

M. FUSS.
SAFETY SWITCH.
APPLICATION FILED APR. 13, 1906.

953,415.

Patented Mar. 29, 1910.

Fig. 1.

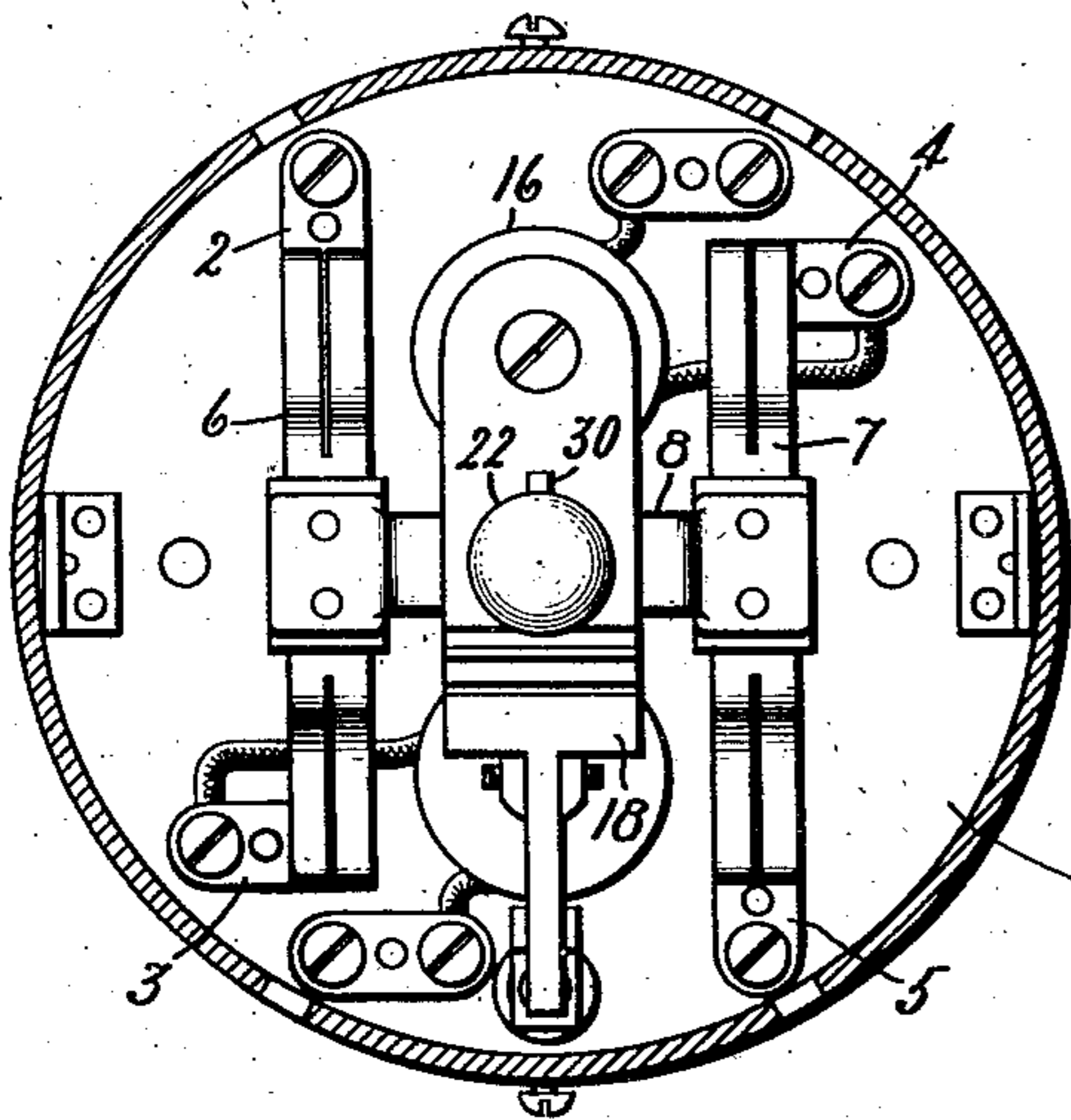


Fig. 2.

