Aug. 16, 1949. E. S. BUNDY 2,479,468

OVERLOAD INDICATOR

Filed Jan. 17, 1947

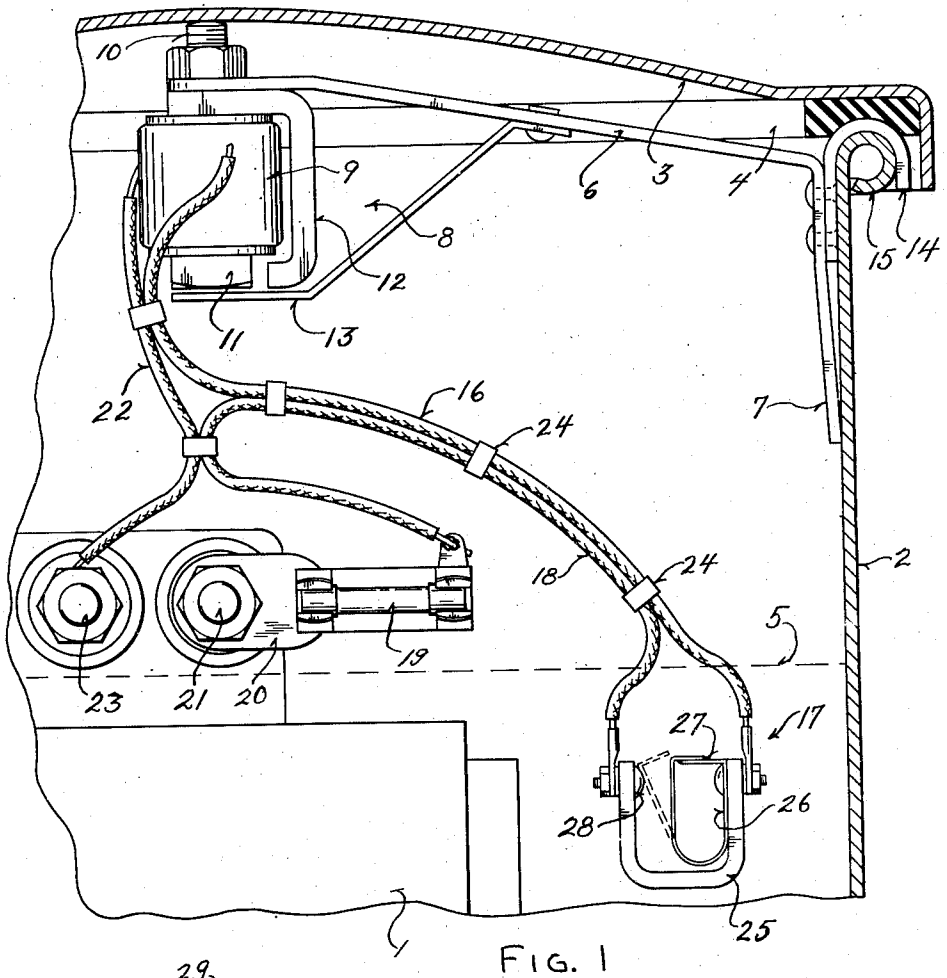


FIG. 1

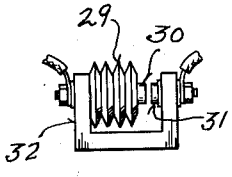


FIG. 3

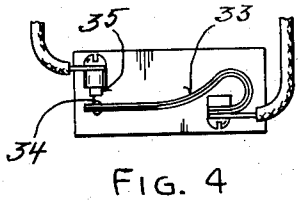


FIG. 4

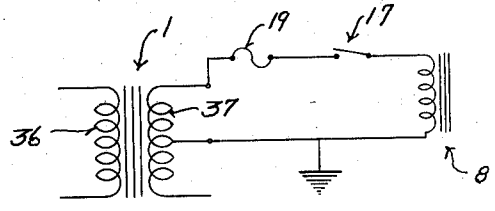


FIG. 2

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Patented Aug. 16, 1949 2,479,468

UNITED STATES PATENT OFFICE

2,479,468

OVERLOAD INDICATOR

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Application January 17, 1947, Serial No. 722,516

3 Claims. (Cl. 177—311)

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This invention relates to an overload indicator and is particularly directed to an overload indicator for distribution transformers.

