May 4, 1943. J. G. JACKSON 2,318,227

CIRCUIT BREAKER

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FIG. 1.

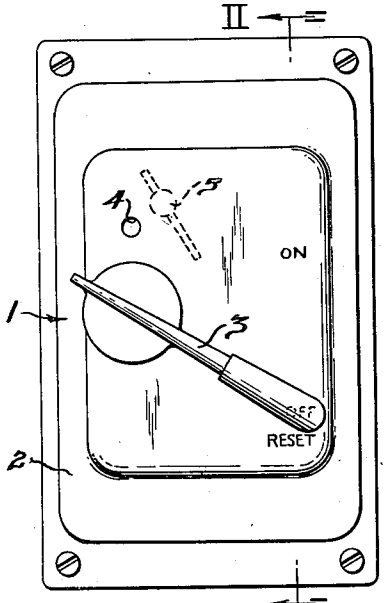


FIG. 3.

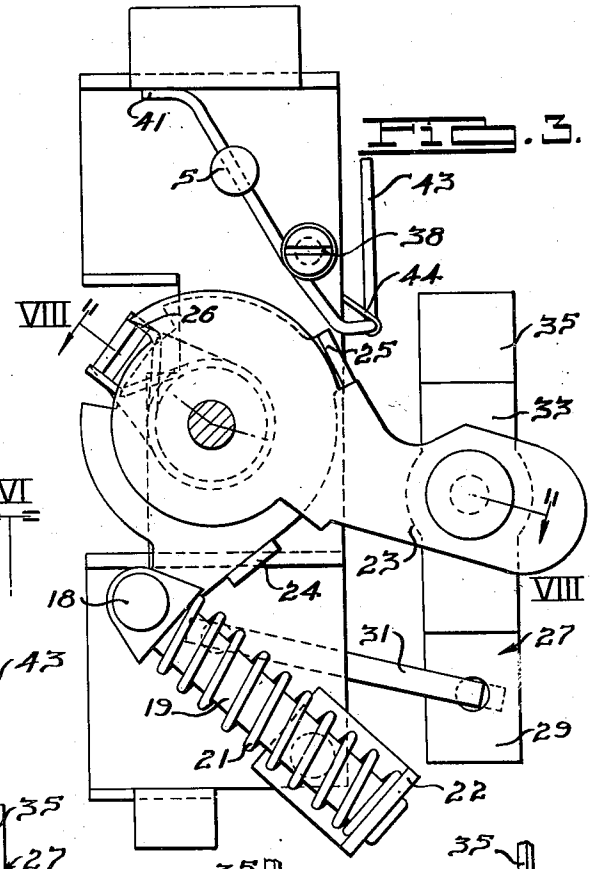


FIG. 2.

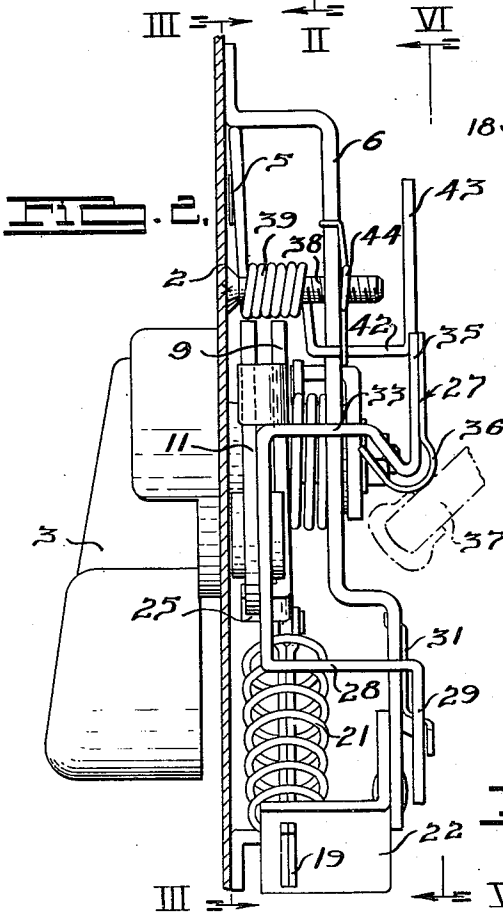


FIG. 4.