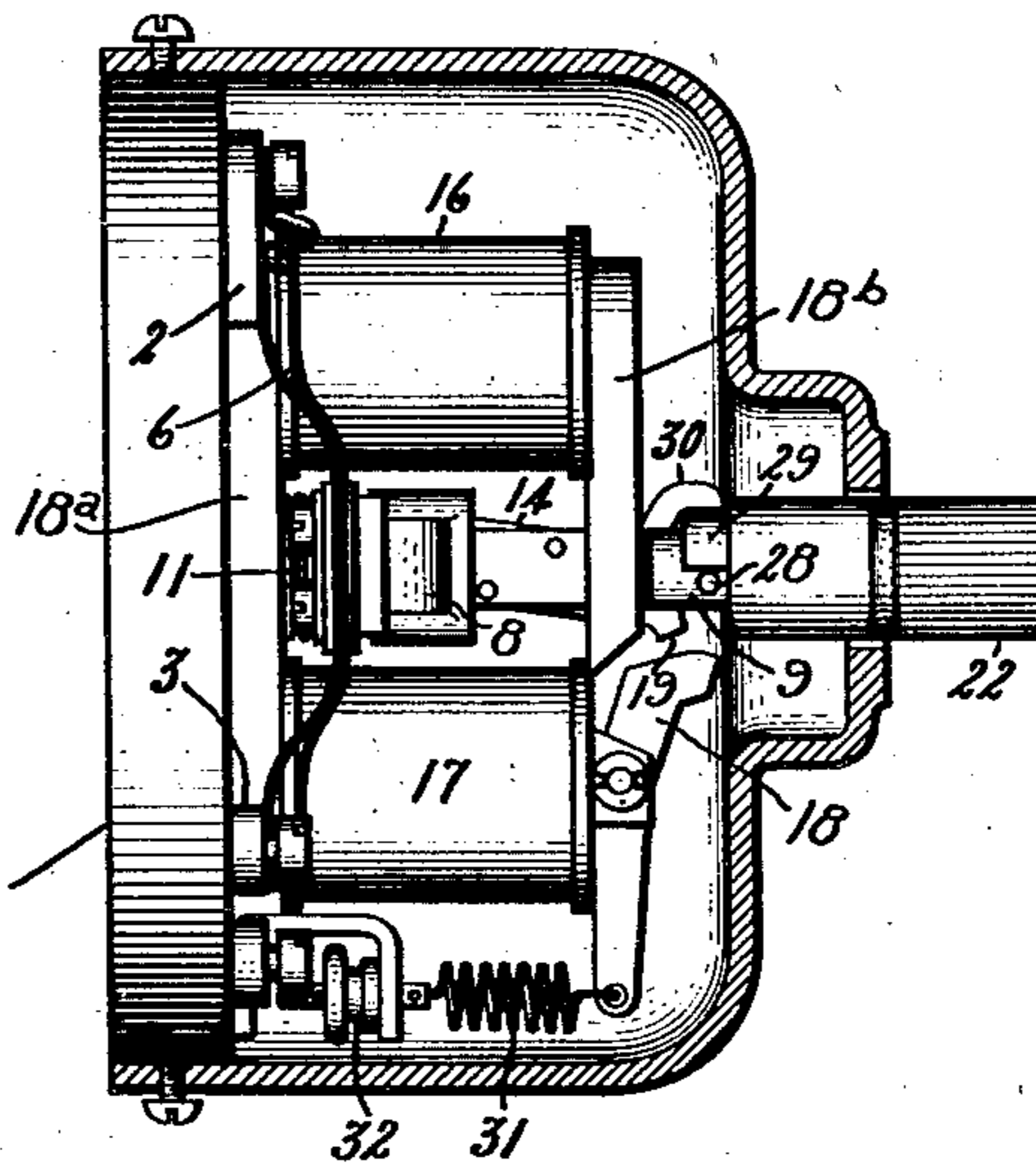


Fig. 3.

