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OVERLOAD INDICATOR FOR ELECTRICAL CIRCUITS

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Fig. 1.

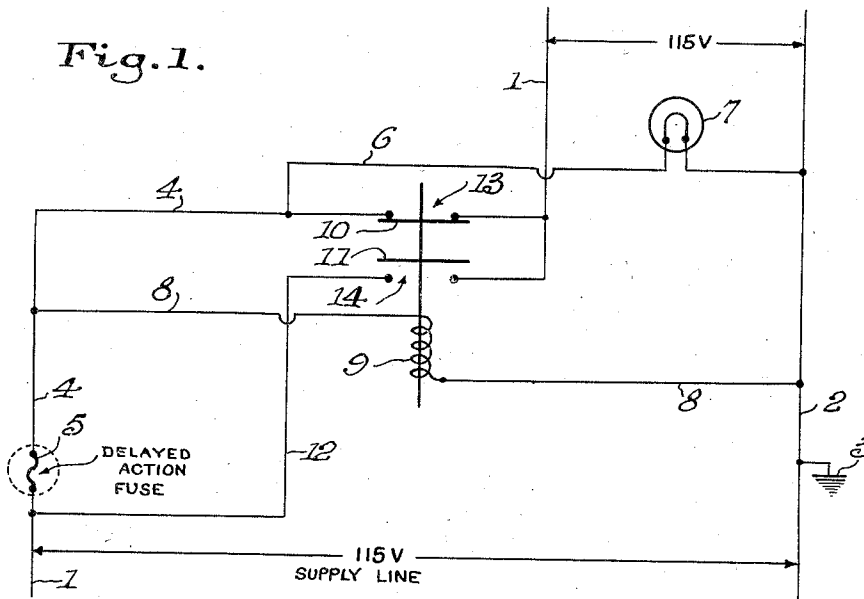
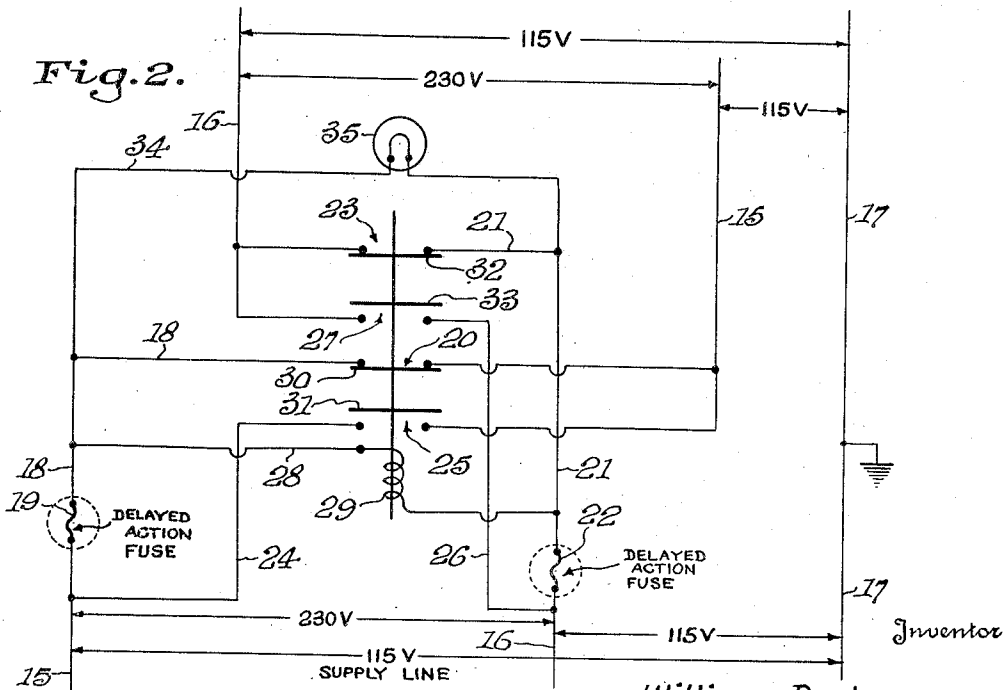


Fig. 2.



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OVERLOAD INDICATOR FOR ELECTRICAL CIRCUITS

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6 Claims. (Cl. 177-311)

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My invention consists in new and useful improvements in an overload indicator for electrical circuits and has for its object to provide an arrangement for determining within reasonably narrow limits, the load which any customer of an electric company, for example, has imposed upon the line.

Another object of my invention is to provide an overload indicator which will function without interruption of service, in an electrical system, and to this end I provide a normally effective supply circuit and an auxiliary supply circuit, the former normally energizing a pilot lamp or other signal device and having interposed therein a delayed action circuit breaker, responsive to an overload extended over a predetermined period, and a controlling or circuit shifting relay which is operable upon the breaking of said normal circuit to energize said auxiliary circuit. Thus, in the event of an overload on the system, the signal lamp is extinguished and without noticeable interruption, the current is transferred from the normal supply circuit to the auxiliary supply circuit. The extinguishment of the pilot lamp indicates to the inspector that the system has been subjected to an extended overload.

