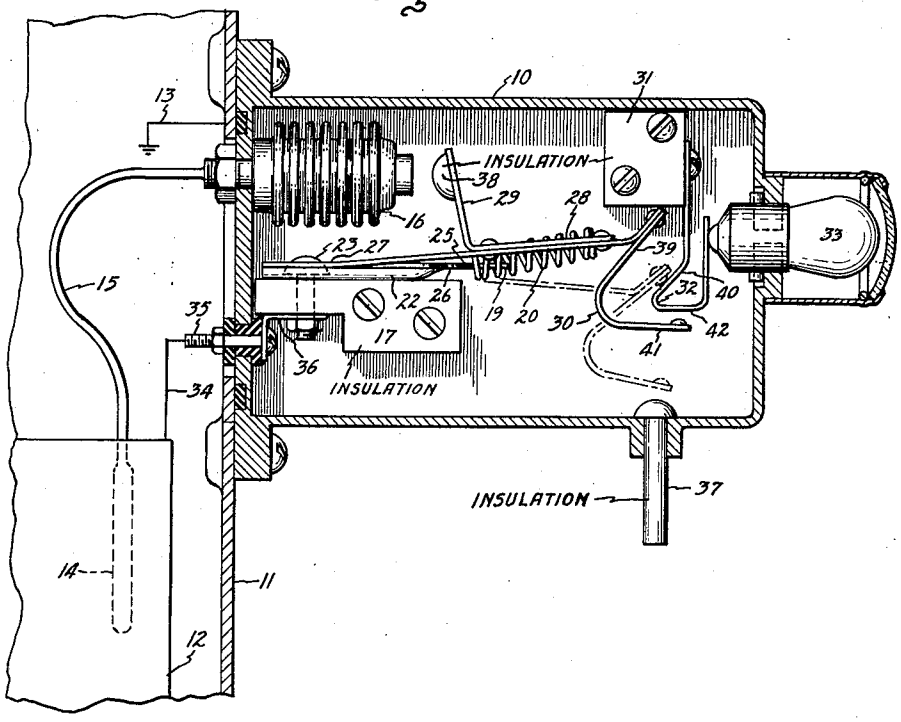
Aug. 10, 1954 J. R. BARR 2,686,300

SIGNAL MECHANISM

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Fig. 1.



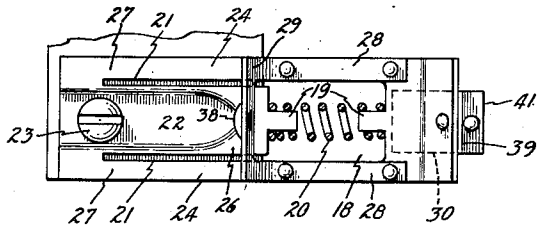


Fig. 2.

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SIGNAL MECHANISM

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5 Claims. (Cl. 340—214)

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This invention relates to a signal mechanism, and more particularly, to a signal mechanism employing an electric light.

Signal mechanisms employing an electric light adapted to be illuminated to signal the occurrence of some event to apprise one of said occurrence are well known in the art. Some forms of said signal mechanisms have means for resetting said signal mechanism after they have given a first signal so that they will be ready to give a subsequent signal. However, as far as I am aware, none of the signal mechanisms having resetting means make provision for automatically and conveniently checking the electric light used and the electrical circuit of the signal mechanism to make sure that said circuit has not become defective or inoperative. Conventionally, the electric light bulb is checked by removing it from the signal mechanism and trying it out in another electrical circuit to make sure that the electric light bulb has not blown.

It is an object of this invention to provide in a signal mechanism having an electric light signal and a resetting mechanism, means for automatically and conveniently checking the electric light bulb and the circuit therefor to make sure that they are in an operative condition.

In a signal mechanism having an electric light and a resetting mechanism, my invention comprises means for automatically and conveniently checking the operativeness of the electric light and the electrical circuit therefor.

