Nov. 7, 1944. G. R. RUNKE 2,362,312

SWITCH CONSTRUCTION

Filed March 19, 1943 5 Sheets-Sheet 1

Fig. 2

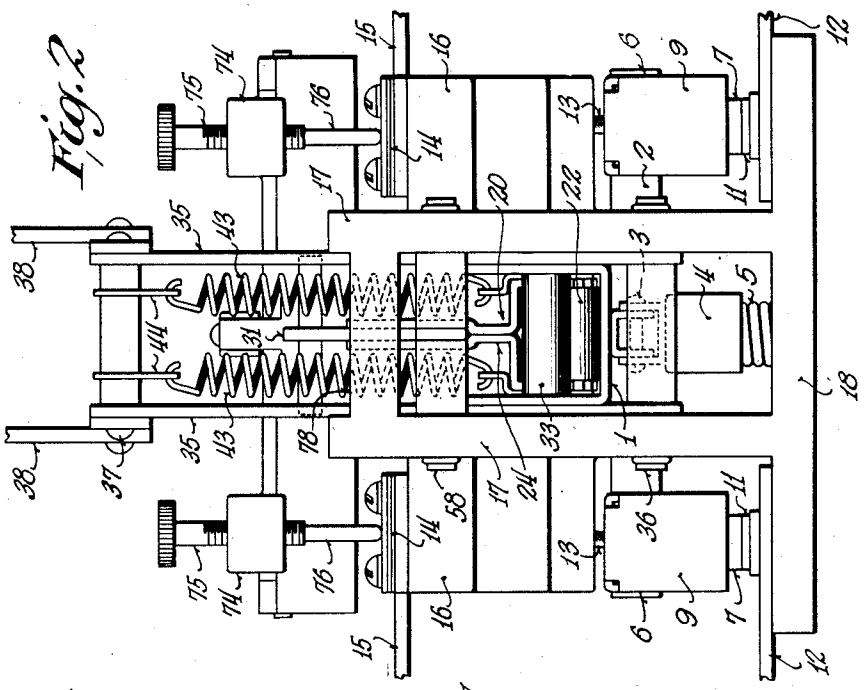
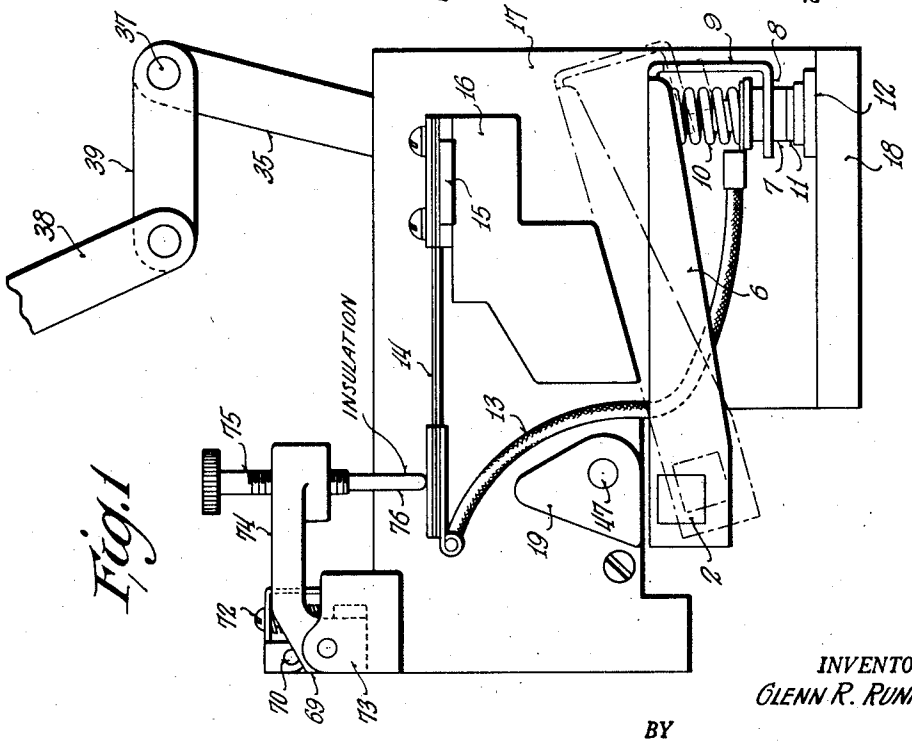


Fig. 1



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SWITCH CONSTRUCTION

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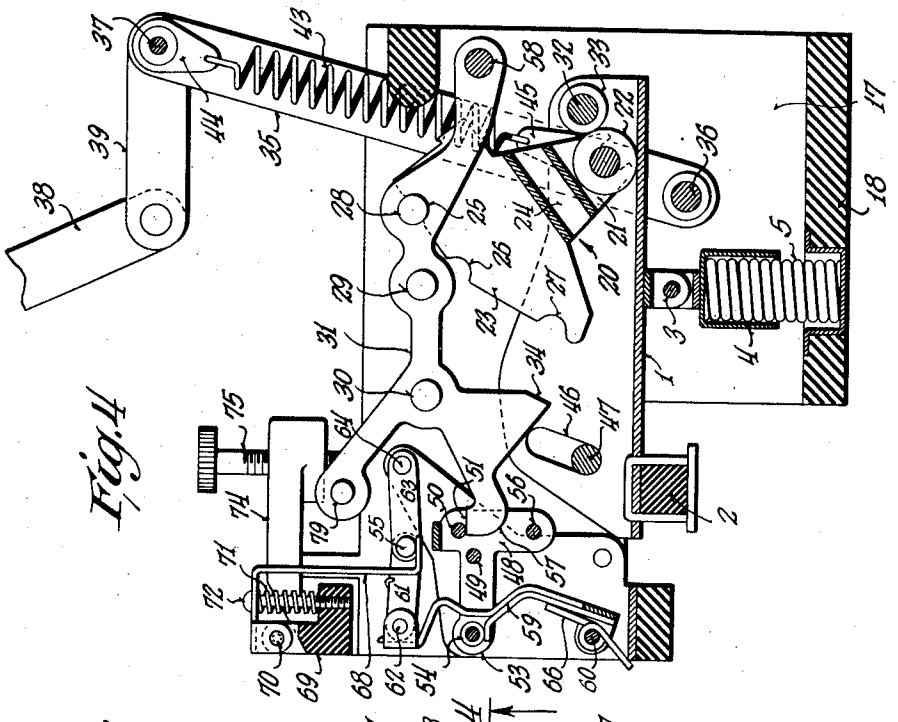


