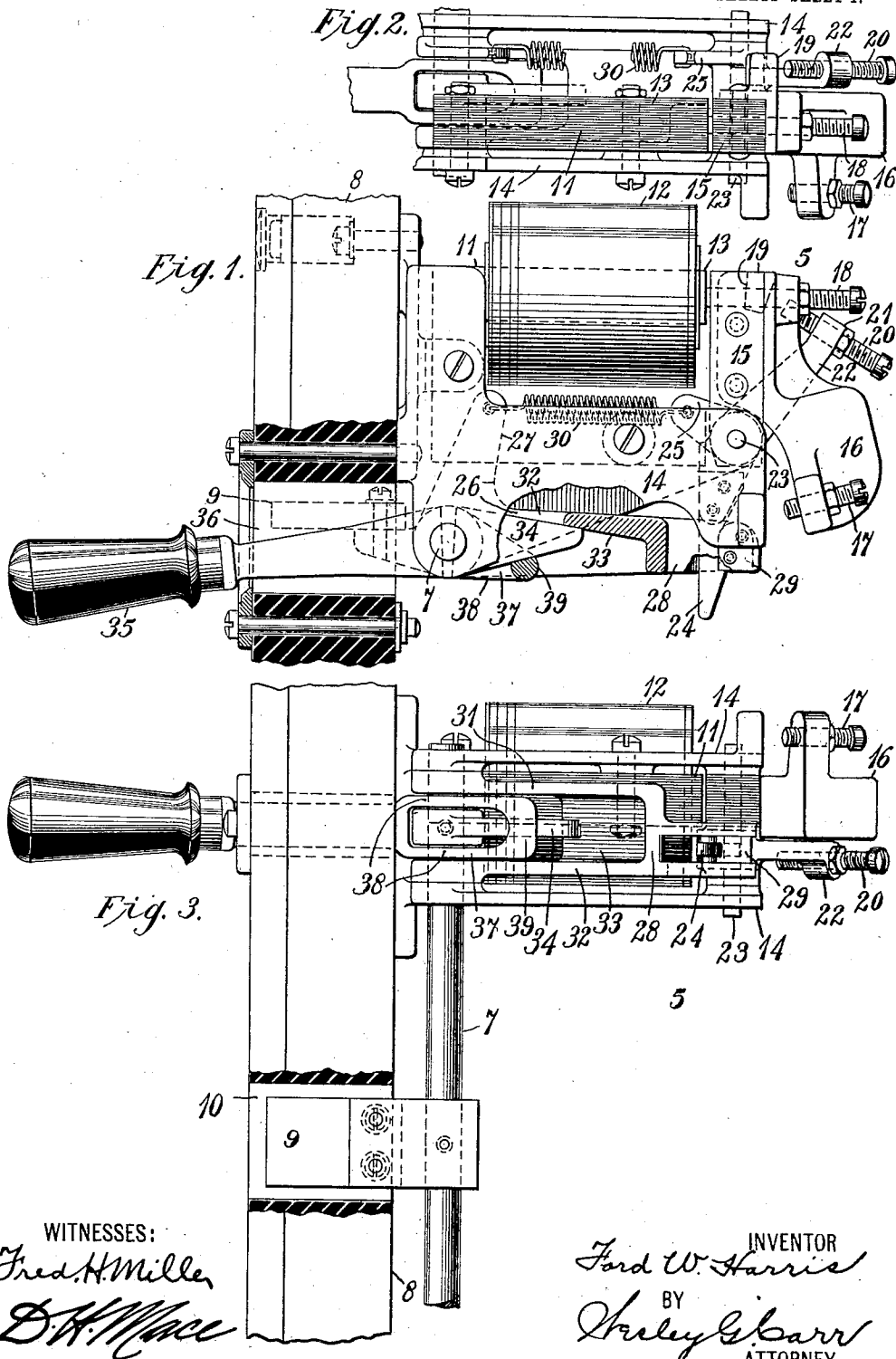


1,029,753.

F. W. HARRIS.
CIRCUIT INTERRUPTER.
APPLICATION FILED AUG. 15, 1911.

Patented June 18, 1912.