A further object of my invention is to provide a simple and practical overload indicator which will impose no resistance on the load circuit such as might otherwise interfere with the maintenance of satisfactory voltage and service at the load.

With the above and other objects in view which will appear as the description proceeds, my invention consists in the novel features herein set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a wiring diagram of one form of my invention designed to operate on two-wire, 115 volt, single phase service; and

Fig. 2 is a wiring diagram of a modified form of the invention adapted to operate on 115-230 volt, three-wire, single phase service.

Referring first to Fig. 1 of the drawings, the numerals 1 and 2 represent the conventional supply lines leading from a source of electrical supply, not shown, to the load, the line 2 being preferably grounded at 3 in the usual manner. Interposed in the supply line 1, is a normal supply conductor 4 provided with a delayed action fuse 5 or other suitable circuit breaking device which is responsive to an overload imposed on the system over a predetermined period. A signal con-

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ductor 6 having connected therein a pilot lamp 7, is shunted between the normal supply conductor 4 and the grounded supply line 2, said pilot lamp being responsive to the functioning of the delayed action fuse 5.

Anterior to the points of connection of the shunted signal conductor 6, I provide a relay or control conductor 8 which is shunted between the normal supply conductor 4 and the grounded supply line 2, said conductor 8 having interposed therein a suitable relay 9 provided with a pair of spaced movable contacts 10 and 11.

An auxiliary supply conductor 12 is connected in the normal supply line 1 at points anterior to the delayed action fuse 5 and posterior to the signal shunt conductor 6, respectively. The normal supply conductor 4 and the auxiliary supply conductor 12 are provided with switches 13 and 14 respectively which include the movable contacts 10 and 11 of the relay 9. These movable contacts 10 and 11 are so arranged that when the relay 9 is energized, the contact 10 closes the switch 13 to complete the circuit through the supply line 1 and the normal conductor 4, and to break the circuit in the auxiliary supply conductor 12. When the relay 9 is deenergized, the reverse takes place, and the movable contact 11 closes switch 14 and the contact 10 opens switch 13, thus deenergizing the normal conductor 4 and energizing the auxiliary conductor 12. Deenergizing of the conductor 4 also deenergizes the signal circuit conductor 6 and causes the lamp 7 to be extinguished.

The system just described is connected in a house circuit preferably at the point where service leaves the watt-hour meter. In operation, as long as the delayed action fuse 5 is intact, the house load will be fed by completion of the circuit through line 1, through conductor 4, and switch 13. The pilot light 7 in conductor 6 and the relay coil 9 in conductor 8 will both be energized. Should the customer impose too great a load on the line during an extended period of 10 or 15 minutes, for example, the delayed action fuse 5 will rupture, thus deenergizing the relay coil 9, dropping the contacts 10 and 11, breaking the circuit through the normal conductor 4, and extinguishing the pilot light 7.

Simultaneously, service is reestablished to the house load through the switch 14 in the auxiliary conductor 12, this being accomplished without noticeable interruption to the house service. However, the extinguishment of the pilot light 7 indicates that the allowable load for the delayed action fuse 5 has been exceeded.

This same principle may be applied with certain modifications in connection with 115-230 volt, three-wire, single phase service as will be seen from Fig. 2. In this figure, 15, 16, and 17 represent three supply lines leading from a source of electrical supply to the house load, the line 17 being preferably grounded in the usual manner. Here however, it is preferable to employ two delayed action fuses and two sets of normal and auxiliary supply conductors in order to adapt the invention to the three-wire service.

One normal supply circuit consists of a conductor 18 in circuit with the supply line 15 and having interposed therein a delayed action fuse 19 and a controlling switch 20. A second normal supply circuit comprises a conductor 21 in circuit with the supply line 16 and having interposed therein a delayed action fuse 22 and a controlling switch 23.

The auxiliary circuit for the line 15 includes a conductor 24 connected into line 15 anterior to the fuse 19 and having interposed therein a controlling switch 25. A second auxiliary circuit includes a conductor 26 connected into line 16, anterior to the fuse 22 and having interposed herein a controlling switch 27.

A relay circuit is shunted across supply lines 15 and 16 posterior to the fuses 19 and 22 and includes a conductor 28 having therein a relay 29; provided with two sets of movable contacts 30, 31, and 32, 33; included in the switches 20, 25 and 23, 27 respectively. Posterior to the relay circuit, I provide a signal circuit consisting of a conductor 34 shunted between supply lines 15 and 16 and having interposed therein a pilot lamp 35. Thus, both the pilot lamp 35 and the relay 29 are responsive to either one of the delayed action fuses 19 or 22.