Various attempts have heretofore been made to provide an overload indicator for distribution transformers but these attempts have usually involved the use of a signal lamp or an indicating flag or similar device none of which have been acceptable or satisfactory. The distribution transformers are mounted on poles and these visual means are not readily noticeable to persons on the ground unless they are specifically looking for the indication.

This invention has for its primary object the provision of an audible overload indicator for distribution transformers which will give a clearly audible signal designed to attract the attention not only of a lineman who may or may not be looking for the indication, but also will attract the attention of any person in the vicinity and of the customers who will hear the audible indications in their homes as the device is so arranged and associated with the transformer and its casing that a part of the casing, such as the cover, acts as a sounding board. It is expected that the customers or other persons in the vicinity, in turn, will call up the power company and notify it.

Further objects are to provide a very simple and easily produced device which may be installed in the casing of a transformer with the utmost ease and without requiring any changes in the transformer. The device is held in place by the cover of the transformer, and will coact with the casing of the transformer to give a clearly audible sound when the transformer is overloaded.

Embodiments of the invention are shown in the accompanying drawings, in which:

Figure 1 is a fragmentary view partly in section showing the device installed within the casing of a distribution transformer.

Figure 2 is a fragmentary diagrammatic view of the electrical circuits employed.

Figure 3 is a view of a modified form of a thermally responsive device.

Figure 4 is a view of a further form of a thermally responsive device.

Referring to the drawings, it will be seen that a distribution transformer has been indicated by the reference character 1. This transformer is housed within a casing whose body portion is indicated by the reference character 2 and whose cover is indicated by the reference character 3. The cover is provided with a gasket 4 and is clamped down on to the body portion 2 in any well known manner, not shown. The casing 2 is partially filled with oil, for instance to the level indicated by the dotted line 5. The overload indicating device comprises a hanger 6 which is of bell crank shape and has one arm 7 projecting downwardly and bearing against the inner side of

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the body portion 2 of the casing. The other portion of the hanger carries the audible indicating device indicated generally by the reference character 8. This device may comprise an electromagnet whose energizing winding is indicated by the reference character 9. This energizing winding is wound around a bolt 10 which forms the core of the electromagnet and terminates in a downwardly projecting head 11. A yoke 12 of magnetic material is also held in place by means of the bolt 10. The bolt 10 passes through the hanger 6 and thus secures the electromagnet firmly to the hanger. A vibrating armature is indicated by the reference character 13 and is formed of resilient magnetic material. One end is securely fastened to the hanger 6 and the other end is in spaced relation to the head 11 of the core or bolt 10 and the yoke 12, the yoke 12 it being noted having its lower end spaced from the head 11 of the core.

It is clear that when the electromagnet is energized with alternating current that the armature 13 will vibrate rapidly and will strike a multitude of blows on the head 11 of the core or bolt 10. The resiliency, length and weight of the armature 13 are so chosen that the armature is resonant to the alternating current frequency of the supply circuit.

The hanger 6 is somewhat resilient and is arranged to force the bolt or core 10 into firm engagement with the cover 3 so that the impact of the blows is transmitted to the cover 3 and the cover, therefore, acts as a sounding board. A convenient way of securing the hanger in place is to provide it with a hook-like portion 14 which is hooked over the bead 15 of the body portion 2 of the casing of the transformer and is clamped in place between the cover 3 and the body portion 2 thus securely positioning the hanger and the electromagnet. The electromagnet has one lead 16 which extends to one side of a thermally responsive device indicated generally by the reference character 17. The other side of the thermally responsive device is connected by means of a lead 18 with one side of a clip type or cartridge type fuse 19. The other side of the fuse 19 is connected to a bracket 20 secured to the line terminal 21 of the secondary of the transformer. The other lead 22 from the electromagnet is secured to the neutral terminal 23 of the secondary. The leads 16 and 18 and 22 are bound together by suitable clips 24. They are relatively stiff and serve to hold the thermally responsive member in any adjusted position below the level 5 of the oil within the body portion 2 of the casing of the transformer.

