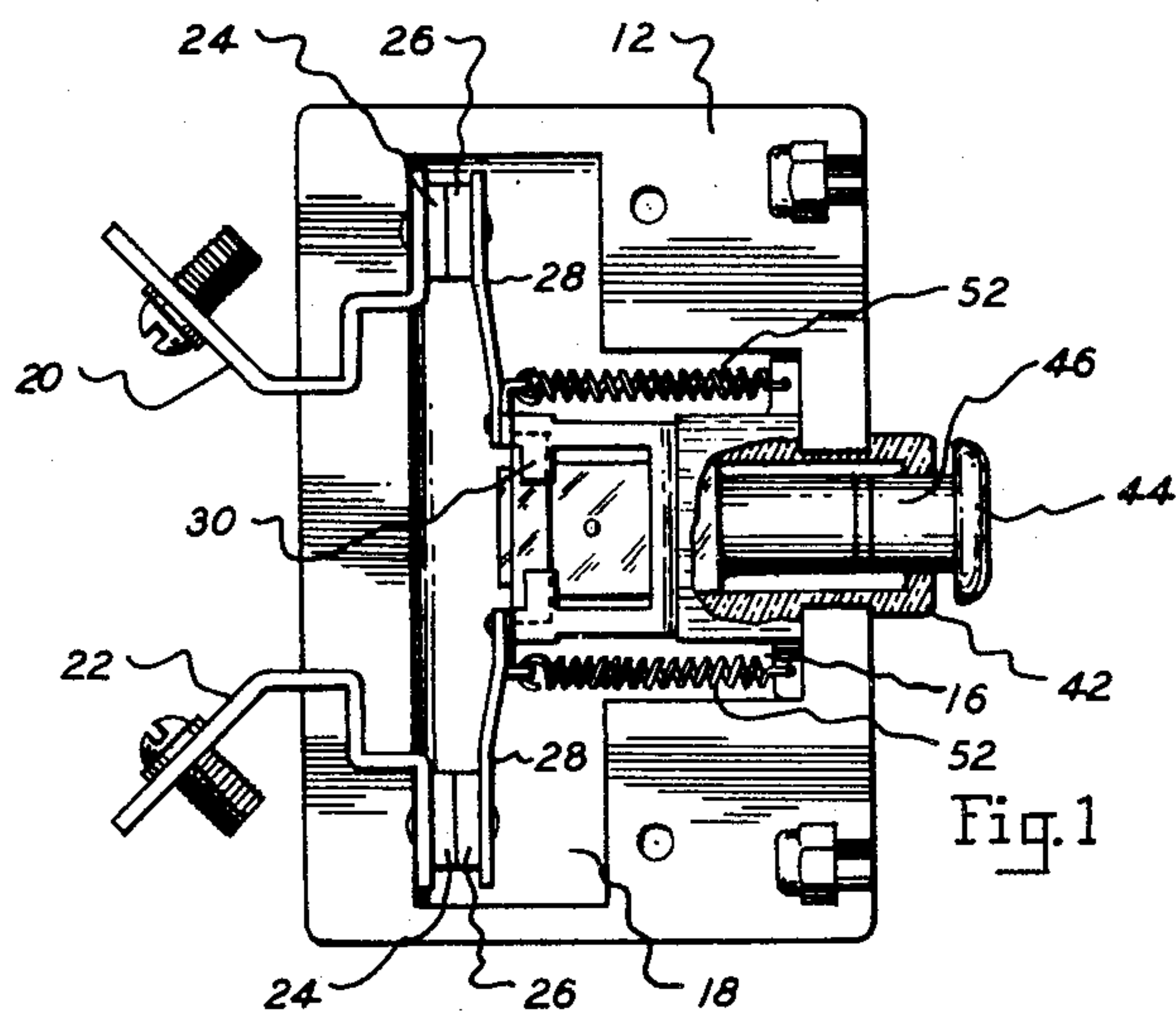


Fig. 2

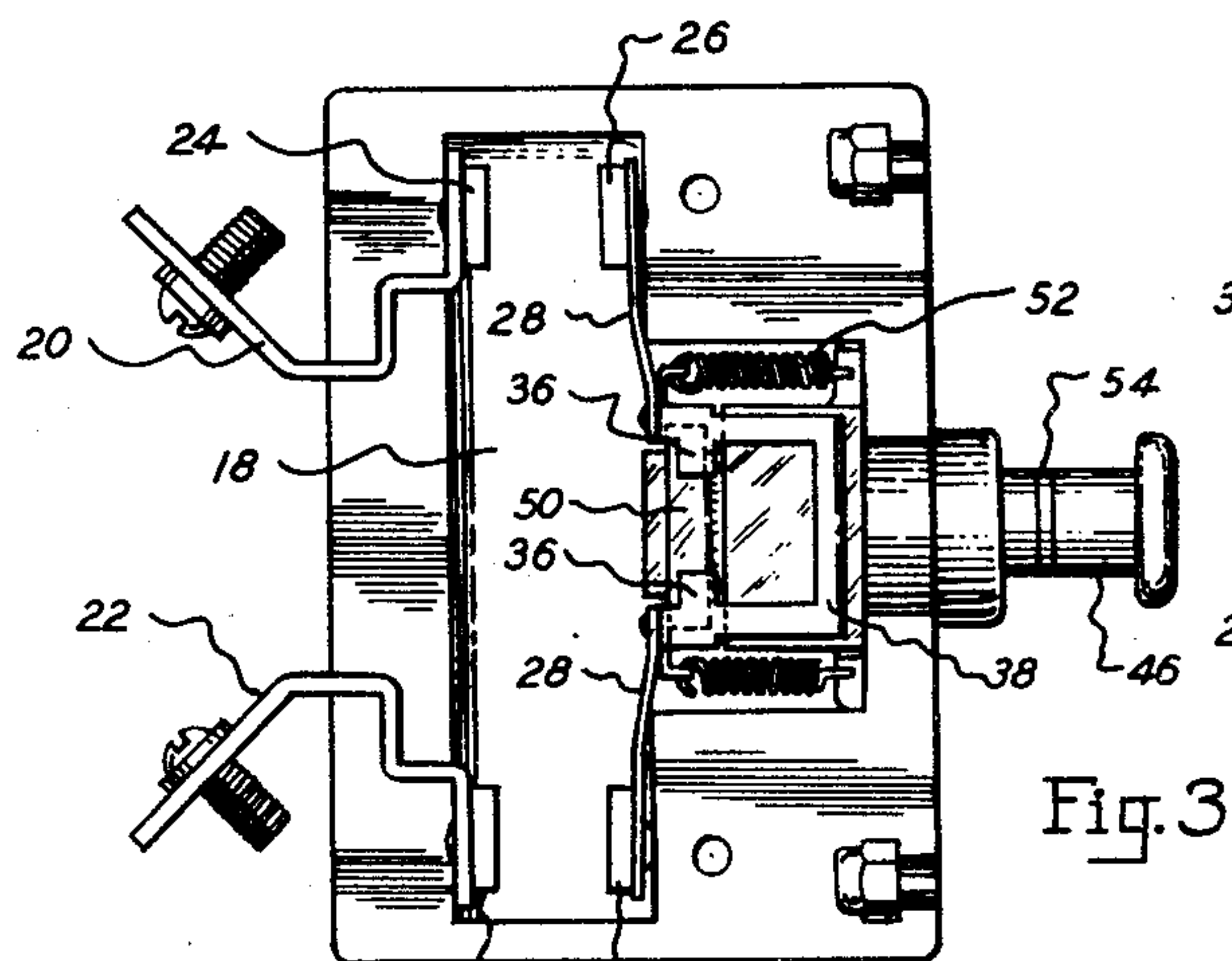


Fig. 3

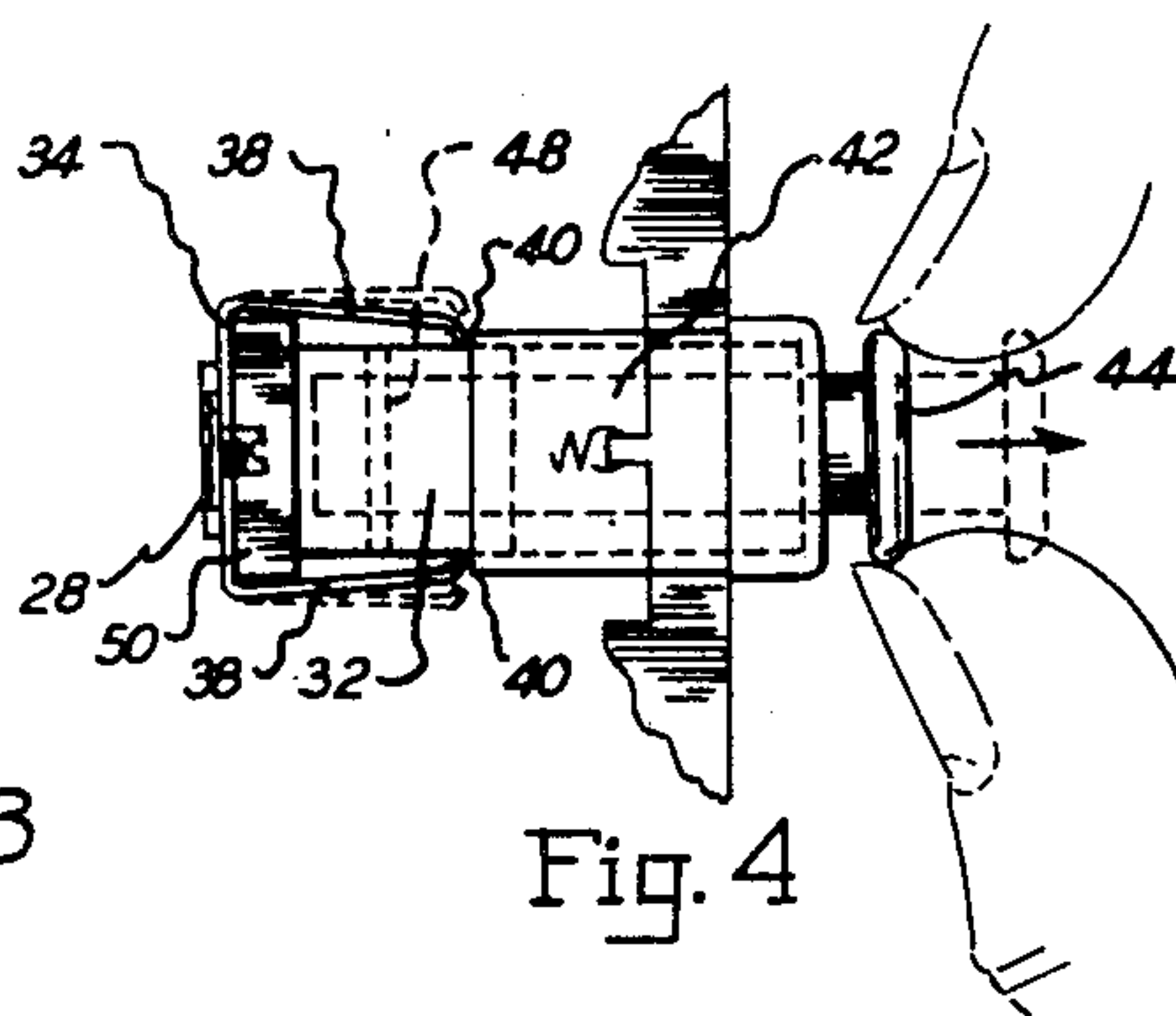


Fig. 4

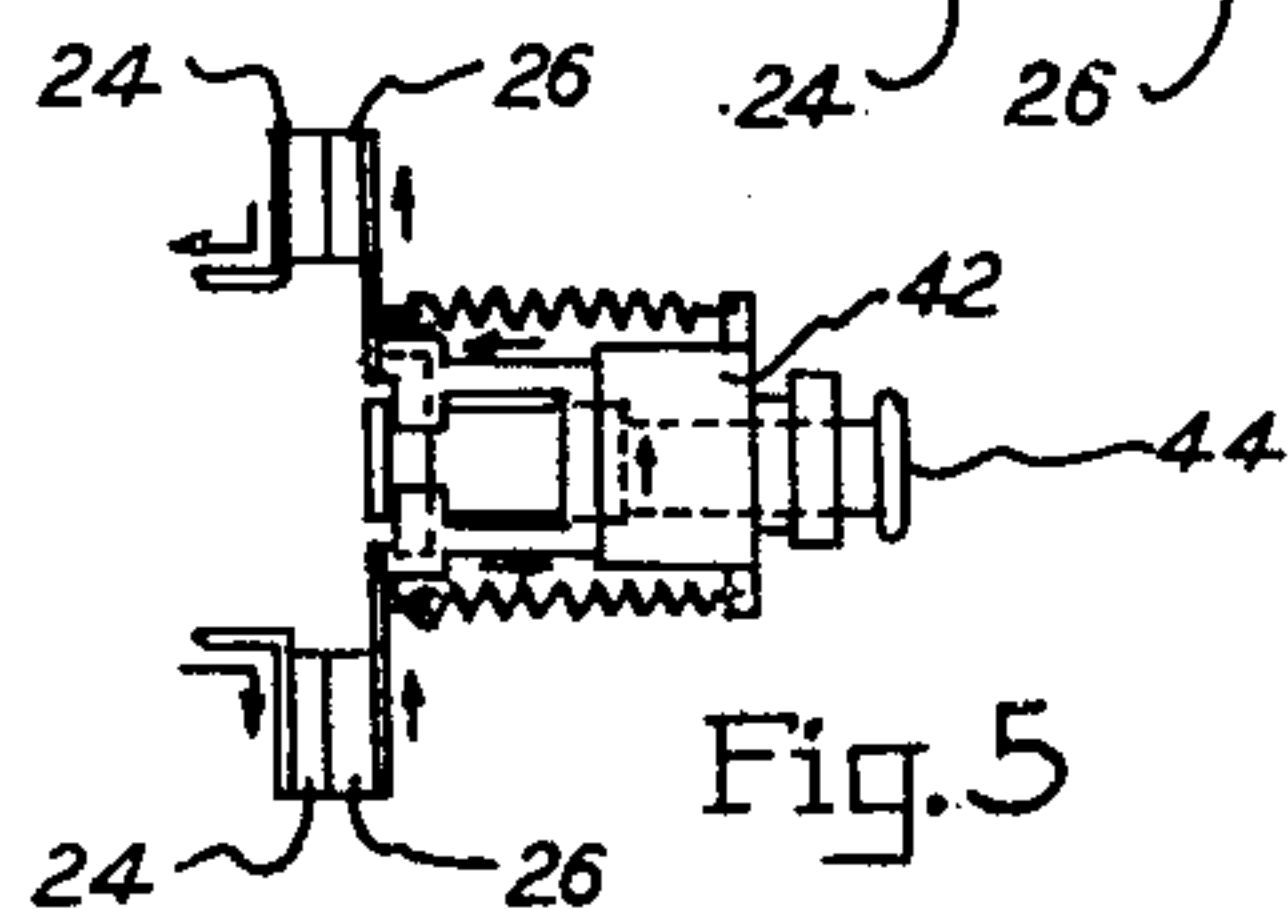


Fig. 5

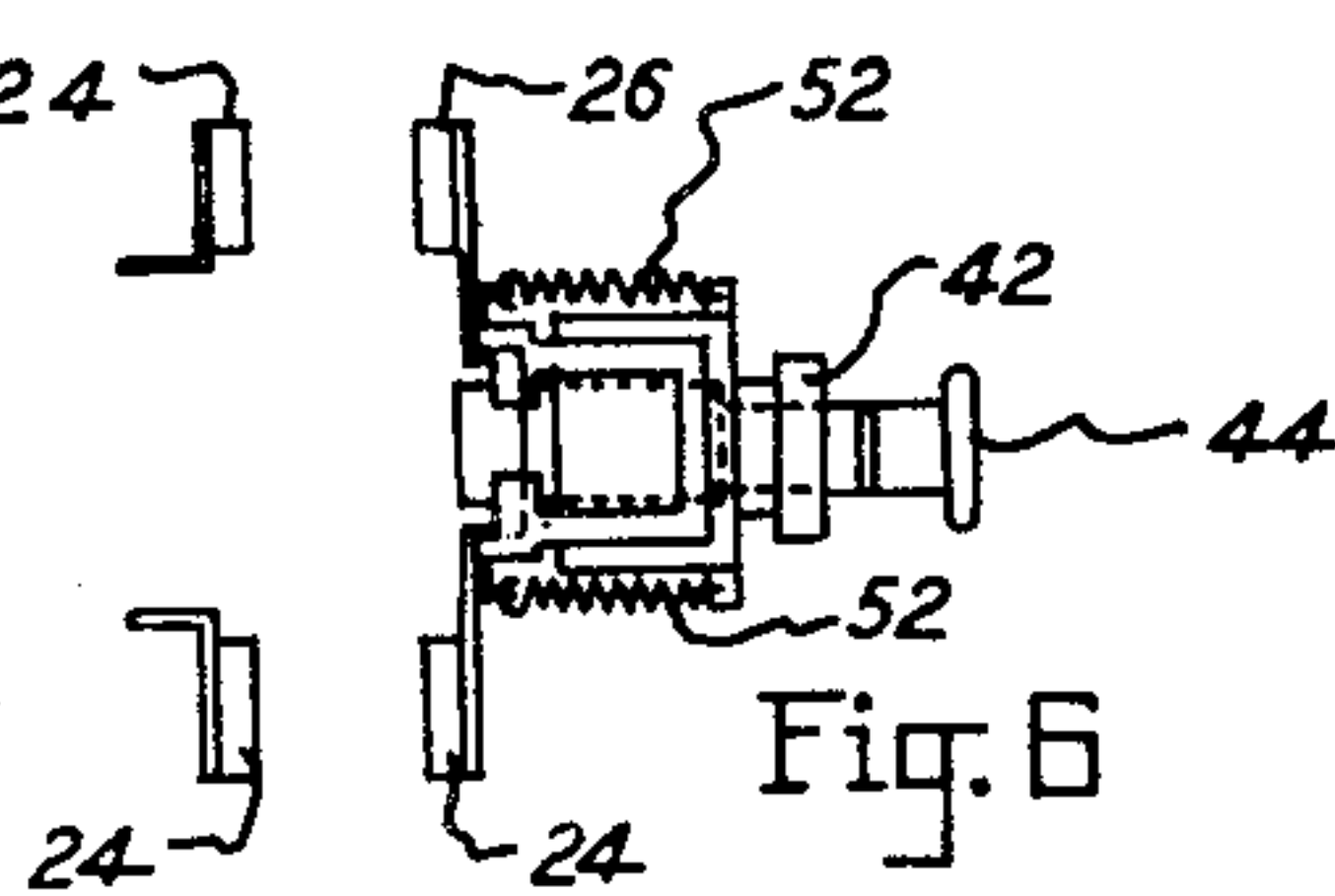


Fig. 6

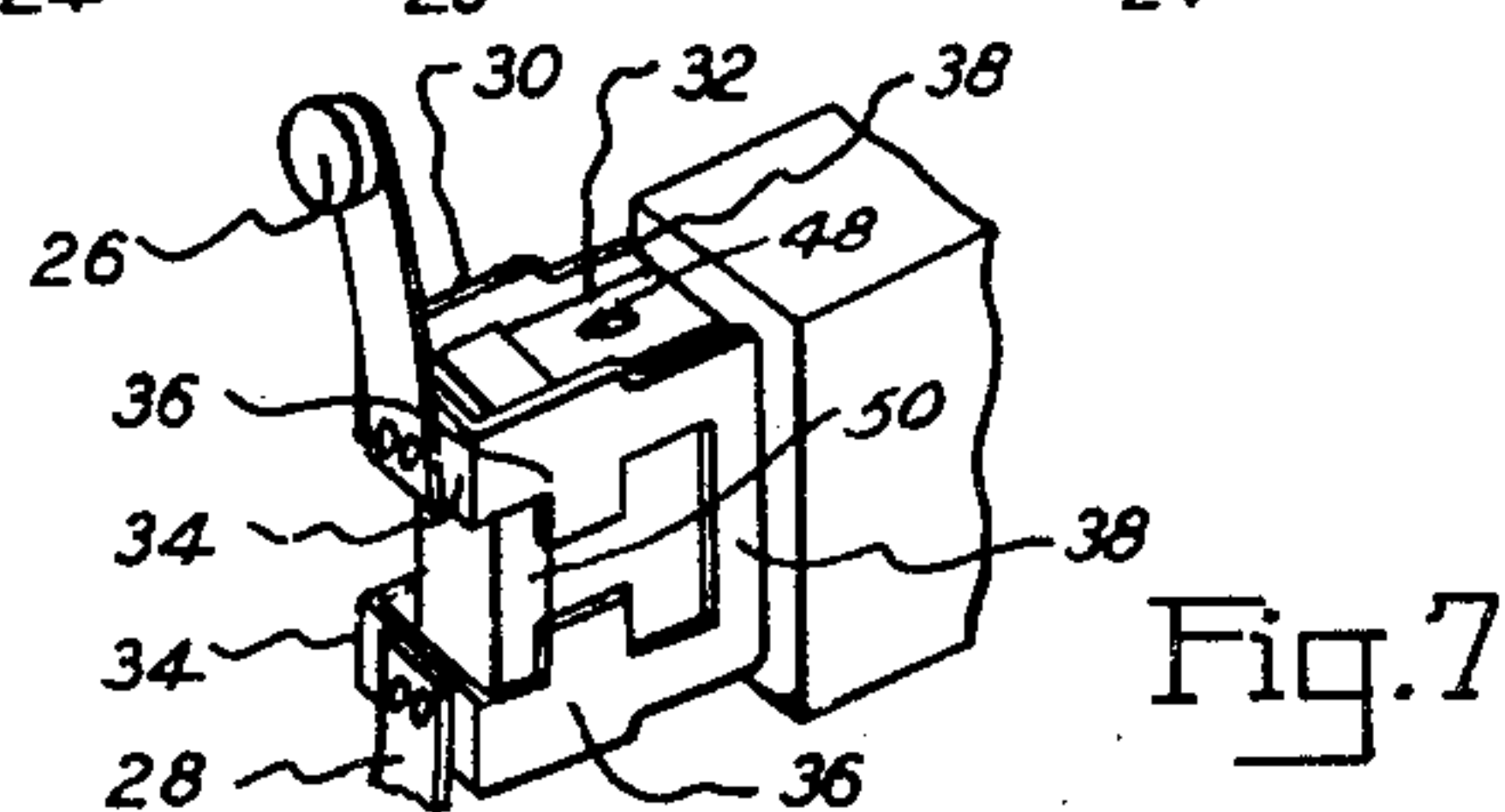


Fig. 7

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# UNITED STATES PATENT OFFICE

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## SWITCH

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6 Claims. (Cl. 200—116)

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The present invention relates to improvements in electrical switch constructions, being specifically concerned with a manually operated on and off switch having overload protection and being so designed as to enable the switch to be manually closed under conditions warranting such operation.

While it is not so limited in its application, switches constructed according to the present disclosure are particularly adapted to aircraft installations where an emergency may necessitate the overloading of the electrical circuit.

One of the objects of the invention is to provide a simple, inexpensive, manually actuated on and off switch having overload protection of the character described.

Another object of the invention is to provide an improved electrical switch having a double set of separable contacts to give maximum spacing of the contacts upon opening and providing overload protection in the form of a thermal latch of such a design that the switch will open with great rapidity upon overload, and is capable of handling excessively high overloads without destruction.

