

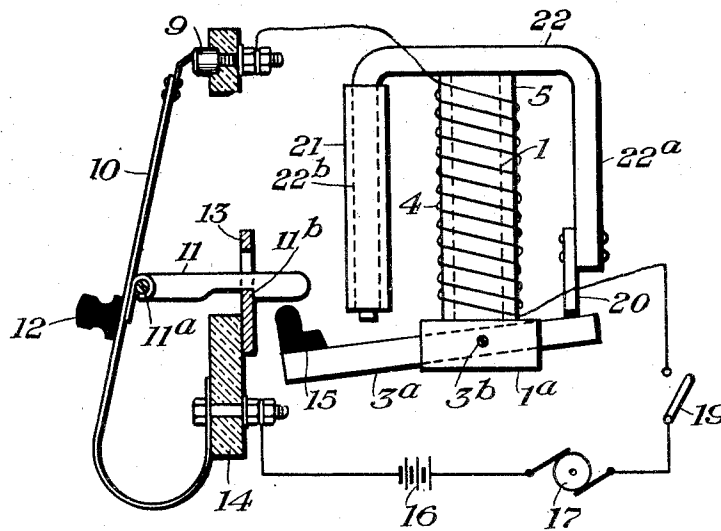
July 19, 1927.

1,636,037

C. R. BEALL ET AL

OVERLOAD CIRCUIT BREAKER

Original Filed Nov. 12, 1919



INVENTORS:

C. R. Beall and
R. M. Culson,
by A. F. Venable
Their Attorney

Patented July 19, 1927.

1,636,037

UNITED STATES PATENT OFFICE.

CHARLES R. BEALL, OF SWISSVALE, AND ROBERT M. GILSON, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

OVERLOAD CIRCUIT BREAKER.

Original application filed November 12, 1919, Serial No. 337,449. Divided and this application filed October 20, 1923. Serial No. 669,725.

Our invention relates to overload circuit breakers, and particularly to circuit breakers designed for operation by a prolonged current above a given value but not by a momentary surge of current above such value.

One object of our invention is the provision of a circuit breaker of this character which is simple and inexpensive to construct, yet reliable in operation.

The present application is a division of our copending application filed Nov. 12, 1919, Serial No. 337,449, for overload circuit breakers.

We will describe one form of circuit breaker embodying our invention, and will then point out the novel features thereof in claim.

The accompanying drawing is a view showing one form of circuit breaker embodying our invention.

Referring now to this drawing, the reference character 1 designates a core member or leg having a pole piece 1^a at the lower end. Attached to the upper end of the core 1 is a U-shaped member or back strap 22 of magnetizable material such as soft iron, having two legs 22^a and 22^b which are parallel to the core 1 and terminate adjacent the pole piece 1^a. An armature 3^a is pivotally mounted at point 3^b in the pole piece 1^a, the pivotal point being to the right of the middle point of the armature so that the armature is biased to the position shown, wherein it is separated from leg 22^a by a block 20 of non-magnetic material.

Mounted on the core 1 is a winding 4 for creating magnetic flux through core 1 and member 22. Between the winding and the core is a sleeve 5 of electro-conductive material, such as copper, the purpose of which is to delay the building up of flux in the magnetic circuit during a sudden increase in current strength in winding 4.

It will be seen that this structure provides two paths in multiple for the flux in core 1, one path being through leg 22^a and the right hand portion of armature 3^a, and the other path being through leg 22^b and the left hand portion of the armature. When the armature is in the position shown, the air gap between the armature 3^a and leg 22^a is greater than that between the armature and leg 22^b, so that the reluctance of the right

hand path is greater than that of the left hand path; consequently, when a steady current of a given value flows in winding 4 the armature will close, that is, it will swing in clockwise direction from the position shown. Leg 22^b is surrounded by a copper sleeve 21, so that most of the varying flux due to a momentary surge of current above the given value in winding 4 will be forced through leg 22^a and so will have no effect on armature 3. The building up of flux due to a surge of current is also delayed by sleeve 5 on core 1.

The operation of the elements thus far referred to is as follows: As long as current of a definite value or less flows in winding 4 the armature 3^a will remain open, but when a steady current of greater value is supplied to the winding the armature will close. When, however, the winding carries a momentary surge of current above such definite value, the sleeve 5 will delay the building up of flux, and the sleeve 21 will force the greater part of the increasing flux through the leg 22^a, so that the flux density in the left hand portion of armature 3^a will be insufficient to cause the latter to close. The surge of current will therefore have no effect on the device.

The circuit controlling portion of the device comprises a fixed contact member 9 and a contact spring 10 which normally tends to move away from member 9. Spring 10 is provided with a handle 12 by which it may be moved into engagement with the member 9, and it is normally held in the latter position by a latch 11. This latch is pivotally connected with the spring 10 at 11^a, and is provided with a shoulder 11^b which coacts with a hook 13 attached to a fixed block 14.

When armature 3^a closes, a toe 15 carried by the armature raises latch 11 and so releases the latter from hook 13 so that the contact opens. It may be closed by means of handle 12.

As here shown, the circuit breaker is included in circuit with a motor and a battery, the circuit being from battery 16, through motor 17, contact 19, winding 4, contact 9—10 to battery 16. The parts of the circuit breaker are so adjusted that the normal operating current taken by motor 17 will not cause the breaker to open, but that a pro-

longed current above this value, such as will occur if the motor becomes stalled, will cause the breaker to open and so avoid injury to the apparatus. The current drawn by the motor while starting is, of course, in excess of the normal operating current, but this excess is merely a momentary surge which for reasons pointed out hereinbefore, has no effect on armature 3 and so does not cause the circuit breaker to open.

Although we have herein shown and described only one form of circuit breaker embodying our invention, it is understood that various changes and modifications may be made therein within the scope of the appended claim without departing from the spirit and scope of our invention.

Having thus described our invention, what we claim is:

20 An electromagnetic structure comprising a magnetizable core provided with a sleeve of electro-conductive material and also with a winding, a U-shaped member of magnetiz-

able material attached to one end of said core and having two legs parallel with said core and on opposite sides thereof, an armature pivotally mounted at the other end of said core and co-operating with both of said legs and biased to a position remote from the end of the first of said legs, the air gap between the armature and said first leg then being less than the air gap between the armature and the second leg so that a steady current above a given value in said winding will move the armature towards the first leg, and a sleeve of electro-conductive material around said first leg whereby the greater part of a surge of flux due to a surge of current above said given value will traverse the second leg and the armature and so will tend to hold the armature in its biased position.

In testimony whereof we affix our signatures.

CHARLES R. BEALL.
ROBERT M. GILSON.