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[54] **POSITIVE NON-INTERFERING TRANSMITTER**

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[51] **Int. Cl.**.....**G08b 17/06,** G08b 25/00

[58] **Field of Search**.....340/415, 217, 295, 340/412, 150, 160

[56] **References Cited**

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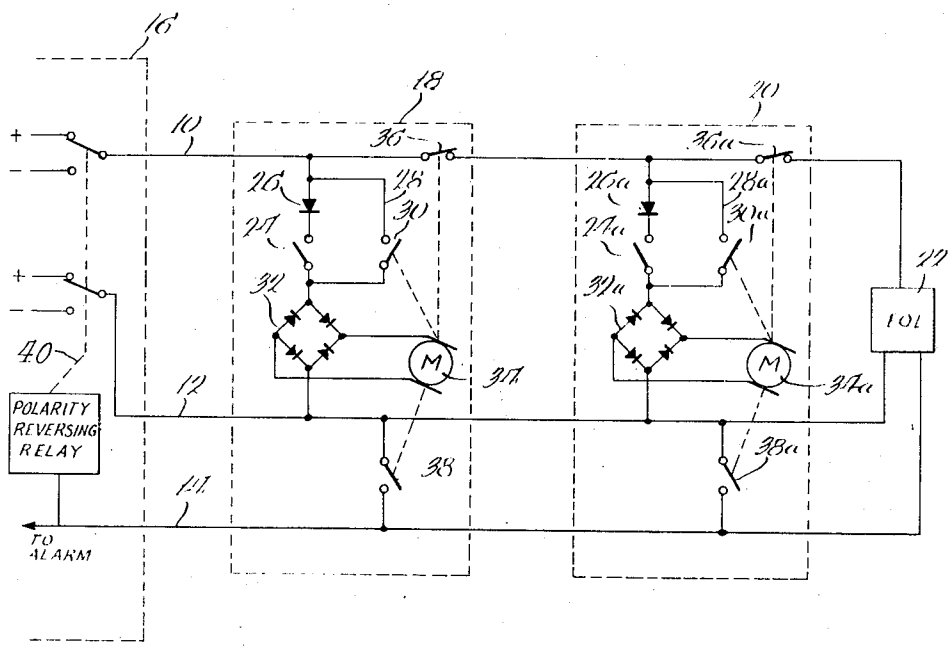
Primary Examiner—Donald J. Yusko