A further object of the invention is to provide an improved electrical switch of the class described in which manual means are provided for closing and holding the switch closed, with the thermal latch in series with the electrical circuit being protected and functioning to resist releasing of separable contacts to the action of stressed spring means.

A still further object of the invention is to provide an improved electrical switch of the class described having a latched mechanism for holding the switch closed following manual closing, the latch mechanism being characterized by having both manual and thermal actuation.

These and other objects and advantages residing in the construction, arrangement and combination of parts will be more fully understood and appreciated from a consideration of the following specification and appended claims:

In the drawing,

Fig. 1 is a side elevational view of one of the molded sections of the switch housing, showing the electrical parts inserted in their respective positions.

Fig. 2 is an end elevational view of the switch with the housing sections shown assembled,

Fig. 3 is a view similar to Fig. 1, showing the electrical parts in open position,

Fig. 4 is a fragmentary view illustrating the manual release of the thermal latch,

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Fig. 5 is a diagrammatic view of the switch showing the electrical path with the switch closed,

Fig. 6 is a view similar to Fig. 5 showing the operating parts of the switch in the open position, and

Fig. 7 is a fragmentary perspective view of the movable contacts and the associated thermal latch structure.

Referring to the drawing, the housing of the switch comprises two similar molded sections 10 and 12 of suitable insulating material divided along the line 14. The cavity 16, enlarged at 18, is defined between the sections 10 and 12 to receive the electrical actuating parts of the switch.

Conductor terminals 20 and 22 are embedded between the sections 10 and 12 and carry a fixed contact 24. Movable contacts 26 are supported on arms 28 of the thermal latch frame 30 piloted upon the member 32 and comprising end portions 34 to which the arms 28 are connected, side portions 36 act as guides, and U-shaped latching portions 38, preferably of bimetallic structure. The portions 38 in their unstressed condition converge slightly, as shown in Fig. 4, to engage the back of the shoulders 40 of the fixed tubular member 42.

As illustrated, the button 44 has a shank 46 pinned at 48 to the member 32. The member 32 has a free sliding fit with a fixed member 42. An enlargement 50 on the member 32 engages the converging sides of the bimetallic portions 38 when the button 44 is pulled outwardly into the dotted line position, shown in Fig. 4, to clear the shoulders 40. Once the shoulders 40 are cleared, the tension of the springs 52 will move the contacts 26 and their associated structure from the position shown in Fig. 1 to that shown in Fig. 3. In this manner the switch may be manually opened. The indicator band 54 on the shank 46 is exposed with the switch open. To close the switch manually, the button 44 is pushed inwardly from the position shown in Fig. 3 toward the left. The enlargement 50 abuts the end 34 to carry the contacts 26 and associated structure to the left, as viewed in Fig. 3, until the members 38 snap or latch behind the shoulders 40 as shown in Fig. 4. This movement results in the springs 52 being placed under tension and at the same time the contacts 24 and 26 are firmly engaged.

It will be understood that by making that portion of the bimetallic portions 38 which engages with the shoulders 40 of less cross sectional



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area and thus a greater electrical resistance than the remaining portions of the bimetallic structure in series with the contacts that the distortion due to increases in temperatures will be localized adjacent the portions engaging with the shoulders 40 to provide maximum deflection at the point of greatest advantage.

With the parts of the closed switch position shown in Fig. 1, excessive flow of current through the bimetallic portions 38 will result in a distortion moving the portions 38 from behind the shoulders 40, whereupon the tension of the springs 52 will open the switch by snapping into the position of Fig. 3.

The structure heretofore described provides a maximum separation of the contacts 24 and 26 with snap action on both manual and overload opening of the switch. It will be apparent that the electrical path is simultaneously opened at both sets of contacts 24 and 26, thus multiplying the actual air gap provided by the separation of the contacts. It will also be appreciated that the switch is simple in construction and operation and is capable of being inexpensively manufactured. Those skilled in the electrical art would readily appraise the present development as providing an improved push pull manual switch with overload protection capable of handling excessively high overloads without the destruction of the switch mechanism. Where unusual circumstances necessitate such action, the construction of the switch will permit manual overriding of the overload protection by holding the switch closed through pressure applied to the button 44 to position the same in its inwardly most position.

