Jan. 2, 1951 G. E. KIRKBY 2,536,944

OVERLOAD CIRCUIT BREAKER

Filed Jan. 28, 1948

Fig. 1.

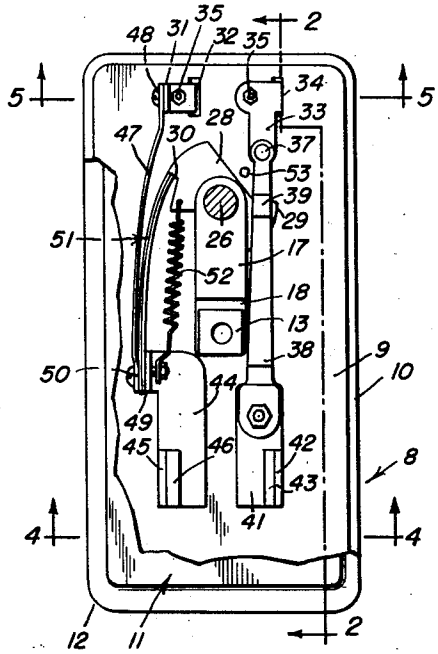


Fig. 2.

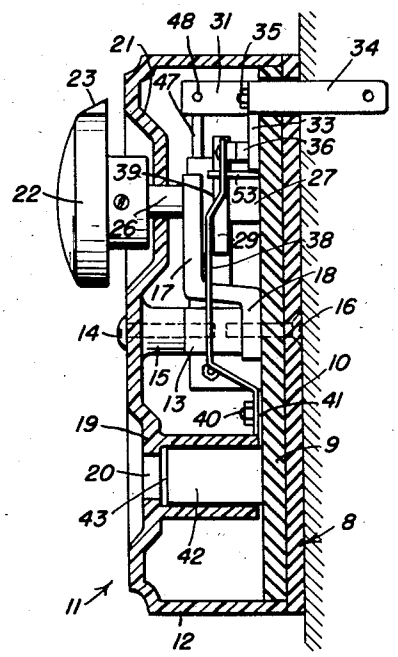


Fig. 6.

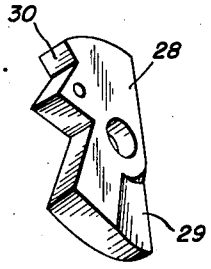


Fig. 5.

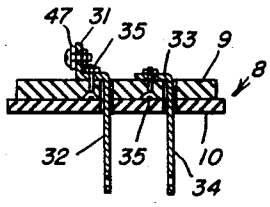


Fig. 3.

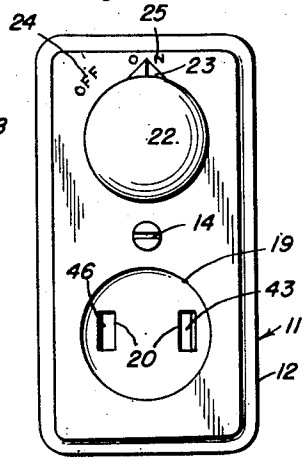
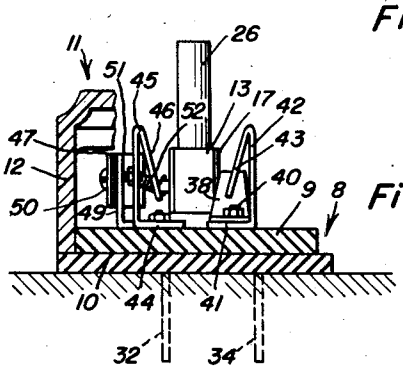


Fig. 4.



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OVERLOAD CIRCUIT BREAKER

George E. Kirkby, Louisville, Ky.

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4 Claims. (Cl. 200—115.5)

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The present invention relates to a safety-type overload make and break appliance, a small and handy device constructed with a pair of outstanding prongs which may be conveniently plugged into a conventional wall or floor receptacle and which is properly constructed to deliver a predetermined amount of house current to the plug equipped cord of a fractional horsepower motor or any similar electrical device that may become ruinously overloaded.