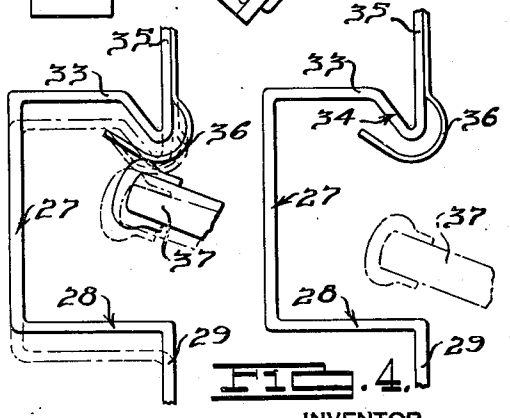


FIG. 5.

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CIRCUIT BREAKER

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Fig. 6.

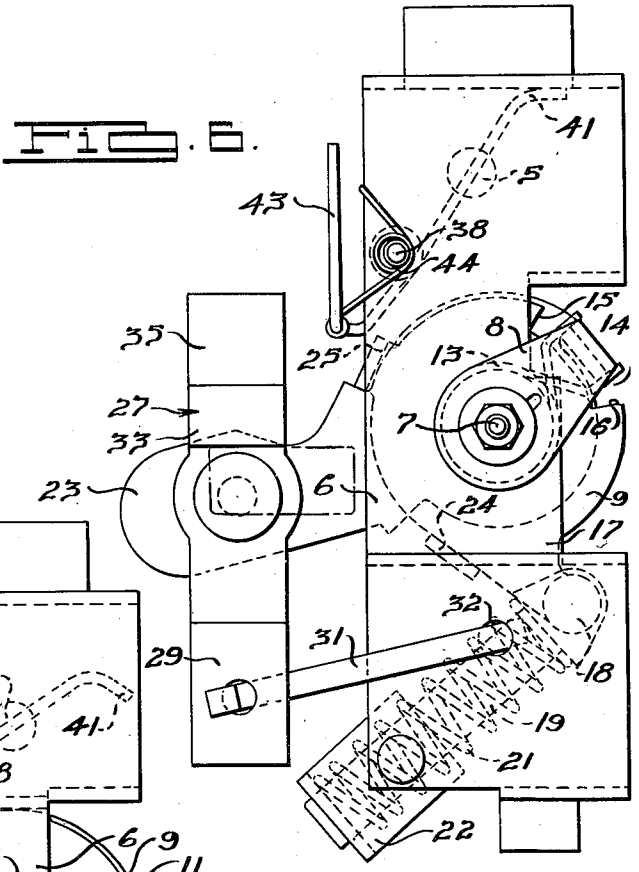


Fig. 7.

