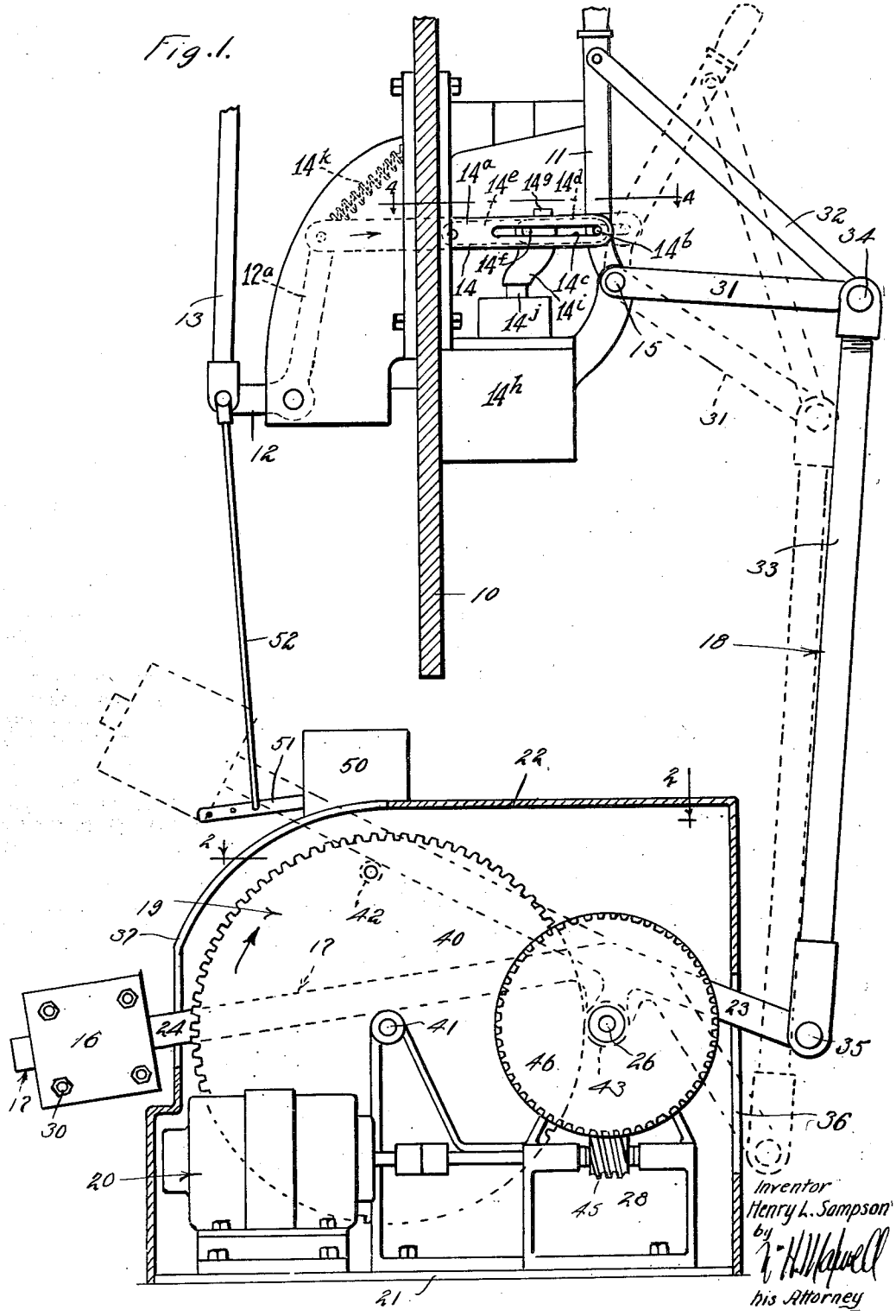
March 18, 1930. H. L. SAMPSON 1,751,059

RECLOSING MECHANISM FOR CIRCUIT BREAKERS

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Fig. 1.



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Fig. 2.