Fig. 4

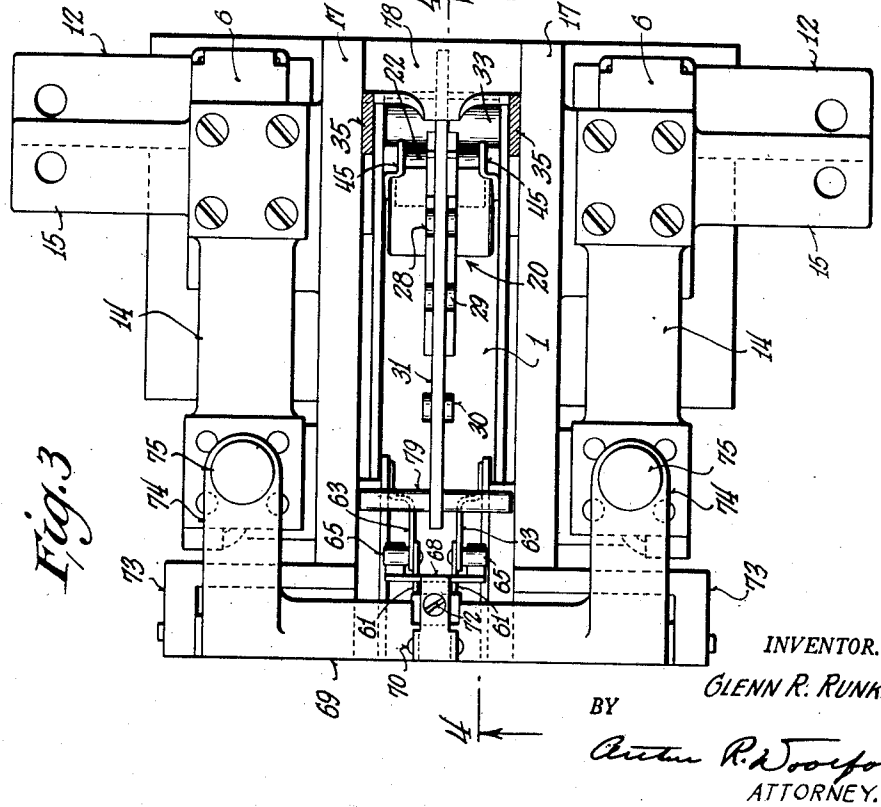


Fig. 3

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SWITCH CONSTRUCTION

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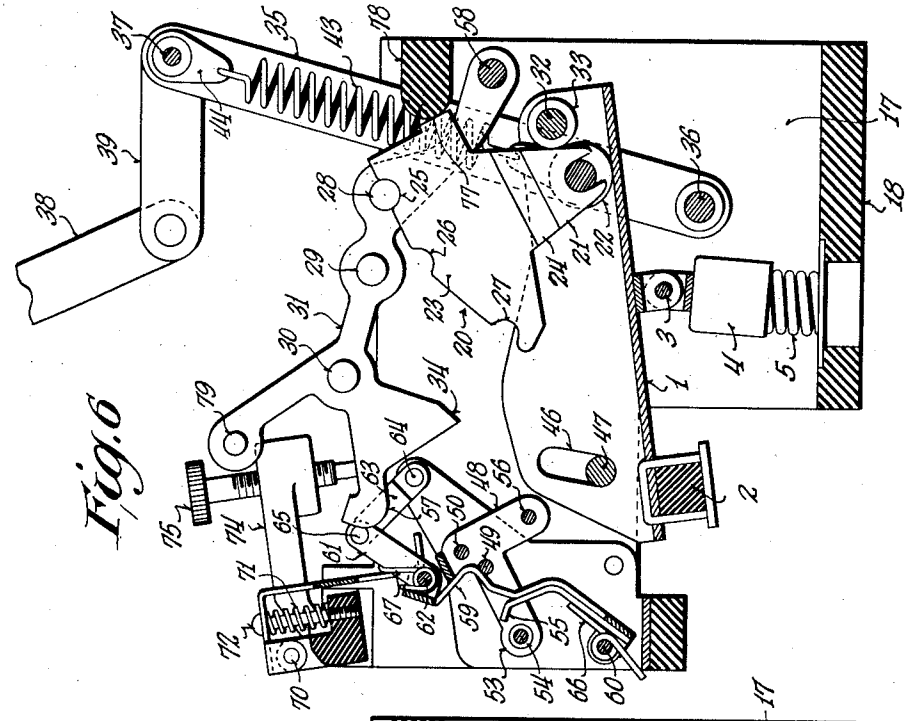