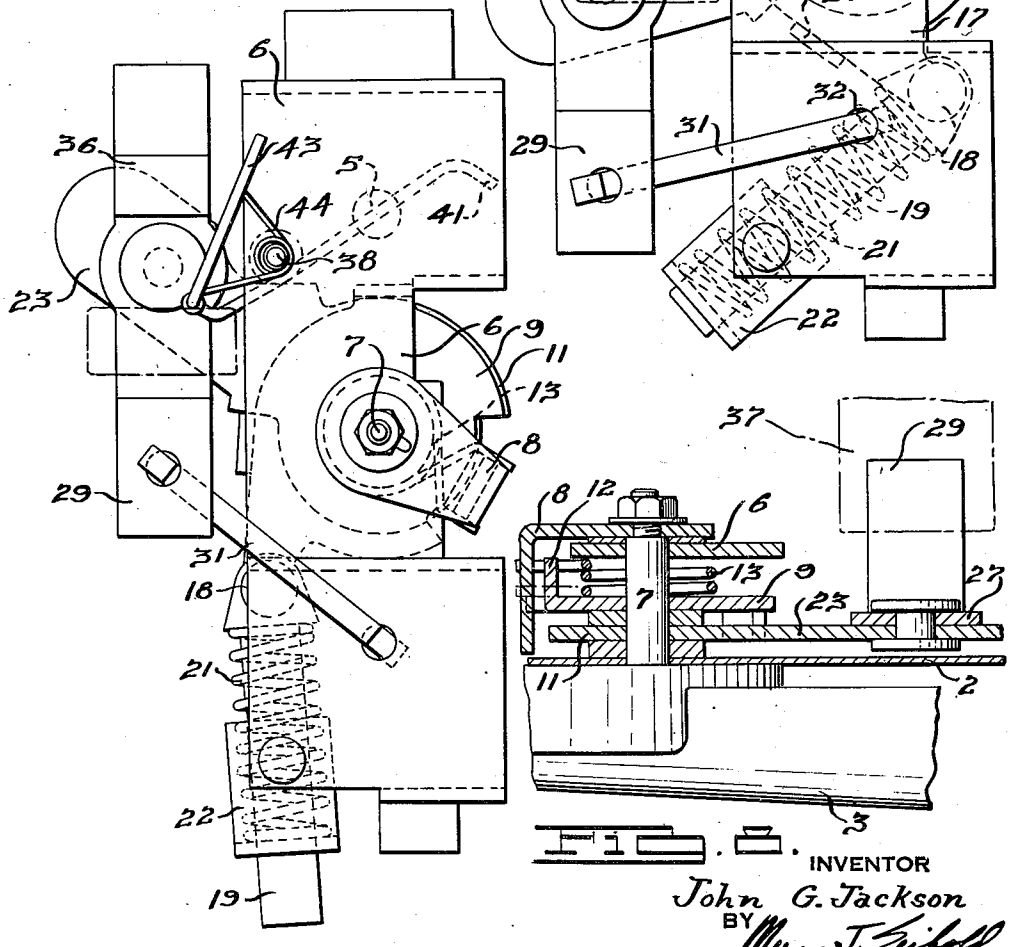


Fig. 8.

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2,318,227

CIRCUIT BREAKER

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Application March 13, 1941, Serial No. 383,068

18 Claims. (Cl. 200—67)

This invention relates to operating means for automatic electric circuit breakers and more particularly to circuit breakers of the industrial type mounted within an additional enclosure with an operating handle at the exterior of the enclosure and with a mechanism within the enclosure for effecting operation of the circuit breaker handle in response to movement of the exterior operating handle.

One object of the invention is to provide an improved form of snap acting mechanism for operating an electric circuit breaker within an outer enclosing box.

Another object of the invention is to provide a snap acting operating mechanism for a circuit breaker of the type wherein the speed of contact movement is dependent on the speed of handle movement, mounted within an outer enclosing box, in which the initial movement of the circuit breaker handle is slowed up to correspondingly slow up initial contact separation.

Another object of the invention is to provide a snap-acting circuit breaker operating mechanism with spring and/or inclined surface means engaging the circuit breaker operating handle to slow up the initial movement thereof as the operating mechanism snaps overcenter.

Other objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawings illustrating certain preferred embodiments of the invention in which:

Figure 1 is a front elevational view of the enclosed, automatic electric circuit breaker means of the present invention.

Figure 2 is a partial vertical sectional view of the operating mechanism taken on the line II—II of Figure 1, showing only the handle of the circuit breaker which is mounted within the enclosure.

Figure 3 is a sectional view on the line III—III of Figure 2.

Figure 4 is a partial view showing the circuit breaker handle engaging parts in "on" position.

Figure 5 is a partial view similar to Figure 4 but showing positions of the parts as they move to separate the circuit breaker contacts.

Figure 6 is a view on line VI—VI of Figure 2.

Figure 7 is a view similar to Figure 6 but with the operating parts corresponding to the "on" position of the breaker and with the breaker handle moved into its automatic tripped position to show the operation of the trip indicating means.

Figure 8 is a sectional view on the line VIII—VIII of Figure 3.

