

997,332.

2 SHEETS--SHEET 1.

*Fig. 10.*

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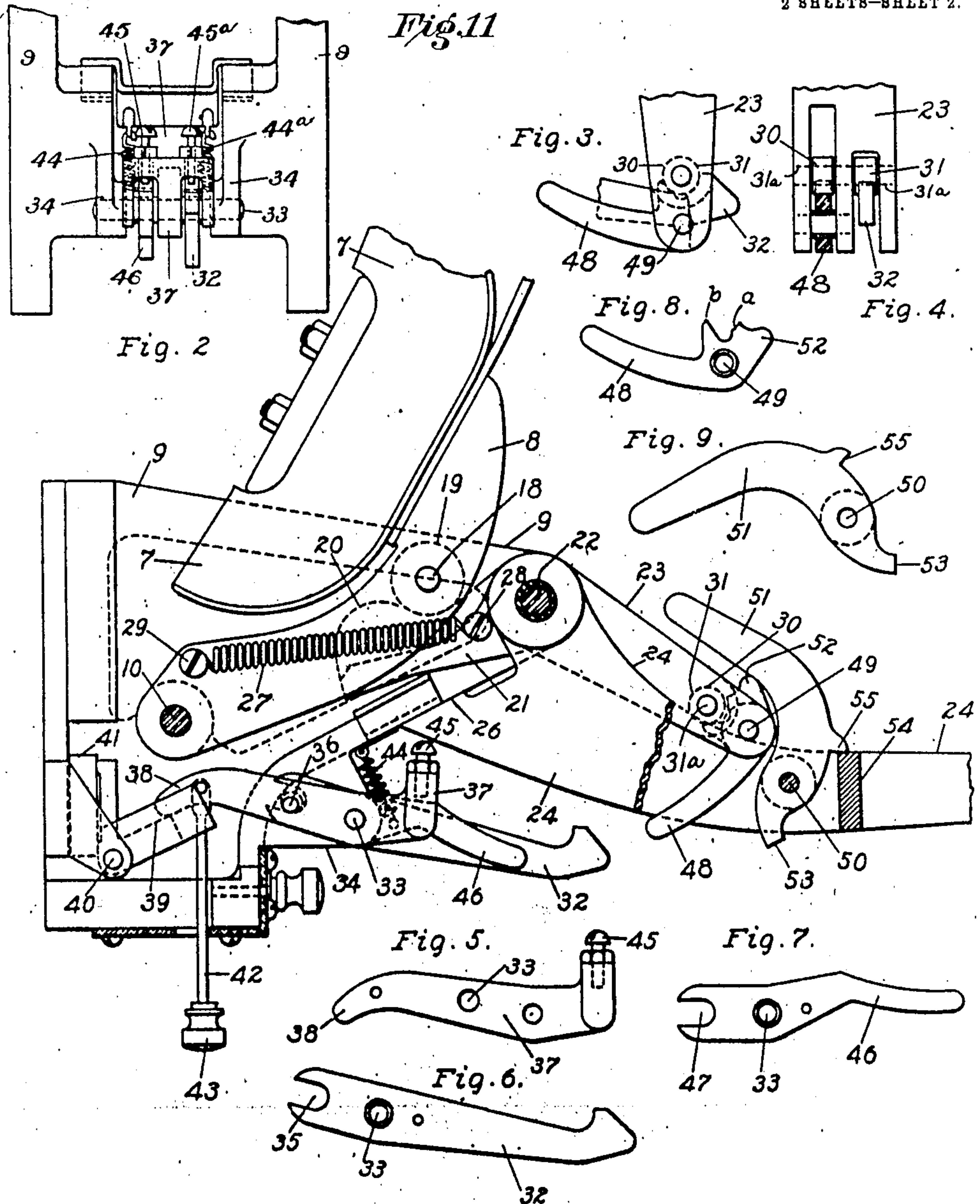
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CIRCUIT BREAKER.  
APPLICATION FILED MAY 25, 1910.

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Patented July 11, 1911

2 SHEETS-SHEET 2.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## CIRCUIT-BREAKER.

997,332.

Specification of Letters Patent.

Patented July 11, 1911.

Application filed May 25, 1910. Serial No. 563,366.