Fig. 6

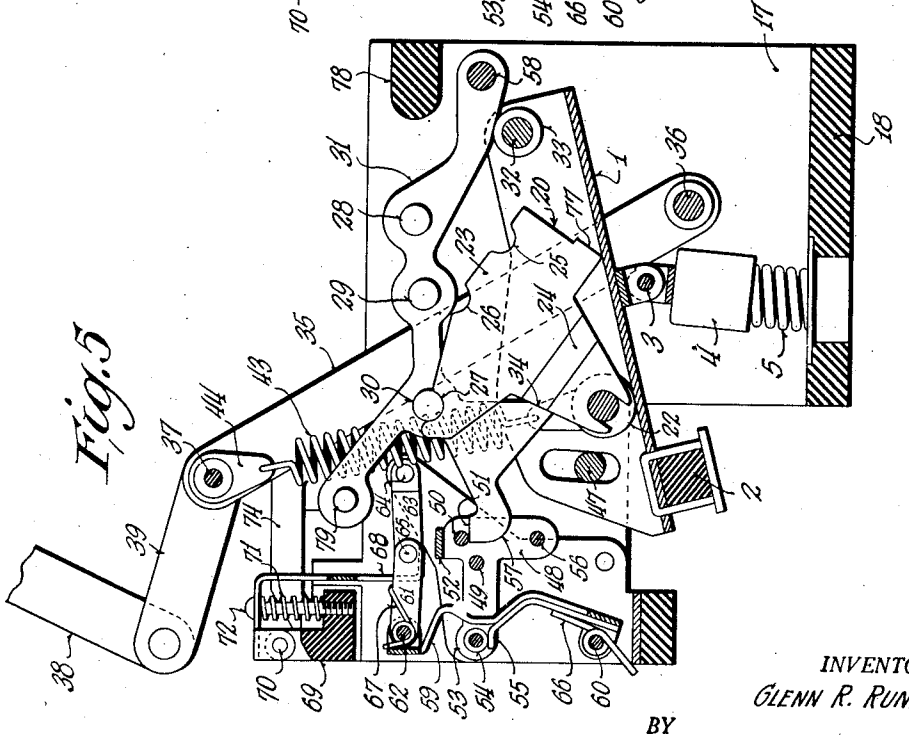


Fig. 5

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SWITCH CONSTRUCTION

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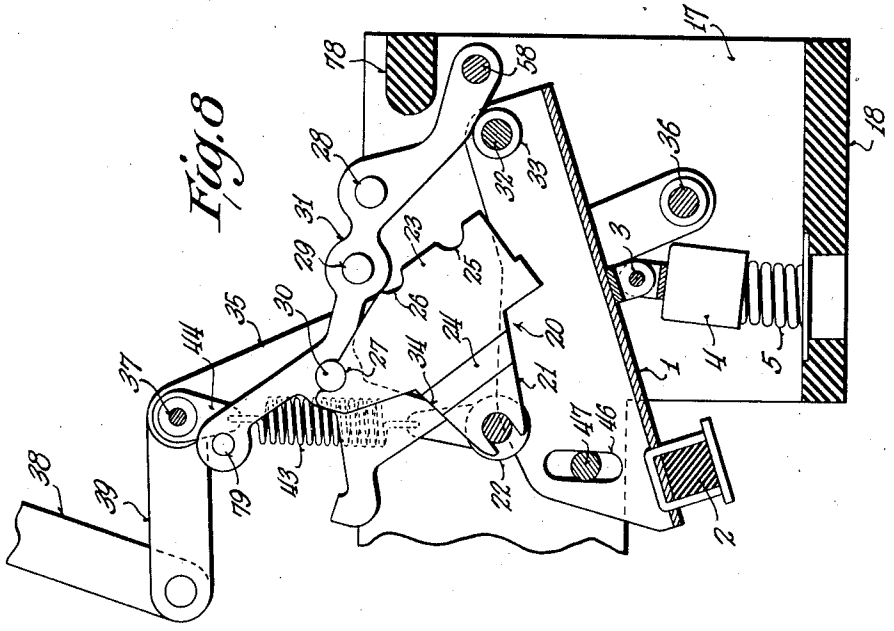