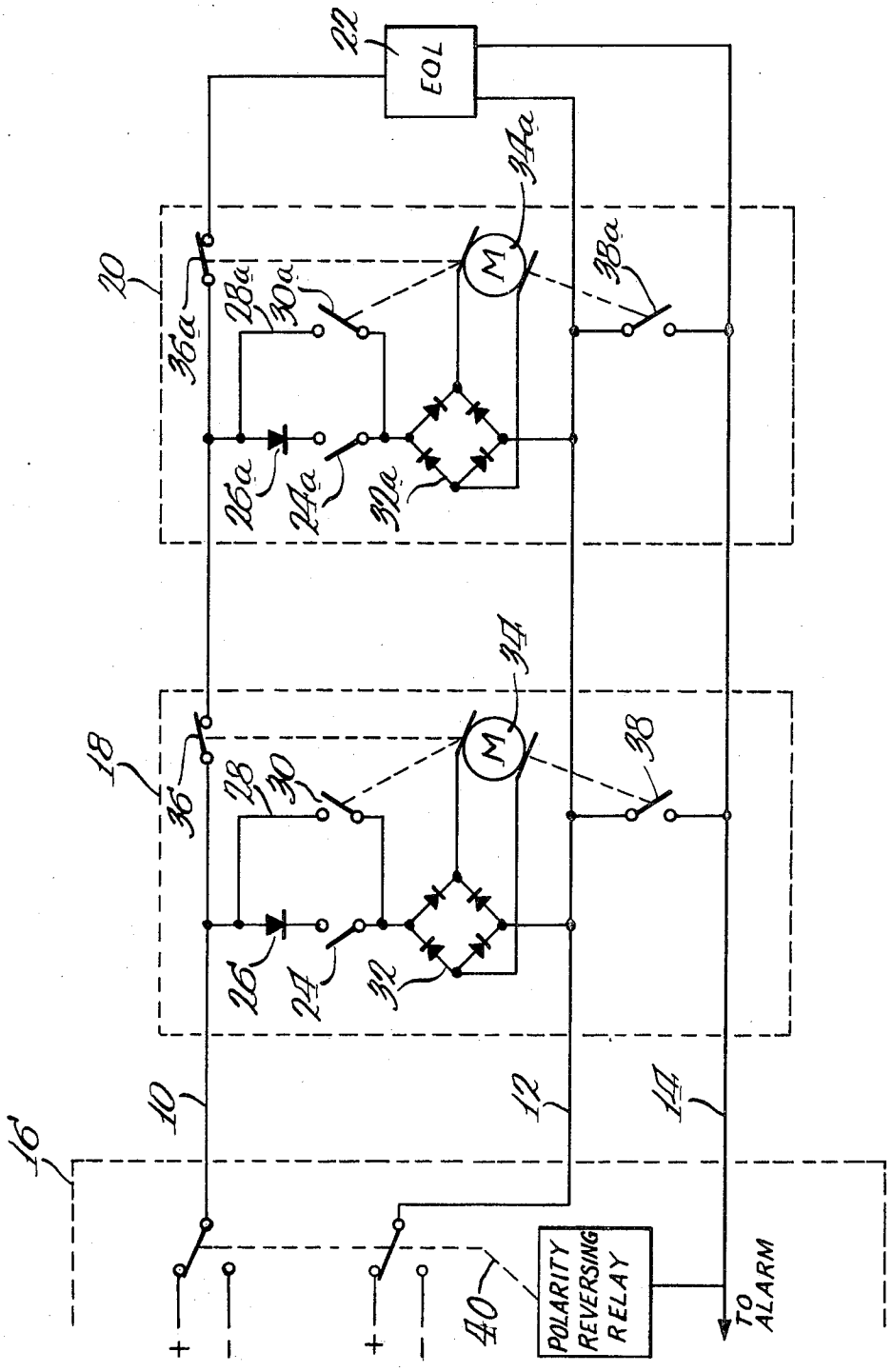
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[57] **ABSTRACT**

A plurality of transmitters utilizing common wiring are connected to a control unit having a power reversal relay. The transmitters each incorporate a diode and a rectifier protected motor that activates a coded signal on a separate signal line. Activation of any one of the transmitters causes a reversal of polarity and shunts the diode therein, thereby allowing operation of the one transmitter while power is blocked from the other transmitters until the complete signal has been transmitted.

8 Claims, 1 Drawing Figure




EOL
22
34a
M
20
36a
28a
30a
38a
26a
24a
32a
34
M
18
36
28
30
38
26
24
32
10
12
14
16
40
POLARITY REVERSING RELAY
TO ALARM
+
-
+
-

POSITIVE NON-INTERFERING TRANSMITTER

BACKGROUND OF THE INVENTION

This invention relates to a system of transmitters utilizing common wiring for power and for transmitting signals to a common receiver and more particularly to a system having means to positively prevent interference between transmitters.

Transmission systems for fire alarms or the like may include a plurality of separate stations utilizing common wiring and being connected to a common signal receiver. Transmitter stations utilized in fire alarm or similar circuits are normally designed to transmit individual identifying codes of each station. For this purpose, a code wheel is rotated for three or four revolutions, which in turn closes and opens a signal contact in a sequence unique to the station.

In connection with systems having a plurality of transmitting units utilizing common wiring, various types of circuits have been proposed to prevent interference because of simultaneaous or possible overlapping operation of two or more units. In a series non-interfering or shunt non-interfering circuit (SNI) having a central control and a plurality of transmitters, the operation of a first transmitter in the circuit will be interrupted by the activation of any other transmitter which is electrically closer to the control than the first transmitter. Since the failure to receive a signal in such systems may create a dangerous situation and defeat the essential purpose of the system, it is desirable to provide a non-interfering system in which the transmitters may be activated in any order and yet all signals will be received. Such systems are commonly described as positive non-interfering systems and include some means of effectively preventing interference between transmitters that utilize common wiring.

