Jan. 29, 1929. 1,700,240

H. SCHERIL

CURRENT LIMITER

Original Filed June 21, 1920 2 Sheets-Sheet 1

Fig. 1.

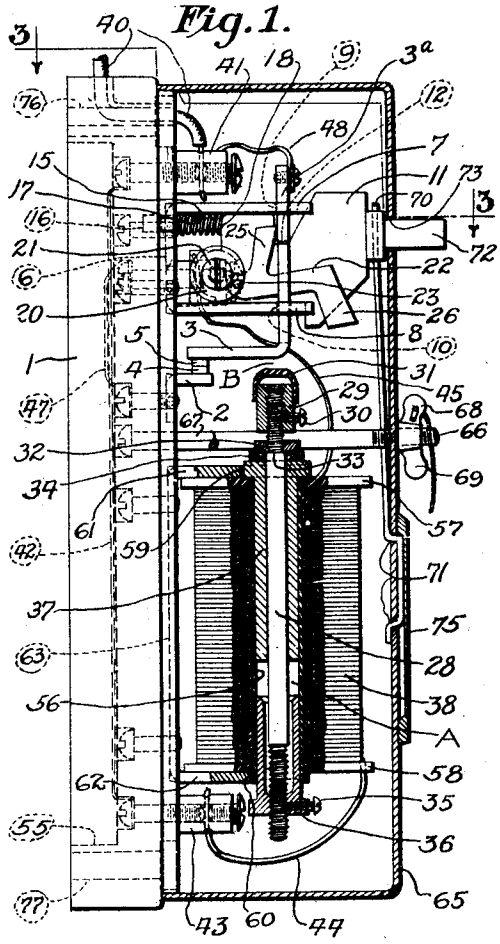
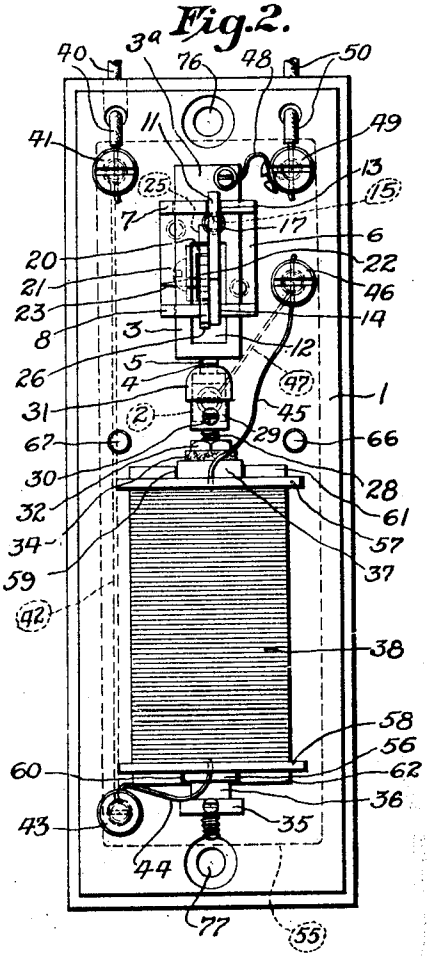


Fig. 2.



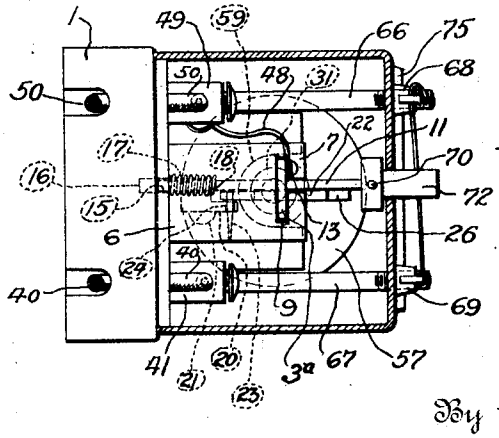


Fig. 3.

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Fig. 4.