Fig. 8

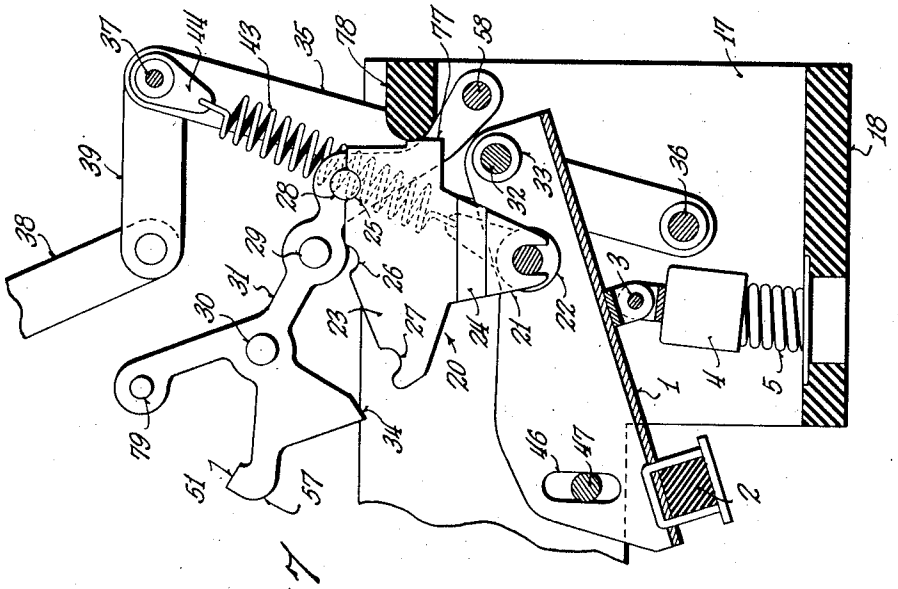


Fig. 7

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SWITCH CONSTRUCTION

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Fig. 9

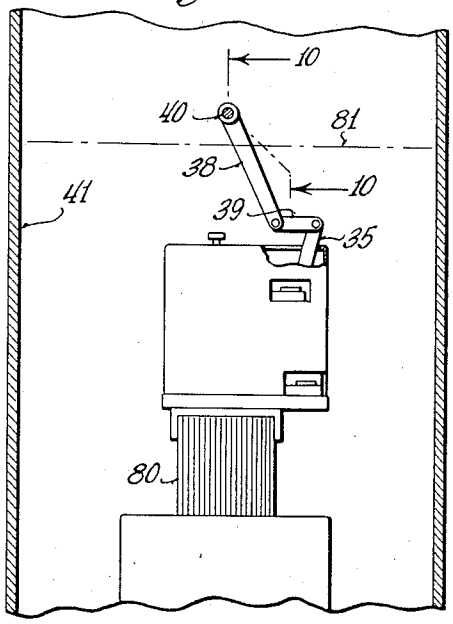


Fig. 10

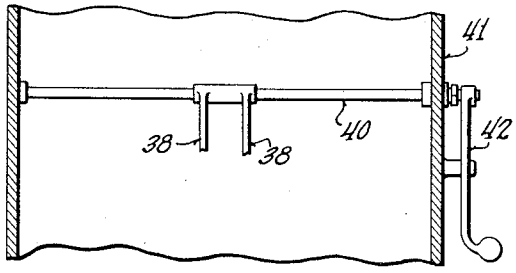


Fig. 11

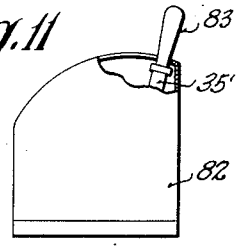
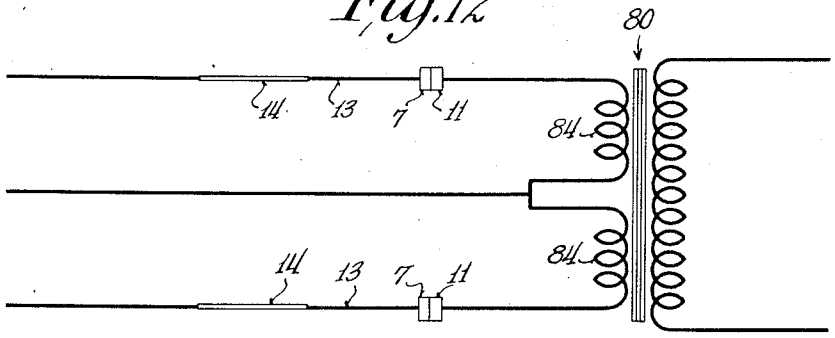


Fig. 12



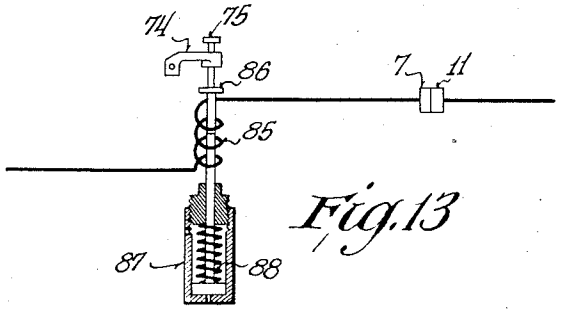


Fig. 13

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Patented Nov. 7, 1944

2,362,312

UNITED STATES PATENT OFFICE

2,362,312

SWITCH CONSTRUCTION

Glenn R. Runke, Racine, Wis., assignor to Line Material Company, South Milwaukee, Wis., a corporation of Delaware

Application March 19, 1943, Serial No. 479,734

20 Claims. (Cl. 200—116)

This invention relates to a switch construction.

In greater detail, this invention relates primarily to a switch construction of the circuit breaker type.

Objects of this invention are to provide a circuit breaker which has a quick make and a quick break, which has condition responsive means of the trip type, which is so constructed that it releases the circuit breaker so that the circuit breaker will open under predetermined conditions, and which is provided with a handle or other operating means for normally opening and closing the circuit breaker and for resetting the trip means, the trip means and the operating means being so related that the trip means will operate to release the circuit breaker irrespective of the position of the operating means and irrespective of any motion that the operating means may be executing at the time the trip means operates so that the trip means is trip free and will operate no matter whether the operating means is forcibly held in closed position or is being moved from one position to another.

Further objects are to provide a circuit breaker which is so constructed that the circuit breaker cannot be closed until the trip means is moved back to normal position, and in which the resetting of the trip means is accomplished by moving the operating means towards one extreme limit of its motion, such motion being followed by movement to closed position after the resetting of the trip means when it is desired to again close the circuit breaker after the operation of the trip means.

Further objects are to provide a construction in which the trip means may be either thermostatically or magnetically or otherwise operated and which has either a quick action or a delayed action and which is adjustable so that the condition to which it will respond may be predetermined.

Further objects are to provide a circuit breaker which has a heavy contact pressure when it is closed, in which this heavy contact pressure is maintained during the operation of the circuit breaker until the instant at which the contacts are suddenly separated, thereby avoiding burning of the contacts under overload conditions.

Further objects are to provide a circuit breaker in which the mechanism is so arranged that it is easy to operate in opening and closing the circuit breaker and in resetting the trip means, and which is so made that there is no great wear on the parts during the opening and closing of the circuit breaker or during the resetting of the trip means as the mechanism is so arranged that during resetting, for example, relatively small forces or pressures are exerted between the cooperating parts, thereby minimizing wear.

Further objects are to provide a circuit breaker in which the handle or main operating means is connected by a spring means to an actuator for actuating the switch operating means, and in which the actuator is designed to pivot successively at a plurality of different points on a carrier so that the tension on the spring means will not be unduly increased at any point during the operation of the actuator.

Further objects are to provide a circuit breaker in which the trip means is required to exert only a very small force in order to cause automatic operation, the construction providing a toggle link arrangement for the trip means to operate a pivoted latch normally restraining the circuit breaker in closed position, the parts being so organized that the pull on the latch is approximately in line with the center point of the pivoted latch, the relation of the parts being such that there is no chance of wedging or jamming any part of the trip mechanism during relatching.

In greater detail, further objects are to provide a switch construction in which the switch operating means is floating and is yieldingly pivoted at an intermediate point so that the pivot point does itself move or shift during the opening or closing of the switch means, the construction being such that heavy contact pressure is maintained up to the instant the switch means is suddenly opened, and the resiliently urged pivot construction cooperating with an actuator to secure quick opening and quick closing motion, the switch operating means having both translatory and rotational motion.

Further objects are to provide a circuit breaker construction which is sturdy and is reliable in operation, which may be installed in a transformer case and submerged in the oil in the transformer case if desired, and which if a thermostatic trip means is employed, may be arranged to have the thermostatic means respond solely to the heat generated by current passing through the thermostatic means or to the combined action of the heat in the oil from the transformer or other device as well as from the heat due to the current passing through the thermostatic means, or may be arranged to respond solely to the heat of the oil.

