Feb. 14, 1956 D. J. KINZER 2,735,088

FAULTY FUSE INDICATOR

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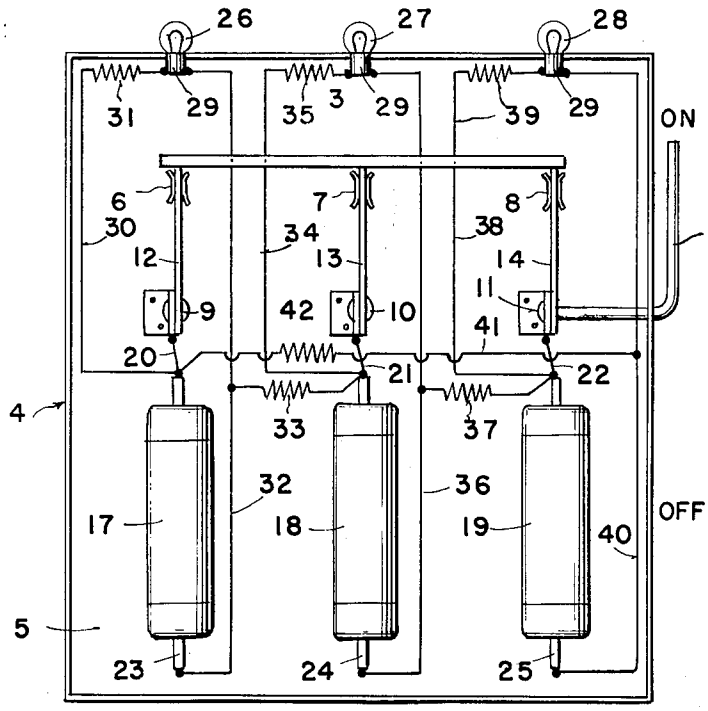

FIG. 1

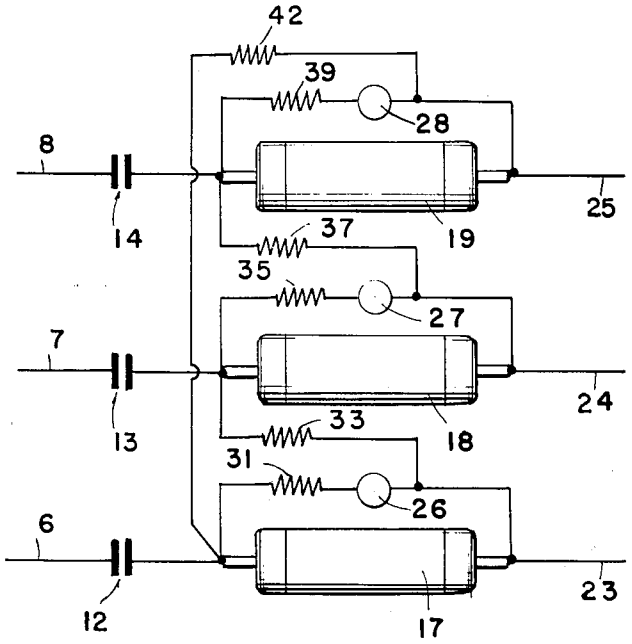

FIG. 2

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FAULTY FUSE INDICATOR

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1 Claim. (Cl. 340—250)

The specification which follows relates to novel improvements in a faulty fuse indicator for electric service circuits. This is directed particularly to fused switch installations which are arranged in closed boxes having hinged covers. The contained switches are operated from outside of the box when the cover is closed and the operation of opening the cover serves to prevent the switch from being closed. This is a safety measure universally adopted to prevent dangerous short circuits or injuries to personnel.

When such switch installations include fuses on the load circuits which become faulty or defective, the location of the defective fuse is difficult to determine when the switch is opened. This frequently leads to dangerous attempts to close the switches while the door is open and the fuses are being tested.

It is the purpose of this invention to provide means by which a visual indication of the faulty fuse is given outside the closed box, or if desired, at any convenient remote position.

It is therefore an object of my invention to indicate the defective or faulty fuse prior to opening the switch and before the cover of the box is opened.

It is a further object of my invention to provide a faulty fuse indicator which draws a minimum quantity of current during normal operation of the load circuit, and the lamp becomes a current carrying circuit only when the fuse becomes defective.

A still further object of my invention is to provide faulty fuse indicators which are adapted to connect with each of the several branches of the fused circuit and adaptable to circuits regardless of the arrangement or number of phases.

Among the objects of my invention is to save time otherwise lost in separately testing the fuses or in dismantling them for inspection.

Other objects of my invention will be readily understood from the following description of the preferred form as illustrated on the accompanying drawings in which

Figure 1 is a wiring layout and pictorial view of a standard 3-pole fused safety switch provided with my improved faulty fuse indicators and

Figure 2 is a schematic diagrammatic representation of the above circuit.

