

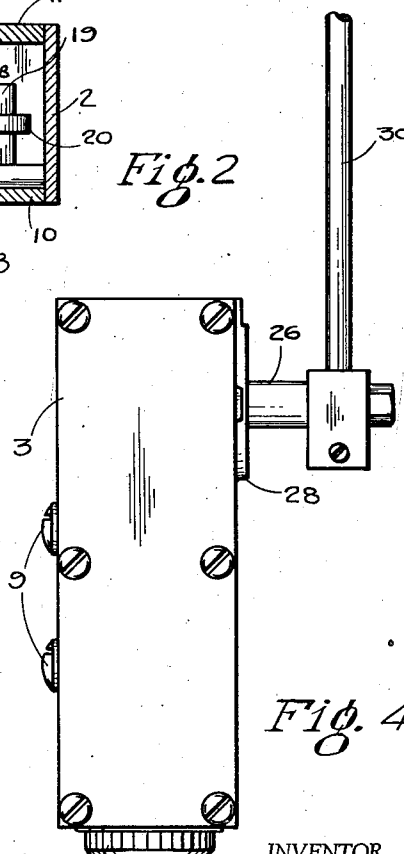
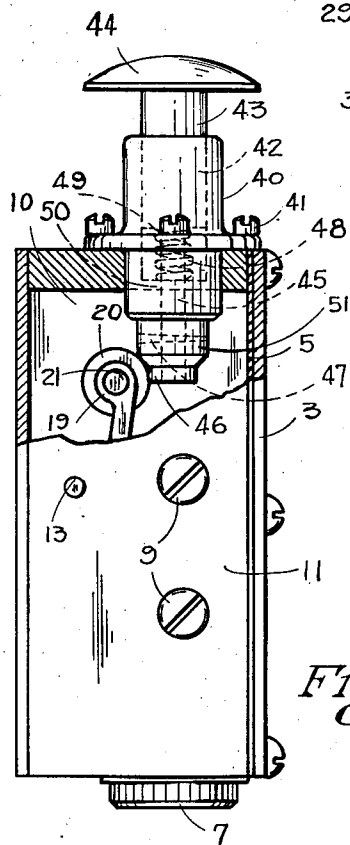
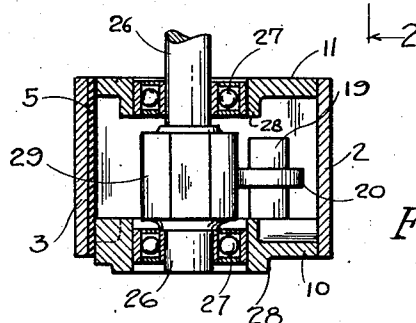
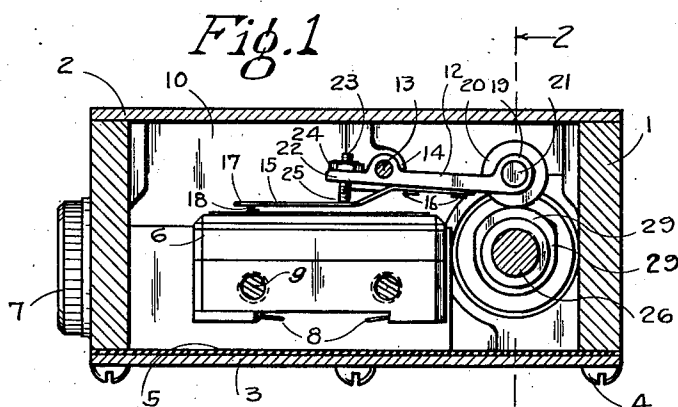
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M. L. JEFFREY

2,181,829

CIRCUIT BREAKER

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INVENTOR.
MAX L. JEFFREY
BY *Richard Watts*
ATTORNEY

UNITED STATES PATENT OFFICE

2,181,829

CIRCUIT BREAKER

Max L. Jeffrey, Shaker Heights, Ohio, assignor, by
mesne assignments, to The M. L. Jeffrey Cor-
poration, Cleveland, Ohio, a corporation of
Ohio

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5 Claims. (Cl. 200—153)

This invention relates to circuit breakers, and more particularly to an improved operating mechanism for circuit breakers.

It is common practice in automatic machinery, to provide switches so disposed that reciprocating or rotating parts of the machine actuate certain switches to initiate movement in some other part of the machine, or for indicating that a movement has been completed. Inasmuch as these switches are operated by various parts of different types of machines, it has necessitated to a considerable extent individual design for each machine.