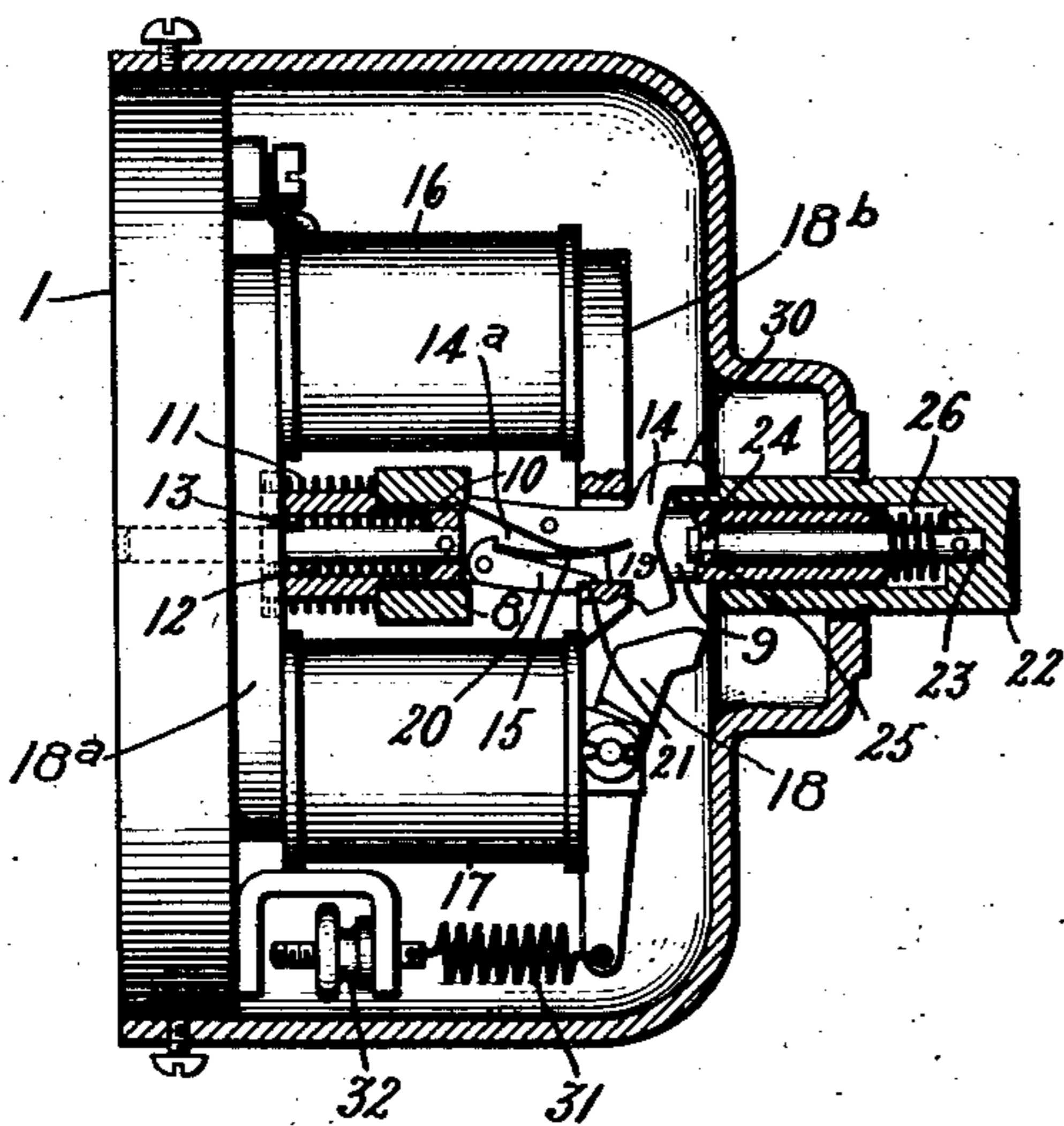


Fig. 4.

