Nov. 11, 1958 H. T. SPARROW 2,860,263

REMOTE CONTROL SWITCHING CIRCUIT

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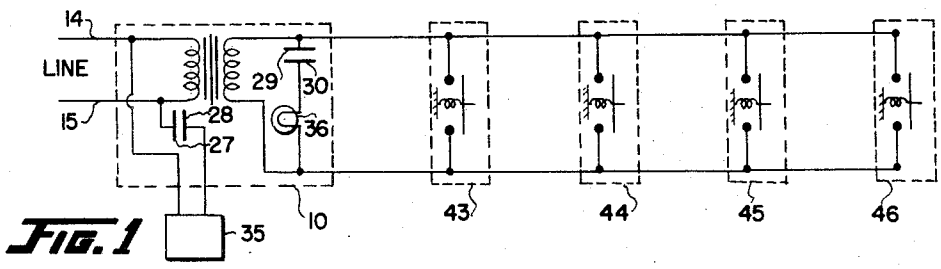


FIG. 1

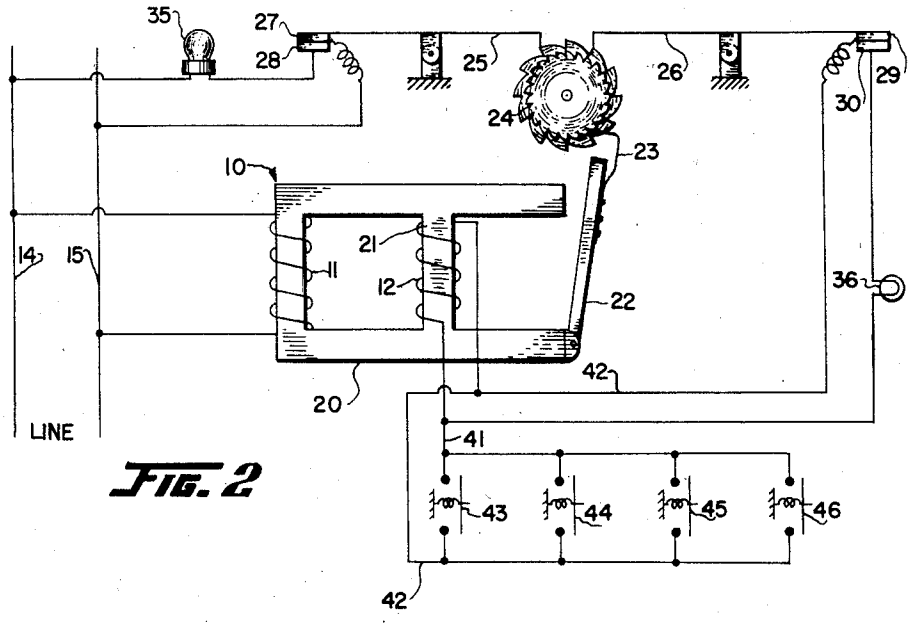


FIG. 2

INVENTOR.
HUBERT T. SPARROW

BY Joseph E. Ryan
ATTORNEY

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REMOTE CONTROL SWITCHING CIRCUIT

Hubert T. Sparrow, Minneapolis, Minn., assignor to Minneapolis-Honeywell Regulator Company, Minneapolis, Minn., a corporation of Delaware

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6 Claims. (Cl. 307—140)

This invention relates to remote control switching circuits and more particularly to an improved remote control lighting circuit. While remote control circuits of this general type are known, they are not presently in widespread usage primarily because of complexity and high cost of installation. The present application is directed primarily to a simplified control circuit with a limited number of parts and with a two-wire remote control circuit which reduces both the initial cost of the apparatus and the cost of installation. It is therefore an object of this invention to provide a simplified two-wire remote control circuit. It is further an object of this invention to provide a simplified remote control switching apparatus which is economical to manufacture, install and maintain. A further object of this invention is to provide in a circuit of this type a simplified means for providing indication of the state of operation of the remote control device. These and other objects of this invention will become apparent from a reading of the attached description together with the drawings wherein:

Figure 1 is a schematic circuit diagram of the improved remote switching apparatus, and

Figure 2 is a diagrammatic disclosure of the parts of the improved remote control switching apparatus.