BRIEF SUMMARY OF THE INVENTION

The present invention provides for positive non-interferening operation with the addition of very few parts over that required for a basic SNI system. In accordance with the present invention, a blocking diode is incorporated into each transmitter such that reversal of polarity of the power source will prevent energization of any transmitter. The control unit includes a power reversal relay that reverses the polarity when any of the transmitters is activated, thereby cutting off power from the other transmitters. At the same time, a shunt around the diode of the first activated transmitter completes a reverse circuit, which powers a DC motor through a rectifier, and the motor operates the code wheel. After the appropriate coded message has been transmitted, the polarity is again reversed, thereby permitting sequential operation of any other transmitters ready for energization.

THE DRAWING

The FIGURE is a schematic of the circuit employed in the practice of the presently described invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The circuit of the drawing includes a power loop having a positive line **10** and a negative line **12**, as well as a separate signal line **14**, all being connected to a control

unit **16**. The signal line may be connected to any suitable receiver having some form of alarm. A plurality of transmitters, such as **18** and **20** are connected in parallel in the power loop. The power loop and the signal line **14** may be connected to a conventional end-of-line electronics **22**, the purpose of which is to supervise the circuit and detect breaks in or grounding of the wiring of the power loop and signal line.

It may be seen that the transmitters **18** and **20** are identical, and only the transmitter **18** will be described, with identical corresponding parts in the other transmitter being denoted by the suffix "*a*." Thus, each transmitter comprises starting contacts **24**, which are intended to be manually or automatically closed to initiate a signal. The contacts **24**, could, for example, comprise a manually operated switch on a fire alarm box and are of the type which will lock in a closed position until the signal has been completed or until manually reopened.

One side of the starting contacts **24** is connected to the positive line **10** through the cathode of a diode **26**, which renders the transmitter circuit unilaterally conductive from the positive side or line **10** to the negative side or line **12**. A shunt **28** having normally open contacts **30** is provided around the diode **26** to bipass the diode when said contacts are closed. The other side of the starting contacts **24** is connected through a rectifier **32** to the negative line **12**. The rectifier preferably comprises four diodes connected together in a box configuration and having diagonally opposite leads connected to a DC motor **34**, with the other leads of the box connected to the respective contacts **24** and negative line **12**. The diodes of the rectifier **32** are arranged to assure the same direction of current flow through the motor irrespective of direction of current flow through the transmitter. Thus, the motor is connected between two anodes on one side and two cathodes on the other side.

Normally closed series contacts **36** are associated with each transmitter **18** and **20** on the positive line **10**, and when closed, complete the circuit between the transmitters and the control unit **16**, which provides the required power for the circuit. A coding contact **38** associated with each transmitter is connected in parallel between the negative line **12** and the signal line **14**, the purpose of which is to complete the signal circuit under conditions as will be hereinafter fully explained.

The motor **34** of each transmitter is operative, upon energization, to rotate and to sequentially close the shunt contacts **30** and open the series contacts **36** and then to close the signal contacts **38**, and thereafter to close and open the signal contacts in a predetermined or coded sequence. The control unit **16** includes a power reversal relay **40** connected in the power loop, which serves to reverse the polarity of power through said loop upon receipt of a single signal pulse from any of the transmitters.

Having thus described the components of the circuit, the function thereof will now be described. Initially, none of the transmitters **18** or **20** has been started, and current flows around the loop from the positive line **10** to the negative line. Assuming first that the contact **24** is closed in transmitter **18**, unidirectional flow through diode **26** and through rectifier **32** will activate the motor **34**. The motor **34** will first open the normally closed series contacts **36** and then close the shunt con-

tacts **30**. Thus, power supply to any more remote transmitter, such as **20**, is interrupted by the series contacts **36**, and the diode **26** is shunted through the shunt **28**. Even though the starting contact **24***a* is closed in the other transmitter **20**, there will be no available power for operation.