2 SHEETS—SHEET 1.



WITNESSES:
Fred. H. Miller
D. K. Mace

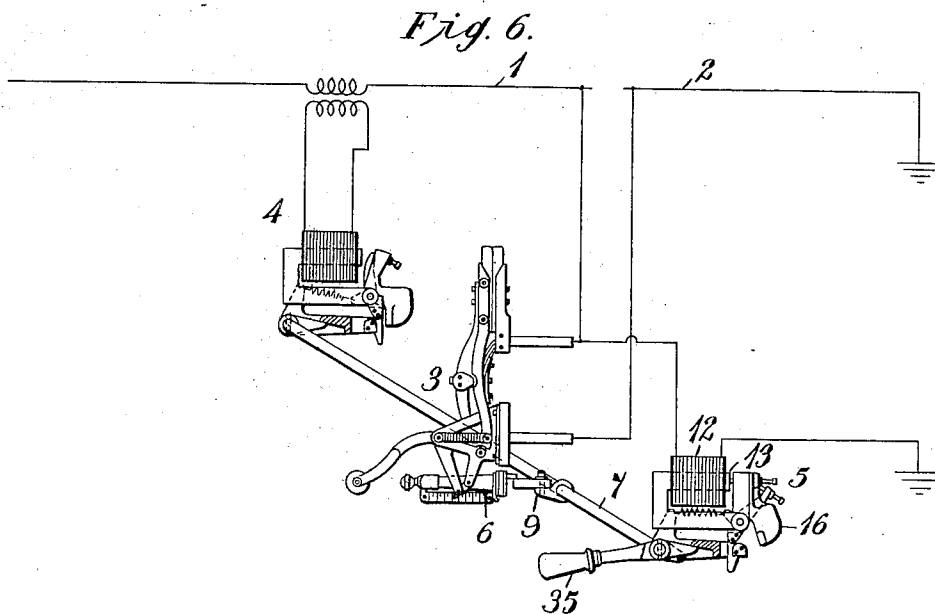
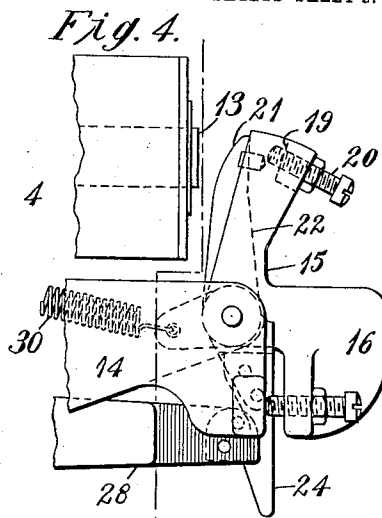
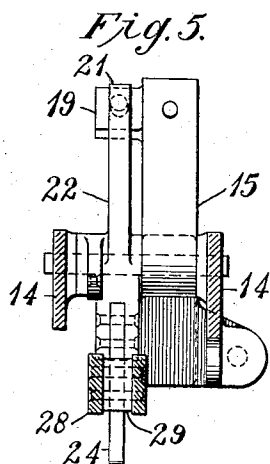
INVENTOR
Ford W. Harris
BY
Wiley S. Barr
ATTORNEY

1,029,753.

F. W. HARRIS.
CIRCUIT INTERRUPTER.
APPLICATION FILED AUG. 16, 1911.

Patented June 18, 1912.

2 SHEETS—SHEET 2.



WITNESSES:
Fred H. Miller
D. H. Mace

INVENTOR
Ford W. Harris
BY
Wm. J. Shaw
ATTORNEY

UNITED STATES PATENT OFFICE.

FORD W. HARRIS, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE
ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CIRCUIT-INTERRUPTER.

1,029,753.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed August 15, 1911. Serial No. 644,164.

To all whom it may concern:

Be it known that I, FORD W. HARRIS, a citizen of the United States, and a resident of Wilkesburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Interrupters, of which the following is a specification.

My invention relates to circuit interrupters and it has special reference to auxiliary tripping devices for circuit interrupting apparatus.

One object of my invention is to simplify and improve devices of the above-indicated character and to provide an auxiliary tripping device which shall be compact and rugged in construction, and durable and reliable in operation.

Another object of my invention is to provide a tripping device that is so designed and constructed that it may be readily adapted for operation under various predetermined circuit conditions and may be cheaply and commercially manufactured on a large scale.

Another object of my invention is to provide a circuit interrupter with a plurality of such auxiliary tripping devices which are severally adapted to be actuated under different circuit conditions in order that the interrupter may be tripped or released in accordance with any one of a plurality of different circuit conditions.

My invention may best be understood by reference to the accompanying drawings, in which—

Figure 1 is a view, partially in side elevation and partially in section, of a tripping device constructed in accordance with my invention. Fig. 2 is a plan view of a portion of the device shown in Fig. 1. Fig. 3 is a bottom plan view of the device shown in Fig. 1. Fig. 4 is a view similar to Fig. 1 showing a portion of a modified form of my invention. Fig. 5 is a view, partially in end elevation and partially in section, of a portion of the device shown in Fig. 4, and Fig. 6 is a diagrammatic view embodying my invention.