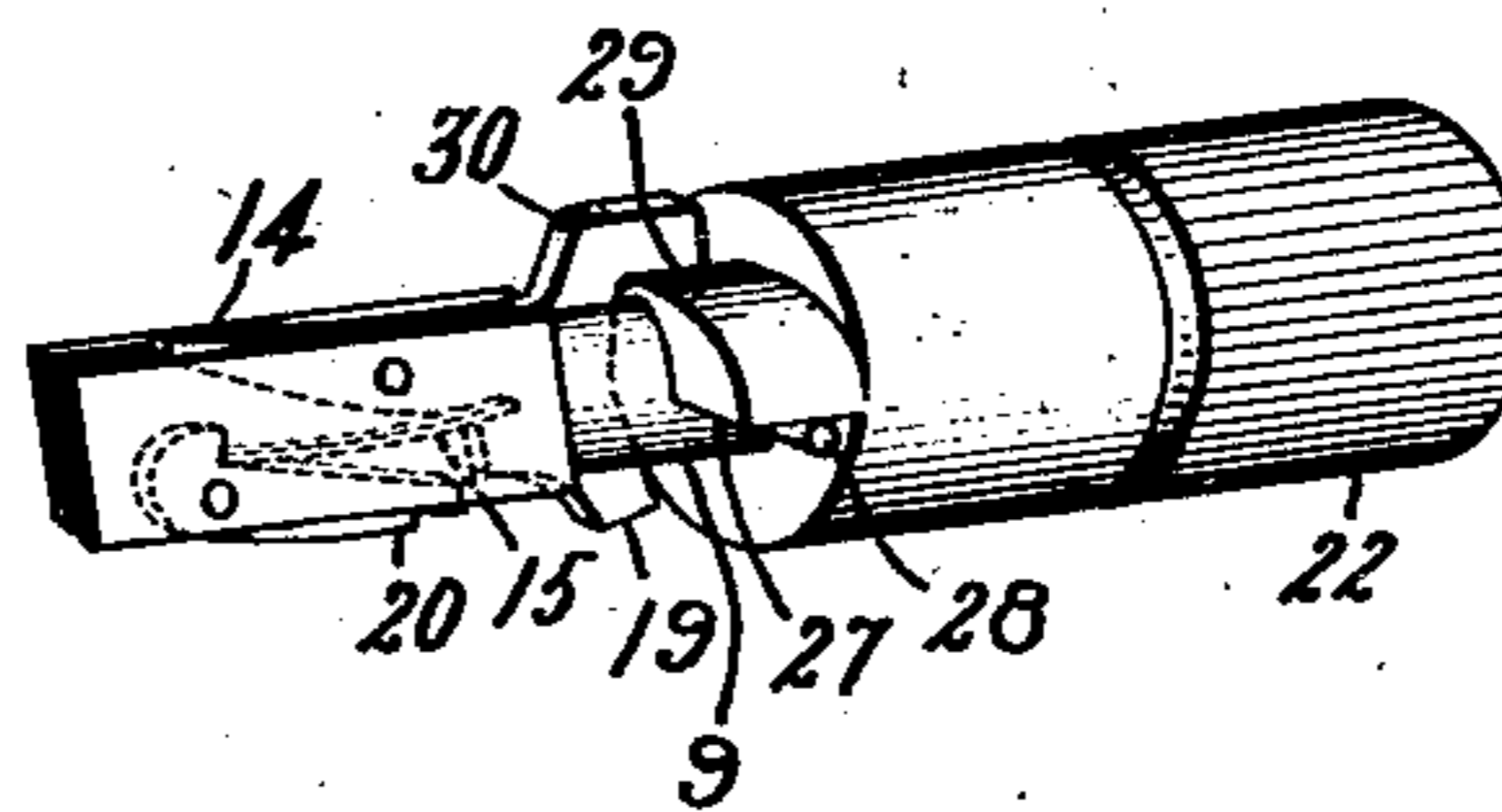
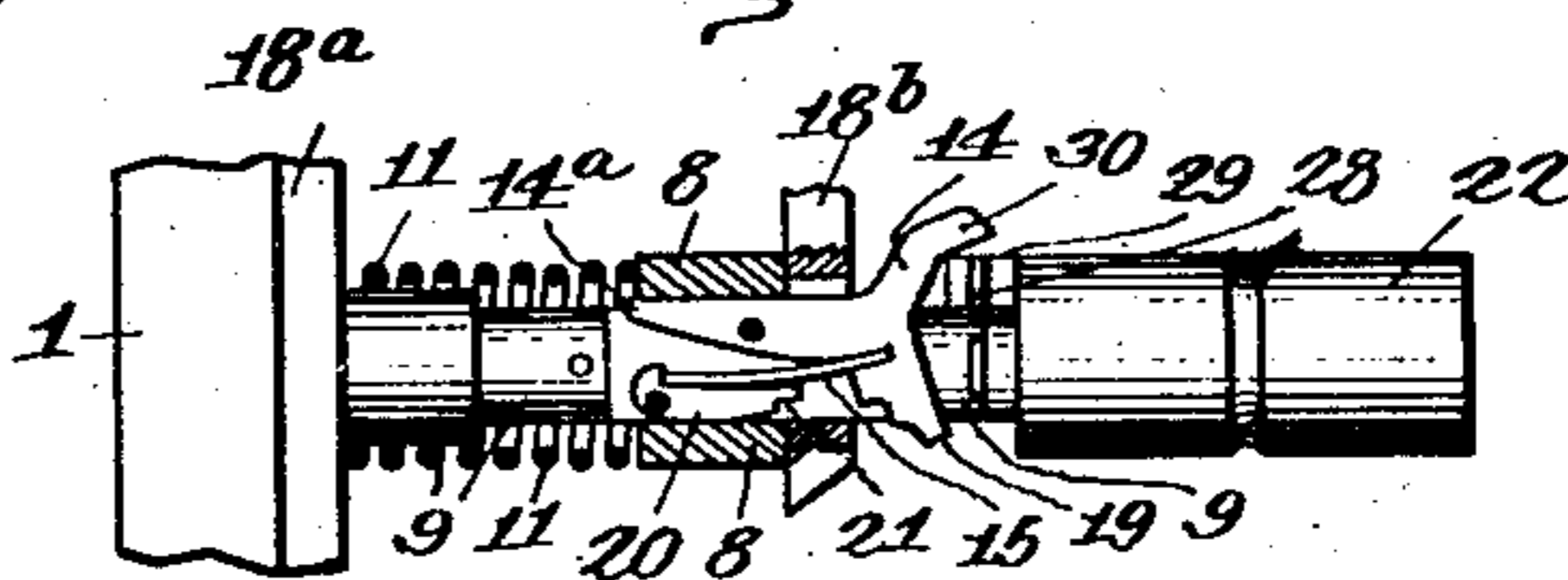