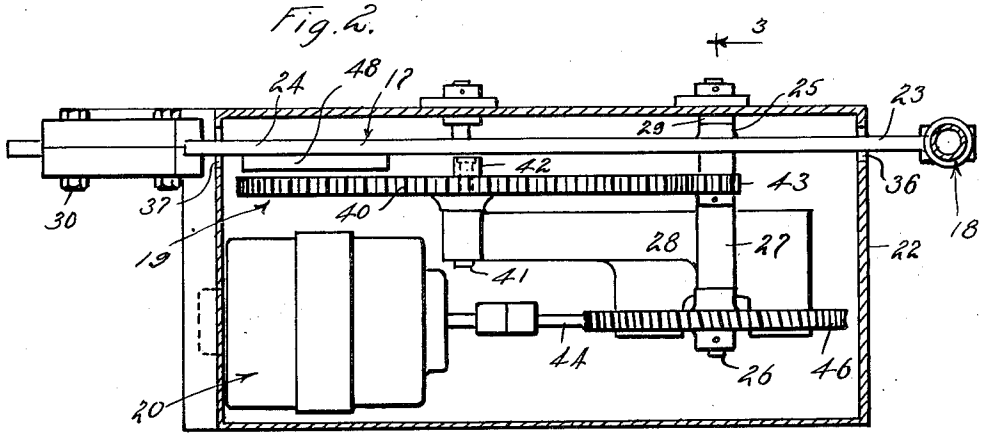


Fig. 3.

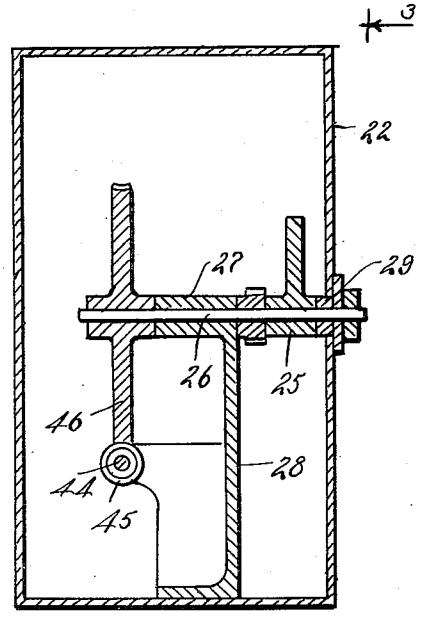
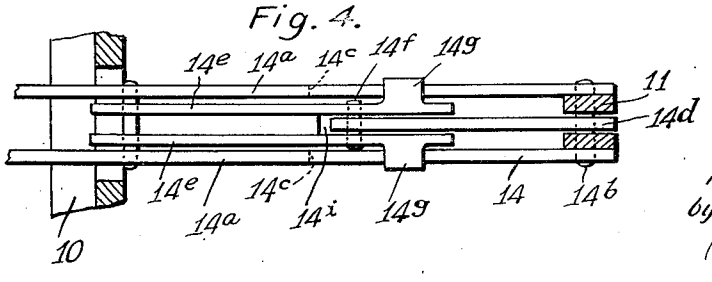


Fig. 4.



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UNITED STATES PATENT OFFICE

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RECLOSING MECHANISM FOR CIRCUIT BREAKERS

Application filed January 10, 1927. Serial No. 160,138.

This invention has to do with a mechanism operable to re-close a circuit breaker or the like, and it is an object of the invention to provide a simple, effective, and inexpensive device of this character.

In handling and distributing electrical energy, there are numerous places requiring the installation of circuit breakers, and in many cases it is desirable that the breakers be re-closed shortly after being opened, as the causes for the breakers opening are usually only temporary. Automatic re-closing mechanisms for circuit breakers have been proposed. However, in most cases these devices have been more or less complicated and expensive. I am aware, that a breaker re-closing mechanism has been used employing a weight to accomplish the re-closing action. This mechanism is apparently an improvement over older types, however, its application is limited and its manner of attachment to a breaker is unsuited for many situations.