*To all whom it may concern:*

Be it known that I, WILLIAM M. SCOTT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Circuit-Breaker, of which the following is a specification.

My invention relates to electric switches for controlling circuits carrying either direct or alternating currents, and more particularly to an electrically controlled or actuated switch or circuit breaker which shall interrupt or otherwise control a circuit.

My invention resides in a new form of electric switch or circuit breaker of the type which cannot be brought to or locked in circuit closing or other normal position during the continuance or existence of an abnormal electrical condition; and my invention may be termed a new type of "non-closable" switch or circuit breaker.

My invention resides in a "non-closable" switch or circuit breaker which is sensitively or delicately locked, though none the less firmly and securely locked, a dog or compression latch being used for this purpose.

I have found that the employment of such a dog in a "non-closable" switch or circuit breaker such as illustrated, or the equivalent thereof, renders the same when locked secure against accidental or undesired release, and yet so sensitive as to respond with utmost certainty and quickness to desired electrical controls.

For an illustration of one of the forms my invention may take, reference is to be had to the accompanying drawings, in which:

Figure 1 is a side elevational view of my improved switch or circuit breaker. Fig. 2 is a fragmentary view, in side elevation, and on larger scale, of the control parts when the switch or circuit breaker is in open position. Fig. 3 is a side elevational view of the operating member for the movable contact member, a part of the dog actuator being broken away. Fig. 4 is a fragmentary view at right angles to Fig. 3 showing the two locking rollers. Fig. 5 is a side view of a member of the tripping mechanism. Fig. 6 is a side view of a latch. Fig. 7 is a side view of a member of the tripping mechanism. Fig. 8 is a side view of the dog actuator. Fig. 9 is a side view of the dog. Fig. 10 is a fragmentary view illustrating

modified operating means. Fig. 11 is a fragmentary view, in end elevation, of parts of the tripping and control mechanism.

Referring to the drawings, 1 is any suitable base of insulating material, such as slate or marble, and may be a switchboard, upon which are secured the main terminal blocks 2 and 3 with which communicate the conducting studs 4 and 5, respectively, extending through the base or switchboard 1, nuts 6 being provided as usual. The laminated contact member 7 is adapted to bridge the main contacts 2 and 3 to close the circuit. The main movable contact 7 is secured upon the arm 8 pivoted to the bracket or housing 9 at 10.

Mounted upon the upper main terminal block 2 and in electrical communication therewith is the metallic shunt contact 11 with which coöperates the movable metallic shunt contact 12 supported upon the arm 8. And above the metallic shunt contact 11 and in electrical communication with the terminal block 2 is the stationary carbon shunt contact 13 pivoted to the bracket 14 at 15. Coöperating with the stationary carbon shunt contact 13 is the movable carbon shunt contact 16 carried by the arm 8, the contacts 12 and 16 being in permanent electrical communication with the lower main contact 3 through the flexible conductor 17.

Pivoted at 18 upon the arm 8 is the roller 19 engaged by the cam surface 20 upon the switch operating member 21 pivoted to the bracket or housing at 22 and having the extension 23. The actuator 24 is pivoted at 22 independently of the operating member 21 and carries an operator's grip or handle 25. On the inner portion of the actuator 24 is a stop 26 adapted to engage the under side of the bracket or housing 9. A spring 27 is connected at its one end at 28 to the operating member 21 and at its other end at 29 to the pivoted arm 8, and when the parts are in circuit closing position the spring 27 is under tension.

Carried by the operating member 23 are two rollers 30 and 31. With the roller 31 is adapted to engage the latch 32 pivoted at 33 on a lug or ear 34 upon the bracket or housing 9. A tension spring 44 is connected to latch 32 and to the housing 9 holds latch 32 raised. The latch 32 extends to the left beyond the pivot 33 and has formed therein



