This invention relates to circuit breakers, and particularly to circuit breakers adapted for remote control, and embodying overload protection means.

Among the objectives of the invention are:

To provide a circuit breaker, as aforesaid, which is exceedingly compact in form and light in weight, thereby rendering the same applicable to installations where size and weight are of importance, such as in aircraft;

To provide a circuit breaker which is reliable in operation, and inexpensive in construction;

To provide a circuit breaker of the overload protection type, which will withstand extreme conditions of vibration and violent positional change without change in its operating characteristics;

To provide a circuit breaker which may be contained in a sealed, gas-proof and explosion-proof housing;

To provide a circuit breaker having "trip-free" characteristics;

To provide a circuit breaker having overload protection, in which the overload cut-out point may be changed by simple substitution of elements without change in the circuit breaker mechanism, per se; and

To provide a circuit breaker having overload protection, in which, after the circuit breaker to be thrown to "off" position before the electric circuit can again be closed.

The circuit breaker is adapted for remote control; such remote control may be actuated mechanically, as by a Bowden wire or equivalent means for transmitting mechanical movement, but preferably, the remote control circuit embodies magnetic actuating means. It is desirable for operate the magnetic system on low voltage, to make possible the use of small size conductors, lightly insulated, for the remote control circuit. When employed with low voltage control circuits, a suitable transformer may be incorporated in the circuit breaker housing, or, if desired, a transformer may be connected into the remote control circuit at a location remote from the circuit breaker.

In aircraft, boats, or other installations where low voltage is available for lighting or other service, the remote control may be operated directly by said low voltage service; usually, such low voltage circuits are direct current.

A preferred form of circuit breaker embodying the present invention, therefore, includes a pair of magnetic coils, centrally arranged with respect to which is an armature system, movable toward one or the other of the coils, depending upon the energization thereof. The armature system includes a magnetically responsive member extending from each end of which, and secured thereto in the line of the axis thereof, is a shaft; to each shaft, at its end, is secured a suitable toggle spring.

One of said toggle springs, hereinafter referred to as the "throw" spring, operates under an initial impulse engendered by magnetic force, to move the armature toward or away from the electric contacts of the load circuit depending upon which of the coils is energized, and to carry such armature through the full extent of its permitted travel, even though the magnetic coil circuit be closed for a time period amounting to only a small fraction of the total movement of the armature system.

The second toggle spring, hereinafter referred to as the "contact" spring, is mounted on the free end of the second shaft, and carries contacts cooperating with the load-line contacts to close or open the load circuit according to the direction of travel of the armature under the influence of the energized magnet coil and "throw" spring.

The load-line contacts are carried by bimetallic members through which the load current passes. Under the influence of an overload condition, the bimetallic elements heat, warp, and exert a substantial pressure on the "contact" spring. Upon the attainment of suitable pressure, the warping of the bimetallic members, the equilibrium of the "contact" spring is overcome, and it will reverse its position, thereby snapping the contacts carried thereby, out of engagement with the load-line contacts.

Desirably the "contact" toggle spring is of a double equilibrium type, that it, will not automatically return to circuit closing position after the interruption of the load circuit has permitted the bimetallic elements to cool to their initial position and hence no longer exert pressure on said toggle spring.

It is a feature of the invention, also, that the "throw" spring is stronger than the "contact" spring, whereas the pressure exerted upon the "contact" spring by the bimetallic elements, and the reaction of said spring under the influence thereof, will not cause the "throw" spring to reverse its position.

To reclose the circuit after it has opened under the influence of overload, it is necessary for
the operator to energize the "off" magnetic coil to move the armature. The "contact" spring is drawn thereby into forcible engagement with suitable abutments, and the pressure exerted against the "contact" spring by such abutments, causes the "contact" spring again to reverse its position to resume its normal circuit closing position. However, as the entire apparatus is then in "off" position, it is necessary to close the "on" circuit to again move the armature and bring the "contact" spring into circuit closing engagement with the load contacts.