It is an object of my present invention to provide a simple, practical and effective re-closing mechanism employing a weight to re-close the breaker.

It is another object of my invention to provide improvements in the construction and arrangements or parts in a re-closing mechanism of the type just mentioned.

It is another object of this invention to provide features of construction which minimize the number of working parts and provide a compact mechanism having a wide range of application.

The various objects and features of my invention will be best and more fully understood from the following detailed description of a typical form of the invention, throughout which description, reference is had to the accompanying drawings, in which:

Fig. 1, is a side elevation of my improved mechanism showing it operatively connected with a typical circuit breaker;

Fig. 2, is a plan view of the device being a view taken substantially as indicated by line 2—2 on Fig. 1;

Fig. 3, is a detailed, transverse sectional view of the device, being a view taken as indicated by line 3—3 on Fig. 2;

Fig. 4 is an enlarged detailed sectional view taken as indicated by line 4—4 on Fig. 1.

The mechanism provided by this invention is particularly suited for use in combination with circuit breakers and for the purpose of facilitating an understanding of the invention, I will describe a simple form thereof, applied to a typical and standard form of circuit breaker.

The breaker upon being opened is re-closed by pulling out and returning the operating handle. In the drawings, I have illustrated the circuit breaker mounted on a panel 10. The breaker includes a hand lever 11 pivotally mounted at the front of the panel 10, an operating lever 12 at the rear of the panel, a connecting rod 13 extending from the lever 12 upwardly to the breaker box or contact mechanism, located above the parts shown in the drawings, and a connecting means 14 between the hand lever 11 and the operating lever 12 whereby the lever 12, upon being moved to position where the breaker is opened, may be returned to the closed position by pulling the hand lever forward to the position indicated in dotted lines in Fig. 1, and then returning it to its normal closed position as shown in full lines in Fig. 1. In the particular breaker illustrated, the hand lever 11 extends upwardly in a vertical direction from its pivotal mounting 15 and is adapted to be pulled down or forward when manipulated to re-close the breaker. I have not shown the details of the breaker mechanism as such parts are familiar to those skilled in the art and do not concern the present invention.

The connecting means 14 shown in the drawings includes a pair of links 14^a connected at one end to the hand lever 11 and at the other end to a lever 12^a rigid with the lever 12. A pivot pin 14^b connects the links 14^a and the lever 11 by extending through slots 14^c formed longitudinally in the links. Toggle links 14^d and 14^e form a releasable means for holding the pivot pin 14^b at the outer ends of the slots 14^c. The links 14^d and 14^e have their adjoining ends connected together by a pivot pin 14^f. The outer end of the link 14^d is carried on the pin 14^b, while

the outer ends of the two corresponding links 14^e are carried by a pivot pin extending between links 14^a at a point inward of the inner ends of the slots 14^c. Stops 14^g are provided on the links 14^e to stop the toggle in position where the pin 14^b is held at the outer end of the slots. The toggle is adapted to be broken or released by an electric control 14^h which has a plunger 14^j that moves up to engage a trigger 14^i on the link 14^d. A spring 14^k is connected with the parts to normally urge the links 14^a in the direction indicated by the arrow in Fig. 1. When the electric control 14^h is operated, say momentarily, the toggle is broken upwardly allowing the spring 14^k to operate the parts, causing the links to move forward. During this operation the pin 14^b operates in the slots 14^c. To reset the breaker the handle 11 is pulled forward until the toggle drops back into set or aligned position and is then pushed back, returning the parts to the position shown in full lines in Fig. 1.

The mechanism provided by my present invention for operating the hand lever 11 of the circuit breaker in a manner to re-close the breaker, is preferably mounted on the floor below the circuit breaker so that it is unnecessary to apply or add parts to the panel 10. The mechanism includes generally, an operating weight 16, a lever 17 carrying the weight, an operating connection 18 between the lever 17 and the lever 11 of the circuit breaker, lifting means 19 operable to raise the weight and then release it, allowing it to fall, and power means 20 for actuating the lifting means.