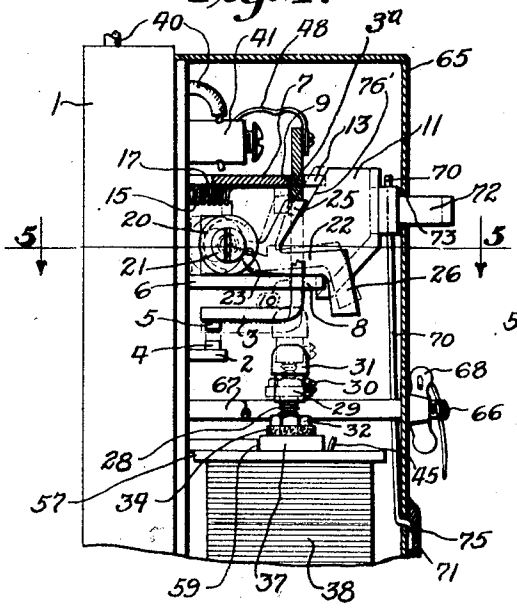
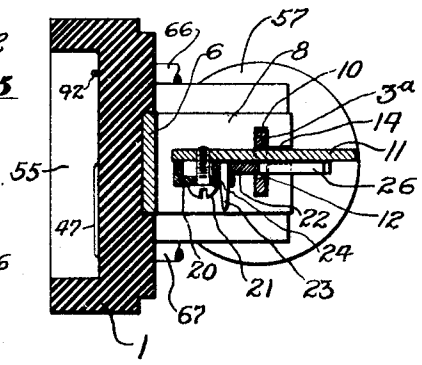


Fig. 5.



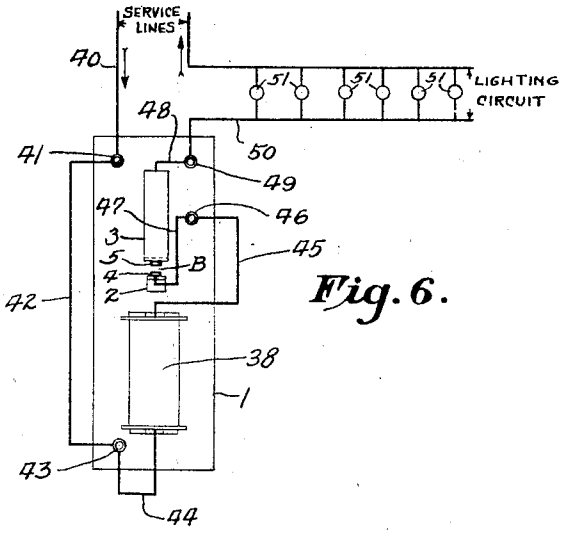
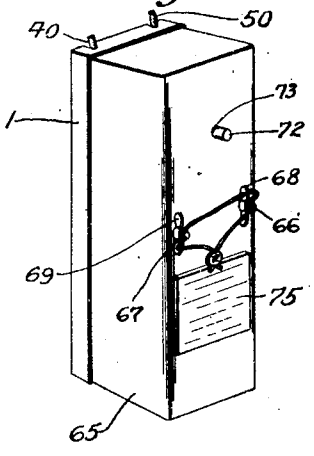


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

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CURRENT LIMITER.

Application filed June 21, 1920, Serial No. 390,387. Renewed April 18, 1928.

This invention relates to a current limiter or circuit breaker, and has for its object to provide a maximum current switch for opening a circuit to prevent excess consumption of current. Such devices are largely used instead of relatively expensive watt meters on flat rate circuits where the expense of installing a meter is prohibitive. According to this invention, the circuit is opened by a predetermined maximum current, and held so, until manually closed, but immediately opens again unless the current taken by the consumption devices is cut down. Before the switch is latched open by exactly the predetermined current, a slightly less current causes fluttering of the switch to warn the user of maximum consumption.

The invention comprises a series magnet operating a core or armature acting as a tappet on a line switch, the latter being latched open upon a predetermined throw, and manually releasable. Adjustments are provided so that each switch can be readily set for the predetermined current and then sealed or locked against tampering by the consumer, who thereby can only obtain the predetermined current less than that which causes the switch to flutter or stay open.

A feature of the invention is simplicity, enabling manufacture at a low cost,—reliability in operation, and adaptability to being placed in any desired location.

The invention comprises various features of construction as hereinafter described in the following specification, and pointed out in the claims and illustrated in the appended drawings, in which:

Figure 1 is a side elevation of the device in the normal or closed position, the cover being shown in section.

Figure 2 is a front view of the device with the cover removed.

Figure 3 is an end view taken on line 3—3, Fig. 1.

Figure 4 shows the device in open position, and the resetting operation of the movable contact in dotted lines;

Figure 5 is a sectional view taken on line 5—5 of Fig. 4, with the cover removed;

Figure 6 is a diagrammatic view of the electrical connections, the circuit being shown open;

Figure 7 illustrates the device in perspective, showing the cover attached.