A second form of invention which retains many of the favorable operating characteristics of the double-magnet type previously discussed, may include a single electromagnet for moving the contacts into circuit closing position and retaining them in such position against the reactive effort of a single equilibrium point toggle spring biased to return the movable contacts to open circuit position when the magnet coil is deenergized.

A feature of overload protective circuit breakers embodying the invention resides in mounting the bimetallic overload elements on a removable cap or plate, whereby precisely the same actuating mechanism may be employed with overload elements of any desired degree of overload actuation, merely by using in connection with the standard mechanism a cap or plate having appropriate overload elements.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Fig. 1 is a perspective of a completely housed circuit breaker embodying the present invention;

Fig. 2 is an enlarged section taken through 2—2 of Fig. 1, illustrating the circuit breaker in circuit closing position;

Fig. 3 is a partial section similar to Fig. 2, illustrating the circuit breaker immediately after the warping of the bimetallic overload members has thrown the contact toggle spring into circuit breaking position, the throw toggle spring and armature system of the circuit breaker remaining in circuit closing position;

Fig. 4 is a partial section similar to Fig. 3, but showing the circuit breaker in normal open circuit position;

Fig. 5 is a partial plan view of the closure member of the circuit breaker housing, taken from the underside to show the disposition of the bimetallic overload elements and contacts thereof;

Fig. 6 is a fragmentary plan view of the circuit breaker with the closure member removed;

Fig. 7 is a plan view of a preferred form of contact toggle spring with contact structure thereon;

Fig. 8 is a plan view of a preferred form of throw toggle spring;

Fig. 9 shows a typical wiring diagram for low voltage remote control of the circuit breaker of Fig. 2;

Fig. 10 is an elevation, combined with which is a schematic wiring system, of a circuit breaker employing a single magnetic coil; and

Fig. 11 is a fragmentary elevation, similar to Fig. 2, showing a second form of contact used with the contact toggle spring.

Referring to the drawings for a more detailed description of the invention, Fig. 1 shows a completely housed circuit breaker, identified 20, in substantially full size. As a typical example of the small dimensions to which my invention may be constructed, a successfully tested circuit breaker embodying the present invention, including a magnetically operated switch mechanism and coordinated transformer, has the overall physical dimensions enabling it to be installed in a standard 1½" by 3½" outlet box.

The housing 21 and closure 22 therefore, completely encasing the operative parts of the apparatus, to render the same immune from dust, chemical fumes, gases, or the like, and adapting it for use under conditions where explosive gases may be present, as in submarines, mines, or chemical manufacturing plants. A plurality of screws may be employed to maintain a tight interassembly of body and closure, and a suitable gasket (not shown) may be used to insure complete air tightness. Desirably, the body and closure may be molded from suitable plastics, such as Bakelite or equivalent.

The closure 22 is formed with a flange 25 defining an annular recess 26 at an end of the closure. At the base of said recess there is a sheet 27 of asbestos or equivalent having suitable fire-proof and heat insulation qualities.

Referring to Fig. 5, a plurality, illustratively two, of load-line contact members 28 are positioned upon the sheet 27, and normally, that is, under normal load conditions, lie flat against said sheet, as shown in Fig. 2. Each of the contact members 28 is secured at its end to the closure 22, as by the studs 27, which pass through the closure 22 to form binding posts on which the attachment of the conductors of the load circuit.

At the free end of each of the contact members 26 there is a contact 25, desirably a button or stud of silver or other material possessing high conductive qualities and resistance to pitting or corrosion under the influence of an electric arc.

The contact members 26 are bimetallic, in that they are formed from laminations of metals having different coefficients of expansion, such as steel and copper, or other suitable combinations known in the art. So that the contact members 26 will warp away from the sheet 27 under the influence of heat, the metal having the higher coefficient of expansion faces said sheet.

As previously stated, said bimetallic members 26 are conductor elements of the load circuit, and the contacts 25 thereof are engageable, under conditions of operation of the invention, by a contact structure which completes the circuit therebetween.