The mechanism is preferably provided with a base plate 21 on which the various parts are mounted and with a housing 22 to surround the principal parts of the mechanism. The lever 17 is pivotally supported intermediate its ends so that it has a forward arm 23 projecting from the forward end of the housing and a rear arm 24 projecting from the rear end of the housing. The lever is provided intermediate its ends with a bearing part 25 which is rotatably carried on a shaft 26 mounted transversely in the housing. The shaft is carried in a bearing 27 supported by a frame 28 and a bearing 29 carried by one side of the housing.

The weight 16 is carried on the rear arm 24 and in the arrangement illustrated in the drawings, the weight is mounted on the arm at the exterior of the housing 22. The weight may be formed in two sections to be clamped to the arm 24 by bolts 30. This construction permits of the weight being readily removed from the arm and also allows it to be adjusted to any desired position on the arm.

The operating connection 18 between the levers 17 and 11 includes an arm 31 extending forward from the pivotal mounting 15 of the hand lever 11, a brace 32 extending between the outer part of the arm 31 and the outer part of the hand lever 11 and a connecting rod 33 connecting the outer part of the arm 31 with the forward arm 23 of the lever 17. The arm 31 is pivotally mounted at 15 and the brace member 32 connects the arm 31 and lever 11 so that they move together about the mounting 15. The connecting rod 33 is connected to the outer arm 31 through a pivot pin 34 and is connected to the outer end of the forward arm 23 through a pivot pin 35. With this arrangement, movement of the connecting rod through pivotal movement of the lever 17 will cause pivotal movement of the arm 31 and corresponding pivotal movement of the hand lever 11. The housing 22 is provided at its forward end with a vertical slot 36 and at its rear end with a vertical slot 37, which slots pass the arms 23 and 24, respectively, of the lever 17, allowing the pivotal movement of the lever 17 between the position shown in full lines and that shown in dotted lines in Fig. 1 of the drawings. This pivotal movement of the lever 17 is communicated to the hand lever 11 through the connecting means 18 and actuates the hand lever in a manner to re-close the circuit breaker.

The means 19 provided for lifting the weight 16 and releasing it so that it will drop, includes a member 40 rotatably carried on a shaft 41 and provided with one or more projections 42 arranged to co-operate with the arm 24 of the lever 17. In the preferred arrangement, the member 40 is in the form of a comparatively large gear, and is mounted at one side of the lever 24 and in mesh with a pinion 43 on the shaft 26. The shaft 26 is adapted to be driven from a drive shaft 44 through a worm gear 45 on the drive shaft and a worm wheel on the shaft 26. The worm gear 45 and worm wheel 46 mesh so that the rotation of the drive shaft 44 causes rotation of the shaft 26 which carries with it the pinion 43 and thereby causes rotation of the gear 40. In the form of the invention shown in the drawings, there are two projections 42 on the side of the gear 40 adjoining the arm 24. The projetcions are mounted near the periphery of the gear 40 and are adapted to engage under a plate 48 projecting from the side of the arm 24. As the gear 40 rotates, the projection 42 on the upwardly moving part of the gear moves to engage under the plate 48 to lift the arm 24 from the position shown in full lines in Fig. 1, to that shown in dotted lines in Fig. 1, and when the arm 24 is lifted to the up position the said projection will pass from under or beyond the end of the plate 48 releasing the arm allowing it to be returned to the down position through the action of the weight 16. In the particular arrangement shown, the lever 24 is adapted to be lifted twice during each revolution of the gear 40 and therefore there are two pro-

jections 42 on the gear which projections are located 180° apart on the gear. In practice, the projections carry rollers which engage the plate 48 to reduce friction between these parts.

The power means 20 provided for actuating the lifting means 25 may include an electric motor mounted on the base 21 and directly connected with the drive shaft 44. The motor may be comparatively small, as the gearing arrangement which I have provided effects a substantial speed reduction between the drive shaft 44 and gear 40.