Fig. 5.



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UNITED STATES PATENT OFFICE.

MAX FUSS, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SAFETY-SWITCH.

953,415.

Specification of Letters Patent.

Patented Mar. 29, 1910.

Application filed April 13, 1906. Serial No. 311,447.

To all whom it may concern:

Be it known that I, MAX FUSS, a subject of the King of Prussia, residing at Berlin, Germany, have invented certain new and useful Improvements in Safety-Switches, of which the following is a specification.

The present invention relates to switches adapted to be operated or controlled manually to open and close a circuit, and to be operated automatically to interrupt the circuit under predetermined conditions in the circuit, and comprises a novel construction and arrangement of parts to be hereinafter described and particularly pointed out in the claims.

In the accompanying drawing, Figure 1 is a plan view of a preferred form of the present invention with part of the inclosing casing cut away; Fig. 2 is a side elevation of the same switch, the inclosing casing being shown in cross-section; Fig. 3 is a view similar to Fig. 2 except that the operating mechanism for the switch is shown in cross-section; Fig. 4 is a detail; Fig. 5 is a detail showing the movable switch member releasing a restraining catch on the operating handle.

Reference being had to the drawing, 1 indicates a base of insulating material which may conveniently be circular in shape. On the base are arranged fixed contact members 2, 3, 4 and 5.

6 and 7 are movable contact members consisting of spring fingers carried upon a movable yoke 8 and adapted, respectively, to bridge the fixed contacts 2, 3, and 4, 5. An operating stem 9 passes loosely through an opening 10 in the yoke 8, thus forming a support and guide for the movable contact members. A spring 11 surrounding the stem 9 and engaging with its opposite ends a fixed support and the under side of the yoke 8 tends normally to move and to maintain the movable contacts out of engagement with the fixed contacts. Similarly, a spring 12 seated within a recess 13 operates, when otherwise free, to move the stem 9 to the open position. The yoke 8 may be locked to the operating stem 9 by means of a catch 14 which is pivotally mounted within a recess 14^a in the stem and adapted to engage at its inner end with the outer face

of the yoke. The catch is normally held in its operative position by means of a spring 15. Thus it will be seen that when the catch is set, the stem may be moved in or out so as to carry with it the movable switch member; but when the catch is tripped the switch is opened through the action of the spring 11 which throws the movable switch members out of engagement with the fixed members. This opening movement of the switch member is independent of any movement of the stem so that the switch may open while the operating stem remains in its extreme inner position. The purpose in making the operating stem separate from the switch member itself is to permit the operating member to be rendered inoperative under predetermined circuit conditions, such, for example, as upon overload. In the form of the invention shown, the switch is adapted for automatic release on overload, and to this end a pair of electromagnets 16 and 17 in circuit with the switch members are provided. These magnets have a movable armature member 18 adapted, when a definite current value is reached, to be drawn against a nose 19 on the catch and thereby force the catch out of engagement with the contact-carrying yoke. Therefore, as soon as the overload condition is reached, the catch is tripped and the switch opened, and so long as the overload condition remains it is impossible to again set the switch. Any desired form of electromagnet may of course be used instead of the particular type shown, but the double magnet is convenient since the yoke pieces 18^a and 18^b may be made to serve as guides and supports for the operating stem as shown.