Desirably, the said contact structure is brought into and out of circuit closing engagement with the contacts 25 of the contact members 26 by electromagnetic means, such method of operation lending itself to remote control whereby a simple push button or the like may be employed to close the operating circuit.

The electromagnetic operator for closing and opening the electric load circuit comprises a pair of magnet coils 30, 31, would upon suitable spool construction embodying pole steel cores 32, 32a, with central wall structures 33, 33a acting as poles for the axially slidable magnetic core 34.

Magnetic core 34 is guided in its movement toward one or the other of the magnetic poles by the inner peripheral walls of coil housings 36, 36a which jointly form a cylindrical structure within which the core 34 slidably fits.

Axially positioned and secured to said core 34 at each end thereof, and passing through an opening provided in the stop members 33, 33a are rods 38, 39.

When magnetic coil 35—hereinafter called the "on" coil—is energized, the armature system, comprising the core 34 and therewith associated
rods is drawn in the direction of the contacts 28 to close the load circuit, whereas when the 'off' coil 31 is energized, the armature system will move in reverse direction, to break the load circuit.

To carry the armature system through its full travel with but a momentary energization of the magnet coil, and with a snap motion, there is employed, inoperative association with rod 37, a loose mounting for ring 5.

Improved operating characteristics result from the employment of a toggle spring such as that forming the subject matter of my presently co-pending application Serial No. 441,382, filed May 1, 1943, and entitled Togglesprings. Such toggle springs include a dished rim 41 and there-with preferably integrally connected radial legs 42, the dished rim 41 having a permanent set, whereas the legs 42 have no permanent set. In such construction, the legs 42 have a curvature tangential to the rim, and are maintained in bowed elastic tension by the permanent set of rim 41. An important characteristic of such a toggle spring is that a force-induced movement of approximately twenty-five (25) per cent of the total throw of the spring causes the spring to throw through its full travel.

By a suitable proportion of the thickness of the rim and the depth to which the rim is dished, the toggle spring may have either one or two positions of stable equilibrium; that is, the toggle spring may be such that when it is deflected to a reverse curvature, it will return to its original curvature when the deflecting pressure is released or, as a double equilibrium spring, the toggle spring will remain in the curvature to which it has snapped.

In the instant embodiment of the invention, it is preferable to employ a double equilibrium toggle spring for the members 40.

As shown in Fig. 8, the legs 42 join at a circular portion at the geometric center of the spring; at the center of such "hub," is a hole suitable to receive the rod 37. The rod may be secured to the spring 40 by means including the washers 43, 44; and the rod 37 may either be riveted over said washer 44, or the end of the rod may be threaded to receive lock nuts (not shown) to secure the rod 37 to the spring 40.

The spring 40 may be relatively loosely supported about its periphery in a suitable shoulder or kerf 45 formed in the housing 21; the peripheral corner of the coil spool 32a serves to secure the toggle spring 40 in position while permitting unrestrained flexing thereof.

To compensate for possible inaccuracies resulting from the molding of the closure 22, and to permit said closure to maintain the coils 30, 31, in correct, fixed position, a metal ring 23a is interposed between flange 20 and coil cap 32.

The contact toggle spring, 38, is mounted on the rod 36 so as to provide a limited swivel action about the end of the rod. Said toggle spring 50 preferably also has a double equilibrium characteristic, and may be otherwise similar to the toggle spring 40.

Mounted on spring 50, to close circuit across the load contact buttons 28, 29, is an inflexible ring 51, desirably a dished ring of silver, the outer edge of which is reversed upon itself to provide opposed rims between which the spring 50 may be loosely held about its rim. The loose mounting of ring 51 on spring 50 renders it free to rotate about spring 50, and the full periphery of the ring 51 is available as contact surface, thereby equalizing wear, and lengthing its operating life.