Referring to the drawings, 1 indicates a base of insulating material, carrying a stationary contact 2 and a cooperating movable contact 3, preferably of L shape, with a vertical extension 3^a, having point contacts 4 and 5, respectively, of non-oxidizable material, for example, of tungsten alloy. Secured to the base 1 is a bracket 6 provided with extended supports 7 and 8, having guideways 9 and 10 therein, through which the movable contact 3 is slidable. A resetting plate 11 extends through the slot 12 in the vertical portion 3^a of the movable contact 3, and is slidable between the supports 7 and 8, and is held in the upright position by the slots 13 and 14, and a stem 15 extending through the bracket 6 and into the opening 16 of the block 1. A spring 17 surrounds the stem and bears upon the shoulder 18 of the resetting plate 11, and upon the bracket 6, thereby forming a compression spring for the plate 11. An adjustable collar 20 is secured to the plate 11 by a set screw 21, and loosely pivoted thereon is a latch 22 provided with a pivot pin 23 loosely fitting hole 24 in collar 20. See Fig. 5. The latch 22 is provided a pawl portion 25 and an angular tail end portion 26, the purpose of which will be described later. For operating the movable contact 3, a tappet 28 is provided composed of a stem threaded at both ends for receiving at the tappet end a sleeve 29 adjustably secured thereto by a set screw 30. An insulating cap 31 fits over the sleeve 29 and forms the tappet-head for engaging the movable contact 3. A nut 32 is secured at the shouldered portion 33 of the tappet stem 28, and retains a felt washer 34 cemented thereto to reduce noise when the tappet falls. Adjustably secured by a set screw 35 at the other end of the tappet is a movable armature 36 which movement is limited by the stationary core 37 which is energized by coil winding 38. The space A should be greater than the gap B, as noted in Fig. 1, as the travel of the tappet will be governed by the fluctuations in the current depending on the flow of current passing through the winding of the coil 38. The service current connection to the device is through the cable 40, binding-post 41, cable 42 and binding-post 43, thence through the cable 44 to the winding 38 and cable 45 to binding-post 46, through the cable 47 to the stationary contact 2 and point contacts 4 and 5, through the movable contact 3, cable 48, binding-post 49 and through the cable 50 to the lighting or power circuit units, which for

example, may be lamps 51. It is to be noted that the block or base 1 is hollowed out as at 55, as shown in Figures 1, 2 and 5, for reducing the weight thereof, and further to conveniently assemble the cables 42 and 47 and the screws shown in dotted form, Fig. 1. The coil 38 is wound on a spool 56 having end washers or flanges 57, 58, all of insulating material. The coil 38 is readily assembled into and removed from the socket openings 59 and 60 in the supports 61 and 62 of the frame 63. A casing 65 is provided to enclose the device, and is held firmly on to the block or base 1, by studs 66 and 67 having wing nuts 68 and 69 securely wired and sealed, as shown in Fig. 7. A spring 70 secured to the casing 65 at 71 holds in outward tension the push-button 72 slidable in the opening 73 of the casing 65, the push-button 72 bearing upon the resetting or push-plate 11 only when the cover 65 is attached. A name plate 75 conveniently covers the spring 70 where fastened to the casing at 71. Openings 76 and 77 in the block or base 1 provide means for securing the device on a wall or the like. It will be noted that the latch 22 actuates to the abnormal or locked position by gravity, but other mechanical means than shown may be used to positively operate and hold same. Further the push-button may be securely locked, and only operated when unlocked by the operator. My invention, it is to be understood, may be embodied in many other forms than shown and described, and I, therefore do not confine myself to the precise construction and arrangement of parts disclosed.

In operation: The normal current flow in series through the winding coil 38 from the lighting circuit will not actuate the movable armature 36 sufficiently to separate the contacts 4 and 5, until the current rises to a certain predetermined overload. During this variation the tappet may rise and fall and will break the circuit at contacts 4 and 5 intermittently. This will cause the lights 51 to flicker and warns the operator or user that too much current is being used. When the fixed overload has resulted, the latch 22 trips into the opening 12 and locks itself therein, as shown in Fig. 4. To restore the switch to closed position the push button 72 is pushed inwardly, causing the inclined edge 76′ of the plate 11 to engage and slightly lift the contact 3, and carry the collar 12 and pivot pin 23 of the latch 22 to the left and causing the depending portion 26 of the latch to engage the edge of the support A and tilt it upwardly, so that when the push button 72 is released, the contact 3 will fall clear of the latch 25.