More specifically, the invention has to do with a simple, economical and efficient safety appliance characterized by the stated prongs to fit into the usual house current receptacle, the same having an incorporated or built-in receptacle to accommodate a pronged plug for delivering the current to the motor or other electrical device and further having a switch and thermal responsive means for opening said switch upon the occurrence of an overload of incoming current.

Another object of the invention is to provide a practical overload current breaker of the type generally referred to above which, through the instrumentality of novel thermal responsive means automatically opens the switch and cuts off the current as soon as the incoming current exceeds ten amperes.

A further object of the invention is to provide a novel overload breaker along the lines briefly described wherein cam means serves to open the safety switch and holds same open and wherein the thermal element, a bi-metal element, functions as a releasing dog or trip, and wherein an accessible knob is handily adapted to re-set the switch to closed position once the thermal element returns to its normal cam retaining position.

Other objects, features and advantages of the invention will become more readily apparent from the following description and the accompanying illustrative drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the views:

Figure 1 is a front view with a portion of the cover or casing broken away to clearly expose the principal parts of the internal mechanism,

Figure 2 is a vertical sectional view taken on the irregular line 2—2 of Figure 1, looking in the direction of the arrows,

Figure 3 is a front or face elevational view on a smaller scale,

Figure 4 is a cross section on the line 4—4 of Figure 1, looking in the direction of the arrows,

Figure 5 is a fragmentary section taken approximately on the plane of the line 5—5 of Figure 1, looking in the direction of the arrows, and,

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Figure 6 is a perspective view of the release and re-set cam.

Referring now to the drawings by distinguishing reference numerals, the base means 8 is made up of a main rectangular base plate 9 superimposed on a slightly larger secondary or auxiliary base plate 10. A shell-like casing or cover is denoted by the numeral 11 and has a marginal rim 12 which surrounds the marginal edges of the main base 9 and rests firmly against the projecting marginal edge portions of the secondary base plate 10. The cover is held frictionally in place, assisted by simple fastening means. The latter means comprises a centrally arranged assembling block 13 which as best shown in Figure 2 has a central screw threaded bore to accommodate an assembling screw 14 which is passed through a boss 15 on the cover and is threaded into the block. A similar fastening screw 16 from the opposite or base side passes through the base plates 10 and 9 and is threaded into the opposite end of the bore in said block 13. Attention is directed to an L-shaped bracket 17 which has a lateral attaching end 18 and this is apertured to permit passage of the bolt or screw 16 in the manner shown. The auxiliary base plate 10 is a removable part, that is, is detached from the base 9 and cover and serves to anchor the countersunk head of the screw 16. This permits the plate 10 to serve as an appropriate wall protector shield. The face of the cover is provided with a depression 19 with slots 20 to accommodate the prongs on a current take off plug (not shown). There is another depression 21 formed in the cover plate which serves to accommodate the hub portion of a re-set knob 22. The stated knob is provided with an indicator 23 to register with suitable "off" and "on" inscriptions 24 and 25 provided on the cover, as shown in Figure 3. The knob 22 is fastened on a shaft 26 which is mounted for rotation in a bearing in the L-shaped bracket 17 and is also mounted in a suitable socket provided therefor, as at 27, on the main base plate 9. The aforementioned release and re-set cam is denoted by the numeral 28 and is a block of insulation and is keyed on the shaft 26 for rotation with latter. At one end is a wedge-like cam 29 and at the opposite end is a shoulder 30 which constitutes a detent.

Before proceeding further with the purely mechanical features and parts, I will now touch upon the electrical equipment. Referring then to Figure 1 the L-shaped element seen at the left and denoted by the numeral 31 is a terminal and has a prong 32 which extends outwardly through apertures in the base plates, as shown better in