Referring now to Fig. 9, the circuit breaker is shown as wired in a 120 volt power circuit with a transformer T used to reduce the voltage of said circuit suitably for the control circuit, preferably to 24 volts. In the control circuit, designated C, are any desired number of push-button switches S. The push-button switches S are of double throw type; the central pole of the switch is common to both magnetic coils, and throw of the switch in one position energizes the "on" coil 30 whereas the other switch position energizes the "off" coil 31.

With the "off" coil energized, the circuit breaker is in the Fig. 4 position; each of the toggle springs 40 and 50 is in a concave shape, as viewed in said figure. Upon energizing the "on" coil 30, magnetic core 24 and associated shafts 25, 31 are drawn toward the closure 22, whereupon after a short movement of the armature system, the spring 40 snaps into the Fig. 2 position, and contact ring 51 is brought sharply into contact with the contacts 28 on the members 26. Spring 50, however, retains its initial position of stable equilibrium. Desirably, the ring 51 engages the contacts 26 before the spring 40 has attained full throw, whereupon the unexpended energy of spring 40 maintains the contact ring 51 resiliently in engagement with said contacts. Spring 50 should be of such "stiffness" that it will remain in its initial position of stable equilibrium under the impact force of the engagement of the ring 51 with the contacts, and under the residual or unexpended energy of spring 40.

Under overload, bimetallic members 26 are subjected to the heating effect of the overload, and the unequal expansion of the laminations of said members, warps them away from base plate 21, to exert an angularly directed pressure upon the ring 51, and hence upon the toggle spring 50 associated therewith. If members 26 warp unequally, the self-adjustment of spring 50 permits its inclination toward that contact 28 having the least movement, maintaining contact with each contact 28 until the throw point of spring 50 is reached. The angular pressure exerted by contacts 28 against ring 51 may enforce brief angular rotation thereof.

When the overload persists, pressure of members 26 against toggle spring 50 steadily increases, until toggle spring 50 is snapped into the concave position shown in Fig. 2, to its convex position shown in Fig. 3. In other words, the spring 50 will assume its second position of stable equilibrium. The throw of the spring 50 to its new position moves the ring 51 completely out of engagement with the contact buttons 28, thereby immediately breaking the circuit. In the broken-circuit position of the spring 50, it will be noted that the inner surface of the contact ring 51 bears against the coil cap 22.

The electric circuit having been broken, the contact members 26 will cool and resume their normally flat position upon the base plate 25.

The relation of comparative strengths of the springs 40 and 50 is such that the spring 40 will remain in its convex or closed circuit position under the influence of pressure of the contact members 26 against the spring 50.

Spring 40 and associated armature assembly remains in circuit closing position; but because the spring 50 is of a double equilibrium type, it will remain in open circuit position, with the edges of the ring 51 in contact with the coil cap.
The operator, to return the circuit breaker to a status wherein the load circuit may again be closed must first energize the "off" coil 31, to draw the magnetic armature system into the "off" position.

The movement of the armature system returns the spring 50 to its original position, for it is recalled that said spring 50, or the rim of the ring 51 associated therewith, bears against the coil cap 32, and the reaction pressure against said rim snaps the spring 50 to its initially concave, i.e., circuit closing shape.

Upon energizing the "on" coil 30, therefore, the armature system and therewith associated contact ring 51 resumes the closed circuit position.

Under certain load conditions, spring 50 may be utilized per se as a contact structure without the ring 51.

According to this construction, see Fig. 11, the toggle spring 50 may have contacts 62a held thereon or riveted thereto, for cooperation with the contacts 28 of the members 26. If such construction is employed, any suitable means may be taken to prevent rotation of the spring 50 with respect to the contacts 28 to insure a satisfactory contact upon closing the circuit.

Fig. 10 illustrates, in vertical section, an embodiment of the invention wherein a single magnetic coil is employed to close the circuit and to maintain the closed circuit status. Pursuant to this form of the invention, the throw spring 50 has but a single point of stable equilibrium; that is, as soon as the pressure exerted on said spring to effect its overthow is released, the spring will immediately revert to its original position. The contact spring 74 is a double equilibrium spring such as the spring 50 previously described.