It is one of the objects of this invention to provide a switch mechanism which is versatile in its applications one particular mechanism being readily adapted to various types of machines. It is a further object to provide a switch mechanism where a number of the switches may be ganged and operated by a single cam shaft or timing mechanism.

Still another object of the invention resides in providing a mechanism for operating a so-called micro-switch where, although the switch may be actuated by different mechanisms, the micro-switch is operated within the limits of travel essential to long life and is not damaged by over-travel or greater pressure ordinarily caused by the different applications where the device is used.

Still other advantages of the invention and the invention itself, will become apparent from the following description of some embodiments, which embodiments are illustrated by the accompanying drawing and which description forms a part of this specification.

In the drawing:

Fig. 1 is a sectional view of the mechanism of my invention in elevation;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a view partly in elevation and partly in section of one type of operating mechanism; and

Fig. 4 is an elevational view of another type of operating mechanism.

Referring now to the drawing throughout which like parts have been designated by like reference characters.

The device generally comprises a rectangular housing adapted to be secured or mounted on a machine adjacent a reciprocating or rotating part which is to operate the switch. In the housing there is disposed a micro-switch which may be of the type disclosed in Patent No. 1,960,020, the micro-switch per se being no part of the present

invention other than as is claimed in the combination. A lever mechanism is supported in the housing for actuating the micro-switch and it in turn is operated by a cam or plunger having operating parts extending out of the housing and adapted to be connected to the reciprocating and/or rotating part of the machine which is to operate the switch.

More specifically the housing comprises a metallic box 1 which may be cast in rectangular form with two open sides which are adapted to be closed by plates 2 and 3 held onto the box by screws 4. A sheet of fiber insulation 5 may be provided and is particularly desirable on the side where the conductor wires connect with the micro-switch which is indicated at 6 to the leads 8.

The micro-switch is held in a fixed position in the housing by supporting pins 9 which extend through the base of the switch and through the walls 10 and 11 of the housing. The pins 9 may be threaded adjacent their heads and screwed into threads in the wall to hold the same in position.

The operating mechanism for the micro-switch comprises a lever 12 pivotally disposed on a pin 13 which is journaled in the walls 10 and 11, the lever being provided with an enlarged boss 14 for the reception of said pin. A substantially Z-shaped leaf spring 15 is secured to the lever by rivets 16, with the free end 17 of the spring in contact with the operating pin 18 of the micro-switch 6. One end of the lever 12 is provided with an enlarged bifurcated portion 19 in which a roller 20 is rotatably supported on a pin 21. The other end 22 of the lever, which is relatively short, is provided with a threaded aperture and carries a set screw or stud 23 which may be held in adjusted position in the lever by a lock nut 24. The end 25 of the screw 23 contacts the spring 15 intermediate its ends and provides a means for adjusting angular displacement, and hence the tension, of said spring relative to the lever. Various means may be provided for moving the lever 12 by contacting with the roller 20, one of the preferred forms including a shaft 26 rotatably journaled in bearings 27 disposed in bosses 28 of the walls 10 and 11 of the housing. The shaft carries a cam 29 upon which the roller 20 rides. One end of the shaft 26 extends exteriorly of the housing and carries on its end a lever 30. The lever is adapted to be engaged by the reciprocating part of the machine by which it operates. Obviously the shaft 26 can either rotate or reciprocate and the lever 30 could be replaced by a

gear, or the shaft 26 can be directly connected by a universal coupling to any rotating part so long as the desired switch timing is attained.

In operation the micro-switch usually takes 14 ounces pressure on the pin end to operate the same. The set screw 23 is adjusted so that the maximum pressure upon rotation of the cam 29 applied to the pin 18 is 20 ounces. When the cam 29 is rotated the high spot 29' on the cam urges the roller 20 and end of the lever 12 upward as viewed in Fig. 1, which causes the lever to be rotated about its pivot and transmit pressure through the end 22 and screw 23 to the mid-portion of the spring 15 and thence by the end 17 of the spring to the operating pin 18 of the micro-switch. It will be clear that regardless of how much movement is applied to the outside lever 30 or how fast the cam is rotated, the pressure applied to the micro-switch never exceeds 20 ounces because of the adjustment of the set screw 23 and thus no unusual stresses are placed on the switch mechanism.