Embodiments of the invention are shown in the accompanying drawings, in which:

Figure 1 is a side elevation of the circuit breaker.

Figure 2 is a front end view thereof.

Figure 3 is a plan view of the circuit breaker with a part of the main operating means sectioned off, and the springs omitted.

Figure 4 is a sectional view on the line 4—4 of Figure 3 showing the circuit breaker in closed position.

Figure 5 is a view corresponding to Figure 4 showing the circuit breaker in the manually opened position.

Figure 6 is a view showing the circuit breaker in one position that it occupies when it is automatically opening.

Figure 7 shows an intermediate position of the parts during automatic operation.

Figure 8 shows the final position of the parts after automatic operation.

Figure 9 is a view showing one manner of mounting the circuit breaker in a transformer casing.

Figure 10 is a sectional view on the line 10—10 of Figure 9.

Figure 11 is a view of a further manner in which the circuit breaker may be mounted.

Figure 12 is a wiring diagram of the circuit breaker showing it connected to the secondary of a transformer.

Figure 13 is a fragmentary view of a further form of condition responsive means.

Before proceeding with the detailed description of this invention, it is to be understood that the circuit breaker may have either a single switch means or a plurality of switch means, a circuit breaker with a pair of switch means having been chosen for the sake of illustration. The circuit breaker chosen for illustration may be installed in a three wire, single phase system as indicated, or in a three phase system with the two switch means located in two lines of the three phase system in a well known manner, or, if desired, three switch elements could be used for the three phase circuit as the invention contemplates the use of a single or any number of switch elements as desired.

Referring to the drawings, it will be seen that the circuit breaker is provided with an elongated channel-shaped switch operating means 1 which at one end carries an insulating, rectangular rock shaft 2. The switch operating means is pivoted as indicated at 3 intermediate its ends upon a member 4 which is constantly upwardly urged by means of a spring 5 so that the switch operating means 1 is pivoted intermediate its ends for both rotational and translatory motion as will appear hereinafter as the description proceeds.

A pair of movable switch members indicated generally at 6, see Figure 1, are rigidly mounted on opposite ends of the insulating rock shaft 2. They may be of channel shape and may carry the movable contacts 7 which are guided through an apertured, inwardly turned lip 8 of a downwardly extending portion 9 of the switch means. These movable contacts are spring urged downwardly with respect to the contact members 6 by means of the springs 10 which are centered over reduced portions of the movable contacts 7 at the lower ends of the springs and are centered at their upper ends in any suitable manner. The movable contacts 7 engage the stationary contacts 11 when the switch is closed. The stationary contacts 11 may be provided with terminal portions 12, see Figure 3. The movable contacts are connected by means of flexible leaders or conductors 13 with the free end of bi-metallic members 14, the bi-metallic members being positioned on opposite sides of the circuit breaker. The fixed ends of the bi-metallic elements 14 are secured to terminal members 15, as shown in Figure 3, and are carried by laterally projecting lugs 16 formed integrally or otherwise secured to the outer sides of the upstanding insulating walls 17 of the insulating body portion or frame structure of the circuit breaker. These walls may be integrally or otherwise joined to the insulating base 18 and are provided with outwardly projecting, rearwardly located lugs 19 between which and the lugs 16 the flexible leaders 13 are positioned.

The switch operating member 1 is actuated by means of the pivotally mounted actuator indicated generally at 20. The actuator is provided with a pair of downwardly projecting arms indicated at 21 which are slotted at the lower end and receive the trunnions of a roller 22, the roller 22 operating within the channel of the switch operating member 1 as the actuator is rocked back and forth in a manner hereinafter described. The actuator is provided with a pair of upwardly extending, spaced arms 23. The actuator is formed in two half sections with the intermediate portion 24 thereof integrally joined.

The upper surface of the arms 23 of the actuator 20 are provided with a series of notches 25, 26 and 27 which are adapted to respectively engage and pivot about pins 28, 29 and 30 rigidly carried by a carrier 31. The carrier 31 is normally held in its latched position, as shown in Figures 4 and 5, and on automatic operation assumes the final position shown in Figure 8. The right-hand position of the actuator as viewed in Figure 4 for instance is determined by means of a rivet 32 extending between the walls of the switch operating member 1 and provided with a spacer sleeve 33. The left-hand position of the actuator is determined by the engagement of the intermediate portion 24 of the actuator with a shouldered portion 34 formed on the carrier 31.

Main operating means are provided which may take the form of a pair of levers 35 pivoted as indicated at 36 below the switch operating member 1 and extending upwardly on opposite sides of the switch operating member. These levers are connected at their upper end by means of the pin 37 and are operated in any suitable manner, as by means of the rock arms 38 connected to the pin 37 by means of links 39, the rock arms 38 being carried by means of the rock shaft 40 extending through the transformer casing 41, for instance in Figures 9 and 10, and operated by means of the externally mounted handle 42 which is rigid with the rock shaft 40.

A pair of tension springs 43 are connected at their outer ends in any suitable manner, for example by means of the members 44 and 45 to the pin 37 and the trunnions of the roller 22 of the actuator. These springs exert a constant pull and maintain the roller within the slotted lower portion of the arms 21 of the actuator and also maintain the actuator indicated generally at 20 in pivotal engagement with one or another of the pins or bearing members 28, 29 and 30 of the carrier 31.

It will be noted from the description thus far given that the switch operating member 1 is constantly spring urged upwardly by means of the spring 5 and that the actuator indicated generally at 20 and the carrier 31 are also constantly

urged upwardly by means of the spring **43**. It is to be noted that the switch operating member is provided with slots **46** in the rear ends of its walls which slots receive the guiding pin **47** rigidly carried between the side frames **17** of the circuit breaker.