The circuit breaker enclosing and operating means illustrated comprises an outer enclosing box 1 including a removable cover 2 on the front surface of which is disposed a handle 3 for rotation in a plane parallel to the plane of the front cover. In the cover is provided a window 4, which may be glass covered, which is adapted to disclose the position of an indicating target 5. Upon the inside surface of cover 2 is mounted a supporting bracket 6 of irregular shape and in openings in this bracket and in the cover is rotatably mounted the shaft 7 of handle 3. Upon the interior end of the shaft 7 is rigidly secured a finger 8. Disposed about the shaft 7 and freely rotatable thereon are a pair of members 9 and 11. The member 9 carries an inwardly directed lug 12 and a torsion spring 13 is coiled about the shaft 7 and has its opposite ends disposed on opposite sides of both the finger 8 and lug 12, this spring thus serving to give to the finger 8, and, hence, to the handle 3 a definite position with respect to lug 12, and, hence, to the member 9. While the spring 13 will be stressed as the finger 8 moves relative to the lug 12, this force has the primary purpose of locating the handle 3 in a definite position and the force which it exerts to effect rotation of the member 9 is only incidental.

The member 9 is provided with a peripheral notch 14 within which the finger 8 extends and the ends of this notch form abutments 15 and 16 adapted to be engaged by the finger 8 to effect movement of the member 9 against the bias of the overcenter spring connected thereto. The member 9 is provided with a short arm or extension 17 to which is pivotally connected at 18 a spring guide 19 having an overcenter compression spring 21 disposed therearound. The free end of the spring guide 19 is guided in a bracket 22 swiveled upon the bracket 6 for free rotation as the spring guide is moved.

The member 11 is provided with an operating extension 23 and the member 9 is provided with a pair of outwardly extended lugs 24 and 25 connecting with opposite sides of the arm 23 to effect rotation of the member 11. The member 11 is also provided with an abutment surface 26 at the end of a peripheral notch therein which is adapted to be engaged by the finger 8 in the resetting operation of the circuit breaker, as will be hereinafter described. Upon the arm 23 is pivotally mounted an element 27 of generally U shape with flanges at the free ends of its

legs and which is adapted to engage the operating handle of the circuit breaker. The lower leg 28 of the element 27 engages the operating handle of the circuit breaker in moving it to the "on" position and has the flange 29 at the end thereof provided with an opening in which is pivotally disposed one end of a link 31 having its other end pivoted in an opening 32 in the bracket 6. By this construction, it is seen that the link 31, arm 23, operating element 27, and the spacing between shaft 7 and opening 32 form a parallelogram by means of which the movement of the operating element 27 is effected with the element at all times remaining vertical. The upper leg 33 of the operating element 27 is formed as more particularly shown in Figures 2, 4, and 5 to form a surface 34 inclined to the general plane of the leg 33, this surface 34 terminating inwardly in a vertical flange 35 to which is secured a strip spring element 36 which directly engages the operating handle of the circuit breaker in moving it to the contacts separated position. The mechanism is so related that the spring 21 will pass through its dead center position in moving toward contacts separated position at substantially the same point that the spring 36 initially engages the operating handle of the circuit breaker.

The invention is particularly adapted to a circuit breaker mechanism of the type in which the speed of movement of the movable contacts depends upon the speed of movement of the operating handle, one mechanism of this type being disclosed in my Patent No. 2,096,544 granted October 19, 1937, for Circuit breaker. In order to simplify the disclosure of this application, it has not been thought necessary to disclose a circuit breaker mechanism of this type specifically and for purposes of illustration only the circuit breaker handle 37 has been shown; and, for the structure and operating characteristics of one circuit breaker of the type herein contemplated, reference is made to the aforesaid patent.

The operation of the mechanism disclosed herein is as follows:

With the parts shown in Figures 1, 2, 3, 6 and 8, the circuit breaker will be in the off position. As the exterior handle 3 is raised or rotated in a counterclockwise direction, finger 8 will move relative to member 9, thus slightly tensioning spring 13 until the finger positively engages the abutment surface 16 at the end of the arcuate notch 14. When this occurs, member 9 will also rotate in a counterclockwise direction with the handle, and the lug 24 engages the arm 23 to also effect rotation of the arm in a counterclockwise direction. This causes the operating element 27 to move upwardly and as the motion continues, the leg 28 of the element 27 engages the operating element 37 of the circuit breaker and causes movement thereof toward the engaged position of the contact. As the member 9 continues to rotate the spring 21 will finally go overcenter and will exert its bias to rotate the member 9 in a counterclockwise direction. This movement, however, is limited by interconnecting portions upon the member 9 and the stationary bracket 6. This contacts engaged position of the operating parts is more particularly shown in Figures 4 and 7.