Figure 5. The numeral 33 designates another terminal plate opposite the first plate and this too has a lateral outstanding prong 34. These may be designated as the primary terminals and they are provided with the current input prongs 32 and 34 which are adapted, in practice, to fit into the wall or floor socket supplying house current (not shown). These terminals are fastened in place by small bolts 35 anchored in the main base 9 with the heads of the bolts covered by the secondary base plate 10. The terminal 33 is provided with a relatively fixed contact button 36 which accommodates a relatively movable contact button 37 on the free end portion of a resilient arm 38. The arm has an offset inclination, adjacent the contact button, and denoted by the numeral 39 which constitutes a releasing cam surface and the aforementioned cam 29 is, obviously, contactable and cooperable therewith. Said arm 38 is fastened, as at 40 on a secondary terminal plate 41 and the fastening 40 serves to secure both parts to the base. The terminal 41 has an outstanding prong 42 with a flexible adapter 43, as shown better in Figure 4. The main and primary terminals 33 and 41, together with the arm and contact buttons constitute the aforementioned safety switch. To the left of the terminal 41 is a companion terminal plate 44 which is suitably fastened in place and this too is provided with a prong 45 with a spring adapter 46. These prongs and adapters line up with the apertures 20, as shown in Figure 3 and provide a built-in receptacle from which the current is taken off, in an obvious manner. As before stated this receptacle is adapted to accommodate the prongs of a plug on a cord which supplies current to the fractional horsepower motor (not shown) or other electrical device. The terminal plate 44 cooperates with the primary terminal plate 31 and therefore these are connected by a current conductor or heater strip 47. This is fastened at one end as at 48 to the terminal 31 and fastened to an ear 49, as at 50, to the plate or terminal 44. At this point I direct attention to the bi-metal or thermal element which is denoted by the numeral 51 and which is longitudinally bowed as shown. It is fastened to the same fastening means 50 at one end and the opposite end constitutes a trip or latch for coaction with the detent 30 on the cam block 28, as shown in Figure 1. The cam block is held in its normal position by a coiled release spring 52 which is fastened at one end to the block end at the opposite end to the fastening means 50. This is a tension spring, as is obvious.

It is plain that current is conducted through the prong 32, by way of the heater strip 47 to the terminal plate 44 and its prong 45. The current on the other side is conducted through the prong 34, terminal 33, and switch means to the terminal plate 41.

At this point I call attention to the numeral 53 seen in Figures 1 and 2 and constituting a stop pin for checking the angular rotation of the cam block 28 in a direction from right to left (Figure 1).

Under normal circumstances the thermal element 51 constitutes a retaining latch and takes the position seen in Figure 1 where it is releasably engaged with the detent 30. Under these conditions, the spring 52 is stretched and the cam 29 is released from the cam surface 39. The inherent resiliency of the contact arm 38 causes, therefore, the contact buttons 36 and 37 to come together and the switch is closed. It follows that by plugging the prongs 32 and 34 into a wall receptacle, current is available by way of this device. By plugging another plug into the receptacle 19 of this device, current is supplied in an obvious manner. Should an overload occur, and this device is set for ten amperes, the heater strip 47 will heat the bi-metallic latch 51 and latter will straighten same out and, in so doing, it will disengage itself from the shoulder 30. The spring 52 will then come into play and will rotate the cam block and will cause the cam 29 to engage the cam surface 39 and thus separate the contact buttons 36 and 37. When the bi-metallic element is not heated, it is a purely mechanical latch as is obvious. When, however, it is heated, it cannot be returned to its latch functioning state until it cools off. When cooled it is a strict mechanical latch and therefore by turning the thumb button 22, from "off" to an "on" position, the parts are again re-set to take the positions shown in the drawings.

A careful consideration of the foregoing description in conjunction with the invention as illustrated in the drawings will enable the reader to obtain a clear understanding and impression of the alleged features of merit and novelty sufficient to clarify the construction of the invention as hereinafter claimed.

Minor changes in shape, size, materials or rearrangement of parts may be resorted to in actual practice so long as no departure is made from the invention as claimed.