In order to hold the operating stem in the switch-closing position against the tension of the spring 12 as well as of the spring 11, a second catch 20, also arranged within the recess in the stem, is provided. This latter catch constantly tends to swing outward so as to engage beneath a fixed shoulder 21 when the stem is in the switch-closing position. When, however, the catch 14 is tripped, the yoke 8 as shown in Fig. 5, in moving outward, engages with the side of the catch 20, forcing it laterally out of en-

gagement with the fixed shoulder 21; and therefore the operating stem is returned to its extreme outer position wherein the catch 14 again locks the yoke to the stem. The switch is then ready to be reset provided the overload condition does not continue; but, in case the overload has not ceased, a momentary closing of the switch will energize the overload magnet and the switch will immediately be opened. Normally the switch is opened by turning a handle or button 22 on the outer end of the stem. This handle or button is held against axial movement relative to the stem by means of a rod 23 secured at one end to the handle or button and having an annular groove 24 near its other end which engages a pin 25 in the stem. The handle or button is therefore held against axial movement upon the stem but may revolve thereon. A torsion spring 26, arranged within the handle and having one end fastened thereto and its other end fastened to the stem, normally holds the handle in a position wherein a shoulder 27 abuts against a pin 28 on the stem. When the handle is turned against the tension of the spring, a cam 29, formed on the lower end of the handle, engages a projection 30 on the catch 14 and forces the catch out of engagement with the movable switch member. During normal operation of the switch, therefore, the handle or button is pushed inward to set the switch and is rotated to cause the switch to open; and since the opening of the switch is entirely independent of the outward movement of the button, there is no danger of causing the switch to open slowly due to holding the handle depressed or allowing it to move outward slowly. The movable armature is normally held out of engagement with the catch by means of a spring 31 and, by adjusting the tension of the spring through the thumb-nut 32, the switch may be made to release on any predetermined load.

It will now be seen that the present invention provides in a simple and compact structure a switch mechanism wherein the movable member is disengaged from the fixed member with a snap action at all times, both during normal and abnormal conditions, and wherein it is impossible to maintain the contacts in engagement during the predetermined abnormal circuit conditions.

While the construction illustrated constitutes the preferred form of the present invention, it will of course be understood that various changes may be made in the constituent elements and in their organization, without departing from the scope of the present invention as viewed in its broader aspects.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A circuit breaker comprising a movable

contact, a longitudinally movable operating stem on which said contact is slidably mounted, a latch for disengageably connecting said contact to said stem, an electroresponsive tripping device for actuating said latch to release said contact from said stem, and restraining means for locking said stem immovable in switch closing position.

2. A circuit breaker comprising a movable contact, a longitudinally movable operating stem for moving said contact to close the switch, said contact and said stem being relatively movable longitudinally of said stem, a disengageable latch for locking said contact to said stem, electroresponsive means for actuating said latch to release said contact, and a catch arranged to hold said operating stem immovable and thereby hold the switch closed.

3. A circuit breaker comprising cooperating relatively movable contacts, a movable operating member on which one of said contacts is slidably mounted, a latch for locking said contact to said operating member, tripping means for actuating said latch to release said contact from said member, and restraining means for holding said member immovable in switch closing position, said means being operated by said contact as the switch opens to release said member.

4. A switch comprising cooperating fixed and movable members, an operating handle mounted to move in a definite path, a latch for connecting said operating handle to the movable switch member, a catch for locking the handle in the switch-closing position, a movable member mounted on said handle to move transversely of the path of said handle into engagement with said latch to trip it and thereby permit said switch member to move.

5. A switch comprising cooperating fixed and movable members, an operating handle mounted to reciprocate, a latch for connecting said operating handle to the movable switch member, a catch for locking said handle in the switch-closing position, a movable grip mounted on said handle to rotate in a plane transverse to the plane of movement of said handle and provided with a cam for tripping the latch, and means associated with the movable switch member for tripping the catch.