Briefly described, the novel faulty fuse indicator is based upon the principle that when an electric circuit is broken, a difference in potential is created across the gap, sufficient to light a neon or incandescent lamp in a parallel circuit of high resistance.

Under normal conditions with the switch closed, the lamp and lamp resistor is in parallel with the fuse, while the resistors are directly across the line. The resistors are of high enough ohmic resistance to prevent any substantial amount of current flowing through them. The neon or incandescent lamp in parallel with the fuse will not glow because current flows in the path of least resistance, which is only through the fuse. Therefore,

when the lamp is out it indicates that the fuse in the circuit is operating effectively. When a fuse is blown, the circuit of the resistors is completed through the indicating lamp. The resistor takes up the excess voltage drop, leaving only the desired voltage across the lamp. This immediately causes the lamp to glow, giving a visual indication that a fuse is blown and also indicating its location.

The novel indicating means for faulty fuses is illustrated by way of example on the accompanying drawings in which there is shown the customary fused switch box **4**. This box is provided with the customary hinged front cover not shown. The base **5** of the box has three terminals, **6**, **7** and **8**, connected in the usual manner to the feed line. In the example shown, this is a three-phase alternating current circuit. The terminals **6**, **7** and **8** are designed to receive individual knife switches.

Opposite the line terminals are terminals **9**, **10** and **11** forming pivot bearings for the three knife switches **12**, **13** and **14**.

The switch is operated by a handle **16** outside of the box, the usual linkage which includes a latch for the cover. As is conventional, the cover is held latched until the outside lever separates the knife blades **12**, **13** and **14** from the line terminals **6**, **7** and **8**, respectively.

Each branch of the circuit is provided with a fuse **17**, **18** and **19**, respectively, of the usual cartridge type, one end of which is connected by a lead **20**, **21** or **22** respectively, to the pivot bearings of terminals **9**, **10** and **11**.

The opposite ends of the fuses **17**, **18** and **19** have terminals **23**, **24** and **25** respectively, connected to branch conductors in the service circuit.

In order to provide a visual indicator for a faulty fuse without opening the switches and the front cover, I have provided a series of signal lamps **26**, **27** and **28**. These lamps are mounted in sockets **29** of the switch box so that the lamps project outside of the box, while they may be connected on the inside of the box to the circuits to be tested. The lamps used are gaseous neon bulbs which become lighted by the passage of extremely small currents.

A lamp **26** has a conductor **30** connected to the terminal **9**. A resistor **31** is in series with the conductor **30**. The opposite terminal of the lamp **26** is connected by conductor **32** to the opposite terminal **23** of the fuse **17**. A resistor **33** connects conductor **32** to the lead **21** of the terminal **10**.

The lamp **27** is connected by conductor **34** to the terminal **10**. A resistor **35** is in series between the lamp **27** and the conductor **34**. The opposite terminal of lamp **27** has a conductor **36** running to the end **24** of the fuse **18**.

A resistor **37** is connected between the conductor **36** to the lead **22** of terminal **11**.

The lamp **28** has a conductor **38** connecting with the conductor **22** and terminal **11**. A resistor **39** is in series with conductor **38**.

The lamp is also connected by lead **40** to the opposite end **25** of the fuse **19**.

A conductor **41** runs from conductor **40** to lead **20** of the terminal **9**. A resistor **42** is in series with the conductor **41**.

Figure 2 shows a schematic of the above circuit.

The circuits illustrated are assumed to be 460 volts three-phase alternating current which is standard for most industrial motors.

The neon lamps are connected with external resistors of 200,000 ohms, and this provides a rating of 115 volts. The wattage of the resistor circuits is approximately 1, and the neon lamp itself consumes one twenty-fifth watt.

Assuming the fuses to be operating normally, not

enough current will pass thru the lamp circuits to light them, because as stated before, current flows in the path of least resistance, which is thru the resistors. If any fuse blows, the circuit of the resistors will be completed thru the lamp circuits to the connected branch line. This will light the lamp of the branch having the faulty or defective fuse.

As will be seen, this indication is produced while the switches are still closed and the front cover in place.

It follows that there is no need of testing the individual fuses after the box is open, and that great saving is made in time and increased safety obtained.

While I have illustrated the preferred form of the invention, numerous changes may be made in minor features and proportions without departing from the scope of the invention as defined in the appended claim.

What I claim is:

An indicator for a faulty fuse in the fused alternating current load circuit of a motor and the like comprising a lamp, conductors from the lamp to opposite ends of the fuse under test, a resistor in the conductor attached to the line end of the fuse and a high resistance shunt from the other conductor to a second branch of the line to the load circuit.

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