The invention will be better understood by considering the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing Fig. 1 is a side view, partly in section, of an embodiment of my invention. Fig. 2 is a top view of the toggle spring switch arm of the device shown in Fig. 1.

Referring to the drawing, shown therein is a signal mechanism enclosed within a housing 10. Housing 10 is mounted on and carried by a tank side wall 11 of a transformer apparatus comprising a magnetic core, not shown, and electrical windings 12. As is well known in the transformer art the magnetic core and electrical windings 12 of the transformer apparatus are enclosed within a tank of which side wall 11 is a part. If so desired, the magnetic core and electrical windings can be submerged within a dielectric liquid contained within the transformer tank.

The transformer tank is grounded, as illustrated by ground lead 13. Accordingly, the housing 10 is also connected to ground inasmuch as housing 10 abuts and is in electrical contact with side wall 11 of the grounded transformer tank.

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Positioned within the electrical windings 12 is a bulb 14 containing a thermally responsive liquid therein. Bulb 14 is connected by a capillary tube 15 to a bellows actuator 16 mounted within housing 10. As is well known in the art, when the electrical windings 12 heat up beyond a predetermined temperature the liquid within bulb 14 will vaporize. The resulting vapor will cause an increase in pressure within bellows actuator 16 and cause it to expand.

Mounted directly below the bellows actuator 16 is an insulating material support 17 carrying a toggle spring switch arm. The toggle spring arm comprises a generally flat elongated rectangular-like strip of thin resilient metal. As seen more clearly in Fig. 2, a wide I-like hole 18 is punched in the forward half of said strip of resilient metal between the central and forward portions thereof leaving two opposed tabs 19. Between the tabs 19 is inserted a coil spring 20, said spring 20 being carried and centered by said tabs 19 inasmuch as tabs 19 enter opposite end portions of said coil spring 20. Extending from the top and bottom edges of I-like hole 18 are two thin parallel slots 21. Slots 21 extend towards but short of the left hand end edge when viewing Fig. 2, of said strip of resilient metal. Between slots 21 is formed a depressed portion 22. The underside of said depressed portion 22 is placed against an upper surface of insulating material support 17 and the toggle spring switch arm is fastened to said support, as by bolt means 23 passing through depressed portion 22 and insulating material support 17.

As will be apparent to those skilled in the art, when the toggle spring switch arm is in its unflexed condition the leaf spring-like portions 24 defined by slots 21 and I-like hole 18 will lie in the horizontal plane of the strip of resilient metal, and tabs 19 will be aligned opposite to each other in said horizontal plane. Said horizontal plane is indicated in Fig. 1 by dead-center line 25 containing the non-depressed portion 26 positioned between slots 21. When leaf spring-like portions 24 are flexed upwardly above dead center or plane 25 about their fixed ends 27, the coil spring 20 will also be flexed upwardly. When the coil spring 20 is flexed upwardly a sufficient amount, as shown by the Fig. 1 position of my toggle spring switch arm, the coil spring 20 will restrain the leaf spring-like portions 24 from returning to dead center. Similarly, when the

toggle spring switch arm is flexed below dead center, as indicated by the Fig. 1 broken-line position of my toggle spring switch arm the coil spring 20 will restrain my toggle spring switch arm from returning back to dead center.

Carried by leaf spring-like portions 24 is a U-shaped member bent into an L-shape, when viewed from the side, as shown in Fig. 1. The forward leg portions 28 of the U-shaped member are superposed with respect to and fastened to leaf spring-like potrions 24, as by rivets. The base portion 29 of the U-shaped member is positioned opposite to bellows actuator 16 and sufficiently above the horizontal plane 25 of the toggle spring switch arm so that it will not abut non-depressed portion 26 to prohibit the toggle spring switch arm from being flexed below dead center.