As shown in Fig. 10, the single magnetic coil 93 is contained within a suitable housing. An armature system includes a core 81, to which are secured shafts 82, 83. Shaft 82 carries the double equilibrium contact spring 70, said spring having suitable contact means 71, 71 thereon. At its end, shaft 83 is secured to the single equilibrium spring 50, the spring being mounted in the circuit opening position, as shown in full line in Fig. 10. Spring 50 is freely held about its periphery in a kerf in housing element 81, as shown.

The contacts 98, 99 are supported on the free ends of bimetallic members 92, 92, said bimetallic members resting upon insulating base 93, and fixedly supported at their opposite ends by the housing, as shown. Suitable binding posts afford connection to the load circuit, as indicated.

The spring 50 normally maintains the circuit breaker in open circuit position. Energization of the coil 30, by closing the push button P in the control circuit C, causes the armature system to move downwardly, whereupon the spring 50 snaps through dead center into a reverse configuration, said position being indicated by the dot-dash line, and the contacts 71 of the contact spring 74 are brought into circuit closing position against the load contacts 88, 90. So long as the control circuit is kept closed, the continuing magnetic force of the magnet 88 holds the load circuit in closed position, against the urging of the single equilibrium spring 50 to return to the armature assembly and contact spring 70 to open circuit position.

In a circumstance of overload in the load circuit, the bimetallic members 92, 92 warp in proportion to the degree of overload, exerting pressure upon the contact spring 70. When said bimetallic members have warped sufficiently, the contact spring 70 is snapped into its reverse position of stable equilibrium, thereby breaking the load circuit. Because the spring 70 has two positions of stable equilibrium, said spring will not again reverse itself when the cooling of the bimetallic members 92, 92 has returned them to their original position against the base 93.

The position assumed by the contact spring 70 after it has been snapped open under overload is with its periphery against, or closely adjacent, the housing cap 100, as shown by the dotted line in Fig. 10. In such position of spring 70, the contacts thereof cannot be brought into engagement with contacts 98. In order to restore the contact spring 70 to a position permitting subsequent reclosing of the load circuit, the operator must open the control circuit; that is, he must deenergize the magnet 88, whereupon the single equilibrium spring 50 reverts to its original, i.e., open circuit, position, moving the armature system in the direction of the housing cap 100. Such movement of the armature system exerts a pressure upon said spring 70 sufficient to reverse its position, wherein it is again in position to close the circuit across the contacts 88, 90. However, even in open circuit position, and the control circuit must again be closed to energize the magnet 88 to reclose the load circuit.

To minimize the current required for magnetically holding the load contacts in closed circuit position, it is advantageous to interpose a relatively high resistance coil R in the control circuit C, and to provide means for cutting said resistance R into the circuit at the instant the magnetic armature 81 has moved to circuit closing position. This is effectively accomplished by mounting contacts 82, 82 on the spring 50, and providing fixed contacts 63, 63, for cooperation with said contacts 62, 62. When the magnet 88 is deenergized, the contacts 62 are in engagement with contacts 63, and because of the high value of resistance R, with respect to the resistance of the circuit 83, the armature 81 is thrown out of the control circuit. At the instant of closing push button P, the path of current in said control circuit is through magnet coil 80, and the spring system, including contacts 62, 63. The magnet 80 pulls the armature system, as aforesaid. and 82, 82 the bimetallic bimetallic members resting upon insulating base 93, in synchronism with the movement of the system, the armature system and spring 50 move practically in coordination. Just prior to the stage of throw of spring 80, the contacts 61, 62, break with the contacts 63, 64, respectively, and the current path of the control circuit is through resistance R. The introduction of the additional resistance into the control circuit, following Ohm's law, reduces the amperage flowing through the control circuit, and the circuit breaker is magnetically held in closed circuit position with substantially less expenditure of current.