The thermally responsive member 17 may comprise a U-shaped Bakelite member 25 which has one arm of a U-shaped member 26 formed of conducting material secured to one of the arms

of the member 25. The upper ends of the arm of the member 26 overlap and are soldered together as indicated at 27 by a low melting point solder such as rosemetal 75° C. solder. The member 26 is made of spring metal and the arms of the member 26 tend to spring apart and when the temperature of the oil arrives at a predetermined point, it will melt the solder 27 and allow the free arm of the member 26 to spring outwardly to the dotted line position shown in Figure 1 and engage the terminal 28 to which the lead 18 is attached, and thus close the circuit of the electromagnet. This causes alternating current to be supplied from the winding of the transformer to the electromagnet and causes the armature 13 to produce a multitude of blows against the head 11 of the core 10, the impact being transmitted to the cover 3 which acts as a sounding board and gives a distinctly audible indication of the overload condition. Not only will a lineman who may or may not be looking for this indication be apprised of the overload condition of the transformer, but it has been found that customers or other persons in the vicinity will also be apprised of this condition. The customers or persons in the vicinity will, in turn, notify the power company and suitable steps will be taken to remedy the overload condition without delay thus avoiding a long interruption to service.

The fuse 19 not only acts as a protecting means to protect the transformer in the event of failure of the electromagnet but also may be used as a disconnecting means if so desired.

In the form of the invention shown in Figure 1, after overload has occurred, the overload audible indication is continuously given until suitable steps have been taken to correct the condition. However, it may be desired to use other means which will give an audible indication only during the overload condition. Any suitable means may be employed for this purpose. For instance, a thermostatically responsive bellows 29, see Figure 3, may be used. This bellows may be made of metal and may carry the movable contact 30 designed to engage the stationary contact 31 when an overload occurs, the bellows and the contact 31 being suitably supported on a U-shaped insulating member 32. If desired, a bimetal thermostatic member indicated by the reference character 33 in Figure 4 may be employed and may carry the movable contact 34 adapted to engage the stationary contact 35 upon overload conditions.

Referring to Figure 2, it will be seen that the transformer has been indicated generally by the reference character 1 and is provided with a primary 36 and a secondary 37. The thermally responsive member is indicated in Figure 2 generally by the reference character 17, the fuse at 19, and the electromagnet generally at 8.

It will be seen that a novel form of overload indicating means, particularly suitable for distribution transformers, has been provided by this invention which will give a distinct audible indication of the overload condition and which not only will apprise a lineman when in the vicinity of the transformer whether he is looking for the indication or not, but will also apprise the customers or any person in the vicinity of the overload condition who, it is expected, will in turn notify the power company.

It will be seen that the device can be very cheaply made primarily from standard stock material and also can be most easily installed in

existing and previously installed transformers without any alteration of the transformers whatsoever.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. The combination of a transformer provided with a casing containing oil, and an overload indicator arranged to produce an audible sound and comprising an electromagnet having an armature arranged to strike blows when the electromagnet is energized by alternating current and including means for transmitting the impact of said blows to the casing of the transformer, a portion at least of said casing being arranged to act as a sounding board, and thermally responsive means immersed in said oil and arranged to electrically connect said electromagnet to the transformer when the oil reaches a predetermined temperature.

2. The combination of a transformer provided with a casing containing oil and having a body portion and a cover, and an overload indicator arranged to produce an audible sound and comprising an electromagnet and an armature, said electromagnet comprising a main portion and an armature arranged to strike said main portion a multitude of blows when said electromagnet is energized with alternating current, a hanger having a portion clamped between the cover and body portion of said casing and arranged to hold the main portion of the electromagnet against said cover, and thermally responsive means immersed in the oil and arranged to electrically connect said electromagnet with the transformer when the oil reaches a predetermined temperature.

3. An audible indicator for an encased transformer comprising a hanger arranged to be secured to the casing of said transformer, an electromagnet carried by said hanger and having a body portion arranged to be held by said hanger in contact with the casing of said transformer and having an armature arranged to strike the body portion of said electromagnet a multitude of blows when said electromagnet is energized with alternating current, to thereby cause a portion at least of said casing to act as a sounding board, said armature being resiliently supported and being arranged to resonate with the alternating current, and means including thermally responsive means arranged to electrically connect said electromagnet to the transformer when said thermally responsive means is heated to a predetermined degree.

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