Referring to the drawings, supply circuit conductors 1 and 2 are adapted to be electrically connected by means of a circuit interrupter 3 in the usual manner, said interrupter being provided with auxiliary tripping devices 4 and 5 which are respectively

adapted to trip the interrupting device in accordance with predetermined abnormal load conditions and predetermined conditions of low voltage.

The construction and operation of the circuit interrupter 3 is old and familiar to those skilled in the art, and, inasmuch as it is shown merely as illustrative of any suitable device for performing the intended function, no further description thereof is deemed necessary. It should, however, be understood that the interrupting device 3 is provided with an overload actuated trigger member 6 by means of which the interrupter is adapted to be tripped or released. Furthermore, a shaft 7 is rotatably mounted in bearings (not shown) on the back of an insulating panel 8, and is provided with an arm 9 which is fixed thereto and projects through an opening 10 into engagement with the trigger member 6. The auxiliary tripping devices 4 and 5 are suitably associated with the respective ends of the shaft 7 and are adapted to actuate the shaft 7 to trip the circuit interrupter 3, in a manner to be hereinafter set forth.

Particular reference may now be had to Figs. 1, 2 and 3, in which an auxiliary tripping device is shown that is adapted for operation under predetermined conditions of low voltage. A stationary magnetizable core 11 is suitably secured to the insulating panel 8 and is provided with an energizing winding 12 which is disposed around a leg 13 of said stationary core. Pivottally mounted between side brackets 14, is a movable armature 15, which, under normal voltage conditions, is maintained against the leg 13 in accordance with well-known principles. The movable armature 15 is provided with a weighted portion 16 which normally tends to rotate the movable armature in a clockwise direction away from its cooperating stationary core member 13, said weighted portion being provided with an adjusting screw 17 in order to limit its movement. The air gap between the armature 15 and the stationary core member 13 may be adjusted as desired through the agency of a screw 18. To one side of the movable armature 15 is a lateral projection 19 which is adapted to engage an adjusting screw 20 at the upper end 21 of a latch member 22 when the winding 12 is insufficiently energized to retain the armature.

The latch 22 is pivotally mounted upon a pin 23, which serves as a support for the armature 15, and is also provided with a downwardly projecting catch 24 and a laterally projecting arm 25. Loosely mounted upon the shaft 7, is an operating lever 26 which comprises arms 27 and 28 that project respectively in substantially vertical and horizontal planes. The outer end of the arm 28 of the operating lever is provided with a block 29 that normally is engaged by the catch 24, whereby the operating lever is restrained in its position. Between the upper end of the arm 27 of the operating lever and the arm 25 of the latch 22, is disposed a strong power spring 30, which normally holds the catch 24 in engagement with the block 29 and which also furnishes power to actuate the operating lever 26 in a clockwise direction when released from the catch 24, as will be hereinafter described. The arm 28 of the operating lever 26 comprises side members 31 and 32 which are integrally connected by a web 33, and between the members 31 and 32 is located an arm 34 that is pinned to the shaft 7 and engages the web 33. In order to reset the tripping device, a handle 35 is provided, which is loosely mounted on the shaft 7 and projects through an opening 36 in the insulating panel 8, said handle being provided with an extended portion 37, the side members 38 of which are connected by a cross member 39 which is located below the arm 34 and engages the same. Assuming that normal voltage conditions exist upon the circuit and that the various parts of the device occupy the positions shown, if the voltage be reduced below a predetermined amount, the magnetism produced in the core members is insufficient to hold the movable armature 15 in engagement with the stationary core member 13 and the weighted portion 16 causes the armature 15 to be rotated in a clockwise direction. In so doing, the projecting portion 19 engages the screw 20 that is provided at the upper end of the latch 22, and thereby causes the catch 24 to be disengaged from the block 29. The spring 30 then exerts a heavy pull upon the operating lever 26 and it is thereby rotated in a clockwise direction. Inasmuch as the arm 34 is pinned to the shaft 7 and in engagement with the web 33 of the operating lever 26, it is evident that the movement of the said lever is imparted to the shaft 7 and, hence, the arm 9 is caused to lift the trigger member 6 of the circuit interrupter 3, whereby said circuit interrupter is released and is caused to open in a well-known manner. In order to reset the tripping device, the handle 35 is forced downwardly, thereby raising the operating lever 26 to its normal position, where it is engaged and restrained by the latch mem-

ber 22 in conjunction with the spring 30, as will be readily understood. When full voltage is restored to the winding 12, the movable armature 15 is attracted to its stationary core member 13 and held in engagement therewith until the voltage again falls below a predetermined value.