The operating structure of the circuit breaker, i.e., the magnetic coil or coils, toggle springs and movable contact, may be used with bimetallic contact members 26 or 28 of any overload characteristic. This materially simplifies manufacturing and stocking; for where a single circuit breaker is intended to operate under definite overload ratings, it is necessary to select a closure 22 with appropriate elements 26 therein, in the Fig. 2 embodiment or plate 52 and elements 22 of the Fig. 10 embodiment, whereupon
2,858,357 said structure may be used with the standard housing and operating structure. As shown in Fig. 2, transformer T may be placed within the housing H, making a circuit breaker provided with a completely self-contained unit. However, in a circuit breaker wherein are connected a number of circuit breakers, manufacturing economies are obviously attained by using a single transformer common to the plurality of circuit breakers.

A circuit breaker made pursuant to the invention has the highly desirable attributes of vibration-proof and fully trip-free operation. The toggle spring throws the armature system with such speed that the armature system may be very light in weight. The permissible weight reduction of the movable armature system and stable equilibrium of the toggle spring make it a practical impossibility to throw the armature system and therewith associated contact system by vibrating or shaking the circuit breaker, for the inertia of the armature system is so small in relation to the stability of the toggle spring that an amount of momentum sufficient to throw said spring could not be generated by any vibration condition which could be experienced under operating conditions.

The circuit breaker is trip-free in operation because of the stable equilibrium of the contact spring and the proper position of the first-named contacts after the overload has caused its throw to such position. The operator cannot restrain the circuit breaker from throwing to open circuit position; nor can he return the circuit breaker to closed circuit status without first throwing the circuit breaker to open position to move the contact toggle spring into its position.

Whereas I have described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made provided they do not depart from the scope of the claims.

I claim:

1. In a remote control circuit breaker and overload protective device, the combination with a base, a plurality of bimetallic strips mounted thereto, an electric circuit with electric contacts supported on said base, electric contacts movable into or out of circuit closing engagement with said first-named contacts to complete the circuit thereacross, electromagnetic means for moving said movable contacts into or out of circuit closing position, said means including a pair of electromagnets, an armature system associated therewith and movable toward one or the other of said magnets according to the energization thereof, a snap spring associated with said armature system to hold the same at either of its extremes of movement, a second snap spring associated with said shaft and supporting said movable contacts thereon, said second snap spring having two positions of stable equilibrium, in one of which positions its contacts are in position for engagement with said first-named contacts and in the second of which positions said contacts may not be brought into engagement with said contacts, and thermostatic means, said second snap spring being movable toward said second named snap spring under predetermined conditions of overload of the load circuit to snap the said springs into its open circuit position of stable equilibrium to thereby move its said contacts out of engagement with said first-named contacts.

2. A remote control circuit breaker and overload protective device comprising a base, electric contacts supported on said base, electric contacts movable into or out of circuit closing engagement with said first-named contacts to complete the circuit thereacross, electromagnetic means for moving said movable contacts into or out of circuit closing position, said means including a pair of electromagnets, an armature system associated therewith and movable toward one or the other of said magnets according to the energization thereof, a snap spring associated with said armature system to hold the same at either of its extremes of movement, a second snap spring associated with said shaft and supporting said movable contacts thereon, said second snap spring having two positions of stable equilibrium, in one of which positions its contacts are in position for engagement with said first-named contacts and in the second of which positions said contacts may not be brought into engagement with said contacts, and thermostatic means, said second snap spring being movable toward said second named snap spring under predetermined conditions of overload of the load circuit to snap the said springs into its open circuit position of stable equilibrium to thereby move its said contacts out of engagement with said first-named contacts.

3. A remote control circuit breaker and overload protective device as set forth in claim 1, wherein said first named snap spring has two positions of stable equilibrium, and wherein said snap spring will remain in a position of stable equilibrium against the pressure of said bimetallic strips and the reaction of said second named snap spring thereby.