for limiting its movement the jaw 35 loosely embracing the pin 36 carried by the housing. Mounted upon the pivot 33 is the member 37 having a rearwardly extending tail 38 disposed in the path of travel of the member 39 pivoted at 40 and carrying the armature 41 of an electro-control magnet responsive to any desired current or circuit condition, but here shown, by way of example merely, as that of an overload magnet. Pivoted to the tail 38 is a rod 42 having the handle 43 for manually tripping the switch or breaker. A second tension spring 44 is connected at one end to the bracket or housing 9 and at its other end to the member 37 at a point to the right of the pivot 33. At its right hand end the member 37 carries the adjustable screws 45, 45<sup>a</sup>, screw 45<sup>a</sup> adapted to strike upon the top of the latch 32 and screw 45 upon the top of the member 46 pivoted at 33 and having a rearward extension provided with a jaw 47, loosely embracing the pin 36, for limiting its movement. In the path of movement of the member 46 is disposed the tailed member 48 pivoted at 49 on the operating member 23 below the roller 30. Pivoted at 50 on the actuator 24 is the dog or compression latch 51 whose end is adapted to rest against the roller 30 at a point slightly below a straight line passing through centers of roller 30 and pivot 50 and above the projection 52 upon the member 48, to operatively connect the actuator 24 and operating member 23. The dog actuator 48 is provided also with two stops *a* and *b*, adapted to engage the roller 30, thus allowing the member 48 a certain amount of movement about the pivot 49, the stop *a* limiting the movement in one direction, while the stop *b* limits the movement in the other direction. The dog 51 has a projection 53 adapted to engage the stop or web 54 upon the actuator 24 to limit the counter clockwise movement of the dog 51. It also has a stop 55 adapted to engage the top of the web 54 to limit its clockwise movement.

The operation is as follows: With the parts in circuit closing position, as shown in Fig. 1, the dog 51 is in engagement with the roller 30 and the latch 32 is in engagement with roller 31 holding the parts locked in the position shown. When the armature 41 is attracted by the overload magnet, or in response to any other predetermined electrical condition in a circuit, the member 39 rotates about its pivot 40 in a counter clockwise direction striking the under side of the tail 38 of the member 37 rocking the same in opposition to spring 44 in a clockwise direction about its pivot 33 and causing a screw 45 at its outer end to strike upon the top of the member 46 rocking it in a clockwise direction about its pivot 33 and causing it to strike the upper side of the member

48, rocking the same in a counter clockwise direction about its pivot 49 causing the lug 52 to raise the nose or rounded end of dog 51 from below and across the imaginary straight line joining the center of pivot 50 and the center of roller 30, thus unlocking the actuator 24 from the operating member 23. A screw 45<sup>a</sup> upon the member 37 strikes upon the top of latch 32 rocking it in opposition to its spring 44 in a clockwise direction about its pivot 33 and disengaging it from roller 31. When these operations have taken place, the circuit breaker or switch is free to open, the spring 27 contracting and rotating the cam member 21 in a counter clockwise direction about its pivot 22, the arm 8 then rotating in a clockwise direction about its pivot 10. The main movable contact 7 then separates from the terminal blocks 2 and 3, thereafter the metallic shunt contact 12 separates from metallic shunt contact 11, and finally shunt carbon 16 separates from shunt carbon 13, the final arc taking place at these carbons. The parts continue their opening movement until they reach the position shown in Fig. 2, where the actuator 24 is disconnected from the operating member 23, and the operating member 23 is also unlatched from the latch 32 carried by the frame or base. The actuator 24 has remained in the same position during the opening movement, the operating member 23 being first disconnected from the actuator 24 by actuation of the dog 51, and immediately thereafter or simultaneously the latch 32 has unlocked the operating member 23 from the base.

To close the switch or circuit breaker, the operator lifts the actuator 24 by handle 25, rotating the same in a counter clockwise direction about the pivot 22. In so doing the dog 51 will rotate in a counter clockwise direction about its pivot 50 and its end will engage back of the roller 30 and rest against the lug 52, the stop *b* of member 48 engaging the side of the roller 30. With the parts in this position the actuator 24 and operating member 23 are again operatively connected and the operator depresses the handle 25, carrying the actuator 24 and operating member 23 in a clockwise direction about pivot 22, causing the cam surface to press against the roller 19 upon the pivoted arm 8, forcing that arm and the parts carried thereby toward the stationary contacts. First, the carbons 16 and 13 engage, thereafter the metallic shunt contact 12 engages metallic shunt contact 11, and finally, the bridging member 7 engages main contacts 2 and 3, thus fully closing the circuit. When the parts have reached this position the latch 32 engages roller 31 and locks the parts in the position shown in Fig. 1. If, however, during the closing movement above described, the abnormal electrical condition