As shown in Figures 1 and 2, the improved remote control switching circuit utilizes a transformer type ratchet relay indicated generally at **10** having a primary winding **11** and a secondary winding **12**. The primary winding **11** is adapted to be directly connected to an alternating current source of power indicated generally by conductors **14**, **15** in which normal or line voltage is applied for house lighting or for operating any desired remote control apparatus. This primary winding will be continuously energized and is mounted on a core structure for the relay indicated at **20** on one leg thereof. The secondary winding is adapted to be mounted on a second leg of the core structure in normal shunt relationship with the first named leg and indicated at **21**, with the relay also including a pivotally mounted armature indicated at **22** such that it will operate or pivot between an attracted and nonattracted position depending upon the direction of flux flow through the core structure. The armature **22** carries a pawl indicated at **23** which cooperates with a pivoted ratchet member **24**, shown herein as remote from the core structure but adapted to be pivotally mounted on a supporting structure, not shown, mechanically connected therewith, the ratchet member having associated therewith two pivoted levers **25** and **26** which operate a pair of switching mechanisms. The lever **25** carries a movable contact **27** which cooperates with a stationary contact **28** to form one of the switching mechanisms and the lever **26** carries a contact **29** which cooperates with a stationary contact **30** to provide the second switching mechanism both of which are adapted to be operated through engagement of an extremity of the respective levers with the ratchet wheel for simultaneous closure and opening. The switching

mechanism formed by the contacts **27**, **28** are adapted to be of the line voltage type and will connect a lighting load or a device **35** to be remotely operated to the line source indicated by conductors **14**, **15** as will be best seen in Figure 2.

The contacts **29**, **30** of the second named switching mechanism operated by lever **26** simultaneously with the switching mechanism for lever **25** are adapted to connect an indicator light indicated at **36** across the secondary winding **12** for energization of the same in a manner to be later described. Also connected to the secondary winding through conductors **41**, **42** are a plurality of remote controlled push button type or momentary contact type switches indicated at **43**, **44**, **45**, and **46** respectively. These switches are adapted to be positioned in any remote location from the relay **10** and the load **35** to be connected to the relay **10** through the single pair of conductors **41**, **42** in a simplified wiring arrangement of the low voltage type.

In operation, the primary winding **11** of the transformer relay will be continuously energized and the flux generated therefrom in the leg upon which it is mounted will thread the core structure and will take the path of least magnetic reluctance through the leg **21** such that the armature **22** will not be attracted toward the core structure and the relay will be in an inoperative or unattracted position. As is conventional in transformer relays, shorting of the secondary winding will complete a circuit for the same permitting an induced current flow therein, which will generate a counter flux raising the magnetic reluctance of the path or leg **21** and directing the flux flow through the core structure **20** to the armature **22** to attract the same toward the core structure. By adjusting the turns ratio between the primary and secondary windings **11** and **12**, respectively, the voltage induced in the secondary winding **12** can be kept in the desired low level or ratio with respect to the primary or line excitation to meet simplified wiring requirements. Operation of the relay or attraction of the armature **22** to the core structure will tend to rotate the rachet member **24** through the detent **23** to operate or pivot the levers **25**, **26** and operate the associated switch contacts **27**, **28**, and **29**, **30** respectively. The levers **25**, **26** are associated with the ratchet member **24** such that the contacts or switches will be opened for one step of the ratchet rotation and will be closed in the next succeeding step and will thereafter be moved to an open position on the next succeeding step of ratchet rotation. Thus for one operation of the relay **10**, the switch mechanisms or switches may be closed and on the next succeeding operation of the relay member the switches may be moved to an open circuit position. As will be seen in the drawings, operation of the switch contacts **27**, **28** to a circuit closure position will connect the lighting load or device **35** across the line voltage supply or conductors **14**, **15** to energize the same and to disconnect the same when the respective switch is in the circuit open position.

Where a master panel is used in connection with a remote control circuit, the secondary switch formed by contacts **29**, **30** may be utilized to connect an indicator light at the master panel to indicate the condition of operation of the remote device, and, if desired, this circuit could be run (not shown) to all or any one of the several remote switches. Because the contact mechanisms **27**, **28** and **29**, **30** are operated simultaneously and in the same manner, the indicator light **36** will be connected across secondary winding and it will be energized from the induced secondary voltage of a lower level to provide an indication of the condition of operation. With the succeeding movement of the ratchet means