4. A remote control circuit breaker and overload protective device, comprising a base, electric contacts positioned on said base, circuit closing contacts movable with respect to said contacts to make or break electrical connection thereacross, electromagnetic means for so moving said circuit closing contacts, a snap spring for resiliently holding said circuit closing contacts in either of their extremes of movement, a second snap spring carrying said circuit closing contacts, said second snap spring having two positions of stable equilibrium, in one of which positions the circuit closing contacts may be moved into engagement with said first-named contacts for closing a circuit thereacross, means whereby said electromagnetic means may cause said second snap spring to assume its potentially circuit closing position, and thermostatic means operating upon said second snap spring when the contacts thereof are in closed circuit position to move said snap spring and thereby associated contacts into open circuit position upon attainment of a predetermined temperature in said thermostatic means.

5. A remote control circuit breaker and overload protective device, comprising a base, contacts positioned on said base, circuit closing contacts movable with respect to said first-named contacts to make or break electrical connection thereacross, electromagnetic means for so moving said circuit closing contacts, a snap spring...
for resiliently holding said circuit closing contacts in either of their extremes of movement, a second snap spring carrying said circuit closing contacts, said second snap spring having two positions of stable equilibrium, in one of which positions the circuit closing contacts may be moved into engagement with said first-named contacts for closing a circuit thereacross, means whereby said electromagnetic means may cause said second snap spring to assume its potentially circuit closing position, and thermostatic means associated with said first-named contacts and operating upon said second snap spring when the contacts thereof are in closed circuit position to move said snap spring and therewith associated contacts into open circuit position upon attainment of a predetermined temperature in said thermostatic means.

6. A remote control circuit breaker and overload protective device as set forth in claim 4, in which said thermostatic means are bimetallic elements secured at one end to said base and said first-named contacts are carried by the free end of said bimetallic elements.

7. A remote control circuit breaker and overload protective device as set forth in claim 4 in which said overload protective device comprises a ring of electrically conductive material.

8. A remote control circuit breaker and overload protective device as set forth in claim 4, in which the snap spring carrying said circuit closing contacts comprises a dished spring member swivelly supported at its center and a bimetallic element thereon in such manner that in one position of repose of said bimetallic element means may be brought into or out of engagement with said contacts upon movement of said rod but in a second position of repose of said bimetallic element movement of the rod is ineffective to bring the contact means into engagement with the contacts, and means responsive to a condition of overload in the electric circuit to move said toggle spring into its said second position of repose.

9. A remote control circuit breaker as set forth in claim 4, in which the second snap spring carries said second snap spring to break contact between said first-named contacts and said movable contacts under predetermined temperature conditions.

11. An electric circuit breaker as set forth in claim 14, wherein said snap spring and therewith associated contacts remain in open circuit position after the circuit has been broken.

12. A circuit breaker, including contacts for connection into an electric circuit, a rod movable toward or away from said contacts, means for moving said rod, a toggle spring operatively associated with said rod and movable thereby, said toggle spring having two positions of repose, contact means carried by said toggle spring and arranged thereon in such manner that in one position of repose of said toggle spring the contact means may be brought into or out of engagement with said contacts upon movement of said rod but in a second position of repose of said toggle spring movement of the rod is ineffective to bring the contact means into engagement with the contacts, and means responsive to a condition of overload in the electric circuit to move said toggle spring into its said second position of repose.

13. A remote control circuit breaker and overload protective device as set forth in claim 4, in which the snap spring carrying said circuit closing contacts comprises a dished spring member swivelly supported at its center and said closing contact carries a ring of electrically conductive material free to rotate about the snap spring supporting means.

14. An electric circuit breaker comprising, in combination, fixed electric contacts, movable electric contacts adapted to cooperate therewith to close or open a circuit thereacross, means for bringing said movable contacts into or out of engagement with said fixed contacts, including a movable rod and a snap spring supported only by said rod and secured thereto at its center, said snap spring carrying said movable contacts, and means associated with said fixed contacts for moving the said movable contacts out of engagement therewith in the circumstance of overload at said fixed contacts, said means including a plurality of thermally responsive members adapted to exert pressure against the outer edges of said snap spring at substantially diametrically opposite positions thereof as the temperature of said thermally responsive means increases, under overload, to a predetermined point.

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