Assuming that the circuit breaker is in closed position as shown in Figure 4 and it is desired to manually open the circuit breaker, the main operating member **35** is rocked from the right-hand position of Figure 4 to the left-hand position of Figure 5. The actuator successively pivots about the pivot points or pins **28**, **29** and **30** as the center line of the springs passes to the left of lines joining the axis of the roller **22** with the respective pivot points or pins **28**, **29** and **30**. The actuator has acquired considerable speed as it passes over the movable pivot point of the switch operating member **1**, and after it has passed to the left of the pivot point of the switch operating member **1**, the spring **5** suddenly rocks the switch operating member upwardly to the position shown in Figure 5, thus opening the switch means with a quick motion.

It is clear that when it is desired to manually close the circuit breaker, the main operating means **35** is rocked from the left-hand position shown in Figure 5 to the right-hand position shown in Figure 4 and the actuator successively pivots about the pivot points or pins **30**, **29** and **28**, thus suddenly closing the switch means, for by the time the actuator is passing over the movable pivot point of the switch operating member it has acquired considerable speed and when it has passed to the right of the pivot point of the switch operating member **1**, the spring **5** suddenly rocks the switch operating member in a direction to close the switch means with a quick motion.

It will be seen that by having a plurality of pivot points between the actuator and the carrier the springs **43** are not unduly extended and consequently less force is required to operate the main operating members **35** under these conditions than if a single pivot point had existed between the actuator and the carrier.

For automatic operation of the apparatus a latch lever **48** is pivotally mounted as indicated at **49** and is provided with a pin **50** beneath which the flat upper face **51** of the carrier normally bears. The effective lever arm tending to rotate the lever **48** is, therefore, very small. The lever is in reality made with two side members of approximately T-shape which are integrally joined at their upper ends as indicated at **52**. The lever **48** has a relatively long outwardly projecting arm **53** which carries a roller **54** normally held above a latching finger **55**. A reset pin **56** is carried by the lower portion of the lever **48** and is adapted to be engaged by the lower rounded face **57** when the carrier **31** is rocked downwardly, as will appear hereinafter. The carrier **31** is pivoted upon the pin **58** at its right-hand end. The latching lip **55** is a part of the lever **59** pivoted at **60** and spring urged in a clockwise direction. The upper end of the lever **59** is connected to the free end of toggle link mechanism, one portion of which is formed of the links **61** pivoted at **62** to the upper end of the lever **59** and the other portion of which is formed by the links **63** pivoted at a stationary point as indicated at **64**. The toggle links are spring urged downwardly as indicated and are provided with projecting pins **65** at their intermediate point where the elements **61** and **63** are pivoted together. In other words, the toggle link mechanism is spring urged towards latching position as shown in Figure 5. It is to be noted, however, that the spring means **66** acting on the lever **59** will overpower the spring means **67** tending to restore the toggle mechanism to the latched position just past center as shown in Figure 5 after the toggle links have been moved upwardly past their center position in a manner immediately hereinafter to appear.

The toggle links are raised upwardly by means of angularly turned strips or hook like members **68** carried by a rock shaft **69**. The hook like members **68**, however, are pivotally mounted as indicated at **70** on the rock shaft **69** and are normally held in relation to the rock shaft in the position shown in the drawings by means of the springs **71**, a headed screw **72** limiting the motion of the hook members **68** as shown most clearly in Figure 4. The purpose of having the hook members **68** yieldingly held with reference to the rock shaft **69** is to prevent jamming or binding of these members during resetting in the event the rock shaft is in a position tending to raise the center of the toggle link mechanism, and the intermediate point of the toggle link mechanism is moved downwardly.

The rock shaft **69** is pivoted between portions **73** supported from the walls **17** of the main body portion of the circuit breaker, see Figure 3. The rock shaft may be formed of insulating material as indicated and is provided with a pair of integral, forwardly extending arms **74** through which adjusting screws **75** are threaded. These adjusting screws extend downwardly and terminate in insulating pins **76** which bear against the free ends of the bi-metallic members **14**, as shown in Figures 1 and 2. The bi-metallic members upon overload are adapted to warp upwardly and thus raise one or both of the arms **74** and thereby rock the rock shaft **69**.

Upon reference to Figure 4 it will be seen that when the rock shaft **69** is rocked in a counterclockwise direction, the hook members **68** will raise the center point of the toggle mechanism and thus break the toggle and allow the lever **59** to rock inwardly, thus releasing the arm **53** of the lever **48** and allowing this lever to rock in a counterclockwise direction as it is urged in such direction by the upward thrust of the flat face **51** of the carrier **31** against the pin **50** of the lever **48**. The lever **48** then rocks to releasing position as shown in Figure 6 and allows the carrier **31** to spring upwardly. During this upward motion of the carrier the projecting portion **77** of the actuator **20** strikes a transverse stop **78** extending between the walls **17** of the main frame and the carrier is suddenly rotated in a clockwise direction about the first pivot point or pin **28**. This brings the line of pull of the spring **43** to the right of the axis of the actuating member or member **35** and thus rocks the actuating member **35** to the left from the position shown in Figure 7 to the position shown in Figure 8, the actuator **20** successively rocking about the pivot points or pins **28**, **29** and **30** and coming to rest by engagement of the portion **24** of the actuator against the shoulder **34** of the carrier **31**, as shown in Figure 8. As soon as the actuator is raised upwardly as described hereinabove by the upward motion of the carrier **31** under the influence of the springs **43**, the spring **5** immediately raises the switch operating member **1** and the switch means are opened with a quick motion so as to provide a quick break.

It is to be noted also with reference to Figure 8 that the actuator **20** is moved to what would

correspond to its switch open position if it had been manually operated, and also it is to be noted that the main operating means 35 has been moved to an indicating position to show that the automatic action has taken place. Correspondingly the handle 42, see Figure 10, will be moved to the indicating position.

In order to reset the circuit breaker the main operating means 35 is rocked from the position shown in Figure 8 to the left so that the levers constituting the main operating means 35 will engage pins 78 projecting from opposite sides of the extreme outer end of the carrier 31 and will consequently depress the carrier.