Having thus described my invention, what I consider to be new and wish to cover by Letters Patent is:

1. An electric switch with overload protection comprising a pair of fixed contacts, a pair of movable contacts in opposed relation to said fixed contacts, structure for supporting said movable contacts for movement toward and from said fixed contacts, said supporting structure including a pair of latch bimetallic members in series with said movable contacts, a fixed guide structure on which said first structure is supported and guided for movement toward and from said fixed contacts, and means on said fixed structure with which said bimetallic members engage on opposite sides thereof to latch said supporting structure with said contacts closed.

2. A manually opened and closed switch with overload protection, comprising two sets of contacts, one of said sets being movable, each contact of one set being engageable with a contact of the other set, means supporting said contacts, manually actuated means for the opening and closing operation of the switch and for holding said switch closed upon overload, spring means biased to move said movable set of contacts away from the other set of contacts, a thermally responsive and resettable latch arranged to hold said movable set of contacts against the other set of contacts against the action of said spring stressed means, said manually actuated means having a portion abutting said contact supporting means for holding said contacts engaged against an overload and releasing means for said latch actuated by said manual means upon movement thereof in a switch opening direction to release said movable contacts to the action of said spring means.

3. An electrical switch having overload protection comprising fixed contact means, movable

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contact means, a manual actuator operatively connected to said movable contact means for closing, opening and holding the switch closed upon overload, spring means operatively connected to said movable contact means stressed by said manual means upon switch closing movement, a thermal latch in series with both of said contact means for holding said contact means together against the action of said spring means, said manual actuator being constructed and arranged to abut said movable contact means to enable said contacts to be held engaged by said manual actuator upon overload, said operative connection between said manual actuator and said movable contact means having lost motion, and means upon said actuator for manually releasing said thermal latch to open the switch by releasing said movable contact means to the action of said spring means, said last mentioned means being operative during the lost motion between said contact means and said actuator.

4. An electric switch having overload protection comprising a fixed contact, a movable contact, a spring means continuously acting to separate the said contacts, a thermal latch deflected by overload and arranged in a series with said contacts and associated with said movable contact to move therewith as a unit, fixed structure including a shoulder with which said latch normally engages to hold said contacts together against the stress of said spring means, a manually actuated slidable member movable in one direction to actuate said latch and movable contact to stress said spring means and to bring said latch into engagement with said shoulder, and means associated with said actuating member and engageable with said latch upon movement of said actuating member in the opposite direction to force said latch out of engagement with said shoulder to separate said contacts.

5. A switch with overload protection comprising a slidable actuator, fixed structure supporting said actuator for axial movement and including shoulder portions located upon opposite sides of said actuator, a thermal latch having spaced latch portions adapted to engage with said shoulder portions, a fixed contact, a movable contact in series with said latch portions and connected with said latch for movement as a unit, a lost motion connection between said latch and said actuator including a portion for engaging with said unit upon movement of the actuator in one direction to engage said contacts and to bring said latch portions into engagement with said shoulder portions to hold said contacts engaged, said latch portions upon overload being constructed and arranged to be deflected out of engagement with said shoulder, another portion of said actuator upon movement in the opposite direction engaging said latch portions to move them in the direction of deflection upon overload and out of engagement with said shoulder portions, and continuously acting spring means for separating said contacts with said latch portions out of engagement with said shoulder portions.

6. A switch with overload protection comprising a slidable actuator, means supporting said actuator for axial movement including a shoulder portion, a fixed contact, a movable contact and thermal latch unit, a lost motion connection between said unit and said actuator including a portion engaging with said unit upon movement in one direction to move said unit in a direction to engage said contacts as well as to engage said latch with said shoulder, said latch upon over-



load being constructed and arranged to be deflected away from said shoulder, a portion of said actuator upon movement of said actuator in the opposite direction engaging with said latch to force the same in the direction of its overload deflection and out of engagement with said shoulder, and continuously acting spring means engaging with said unit for separating said contacts with said latch out of engagement with said shoulder.

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