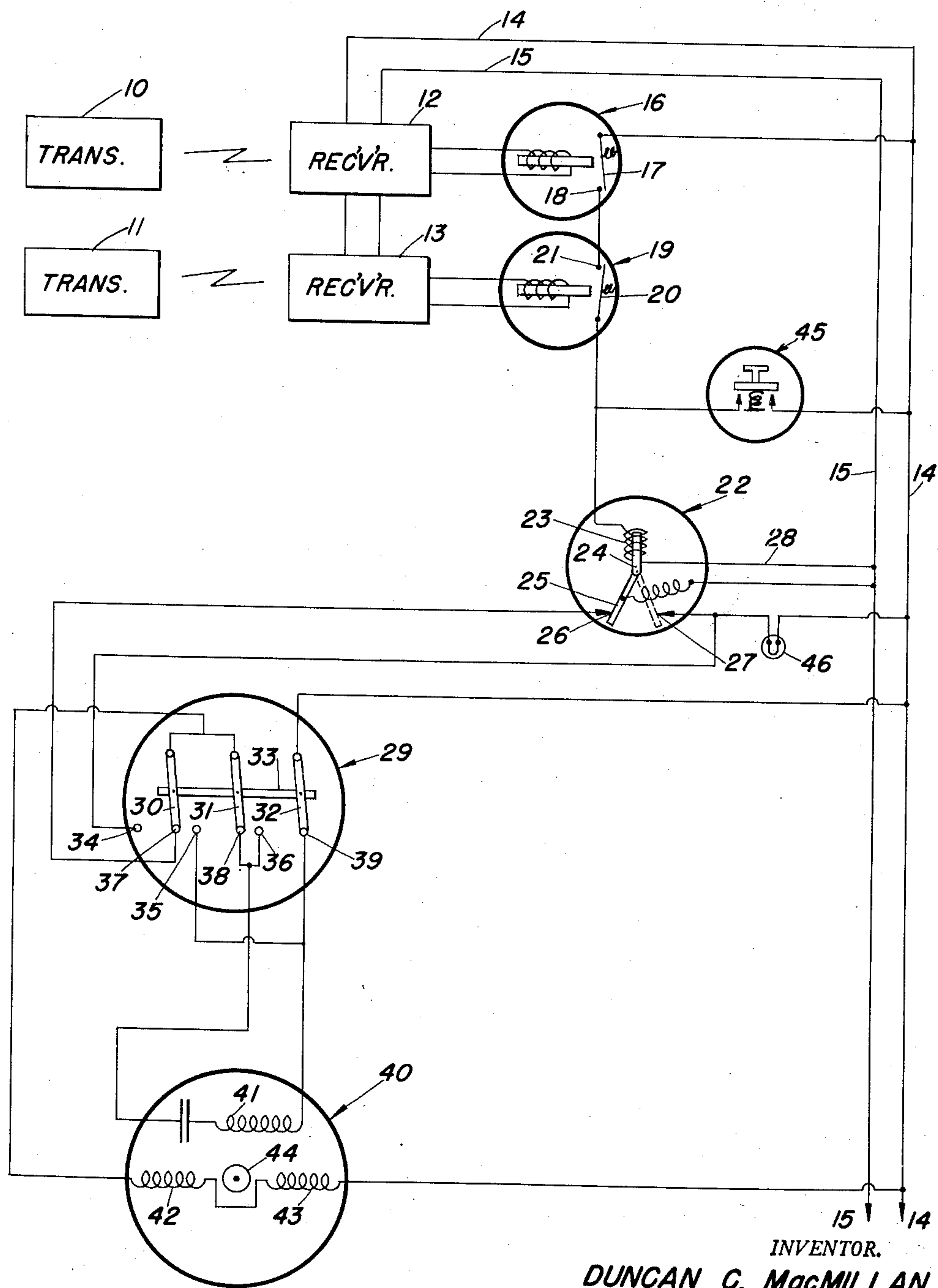


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AUTOMATIC DOOR OPERATOR

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AUTOMATIC DOOR OPERATOR

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This invention relates to a method, system and apparatus for automatically operating doors, and more particularly to an arrangement whereby the actuating mechanism will not be put into operation until a multiple of suitable predetermined signals or impulses have been received.

One of the applications of this invention is the opening and closing of garage doors, and one of its specific objects is the provision of means by which the driver of a vehicle may open and close garage doors without the necessity of leaving the vehicle.

Another object of this invention is to provide a system and apparatus which operates upon the simultaneous receipt of two or more signals of predetermined audio or radio frequencies and which will operate in response to no other signals than those for which it is adjusted.

It is the further object of this invention to provide a device which will, in conjunction with its door operating service, control other devices such as lights, signals, and the like.

Further objects and advantages of this invention, as well as its construction, arrangement and operation will be apparent from the following description and claims in connection with the accompanying drawings, in which

The single figure represents a combination block and schematic diagram of the apparatus and circuit connections.