Upon an examination of Figure 6 it will be seen that as the carrier is rocked downwardly, the rounded lower portion 57 of the carrier will engage the pin 56 and will rock the lever 48 in a clockwise direction, thus raising the latching roller or member 54 above the lip 55. The projecting pins 79 of the carrier will engage the links 63 of the toggle link mechanism and will push the toggle link mechanism downwardly to its position shown in Figure 4, thus resetting the circuit breaker by moving the latching lip 55 of the lever 59 to the left beneath the latching roller or member 54 of the lever 48. If the bi-metallic elements have cooled sufficiently, the circuit breaker will remain in latched position but if by any chance the operator attempts to reset the circuit breaker prior to cooling of the bi-metallic elements, no damage will be done to the hook like members 68 as they will merely pivot about the pivot point 70 on the rock shaft 69, the spring 71 yielding to allow this motion. Thus there is no chance of jamming or injuring any part of the latching mechanism even if an attempt is made to reset the circuit breaker too quickly after automatic operation.

After the circuit breaker has been reset, the main operating means 35 is rocked to the right and the actuator rocks in a counterclockwise direction to the extreme right-hand limit of its motion to the position shown in Figure 4 and thus quickly closes the switch means.

It will be seen that the switch operating means 1 and the switch means constitute a unitary floating structure which is pivoted about a point and is adapted to have both rocking and translatory motion. It will be seen that as the actuator is rocked back and forth across the pivot point of the switch operating member 1 during manual operation of the circuit breaker, the spring 5 will suddenly throw the switch to open or closed position depending on the position of the actuator. It will also be seen that upon automatic operation the springs 43 suddenly raise the actuator and carrier and the spring 5 will suddenly raise the switch operating means and cause it to pivot about the pin 47 to the position shown in Figure 6 and thus quickly open the switch means.

If desired the circuit breaker may be mounted directly upon the transformer 86 within the transformer case 41 as shown in Figure 9 and may be operated by means of the externally located handle 42, see Figure 10.

The circuit breaker may be mounted below the oil level indicated at 81 in Figure 9 so that the switch is operated in oil and so that the thermostatic elements may be heated not only by the current passing therethrough but by the general temperature of the oil. The purpose of this is to allow the thermostatic elements to respond not only to a relatively sudden overload but to allow them to respond to the gradual rise of temperature of the oil which would result from a small and prolonged overload due to the heating of the transformer itself. Thus there may be afforded the double protection of opening the switch under the influence of an overload of reasonable magnitude or the opening of the switch from a prolonged small overload due to the heating of the transformer. It is obvious also that if desired the main current need not pass through the thermal members and the thermal members could then respond merely to the heat of the oil if so desired, or the oil level could be so regulated that it is below the thermal members and then the thermal members would respond merely to the heat of the current passing therethrough.

The circuit breaker is also adapted for wall mounting. For example it may be mounted in a casing 82, see Figure 11, and may be operated by an insulating handle 83 which is attached to the main operating means 35', which latter correspond to the main operating means 35 hereinbefore described. The insulating handle 83 extends through a slot in the curved outer wall of the casing 82. It is apparent also that the adjusting screws 75 may be adjusted so that the device will respond to any predetermined current condition. If desired pointers, not shown, may cooperate with the adjusting screws 75 to indicate the setting.

Figure 12 shows a wiring diagram in which the circuit breaker is mounted in a grounded neutral, single phase circuit of the secondary 84 of the transformer 88.

Obviously other forms of condition responsive means may be employed. For example the solenoid type as shown in Figure 13 may be provided. This device may comprise a solenoid 85 which is adapted to raise a plunger 86 and thus rock one or both of the arms 74 to trip the circuit breaker. If desired, a dashpot arrangement may be provided as indicated at 87 and a spring 88 may be provided for returning the plunger to its normal position.

It is to be noted that the dashpot arrangement may be so made that a time delay of any desired extent may be obtained by suitably proportioning the cylinder and the orifices opening thereinto as shown in Figure 13. Obviously other time delay means may be employed without departing from the spirit of this invention and it is to be distinctly understood that the circuit breaker could be made to respond to over or under voltage, overload, phase reversal, or any other desired condition.

The purpose of having time delay is to prevent the breaker from suddenly opening for any sudden and extremely transitory overload for instance but to allow the breaker to open as promptly as desired for an overload for a period longer than that for which the time delay has been designed. As stated hereinabove, a certain degree of adjustment is also obtained by adjusting the screws 75.

It is to be understood that the circuit breaker can be made either with a double switch construction as illustrated or a single switch construction or in any manner desired. Also it is to be understood that although it is shown in a single phase system it can be used in a three phase system as the two switch means would be arranged in two of the lines and would thereby control the three phase system, or, if desired, three separate switch elements could be used as the invention is not limited to any specific number of switch

elements as obviously there could be one or a plurality of switch elements.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said unitary structure at the pivot point, an actuator engaging said switch unit and rockable back and forth across said pivot point and having both rocking and translatory motion, a plurality of pivot means for said actuator, said actuator successively engaging said pivot means as said actuator is rocked, and two independent means for respectively controlling the rocking and translatory motion of said actuator.

2. A switch comprising a switch unit including a movable contact and switch operating means for moving said movable contact, a cooperating contact, said switch unit having a pivot point, spring means pivotally supporting said switch unit at said pivot point, a rocking actuator coacting with said switch unit at one end to rock said switch unit as said rocking actuator is rocked back and forth across said pivot point to cause said contacts to engage and disengage, a plurality of pivot means for said actuator, said actuator successively engaging said pivot means as said actuator is rocked, said actuator bodily shifting its position longitudinally of said switch operating means when said actuator is rocked, and means for rocking said actuator.

3. A switch comprising a switch unit including a movable contact and switch operating means, a cooperating contact, said switch unit having a pivot point and rockable about said pivot point to cause engagement and disengagement between said contacts, a rocking actuator coacting at one end with said switch unit and movable to opposite sides of said pivot point to cause said switch unit to rock, a plurality of pivot means for said actuator, said actuator successively engaging said pivot means and having bodily travel from one pivot means to another pivot means as said actuator is rocked, spring means for holding said actuator and said switch operating means in engagement, and means for rocking said actuator.