I may provide an electric control in connection with my mechanism whereby the motor 20 is automatically put into operation when it is required to re-close the breaker which mechanism may be of the type set forth in my co-pending application entitled "Electrical control", filed Jan. 10, 1927, Serial Number 160,137. In the drawings I have indicated the electric control device at 50. I have shown the control device 50 mounted on the housing 22 with its operating lever 51 operatively connected with the lever 12 of the circuit breaker through a suitable connecting rod 52. With this arrangement the electric control is effectively and conveniently connected with the circuit breaker so that the reclosing device is put into operation when the breaker opens.

When the breaker is open, the movement of the lever 12 caused by the opening of the breaker, causes actuation of the electric control 50 through the rod 52. The electric control may be such as to immediately put the motor 20 into operation so that the gear 40 starts to turn in the direction indicated by the arrow in Fig. 1, causing one of the projections to engage the plate 48 on the arm 24 to gradually lift the arm until it reaches the up position whereupon the said projection passes out of engagement with the plate and the arm 24 is released to return to its down position by the action of the weight. It will be obvious from Fig. 1 of the drawings, how this movement of the arm 24 causes the hand lever 11 of the circuit breaker to be pulled forward and then quickly returned in a manner to cause re-closing of the circuit breaker. The fact that the weight is lifted slowly enables me to use a comparatively small motor 20, thus making the apparatus comparatively simple and inexpensive. I will call particular attention to the fact that the various parts of my device are arranged in a very simple and compact manner so that the device involves comparatively few parts and is reliable in operation.

Having described only a typical preferred form of my invention I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims:

Having described my invention, I claim:

1. An attachment for a circuit breaker for reclosing the circuit breaker including a shaft, a motor, a drive connection between the shaft and motor, a lever pivotally mounted on said shaft and adapted to be operatively connected with the breaker, a weight on one end of the lever, a pinion fixed on the shaft, a gear mounted on an axis spaced from the shaft to mesh with the pinion, and a projection on the gear to engage and lift the lever and then release it.

2. An attachment for a circuit breaker for reclosing the circuit breaker including a shaft, a motor, a worm gear drive connection between the shaft and motor, a lever pivotally mounted on the shaft, a connecting rod attached to the lever and adapted to be connected with a part of the breaker, a weight on one end of the lever, a pinion on the shaft, a gear mounted on an axis spaced from the shaft to mesh with the pinion, and a projection on the gear to engage and lift the lever and then release it.

3. An attachment for a circuit breaker for reclosing the circuit breaker including a shaft. a motor, a drive connection between the shaft and motor, a lever pivotally mounted on the shaft and adapted to be operatively connected with the breaker, a weight on one end of the lever, a pinion on the shaft, a gear mounted on an axis spaced from the shaft to mesh with the pinion, and spaced projections on the gear to successively lift and release the lever.

4. A reclosing mechanism for a circuit breaker having a pivotally mounted operating member, including a motor, a shaft, a drive connection between the motor and shaft, a lever pivotally mounted on the shaft, a weight in connection with the lever, a pinion on the shaft, a gear mounted to mesh with the pinion, a projection on the gear to lift and release the lever, and an operating connection between the lever and operating member, including an arm extending from the pivotal mounting of the member, a brace between the arm and member, and a connecting rod connecting the lever and the outer part of the arm.

5. A reclosing mechanism for a cricuit breaker having a pivotally mounted operating member, including a motor, a shaft, a drive connection between the motor and shaft, including a worm gear driven by the motor and a worm wheel on the shaft in mesh with the worm gear, a lever pivotally mounted on the shaft, a weight in connection with the iever, a pinion on the shaft, a gear mounted to mesh with the pinion, a projection on the gear to lift and release the lever, and an operating connection between the lever and operating member, including an arm extending

from the pivotal mounting of the member, a brace between the arm and member, and a connecting rod connecting the lever and the outer part of the arm.

In witness that I claim the foregoing I have hereunto subscribed my name this 7th day o December, 1926.

HENRY L. SAMPSON.