and operation of the contacts to a circuit open position, the indicator light will be de-energized. In this remote control apparatus, the plurality of momentary switches **43—46** are simply connected to the secondary winding for shorting of the same to cause relay operation and engagement of the armature **22** with the core structure **20**. This switching operation is of the momentary type and when the respective momentary switch is released to a circuit open position, the relay will be moved to be in an inoperative position. Because of the engagement of the pawl **23** with the ratchet member **24**, the switches will be moved to and held in a desired condition of operation. The control or indicator circuit for the light **36** is of the high impedance type due to the electrical characteristics of the indicator bulb and the current flow through the secondary winding **12** to maintain energization of this indicator light will be of such reduced magnitude that it will not maintain the armature in an attracted position with the core structure **20** but will allow the armature to move to a retracted position while still supplying sufficient current to maintain indication through energization of the light **36**. On the next succeeding closure of any of these switches **43—46**, the armature again will be moved to a closed or attracted position with respect to a core structure **20** again operating the ratchet member **24** to move the respective switches to an opposite condition of operation from that which had previously been in effect. This will open the energization circuit from the indicating light. Thus it will be seen that by adding one wire an indication of the condition of operation of the relay may be obtained without effecting the operation of the transformer relay or the control of the same through the remotely positioned switches **43—46**.

In considering this invention it should be kept in mind that the present invention disclosure is intended to be illustrative only and I wish to be limited only by the appended claims.

I claim:

1. A remote control lighting circuit comprising, a transformer type ratchet relay including a pair of simultaneously operated switches and a primary and secondary winding, a first circuit connecting the primary winding to a source of power to continuously energize said relay, the secondary winding having a turns ratio with respect to said primary winding to provide a low voltage induced therein, a second circuit including a plurality of parallel connected momentary contact type switches connected to said secondary winding and adapted to short circuit the same, means included in said relay to sequentially operate the switches to a closed position and an open position with successive short circuiting of the secondary winding, one of said switches being adapted to connect a lighting load to the source of power, a second of said switches being adapted to connect an indicator light in the second named circuit in parallel with the plurality of momentary switches and to said secondary winding to energize said indicator light.

2. A remote control lighting circuit comprising, a transformer type ratchet relay including a pair of simultaneously operated switches and a primary and secondary winding thereon, a first circuit connecting the primary winding to a source of power to continuously energize said relay, a second circuit including a plurality of parallel connected momentary contact type switches connected to said secondary winding and adapted to short circuit the same, said relay means upon short circuit of said secondary winding being adapted to sequentially operate said simultaneously operated switches from a closed to an open position, and circuit means connecting one of switches to a lighting load and said source of power, said circuit means connecting another of said switches in said secondary circuit to an indicator light to provide energization of the indicator light from said secondary winding.

3. A remote control lighting circuit comprising, a transformer type ratchet relay including a pair of simultaneously operated switches and a primary and secondary winding thereon, a first circuit connecting the primary winding to a source of power to continuously energize said relay, a second circuit including a plurality of parallel connecting momentary contact type switches connected to said secondary winding and adapted to short circuit the same, said relay means upon short circuit of said secondary winding being adapted to sequentially operate said simultaneously operated switches from a closed to an open position, and circuit means connecting one of said switches to a lighting load and said source of power.

4. A remote control lighting system comprising, relay means, a ratchet type actuator including a plurality of ganged switches operated by said relay means and adapted to be simultaneously operated from an open to a closed position with sequential operations of said ratchet means and said relay means, a primary energizing coil for said relay means, a first circuit connecting said primary energizing coil to a source of power to continuously energize said relay means, a control winding for said relay means, a second circuit including a plurality of parallel connected momentary switches connected to said control winding, said momentary switches being adapted to short said control winding to operate said relay means, one of said switches of said ratchet means being adapted to connect a lighting load to the source of power and disconnect the load from the same with alternate steps of said ratchet means, a second ganged switched ratchet means being adapted to connect an indicator light to said momentary switches and said control winding.

5. A remote control circuit comprising a transformer relay including a movable element and a primary and secondary winding thereon, ratchet means adapted to be operated by said movable element of said relay, a plurality of switches operated by said ratchet means, one of said switches being adapted to connect a device to be operated by said relay, to a source of power, circuit means connecting the primary winding of said relay to said source of power to continuously energize said relay, a remote control circuit connected to said secondary winding and including a plurality of momentary operated shorting switches adapted to short circuit the secondary winding, a second of said switches of said ratchet means connected in said remote control circuit and adapted to connect an indicator light in parallel with said secondary winding.

6. A remote control circuit comprising a transformer relay including a movable element and a primary and secondary winding thereon, ratchet means adapted to be operated by said movable element of said relay, a plurality of switches operated by said ratchet means, one of said switches being adapted to connect a device to be operated by said relay, to a source of power, circuit means connecting the primary winding of said relay to said source of power to continuously energize said relay, a remote control circuit connected to said secondary winding and including a plurality of momentary operated shorting switches adapted to short circuit the secondary winding.

No references cited.