Having described the invention, what is claimed as new is:

1. A thermally responsive overload safety switch of the class shown and described comprising a base, a pair of independent primary terminal plates mounted on said base in spaced side by side relationship, each terminal plate being provided with a current input prong, a stationary contact button carried by one of said terminal plates, a current conducting heater element connected with the remaining terminal plate, a complemental pair of side by side secondary terminal plates also mounted on said base, each secondary terminal plate having a current output prong, said heater element being also connected with one of said secondary terminal plates, a resilient arm parallel to and connected at one end with the remaining secondary terminal plate, the opposite free end portion of said arm having a relatively movable contact button opposed to and movable toward and from said first named button, the inherent resiliency of said arm serving to normally maintain said buttons electrically engaged and providing the switch proper, and thermal responsive means also mounted on said base for automatically opening said switch upon the occurrence of an overload of incoming current, said thermal responsive means embodying a cam mounted for oscillation on said base adjacent to said arm, said arm having a cam surface with which said oscillatory cam has wiping contact, said cam being provided with a shoulder constituting a detent, a bi-metallic element anchored at one end on said base and having its opposite end functioning as a trip latch, the latter being releasably engageable with said detent.

2. A thermally responsive trip latch overload switch of the class shown and described comprising a base, a primary terminal plate fastened on one end portion of said plate and having a current input prong, a secondary terminal plate mounted on said base at the opposite end of the latter and in longitudinally spaced alignment

with said first-named plate and provided with an output prong, a current conducting heater element attached at one end to said primary terminal plate and attached at its opposite end to the secondary terminal plate, a longitudinally bowed bi-metallic element, constituting a trip latch, said element being fastened at one end to said secondary terminal plate, the opposite end being free and constituting the trip latch proper, said bi-metallic element being disposed in close proximity to and in longitudinal alignment with said heater element, a block-like member mounted for oscillation on said base and having a cam at one end and a detent at an opposite end, said detent being releasably engageable with said trip latch, a coiled spring attached at one end to the detent equipped end of said block-like member, the opposite end of the spring being anchored on said base and said spring serving to normally maintain coacting relationship between said detent and trip latch, and circuit make and break switch means also mounted on said base and including a cam equipped arm, the cam on said block-like member being engageable with the cam on said arm.

3. A thermally responsive overload switch of the type herein shown and described comprising a base plate, a pair of separate primary terminal plates mounted on one end portion of the base in side by side relation, each terminal plate being provided with a current input prong, a relatively stationary contact button mounted on one of said terminal plates, a current conducting heater element attached at one end with the remaining terminal plate, a pair of separate secondary terminal plates also mounted on said base at the opposite end of the latter and in approximate longitudinal alignment with said first-named terminal plates and having current output prongs, the remaining end of said heater element being attached to a complemental one of said secondary terminal plates, a normally bowed bi-metallic element also fastened at one end to said last-named secondary terminal plate and disposed in close proximity to said heater element, the opposite end of said bi-metallic element being free and constituting a trip-latch, a resilient arm having one end anchored on the remaining secondary terminal plate and having its opposite end free of attachment and provided with a contact button, the inherent resiliency of said arm serving to maintain said buttons normally engaged with each other, the intermediate portion of said arm being provided with a cam surface, a block-like member mounted for oscillation on said base and situated between the bi-metallic element and resilient arm, said block-like member having a cam at one end engaged with the cam surface on said arm and being provided at its opposite end with a shoulder forming a detent engageable with said trip latch, and a coiled spring anchored on said base and attached to said block-like member and serving to hold said detent releasably associated with said trip latch.

4. An automatically operable overload trip-latch switch of the class shown and described comprising a base plate, a primary prong equipped terminal mounted on said base plate, a complemental secondary prong equipped terminal plate mounted on said base at a point spaced longitudinally from said first-named terminal plate and provided with an outstanding ear, a heater element attached at one end to said ear and at its opposite end to said primary terminal plate, a bi-metallic element lying alongside of said heater element and in close proximity thereto and contacting same at one end and secured at said one end to said ear, the remaining end of said bi-metallic element being free and longitudinally curved and constituting a trip latch, a block-like member mounted intermediate its ends for oscillation on said base and having a shoulder at one end constituting a detent, said detent being releasably engageable with said trip latch, and having a switch opening cam at its opposite end, a coiled spring attached at one end to the shouldered end of said block-like member and secured at its opposite end to said ear, and switch means including a resilient contact arm having a cam surface cooperable with the cam on said block-like member.

GEORGE E. KIRKBY.

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