Further rotation of the motor **34** causes the signal contacts **38** to momentarily close, thereby activating the relay **40** in the control unit and causing reversal of polarity. The motor **34** continues to rotate in the same direction, however, because of directed flow of current through the rectifier **32**. Also, irrespective of the series contact **36**, the other transmitter **20** or transmitters could not be activated because of the unidirectional conductivity thereof due to the diode **26***a*. Thus, the possibility of interfering signals is eliminated until the motor **34** has revolved sufficiently to cause transmission of its coded signal. Thereafter, further rotation of the motor **34** causes the series contacts **36** to again close, the shunt contacts **30** to open, and the signal contacts **38** to open, whereupon the relay **40** again reverses the polarity back to its initial condition after a predetermined time period of no signals being received at the control unit, enabling other transmitters to send coded messages. If the starting contacts of several transmitters have been closed, the circuit will cause the signals to be transmitted in a sequential order as determined by electrical distance from the control unit.

The purpose of the diodes and power reversal relay is best illustrated when considering the actuation of an intervening transmitter while another transmitter is in operation. Assuming that the starting contact **24***a* of the transmitter **20** is closed and is followed by closing of the contact **24** of an intervening transmitter **18**, there will be no interference from the transmitter **18** because of its unidirectional conductivity. In this case, it will be noted that opening of the series contact **36***a* will not isolate the intervening transmitter **18**. Reversal of polarity, however, will prevent the intervening transmitter **18** to be energized until the polarity is again reversed.

Although we have shown and described a preferred embodiment of the invention, it will be obvious to those skilled in the art that various modifications and changes may be made to the construction and design of the present circuit and the parts thereof without departing from the scope and spirit of the appended claims.

We claim:

1. In a transmission system having a control unit and a plurality of transmitters connected in parallel to a power loop from said control unit, the improvement wherein said transmitters are normally limited to unilateral conductivity in the same direction and each has starter means for actuation thereof, means in each transmitter for allowing reverse polarity operation thereof in response to actuation of said starter means, and means for reversing the polarity of said power loop responsive to actuation of any one of said transmitters.

2. The transmission system of claim **1** wherein a signal line is provided separate from said power loop, and normally open contacts in said signal line are associated with each transmitter, and means for closing said contacts in response to actuation of an associated transmitter.

3. A positive non-interfering transmitting circuit comprising a control unit, a power loop from said control unit, a plurality of diodes each arranged in parallel in said power loop, signal sending means associated with each of said diodes, normally open starter switch means between each diode and its associated signal sending means, normally open shunt means around each diode and its associated switch means, a polarity reversal relay associated with said control unit and operative to reverse polarity of said power loop upon closing of any of said starter switch means, and means for closing said shunt means in one transmitter in response to closing of associated starter switch means.

4. The circuit of claim **3** wherein said signal sending means comprises a signal line separate from said power loop, a DC motor connected between said starter contacts and said loop, and normally open signal contacts associated with each diode location between said power loop and said signal line, said motor being operative to open and close said signal contacts.

5. The circuit of claim **4** wherein rectifier means is associated with said motor for causing the flow of current through the motor to be unidirectional irrespective of polarity reversal in said power loop.

6. The circuit of claim **4** wherein normally closed series contacts in the power loop are associated with said motor so as to be opened thereby.

7. The circuit of claim **6** wherein said motor is operable to sequentially open said series contacts, close said shunt means and close said signal contacts.

8. A positive non-interfering transmitting circuit comprising a control unit, a power loop from said control unit, a separate signal line coextensive with a portion of said loop, a plurality of transmitters arranged in parallel between said loop, each station comprising a diode having its anode connected to the positive side of said loop, normally open signal contacts associated with each transmitter between said signal line and the negative side of said loop, normally open starter switch means on the cathode side of said diode, normally open shunt means around said diode and and said starter switch means, means between said starter switch means and the negative side of said loop for closing said shunt means and said signal contacts in response to closing of said starter switch means, and means for reversing the polarity of said power loop responsive to closing of said starter switch means.

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