4. A switch comprising a switch unit pivotally mounted for rocking motion about a pivot point and having a movable contact, a cooperating contact, a rocking actuator engaging said switch unit at one end and adapted to move back and forth to opposite sides of said pivot point for operating said switch unit to cause engagement and disengagement between said contacts, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is moved, spring means for holding said actuator and switch unit in engagement, and means for moving said actuator.

5. A switch comprising a switch unit pivotally mounted for rocking motion about a pivot point and having a movable contact, a cooperating contact, an actuator bearing against said switch unit and movable to opposite sides of said pivot point for rocking said switch unit to cause engagement and disengagement between said contacts, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is moved back and forth across the pivot point of said switch unit, spring means for holding said actuator and switch unit in engagement, and means for moving said actuator.

6. A switch construction comprising switch means, floating switch operating means operatively coupled to said switch means and pivoted intermediate its ends, an actuator bearing against said switch operating means and movable back and forth along said switch operating means to cause said switch operating means to rock, a carrier for said actuator, said actuator having rolling engagement with said carrier, spring means for holding said actuator and said switch operating means in engagement, and means for moving said actuator.

7. A switch construction comprising a floating switch unit having a pivot point intermediate its ends and having both rocking and translatory motion and including a movable contact, a cooperating contact, an actuator bearing against said switch unit and movable to opposite sides of said pivot point for rocking said switch unit to cause engagement and disengagement of said contacts, a carrier for said actuator, said actuator having rolling engagement with said carrier, spring means bearing against said switch unit adjacent said pivot point and urging said switch unit towards motion of translation, said spring means acting in the same direction to rock said switch unit in opposite directions depending on the position of said actuator, and means for moving said actuator.

8. A circuit breaker comprising a switch unit having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said switch unit adjacent said pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier, main operating means for moving said actuator, and condition responsive means for releasing said switch unit for translatory motion.

9. A circuit breaker comprising a switch unit having both rocking and translatory motion, spring means supporting said switch unit and urging said switch unit towards translatory motion to switch open position, an actuator engaging said switch unit and movable back and forth towards opposite ends of said switch unit and mounted for both rocking and translatory motion, a movably mounted carrier for said actuator, said actuator having rolling engagement with said carrier, said spring means when said actuator is adjacent one end of said switch unit rocking said switch unit in one direction and when said actuator is adjacent the other end of said switch unit rocking said switch unit in the other direction, main operating means for moving said actuator towards opposite ends of said switch unit, and condition responsive means controlling the motion of said carrier.

10. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said switch unit adjacent the pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, main operating means

for rocking said actuator, and condition responsive means for releasing said carrier to allow said actuator to execute translatory motion.

11. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said floating structure, an actuator engaging said switch unit and rockable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier, and two independent means for respectively controlling the rocking and translatory motion of said actuator.

12. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said unitary structure adjacent said pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a movable carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, means biasing said actuator towards translatory motion, means for rocking said actuator, and condition responsive means for releasing said carrier to allow said actuator to execute translatory motion.

13. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said floating structure adjacent said pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a movable carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, means biasing said actuator towards motion in a direction away from said switch unit, means for rocking said actuator, and condition responsive means for releasing said carrier to allow said actuator to execute translatory motion away from said switch unit.

14. A circuit breaker comprising a switch unit having both rocking and translatory motion, spring means supporting said switch unit and urging said switch unit towards translatory motion to switch open position, an actuator engaging said switch unit and movable back and forth towards opposite ends of said switch unit and mounted for both rocking and translatory motion, a pivotally mounted carrier forming bearing means for said actuator, said actuator having rolling engagement with said carrier and being biased outwardly away from said switch unit, main operating means for moving said actuator towards opposite ends of said switch unit, condition responsive means for releasing said carrier, and means operatively connecting said carrier and said main operating means for resetting said carrier.

15. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said switch unit adjacent the pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, main operating means for rocking said actuator, condition responsive means for releasing said carrier to allow said actuator to execute translatory motion, and means for moving said main operating means from switch closed position to an indicating position when said carrier is released.

16. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said switch unit adjacent the pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, main operating means for rocking said actuator, spring means joining said main operating means and said actuator, and condition responsive means for releasing said carrier to allow said actuator to execute translatory motion, said spring means upon release of said carrier moving said main operating means to an indicating position.

17. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said switch unit adjacent the pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, main operating means for rocking said actuator, means biasing said carrier towards motion away from said switch unit, latch means for latching said carrier against outward motion and including toggle means, and condition responsive means for actuating said toggle means to cause said latch to release said carrier.

18. A circuit breaker comprising a switch unit mounted as a floating structure and having both rocking and translatory motion and having a movable pivot point, spring means yieldingly supporting said switch unit adjacent the pivot point, an actuator engaging said switch unit and movable back and forth across said pivot point and having both rocking and translatory motion, a carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is rocked back and forth across the pivot point of said switch unit, main operating means for rocking said actuator, means biasing said carrier towards motion away from said switch unit, latch means for latching said carrier against outward motion and including toggle means, condition responsive means for actuating said toggle means to cause said latch to release said carrier, and means for resetting said carrier and said toggle means upon motion of said main operating means to a predetermined position.

19. A circuit breaker comprising a pivotally mounted switch unit, an actuator engaging said switch unit and movable back and forth along said switch unit to open and close said circuit breaker, a movable carrier for said actuator, said actuator having rolling engagement with said carrier as said actuator is moved back and forth along said switch unit, means biasing said actu-

ator towards motion in a direction away from said switch unit, means for moving said actuator, and condition responsive means for releasing said carrier to allow said actuator to execute translatory motion away from said switch unit.

20. A circuit breaker comprising a pivotally mounted switch unit, an actuator engaging said switch unit and movable back and forth towards opposite ends of said switch unit and mounted for both motion back and forth along said switch unit and for translatory motion away from said switch unit, a pivotally mounted carrier forming bearing means for said actuator, said actuator having rolling engagement with said carrier and being biased outwardly away from said switch unit, main operating means for moving said actuator towards opposite ends of said switch unit, condition responsive means for releasing said carrier, and means operatively connecting said carrier and said main operating means for resetting said carrier.

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