The operation of this modified form of my invention is basically similar to that described in connection with Fig. 1. Here, 115 volt service is normally available through lines 15 and 17 or lines 16 and 17 and 230 volt service is available through lines 15 and 16.

On 115 volt service, so long as the delayed action fuses 19 and 22 remain intact, the circuit is maintained through conductors 18 and 21, across contacts 30 and 32 of switches 20 and 23 to the load, and the pilot lamp 35 remains energized. Upon subjecting the line to an extended overload, one or both of the fuses are ruptured, deenergizing the relay 29 and the pilot lamp 35, dropping the contacts 30 and 32 of the relay to break the circuit through switches 20 and 23 and make the circuit in the auxiliary switches 25 and 27 through contacts 31 and 33.

On 230 volt service, so long as the fuses 19 and 22 remain intact, the normal circuit is completed through conductor 18 and across switch 20 through contact 30; and through conductor 21 and across switch 23 through contact 32. The pilot lamp 35 and the relay 29 will then be energized. Upon rupture of either of the fuses 19 or 22 by overloading the system, the relay 29 is deenergized and the pilot lamp 35 extinguished, the deenergizing of the relay 29 permitting the contacts 30, 31, 32, and 33 to drop, breaking the circuit through switches 20 and 23 of the normal circuit and completing the circuit through switches 25 and 27 in the auxiliary circuit.

This same principle may be employed with equal advantage in connection with a system wired for 230 volt, three-wire, three phase service. In fact, my invention is readily adaptable,

to various circuits and services with minor modifications to meet the particular needs of the individual situation.

From the foregoing it is believed that my invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details of construction without departing from the spirit of the invention as set forth in the following claims.

I claim:

1. An electrical system for indicating overload, comprising two supply lines, a normal supply conductor and an auxiliary supply conductor in one of said supply lines, a signal conductor shunted between said normal conductor and the other of said supply lines, a normally energized signal device connected in said signal conductor, a control conductor shunted between said normal conductor and said other supply line in parallel with said signal conductor, a relay connected in said control conductor, said relay having movable contacts adapted to close the circuit through said normal conductor and open the circuit in said auxiliary conductor when the relay is energized and to open the normal circuit and close the auxiliary circuit when the relay is deenergized; and a circuit breaker in said normal conductor in series with said signal and relay and responsive to overload on the system.

2. An electrical system for indicating overload, comprising two supply lines, a normal supply conductor and an auxiliary supply conductor in one of said supply lines, a signal conductor shunted between said normal conductor and the other of said supply lines, a normally energized signal device connected in said signal conductor, a control conductor shunted between said normal conductor and said other supply line in parallel with said signal conductor, a relay connected in said control conductor, said relay having movable contacts adapted to close the circuit through said normal conductor and open the circuit in said auxiliary conductor when the relay is energized and to open the normal circuit and close the auxiliary circuit when the relay is deenergized; and a delayed action circuit breaker in said normal conductor in series with said signal and relay and responsive to overload on the system.

3. In a three-wire electrical system, means for indicating overload comprising a normal supply conductor and an auxiliary supply conductor connected in each of two of said wires, a signal device shunted across said normal conductors and normally energized thereby, switches in said normal and auxiliary conductors, a delayed action circuit breaker in each of said normal conductors, responsive to overload on the system, and means responsive to said circuit breaker for controlling said switches to shift the current from the normal conductors to the auxiliary conductors upon breaking the circuit in either normal conductor and the deenergizing of said signal device.

4. An electrical system as claimed in claim 3, wherein said last named means comprises a relay coil shunted between said normal conductors for common control of both sets of switches.

5. An electrical system for indicating overload, comprising two supply lines, a normal supply conductor and an auxiliary supply conductor connected in one of said lines, a signal device normally energized through said normal supply

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conductor, switches in said normal and auxiliary conductors, a delayed action circuit breaker in said normal conductor, responsive to an overload on said circuit, and a relay coil operatively connected to said switches and shunted between said normal conductor and the other of said supply lines, said relay coil being responsive to said circuit breaker for controlling said switches, to shift the current from the normal conductor to the auxiliary conductor upon breaking the circuit in the normal conductor and the deenergizing of said signal device.

6. An electrical system for indicating overload comprising first and second supply lines, a delayed action circuit breaker in the first supply line, a normally deenergized auxiliary conductor connected in said first supply line adapted to by-pass said circuit breaker, a normally energized signal device shunted between said first and second supply lines, posterior to said circuit breaker and responsive to the latter, a relay coil in parallel with said signal device and shunted between said first and second supply lines, a nor-

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mally closed switch in said first supply line, posterior to said circuit breaker, a normally open switch in said auxiliary conductor, and means operatively connecting said switches for simultaneous actuation in response to the functioning of said relay coil, whereby when said relay is deenergized upon the blowing of said circuit breaker, the condition of said switches is reversed and said circuit breaker is by-passed.

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