Connected to the forward end of the toggle spring switch arm is a resilient V or U-shaped contact member 30. Mounted within housing 10 is another insulating material support 31 carrying another contact member having a V or U-shaped contact portion 32. The V or U-shaped contact portion 32 is generally disposed within V or U-shaped contact member 30 so that the legs of member 30 embraced the legs of contact portion 32. Mounted at the forward end of housing 10 is an electric light bulb 33 in electrical contact with electrically grounded housing 10 and contact portion 32. The electrical windings 12 of the transformer constitute a source of electrical power for operating the electric light bulb 33, as by having a tap lead 34 of suitable voltage extending from said windings 12 to a bolt means 35, or by having separate electrical windings provided for this purpose. Bolt means 35 is insulated from the grounded housing 10 and grounded tank wall 11, as by suitable insulating material gaskets. Electrical contact is made between bolt means 35 and bolt means 23, as by a connecting strip 36. Positioned below the contact member 30 is an insulating material plunger 37, and as will appear more clearly hereinafter, depression of plunger 37 will reset the signal mechanism and also conveniently and automatically check the operativeness of the electric light bulb 33 and the electrical circuit therefor.

In Fig. 1 the signal mechanism is shown in its reset position whereby it is ready to signal the occurrence of a temperature rise in the windings 12 of the transformer apparatus beyond a predetermined temperature. Should the electrical windings 12 heat up beyond said predetermined temperature the liquid within bulb 14 will vaporize and expand bellows actuator 16. The bellows actuator 16 will thereupon strike an insulating material button 38 on the base portion 29 and cause the leaf spring-like portions 24 to be flexed below dead center. With the leaf spring-like portions 24 flexed below dead center the upper leg 39 of contact member 30 will be placed in electrical contact with the upper leg 40 of contact portion 32. The electrical circuit for the electric light bulb 33 is now complete and electric light bulb 33 will now light up to signal the occurrence of a temperature rise in windings 12 beyond said predetermined temperature. The electrical circuit for bulb 33 comprises tap lead 34, bolt means 35, connecting strip 36, bolt means 23, the toggle spring switch arm, contact member 30, contact portion 32, electric light bulb 33, housing 10, and grounded tank side wall 11. This closed circuit will be maintained even if said temperature rise condition in the transformer apparatus ceases since when the toggle spring switch arm was flexed below dead center the coil spring 20 was also flexed downwardly. The downwardly flexed coil spring 20 will restrain leaf spring-life portions 24 from flexing back to dead center. That is, even though bellows actuator 16 is no longer in its expanded condition the position of my toggle spring switch arm will be as shown in Fig. 1 by the broken-line outline of my toggle spring switch arm.

After the cause for said temperature rise has been determined and corrected the signal mechanism can be reset to be prepared to signal a subsequent temperature rise by depressing plunger 37. Partial depression of plunger 37 will flex the toggle spring switch arm above dead center or plane 25 and coil spring 20 will restrain the toggle spring switch arm from flexing back to dead center. Thus, as shown by the full-line position in Fig. 1 of the toggle spring switch arm, the upper legs 39 and 40 are no longer in electrical contact with each other. Also, the lower leg or auxiliary contact portion of contact member 30 is spaced from the lower leg 42 of contact portion 32. The electrical circuit for the electric light bulb 33 is now broken and the electric light bulb 33 is off.

The operativeness of the electrical circuit for electric light bulb 33 and the electric light bulb 33 can be conveniently checked at any time by merely depressing the plunger 37 until it causes the lower leg or auxiliary contact portion 41 to come into electrical contact with lower leg 42. When legs 41 and 42 contact each other the electrical circuit through the electric light bulb is complete and it will light up. If it does not light up, then one is apprised of the fact that either the electric light bulb 33 or the electric circuit therefore is inoperative.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention, and that it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A signal mechanism comprising an electrical circuit having an electric light bulb therein, a movable switch arm and a fixed contact in said circuit, said switch arm engageable with said fixed contact to close said circuit, and structure for resetting said signal mechanism and automatically checking the operativeness of said bulb and circuit comprising a manually movable element, partial movement of said manually movable element causing movement of said switch arm to a reset position whereby said switch arm is out of engagement with said fixed contact, further movement of said movable element causing closing of said circuit while said arm is in reset position whereby the operativeness of said bulb and circuit is checked.