In moving the parts to contacts separated position, the clockwise rotation of handle 3 causes finger 8 to engage abutment surface 15 to rotate member 9 until the spring 21 passes through its overcenter position in the reverse direction. Member 9 has in the meantime engaged arm 23 through lug 25 and has moved the element 27 downwardly to engage spring 36 with the handle 37 of the circuit breaker. The parts of the mechanism are adjusted so that the spring 21 will go through its dead center at the moment the positive connection is formed to engage spring 36 with handle 37. Thereupon, the member 9 is quickly rotated in a clockwise direction to quickly rotate the arm 23 and snap the operator 27 downwardly, thus moving the operating handle 37 and the contacts controlled thereby to contacts separated position.

In the operation of circuit breakers of the type under consideration, where operating on alternating current circuits, it has been found desirable in some instances to have the initial contact opening movement relatively slower than would normally be obtained with the snap acting mechanism herein described. While applicant does not wish to be limited to any particular theory of operation of the breaker, it appears that if the contacts are initially separated too rapidly, the arc will be elongated before it has a chance to be extinguished, and the resultant energy and temperature of the elongated arc may deleteriously affect the contact material employed in the circuit breaker; while, on the other hand, with relatively slow opening movement, the arc will be extinguished more readily due to its short length and the lower energy and temperature thereof so that less damage is occasioned to the circuit breaker contacts. This operating characteristic is effected with the snap actuation herein shown as will be described in connection with Figure 5.

In the full line position of the parts of Figure 5, the spring 36 has just engaged the operating handle 37 and the spring 21 has just been thrown overcenter. The positions of the parts a very short time later correspond to the dotted line representation of the same figure. From this, it is seen that while the operating element 27 has had a considerable movement, the handle 37 has moved only a short distance, this distance being sufficient to effect separation of the contacts of the breaker. Since the distance shown occurs in the same time interval, the contact opening movement will therefore have been relatively slower than would have been effected by direct engagement of the handle by the snap acting element 27. This lessened movement of the operating handle is contributed to by two factors in the disclosed structure. In the first place, it will be noted that the spring 36 has been compressed and a portion of the movement of the element 27 not transmitted to handle 37, but taken up in the distance through which the spring 36 is compressed. A second factor is that the spring 36 engages the handle 37 upon an inclined surface which, as shown in Figure 5, is in the dotted line position generally parallel to the surface 34 on the leg 33 of the element 27. This engagement of the handle on the inclined surface also permits a relatively large vertical movement of the element 27 with a relatively small rotative movement of the handle 37. It is thus seen that the slowing of the initial movement of the handle 37, and hence the slowing of the initial separating movement of the interrupting contacts of the breaker, is brought about in the complete mechanism shown both by the compressing of the spring 36 and by the riding of the handle 37 upon the surface thereof

inclined with respect to the direction of movement of the element 27.

It is also contemplated within the scope of applicant's invention that either a compressible spring could be used to engage the handle 37 alone or that an inclined surface such as shown at 34 could be used alone to engage the handle; and that either of these devices would produce a slowing up of the initial contact separating movement over that which would be normally obtained by the snap acting movement of the element 27. However, it is preferred to use both of these means together as disclosed in the preferred embodiment of the invention, so as to secure their additive effect in slowing up the speed of the initial contact separation.

The indication of the automatic trip position, the subject matter of a divisional application, is effected as follows: As viewed in Figure 7, the circuit breaker has been automatically tripped and the handle 37 has been moved beyond its normal "on" position as explained in my patent above cited. About a stationary post 38 is pivotally mounted a relatively rigid wire member having its mid-portion in the form of a bearing coil 39 disposed upon the post 38 and carrying the target 5 and having one of its free ends as at 41 engaging against a part of the bracket 6 as a stop. The opposite end of the indicating wire member is provided with a horizontal arm 42 and with a vertically extending projection 43. A light spring 44 engages the arm 42 and biases the indicating member into its non-indicating position. In the tripped position of the operating handle, as shown in Figure 7, the handle engages the horizontally inwardly directed arm 42 and effects rotation of the indicating member in a counterclockwise direction against the bias of the spring 44 to expose the target 5 at the window 4.