The effective strength of the magnet may be varied to enable a greater current to be used before the movable contact will be engaged by the latch and the circuit opened. To do this, the cover 65 is removed, the set screw 21 is loosened and the collar 20 rotated to lift the pivot pin 23 of the latch 22, so that the movable contact 3 will not be engaged until the magnetization of the magnet 38 is increased sufficiently to lift the contact to a greater altitude. The movement of the tappet 28 required to lift the contact 3 and cause it to flutter, may be varied by threading the sleeve 29 upwardly, thus decreasing the gap B. The effective length of the tappet may be adjusted by lowering the armature 36 on the tappet stem 28 to increase the gap A and, consequently the distance through which the tappet may move. The idle throw of the tappet may also be varied by raising the pivot pin 23 of the latch 25 at the same time that the gap A is increasing.

If it is not desired to have the switch latch open upon a predetermined number of ampere turns, it can be made to flutter, upon a predetermind current without latching open, by causing armature 36 to be so adjusted as to positively limit the tappet after it has opened the circuit, so that switch 3 will not rise high enough to cause the weight 26 to drop latch 25. Raising of latch 25 by adjusting collar 20 will aid in doing this. When no flutter is desired, the adjustment can be made such that any movement of switch 3 sufficient to open the circuit will cause latch 25 to operate.

This flexibility of design adapts this device for many uses other than as a current limiter where a first warning flutter and then a cut out is desired, and many uses will be found for this device where expensive circuit breakers are now required, owing to its flexibility, simplicity, and cheapness.

Various modifications and changes can be made without departing from the scope of the appended claims.

What is claimed is:

1. A current limit switch comprising a series solenoid, a slidable switch contact member actuated thereby and adapted to rapidly make and break the circuit with a predetermined overload, a latch adapted to lock said contact member in circuit open position with an increase in said overload and means for adjusting said latch to determine the length of movement of said sliding contact member.

2. A switch comprising a circuit including relatively movable contacts biased to closed position, a tappet for opening said circuit, a magnet for actuating said tappet to move said contacts to open position, means acting upon a predetermined throw of the tappet to hold the circuit open independently of further movement of the tappet, and for holding the circuit open independently of further movements of the tappet, and means for adjusting the idle throw of the tappet.

3. A switch comprising a circuit including relatively movable contacts biased to closed position, a tappet for opening said circuit, a magnet for actuating said tappet in series with said contacts and wound to actuate said

tappet upon a predetermined current flowing means for varying the effective strength of said magnet, and means for varying the effective length of said tappet.

4. A current limit switch comprising a series solenoid, a slidable switch contact member actuated thereby and adapted to rapidly make and break the circuit with a predetermined current, a latch adapted to lock said contact member in circuit open position upon an increase in said current above said predetermined current, and means for varying the increased current to which said latch is responsive comprising mechanism for adjusting said latch toward or from the solenoid.

5. A current limit switch comprising a series solenoid, a slidable switch contact member actuated thereby and adapted to rapidly make and break the circuit with a predetermined current, a latch adapted to lock said contact member in circuit open position with an increase in said current from said first mentioned value, and manually controlled means adapted to release said latch for closing said circuit.

6. A switch comprising a magnet having a core, a movable tappet within the core, a movable armature mounted on said tappet, a switch actuated by the tappet and in series with the magnet, a latch for holding the switch open, a device for releasing the latch, and means permitting actuation of the latch releasing device.

7. In a current limiter and circuit breaker, the combination of a stationary contact and a movable contact, a magnet provided with a core and a movable armature, an adjustable tappet, an adjustable latch, said stationary contact engaging said movable contact in normal circuit conditions, said tappet adapted to separate said contacts when an overload prevails, and said latch adapted to engage and hold said separated movable contact.

8. In a current limiter and circuit breaker, the combination of a stationary contact and a movable contact, a magnet provided with a core and a movable armature, a tappet actuated by said movable armature to lift said movable contact from said stationary contact, a latch adapted to engage said movable contact, said latch being adjustable to suit a predetermined overload, and means to reset the movable contact to closed position.

9. In a current limiter and circuit breaker, the combination of an insulated base, a stationary contact, a movable contact, said movable contact provided with an opening, a push plate extending through said opening, a latch adjustably and loosely pivoted to said push plate, a magnet provided with a core, a tappet slidable therethrough, a movable armature secured to said tappet, means for adjusting the latch and the tappet throw, and means to reset said movable contact to reestablish the circuit.

10. In a current limit switch mechanism, the combination of a stationary contact, a movable contact element, an electromagnet provided with a core, an armature, a tappet actuated by said armature to move the movable contact element, a latch cooperating with the movable contact to hold said contact element in open circuit position, means for varying the air gap between said core and armature, means for varying the idle throw of said tappet, and means for adjusting the position of the latch relative to said stationary contact.

Signed at New York, in the county of New York and State of New York, this 18th day of June, A. D. 1920.

HENRY SCHERIL.