As best shown in Fig. 3, I have illustrated another type of operating mechanism for the lever 12 which includes a housing 40 secured to the end of the casing 1 by screws 41. The housing is provided with a longitudinal bore 42 in which is disposed a piston 43 having an exterior operating head 44. The end of the piston is provided with a reduced stem 45 and carries on its end inside of the housing a cam 46 which is pinned to the stem by a taper pin 47. A helical spring 48 is disposed about the stem 45 having one end engaging against the shoulder 49 of the piston and the other end bearing against the re-entrant wall 50 of the housing 42 to urge the piston and operating head 44 to its outward position. The cam 46 rests against the roller 20 and when pushed inward by pressure on the head 44, causes the roller to ride up on the surface 51 and move the roller to the left as shown in the drawing. When pressure on the head 44 is relieved, the spring 44 returns the piston to its original position. The mechanism otherwise is the same as shown in Fig. 1.

Although I have described but one micro-switch being operated by one lever and one cam, as previously stated, it would be quite within the purview of this invention to provide a bank of such switches, levers and cams operable from a single cam shaft 26, the timing of the switches being dependent upon the position of the high spots 29' of the cams. A bank of such switches could also be operated exteriorly by the individual mechanism such as shown in Fig. 3. In either event the mechanisms for transmitting a predetermined pressure to the contactor plungers 18 would be as shown and described.

It will thus be seen that in the device shown in Figs. 1, 2 and 4, no matter what instrumentality is used to rotate the cam shaft, or whether the movement be large or small, the pressure for operating the micro-switch does not exceed a predetermined maximum and thus result in damage to the delicate interior mechanism of the micro-switch.

Having thus described my invention and some embodiments thereof, I am aware that numerous and extensive departures may be made therefrom by those versed in the art in view of the disclosure herein, and it is not my intention to limit my invention to the precise embodiment shown other than as is indicated in the appended claims.

I claim:

1. A switch operating mechanism including a housing, a switch fixedly supported within the housing and having an operating pin, means for moving said pin comprising a lever pivotally supported in the housing, a spring carried thereby and having an end disposed on said pin, means carried by the lever to adjust the tension of the spring, a cam in connection with the lever and adapted to be moved from without the housing.

2. In a device of the class described, a housing, a lever comprising a body pivotally supported by the housing, a roller on one end of said lever, a cam for moving said roller, a leaf spring secured to said lever intermediate its pivot and said roller and extending beyond the free end of said lever, adjusting means for positioning said spring relative to the lever comprising a screw threaded through the free end of said lever and energizing the face of said spring, and a lock nut for locking said screw in adjusted position, and a switch adapted to be actuated by said spring.

3. In a device of the class described, a housing, a contactor disposed within said housing, means for operating said contactor comprising a lever pivotally supported in the housing, a spring supported by said lever and extending in prolongation thereof with the end operably engaging the contactor, and means to adjustably position said spring supported by said lever including a threaded stud extending therethrough and engaging said spring and adapted to change the angular position of said spring relative to said lever, and locking means for said stud, and means for moving said lever comprising a cam rotatably journaled in said housing and having an axial extension disposed outside of the housing, and a roller carried by the lever and held in contact with said cam by said spring.

4. In a device of the class described, a housing, a switch disposed in the housing for controlling an electrical circuit, means for operating said switch including a lever pivotally supported in said housing and carrying a spring extension on one end, means to vary the position of said spring comprising a screw threaded through the lever and engaging said spring to vary the angular relation between the spring and lever, and locking means for fixing the position of said screw, means for operating said lever comprising a coupling secured to said housing and supporting a movable member for engaging the lever in the housing and adapted to be engaged on the outside of the housing.

5. A device of the class described, a housing, a contactor supported within said housing and having an operating plunger, means for operating said contactor comprising a lever pivotally supported on a pin journaled in the walls of said housing, a Z-shaped spring carried by said lever and extending beyond an end thereof with the free end in engagement with said plunger, and means to adjustably position said spring supported by said lever comprising a threaded stud extending through the lever engaging said spring intermediate its end and its point of attachment to said lever, and adapted to adjust the angular position of said spring relative to said lever, and locking means for said stud, the free end of said lever being bifurcated and a roller pivotally supported thereby, a cam journaled in said housing and in engagement with said roller and having a portion disposed outside of the housing adapted for movement from an external source.

MAX L. JEFFREY.