6. A circuit breaker comprising cooperating relatively movable contacts, a spring for separating said contacts, a movably mounted operating member on which one of said contacts is slidably mounted, a spring for moving said member to the open position, a disengageable latch for rigidly connecting said contact to said member, electroresponsive means for tripping said latch to free said contact from said member, and a catch for locking said member immovable to hold said

contact in switch closing position, said catch being tripped by the movable contact as the switch opens.

7. A switch comprising a cooperating fixed and movable member, a spring for moving said movable member out of engagement with the fixed member, an operating stem mounted for longitudinal movement, a catch for connecting said operating stem to said movable switch member, a second catch for locking said operating stem in the switch-closing position, and a sleeve mounted on said handle to rotate in a plane transverse to the plane of movement of said handle to trip the first-named catch.

8. A switch comprising cooperating fixed and movable members, a spring for moving said movable member out of engagement with the fixed member, an operating stem mounted to reciprocate, a catch for connecting said operating stem to said movable switch member, a second catch for locking said stem in the switch-closing position, a member mounted on said stem to move in a plane transverse to the movement of said stem and thereby trip the first-named catch, and an electromagnet also arranged to trip the first-named catch under determinate circuit conditions.

9. A circuit breaker comprising cooperating relatively movable contacts, an operating member mounted to reciprocate and on which one of said contacts is slidably mounted, a latch for locking said contact to said member, a spring for separating said contacts, a catch arranged to lock said member immovable in the switch closing position, means rotatably mounted on said member for tripping said latch, and an electromagnet arranged to trip said latch in response to abnormal current in the circuit.

10. In a switch, a fixed contact member, an operating device arranged to reciprocate toward and from said contact member, a movable contact member slidably mounted on said operating device, a spring for moving said movable contact member out of engagement with the fixed contact member, a catch for locking said movable contact member to said operating device, an electromagnet for releasing said catch under determinate circuit conditions, and means controlled by said movable contact member arranged to hold said operating device in the switch-closing position.

11. In a switch, a fixed contact member, an operating device arranged to reciprocate to and from said contact member, a movable contact member slidably mounted on said operating device, a spring for moving said movable contact member out of engagement with the fixed contact member, a catch for locking said movable contact member to said operating device, an electromagnet for re-

leasing said catch when the circuit is overloaded, means on said operating device also arranged to release said catch, and means controlled by said movable contact member arranged to hold said operating device in the switch-closing position.

12. In a switch, a switch contact member, an operating device arranged to reciprocate toward and from said contact member, a movable contact member slidably mounted on said operating device, a spring for moving said movable contact member out of engagement with the fixed contact member, a catch carried by said operating device for locking said movable contact member to said operating device, a movable portion on said handle for releasing said catch, and a second catch carried by said operating device for locking said operating device in switch-closing position, said latter catch having a portion arranged in the path of movement of the movable contact member.

13. A circuit breaker comprising cooperating relatively movable contacts, a reciprocating operating member on which one of said contacts is slidably mounted, a latch for locking said contact to said operating member, a spring for separating said contacts, a second spring for moving said operating member out of switch closing position, electroresponsive means for tripping said latch to release said contact from said member, and restraining means for locking said operating member immovable in switch closing position against the tension of said springs, said restraining means being controlled by said movable contact.

14. In a switch, a movable switch member, an operating handle arranged to be moved axially to close the switch, a latch between the handle and the switch released by the rotation of the handle, restraining means cooperating with said handle to hold the switch closed and means operative upon release of the latch by said handle to move said movable switch member axially of the handle to open the switch.

15. In a switch, fixed and movable contact members, an operating member for closing the switch upon an axial movement, a latch between the operating member and the movable contact member, a handle revolvably mounted on the outer end of said operating member to release said latch, restraining means cooperating with said handle to hold the switch closed and means for moving said movable contact member axially of the operating member to open the switch when the latch is released.

16. A circuit breaker comprising cooperating relatively movable contacts, an operating member for said contacts mounted to move in a definite path to close said circuit breaker and to move transversely of said

path to trip said circuit breaker, restraining
means for holding said operating member
in circuit closing position, a latch for dis-
engageably connecting one of said contacts
5 to said operating member and associated
with said operating member to be tripped
by a transverse movement of said member,
and an electroresponsive tripping device for

actuating said latch to permit said contacts
to separate. 10

In witness whereof, I have hereunto set
my hand this 21st day of March, 1906.

MAX FUSS.

Witnesses:

MAX HAMBURGER,
JULIUS RUMLAND.