Particular reference may now be had to Figs. 4 and 5, which illustrate a tripping device 4 similar to the tripping device 5 hereinbefore described, which embodies slight modifications in order that it may be adapted for operation under abnormal overload conditions. The device here shown differs from the device hereinbefore set forth in that the movable armature 15 is normally held out of engagement with the stationary core member 13 by means of the weighted portion 16 and is adapted to be attached thereto when an abnormal load condition exists upon the circuit. The lateral projection 19 which is provided at the upper end of the armature 15 is provided with an adjustable set screw 20, the latter being arranged to engage the upper end 21 of the latch 22 when attracted to its core member 13. Although differing somewhat in specific details, the latch 22 is substantially similar to the latch hereinbefore described and, on account of the similarity of operation of this tripping device to that already set forth, no further description will be given.

Although I have shown and described auxiliary tripping devices 4 and 5 which are adapted for operation under certain predetermined circuit conditions, those skilled in the art will readily understand that my invention is applicable to various other circuit conditions. It is also evident that, if a plurality of such devices which are severally adapted for operation under different circuit conditions be associated with a circuit interrupter or circuit interrupters in the manner shown in Fig. 6 and hereinbefore set forth, said interrupter or interrupters may be automatically tripped under any one of the various predetermined conditions. Furthermore, a single handle may serve the purpose of resetting any one of the devices.

I do not wish to be restricted to the specific structural details and arrangement and location of parts hereinbefore shown and described, as various modifications may be effected therein without departing from the spirit and scope of my invention, and I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. A tripping device for circuit interrupters comprising a stationary magnetizable core, a winding therefor, a cooperating movable armature, an operating lever, a latch to restrain said lever and adapted to be re-

leased by said armature, and a power spring disposed between said latch and said operating lever for maintaining said members in engagement and for actuating said lever when released from said latch.

2. A tripping device for circuit interrupters comprising a stationary magnetizable core, a winding therefor, a movable armature, an operating lever, means for restraining said lever and adapted to be released by said armature, means associated with said restraining means and said operating lever for holding the same in engagement, said means being adapted to actuate said lever, and means associated with said lever for tripping said interrupter.

3. A tripping device for circuit interrupters comprising a stationary magnetizable core, a winding therefor, a movable armature associated therewith, a restraining latch adapted to be released by said armature, an operating shaft, a lever loosely mounted thereon, a power spring disposed between said latch and said lever for maintaining both of said members in engagement and for actuating said lever when released from said latch, and a projecting arm fixed to said shaft and adapted to be engaged by said lever.

4. The combination with a stationary magnetizable core, a winding therefor, a movable armature associated therewith, an operating shaft, an operating lever loosely mounted thereon, a latch for restraining said operating lever and adapted to be released by said armature, and a coil spring located between said latch and said operating lever and adapted to actuate said lever, of means for transmitting the movement of said operating lever to said operating shaft, and means associated with said shaft for resetting the parts.

5. In a circuit interrupter, the combination with an electromagnet comprising a

stationary core, a movable core, and an energizing winding, of an operating member, means dependent upon the movement of said operating member for tripping said interrupter, means for restraining said operating member, and a power spring for maintaining said restraining means in engagement with said operating member and for actuating said operating member when released from said restraining means.

6. The combination with a circuit interrupter and a plurality of auxiliary tripping devices dependent upon predetermined circuit conditions, each comprising an electromagnet, an operating lever, a latch adapted to be released by said electromagnet, and a power spring associated with said latch and said operating lever, of an interconnecting means associated with said operating levers, means associated with said interconnecting means for releasing said interrupter when any tripping device is actuated, and a single means for resetting any one of the tripping devices.

7. The combination with a circuit interrupter having a tripping mechanism, and a rotatable shaft associated therewith and adapted to release said tripping mechanism, of a plurality of auxiliary tripping devices associated with said shaft, each comprising a normally set power spring, means associating said spring with said shaft, and electro-responsive means for releasing said spring whereby said shaft is actuated to release the tripping mechanism of the interrupter.

In testimony whereof, I have hereunto subscribed my name this 4th day of Aug. 1911.

FORD W. HARRIS.

Witnesses:

A. ST. GEORGE,
B. B. HINES.