2. A signal mechanism comprising an electrical circuit having an electric light bulb therein, a toggle spring switch arm and a fixed contact in said circuit, said toggle spring switch arm engageable with said fixed contact to close said circuit, said toggle spring switch arm having a spring element to retain said toggle spring switch arm in engagement with said fixed contact, and means for resetting said signal mechanism and automatically checking the operativeness of said bulb and circuit comprising a manually movable

element, partial movement of said manually movable element causing movement of said toggle spring switch arm to reset position whereby said toggle spring switch arm is out of engagement with said fixed contact, said spring element retaining said toggle spring switch arm out of engagement with said fixed contact, and an auxiliary contact portion engageable with said fixed contact while said toggle spring switch arm is in said reset position for completing said circuit, further movement of said movable element causing engagement of said auxiliary contact portion with said fixed contact.

3. A signal mechanism comprising an electrical circuit having an electric light bulb therein, a movable switch arm and a fixed contact in said circuit, said switch arm carrying a U-shaped contact member having only one leg thereof engageable with said fixed contact when said arm is in a closed position with respect to said fixed contact, said fixed contact positioned between the legs of said U-shaped contact member, means for resetting said signal mechanism and automatically checking the operativeness of said bulb and circuit comprising a plunger, partial movement of said plunger moving said switch arm to a reset open position with respect to said fixed contact whereby none of said legs will be in contact with said fixed contact, further movement of said plunger causing the other of said legs to come into contact with said fixed contact whereby the operativeness of said bulb and circuit is checked.

4. A signal mechanism comprising an electrical circuit having an electric light bulb therein, switch means in said circuit for opening and closing said circuit comprising a fixed contact and a movable contact, said movable contact carried by a movable switch arm, each of said contacts comprising a substantial V-shaped portion having two legs, said fixed contact V-shaped portion being smaller than said movable contact V-shaped portion and substantially disposed within said movable contact V-shaped portion whereby the legs of said movable contact V-shaped portion surround the legs of said fixed contact V-shaped portion in spaced relationship, the apexes of said V-shaped portions pointed in a substantially identical direction, means for moving said switch arm to a closed position whereby one leg of said movable contact V-shaped portion will contact one leg of said fixed contact V-shaped portion, means for resetting said signal mechanism and checking the operativeness of said circuit

and bulb comprising a plunger, partial depression of said plunger moving said switch arm whereby said movable contact one leg will be out of contact with said fixed contact one leg, further depression of said plunger moving the other of said movable contact V-shaped portion legs into contact with the other of said fixed contact V-shaped portion legs.

5. A signal mechanism comprising an electrical circuit having an electric light bulb therein, means for closing said circuit to light said bulb comprising a toggle spring switch arm and a fixed contact in said circuit, said toggle spring switch arm comprising a thin resilient strip of metal, said strip having a wide I-shaped hole punched therein between a central portion thereof and one end portion thereof defining two opposed tabs, a coil spring between said tabs, said tabs entering opposite end portions of said coil spring, two parallel thin slots extending from a bottom and top edge of said I-like hole towards but short of another end portion of said strip, a portion of said strip between said parallel slots being rigidly fixed and said one end portion free for movement above and below said fixed portion, said free end portion having a resilient U-shaped contact mounted thereon engageable with said fixed contact, said fixed contact positioned between the legs of said U-shaped contact and said legs spaced from said fixed contact when said circuit is open, means for moving said free end portion below said fixed portion whereby only one of said legs will contact said fixed contact, said coil spring retaining said one leg and fixed contact in engagement, and means for resetting said signal mechanism comprising a plunger, partial depression of said plunger causing movement of said free end portion above said fixed portion whereby said legs are spaced from said fixed contact, said coil spring retaining said legs spaced from said fixed contact, further depression of said plunger moving the other of said legs into contact with said fixed contact to complete said circuit for testing the operativeness of said bulb and said circuit.

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