In this automatic tripping of the circuit breaker the exterior operating handle remains in "on" position, and to reset the circuit breaker, the exterior handle is first rotated to its normal "off" position and is then pressed beyond this position in the clockwise direction. In this movement, the finger 8 engages surface 26 on the member 11 and effects positive rotation of the arm 23 in a clockwise direction and positive downward movement of element 27 so that the handle 37 of the breaker is forced beyond its normal "off" position into the resetting position of the breaker handle, as described in my patent aforementioned. When the breaker is reset, operating handle 3 is rotated in a counterclockwise direction as previously described to again place the parts in circuit closed, contacts engaged position.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior manual operating handle, and means for slowing up the speed with which the initial movement of the interior operating handle is effected by said overcenter spring operating mechanism over the speed with which the interior operating handle would normally be moved by said operating mechanism.

2. Electric circuit breaker apparatus, comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box, overcenter spring operating mechanism within the box for effecting movement of the interior operating handle with a snap action in response to movement of said exterior manual operating handle, the speed of operation of said mechanism being independent of the exterior manual operating handle after the spring passes through its dead center position, and means for slowing up the speed with which the initial movement of the interior operating handle is effected by said operating mechanism without effecting the operating speed of said operating mechanism.

3. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior manual operating handle, and means for slowing up the speed with which the initial movement of the interior operating handle is effected by said overcenter spring operating mechanism.

4. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of the operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism within the box effecting movement of the interior operating handle in response to movement of said exterior manual operating handle, the speed of operation of said mechanism being independent of the exterior manual operating handle after the spring passes through its dead center position, and means for slowing up the speed with which the initial movement of said operating handle is effected by said overcenter spring operating mechanism.

5. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed

within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, and means for effecting movement of said interior operating handle by said operating mechanism after the overcenter spring has passed through its dead center position with the speed of initial movement of the interior operating handle slower than normally provided by the speed of movement of the overcenter spring operating mechanism.

6. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, and means for slowing up the speed with which the initial movement of the interior operating handle is effected by said operating mechanism whereby said contacts may be initially separated with a speed of relative movement relatively less than would be normally effected by an overcenter spring mechanism.

7. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, the speed of operation of said mechanism being independent of the exterior manual operating handle after the spring passes through its dead center position, said mechanism having a normal speed of operation through the bias of the overcenter spring, and means interposed between said mechanism and interior operating handle to slow up the speed with which the initial movement of the interior operating handle is effected by said operating mechanism without affecting the speed of movement of the mechanism.

8. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, means operatively connecting said mechanism to said interior operating handle and including spring means stressed during the initial movement of the interior operating handle to effect a slowing up of the normal speed with which said interior operating handle would be moved by said operating mechanism.

9. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, means operatively connecting said operating mechanism with the interior operating handle and including a spring strip through which said mechanism engages the handle in one direction of movement, said spring strip being stressed in the period of initial movement of the operating handle by said mechanism to effect a slowing of the speed with which said operating handle is initially moved in said one direction.

10. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement between said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, means operatively connecting said operating mechanism with said interior operating handle and including a surface engageable with said handle in one direction of movement thereof, said surface being inclined to its direction of movement so as to effect a shorter travel of said interior operating handle in response to a greater travel of said operating mechanism in at least the initial movement of the operating handle whereby the speed of initial movement of the operating handle is reduced.

11. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, the speed of relative movement of said contacts being dependent upon the speed of movement of said operating handle, a manual operating handle at the exterior of the box, overcenter spring operating mechanism for effecting movement of the interior operating handle in response to movement of said exterior operating handle, means operatively connecting said operating mechanism to said interior operating handle and including a spring strip engaging said interior operating handle in the di-

rection of movement which effects operation of the contacts of said circuit breaker, said spring strip being stressed in the initial movement of the interior operating handle, said spring strip engaging said operating handle in at least its stressed position with a surface inclined to its direction of movement by said operating mechanism, the stressing of said strip and the inclined surface engaging with the handle cooperating to effect a shorter travel of said handle than that through which the operating mechanism moves, whereby the speed of initial contact separation will be reduced.

12. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box and having a portion projecting into the box interior, a pair of rotatable elements within the box, a lost motion connection between said exterior handle and one of said elements, a lost motion connection between said one of said elements and the second of said elements, an overcenter spring connecting to said one of said elements, and means connecting said second of said elements to said interior operating handle, whereby movement of said interior operating handle is effected with a snap action in response to movement of said exterior handle and independent of the movement of the exterior handle after the spring has passed through its dead center position.

13. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box and having a portion projecting into the box interior, a pair of rotatable elements within the box, a lost motion connection between said one of said elements and the second of said elements, an overcenter spring connecting to said one of said elements, and means connecting said second of said elements to said interior operating handle, whereby movement of said interior operating handle, is effected with a snap action in response to movement of said exterior handle and independent of the movement of the exterior handle after the spring has passed through its dead center position, and spring means biasing said exterior operating handle to a definite position with respect to said one of said elements so as to avoid the play in the operating handle which would normally be provided by its lost motion connection to said one of said elements.

14. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box and having a portion projecting into the box interior, a pair of rotatable elements within the box, a lost motion connection between said exterior handle and one of said elements, a lost motion connection between said one of said elements and the second of said elements, an overcenter spring connecting to said one of said elements, and means providing a lost motion connection between said second of said elements and said interior operating handle, whereby movement of said interior operating handle is effected with a snap action in response to movement of said exterior handle and independent of the movement of the exterior handle after the spring has passed through its dead center position.

15. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box and having a portion projecting into the box interior, a pair of rotatable elements within the box, a lost motion connection between said exterior handle and one of said elements, a lost motion connection between said one of said elements and the second of said elements, an overcenter spring connecting to said one of said elements, and means connecting said second of said elements to said interior operating handle, and means for effecting movement of said second of said elements directly and positively through the exterior operating handle in one position thereof so as to effect positive resetting of the circuit breaker mechanism after an automatic opening thereof.

16. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, an operating handle projecting through the enclosure and disposed within the box, a manual operating handle mounted on the front face of said enclosing box and rotatable in a plane parallel to the plane of said front face, said handle including an operating shaft projecting into the interior of the box, a pair of elements within the box pivoted on said operating shaft and freely rotatable relative thereto, a lost motion connection between said exterior handle and one of said elements, overcenter spring operating means connected to said one of said elements and adapted to be moved through its dead center position to effect movement of said element in opposite directions, a lost motion connection between one of said elements and the second of said elements, and a lost motion connection between said second element and the interior operating handle of the circuit breaker.

17. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box and having a portion projecting into the box interior, a pair of rotatable elements within the box, a lost motion connection between said exterior handle and one of said elements, a lost motion connection between

said one of said elements and the second of said elements, an overcenter spring connected to said one of said elements, and means connecting said second of said elements to said interior operating handle, and means for effecting movement of said second of said elements directly and positively through the exterior operating handle in one position thereof so as to effect positive resetting of the circuit breaker mechanism after an automatic opening thereof, and spring means biasing the exterior operating handle to a definite position with respect to said one of said elements.

18. Electric circuit breaker apparatus comprising an outer enclosing box, an automatic electric circuit breaker within said box including an enclosure, relatively movable contacts and manual and automatic means for actuating said contacts within the enclosure, and an operating handle projecting through the enclosure and disposed within the box, a manual operating handle at the exterior of the box and having a portion projecting into the box interior, a pair of rotatable elements within the box, a lost motion connection between said exterior handle and said one of said elements, a lost motion connection between said one of said elements and the second of said elements, an overcenter spring connected to said one of said elements, means providing a lost motion connection between said second of said elements and said interior operating handle, whereby movement of said interior operating handle is effected with a snap action in response to movement of said exterior handle and independent of the movement of the exterior handle after the spring has passed through its dead center position.

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