still exists or obtains, the member 37 will be rotated at first closure of the circuit or will have remained rotated to such position as to depress the member 46 into the path of travel of the member 48 as it approaches the position shown in Fig. 1 due to the closing movement. The member 48 will then engage the depressed member 46 with the result that the member 48 will be again rotated in a counter clockwise direction about its pivot 49, causing the lug 52 to shift the dog 51 beyond the roller 30, again unlocking the actuator 24 from the operating member 23, leaving the parts free to fly to open circuit position, inasmuch as the position had not been reached where latch 32 would engage roller 31. It is apparent, therefore, that on attempting to close the circuit breaker during the existence or continuance of a predetermined electrical condition, the parts will fly to open circuit position and the operator is robbed of control, in effect preventing closure of the switch or breaker.

While I have shown a cam as an operating means to shift the arm 8 toward circuit closing position, it is to be understood that a toggle may be employed, as, for example, pivoting two toggle links together, one toggle link pivoted at 22 and the other to the arm 8, as shown in Fig. 10.

What I claim is:

1. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a gravity controlled dog pivoted upon said actuator and adapted to engage said roller at a point slightly to one side of the line joining said pivot and the center of said roller, and means for shifting said dog across said line, said operating member moving said dog upon its pivot during the opening movement of said switch.

2. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a dog pivoted upon said actuator and adapted to thrust against said roller, a dog actuator, and lugs on said dog actuator adapted to engage said roller to limit the movement of said dog actuator.

3. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted on said actuator and thrusting against said operating member to move said operating member with said actuator, and a dog actuating member upon said operating member.

4. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller upon said operating member, a dog pivoted

on said actuator and thrusting against said roller, and a dog actuating member pivoted on said operating member and adapted to disengage said dog from said roller.

5. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a member having a rounded surface upon said operating member, a dog pivoted on said actuator and thrusting against said rounded surface, and a dog actuating member pivoted on said operating member and adapted to disengage said dog from said rounded surface.

6. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted upon said actuator and thrusting against said operating member, a dog actuating member pivoted upon said operating member, and means for limiting the pivotal movement of said dog actuating member.

7. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a dog pivoted on said actuator and adapted to engage said roller, a dog actuating member pivoted upon said operating member, a projection on said dog actuating member for engaging said dog, and means for limiting the pivotal movement of said dog actuating member.

8. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a dog pivoted on said actuator and adapted to engage said roller, means for limiting the pivotal movement of said dog, a dog actuating member pivoted upon said operating member, a projection on said dog actuating member for engaging said dog, and means for limiting the pivotal movement of said dog actuating member.

9. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a dog pivoted upon said actuator and adapted to engage said roller at a point slightly to one side of the line joining said pivot and center of said roller, a dog actuator upon said operating member, means for preventing the movement of said dog in one direction beyond said position, and means for shifting said dog across said line.

10. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted on said actuator and engaging said operating member, a base, a latch locking said operating member to said base, and means on said operating member for actuating said dog.

11. In an electric switch, the combination



with a movable contact member, of an operating member therefor, an actuator, a dog pivoted on said actuator and thrusting against said operating member, a dog actuator upon said operating member, a base, a latch locking said operating member to said base, and means for actuating said dog actuator and latch in succession.

12. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted to said actuator and thrusting against said operating member, a dog actuator on said operating member, and lugs on said dog adapted to engage said actuator to limit the movement of said dog.

13. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller pivoted to said operating member, a latch pivoted to said actuator and engaging said roller, a latch actuator pivoted to said operating member, and projections on said latch actuator adapted to engage said roller to limit the movement of said latch actuator.

14. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a latch pivoted to said actuator and engaging said operating member, and a latch actuating member upon said operating member.

15. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a latch pivoted to said actuator and engaging said operating member, a latch actuating member pivoted upon said operating member, a base, and electro-responsive means upon said base controlling said latch actuating member.

16. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a projection on said operating member, a dog pivoted on said actuator and thrusting against said projection, and a dog actuating member mounted upon said operating member, and lugs on said dog actuating member adapted to engage said projection to limit the movement of said dog actuating member.

17. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted to said actuator and having a rounded end thrusting against said operating member, a base, a latch upon said base engaging said operating member, and a dog actuator on said operating member.

18. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller upon said operating member, a dog pivoted to said actuator and having a rounded end thrusting against said roller, a base, and a latch upon said base engaging said operating member, said operating member moving

said dog upon its pivot during the opening movement of said switch.

19. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted to said actuator and having a rounded end thrusting against said operating member, a base, a hook latch upon said base engaging said operating member, and a dog actuator on said operating member.

20. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller upon said operating member, a dog pivoted to said actuator and thrusting against said roller, a base, a hook latch upon said base engaging said operating member, and a dog actuator on said operating member.

21. In an electric switch, the combination with a pivoted arm, of a movable contact member carried thereby, a pivoted operating member for actuating said pivoted arm, an actuator pivoted independently of said operating member, a roller upon said operating member, a dog pivoted on said actuator and thrusting against said roller, and a dog actuator on said operating member.

22. In an electric switch, the combination with a pivoted arm, of a movable contact member carried thereby, a pivoted operating member for actuating said pivoted arm, an actuator pivoted independently of said operating member, a roller upon said operating member, a dog pivoted on said actuator and having a rounded end thrusting against said roller, a base, and a latch pivoted on said base and engaging said operating member, said operating member moving said dog upon its pivot during the opening movement of said switch.

23. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a dog pivoted on said actuator and adapted to engage said roller, a dog actuating member, a projection on said dog actuating member for engaging said dog, and lugs on said dog actuating member adapted to engage said roller to limit the movement of said dog actuating member.

24. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller on said operating member, a dog on said actuator engaging said roller, a dog actuating member upon said operating member, and means for preventing movement of said dog in one direction past engaging position with said roller.

25. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a dog pivoted to said actuator and thrusting against said operating member, a dog actuator



ator pivoted on said operating member, and means for limiting the pivotal movement of said dog actuator.

26. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a roller upon said operating member, a dog pivoted to said actuator and thrusting against said roller, a dog actuator on said operating member limited in its movement by said roller, a base, a latch for locking said operating member to said base, and electro-magnetic means for controlling said latch and said dog actuator.

27. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a thrust dog connection for causing said operating member to move with said actuator, a dog actuator movable with said operating member and said actuator when they are connected, a base, and means on said base for actuating said dog actuator to disconnect said actuator from said operating member, said operating member in its movement independent of said actuator raising said thrust dog against gravity.

28. In an electric switch, the combination with a base, of a movable contact member, an operating member therefor, an actuator, a dog on said actuator thrusting against said operating member, a dog actuating member upon said operating member, a tail on said dog actuating member, electro-responsive means, and a member on said base movable by said electro-responsive means into the path of travel of said tail.

29. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a gravity controlled dog pivoted on said actuator and adapted to thrust against said operating member to move said operating member with said actuator, said operating member moving said dog against gravity during the opening movement of said switch.

30. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a gravity controlled dog pivoted on said actuator and adapted to thrust against said operat-

ing member to move said operating member with said actuator, said operating member moving said dog against gravity during the opening movement of said switch, and a stop for limiting the movement of said dog by said operating member.

31. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a gravity controlled dog pivoted on said actuator and adapted to thrust against said operating member to move said operating member with said actuator, and means for actuating said dog to trip said switch, said operating member during the opening movement of said switch moving said dog against gravity, said dog adapted to be lowered by gravity upon movement of said actuator independently of said operating member to thrust against said operating member.

32. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a gravity controlled dog pivoted on said actuator and adapted to thrust against said operating member to move said operating member with said actuator, and a dog actuating member carried by said operating member, said dog actuating member adapted to move said dog against gravity during the opening movement of said switch.

33. In an electric switch, the combination with a movable contact member, of an operating member therefor, an actuator, a gravity controlled dog pivoted on said actuator and adapted to thrust against said operating member to move said operating member with said actuator, a dog actuating member carried by said operating member, said dog actuating member adapted to move said dog against gravity during the opening movement of said switch, and a stop limiting said movement of said dog by said dog actuating member.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

WILLIAM M. SCOTT.

Witnesses:

ELEANOR T. McCALL,  
ANNA E. STEINBOCK.