Referring to the drawing, two transmitting devices 10 and 11, of any suitable type, are installed upon a vehicle and arranged to each emit a sound or radio signal or impulse of different frequencies to which receivers 12 and 13 are respectively responsive. Actuating current for receivers 12 and 13 may be provided by means of lines 14 and 15 connected to any suitable source of current.

When the proper impulse from transmitter 10 is received by receiver 12 the relay generally indicated as 16 will function to bring armature 17 into contact with stationary contact 18, while a signal simultaneously emitted by transmitter 11 and received by receiver 13 will cause the relay generally designated as 19 to bring its armature 20 into contact with stationary contact 21 and thus complete a series circuit from line 14 through relays 16 and 19 to the actuating coil 23 of the selector switch generally designated as 22.

Selector switch 22 may consist, as indicated in the drawing, of a solenoid coil 23 which operates an armature 24 in such manner that each movement of armature 24 causes contact blade 25 to be alternately thrown to and remain on

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either contact 26 or 27 until the next actuating impulse occurs.

Selector switch 22 may be constructed in any suitable manner to cause motion of the contact lever 25 as above required.

The series circuit from supply line 14 through impulse relays 16 and 19 and selector switch 22 is completed by means of lead 28 to return supply line 15.

A control and reversing switch generally designated as 29 consists of three switch levers designated 30, 31 and 32 bound together by strip 33 for simultaneous operation either to the right or to the left to contact switch points 34, 35 and 36 in one direction, and to contact the points 37, 38 and 39 when moved in the opposite direction.

Control and reversing switch 29 may be mechanically operated at the extreme of travel of the door operating mechanism when set in motion by the driving motor generally indicated at 40 and consisting of the usual field coils 41, 42, and 43, and armature 44.

It will be readily understood that when the door operating mechanism is set in motion by means of driving motor 40 with the switch levers 30, 31 and 32 of reversing switch 29 in contact with switch points 34, 35 and 36 the direction of rotation of motor armature 44 will be such as to, for example, open the doors, and when they are fully opened switch levers 30, 31 and 32 will be automatically moved into contact with switch points 37, 38 and 39 thus automatically opening the circuit, stopping the rotation of armature 44 and reversing the connections to field coil 41 in such manner that when the next combination of impulses are received by receivers 12 and 13 switch lever 25 of selector switch 22 will be thrown into contact with stationary contact 27 and the rotation of the armature of driving motor 40 will be in the opposite direction.

In lieu of receivers 12 and 13 and relays 16 and 19 a hand switch or push button generally designated as 45 may be used for manual operation to close the circuit through the selector switch 22 and thus put the driving motor 40, of the door operator mechanism, into operation.

When selector switch 22 is actuated so that its armature switch blade 25 is in contact with switch point 27 a signal may be given or illumination provided by means of lamp 46. This should therefore be the proper position of armature 25 while the garage doors remain open, although it is obvious that this condition may be reversed

at will by properly coordinating switches 22 and 29 with driving motor 40.

The impulses emitted by transmitters 10 and 11 may be of different radio frequencies, or they may be audio or supersonic frequencies generated by suitable equipment such as, for example, radio transmitters, horns of different pitch, or any other suitable arrangement provided receivers 12 and 13 are of such nature and adjusted to respond to the signals emitted by the transmitters.

It will be understood that any desired number of push buttons 45 may be suitably located for manual control of driving motor 40, and that any number of lamps 46, or signal devices, may be utilized as desired.

The arrangement as above described, utilizing a combination of signals of different frequencies, will add considerably to the security against unauthorized operation of driving motor 40 and the mechanism to which it may be connected, and that unless the particular type and combination of signals for which the receivers are adjusted are received there will be no operation of the driving motor. If only one of the necessary signals were received only one of the relays 16 or 20 would be actuated and, being connected in series with the energy source, no energy would flow to the selector switch 22.

It will be readily seen that while driving motor 40 is in operation it may be stopped at any time prior to completing its operating cycle merely by transmitting a second combination of signals to receivers 12 and 13 or by manual operation of push button 45. In this event selector switch lever 25 will be thrown from its then operating contact to the opposite contact whose circuit through reversing switch 29 will be open. In this manner the operation of garage or other doors, to whose operating mechanism driving motor 40 is attached, may be stopped in the event of obstructions or other momentary interference and restarted in similar manner after the obstruction has been removed.

It will also be readily understood that any desirable number of different signal frequencies may be utilized provided a corresponding number of receivers with their respective relays are also provided.

Operation of transmitters 10 and 11 may be effected by means of a push button located on the dashboard or in any other convenient position in a vehicle.

It will be understood that various modifications and changes may be made in this invention without departing from the spirit and scope thereof as set forth in the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. In an electrical control system for a closure member, a source of electric current, a two-position selector switch connected to said source, a

two-position reversing switch, an operating motor adapted to be connected to the closure to open and close the same and connected for energization through said reversing switch to be driven in either direction depending upon the current polarity applied thereto by said reversing switch, circuit means connecting said selector switch with said reversing switch whereby said motor is energized only upon predetermined coincidence in the position of said switches, one of said switches being adapted to be actuated by the closure as it reaches its open and closed positions, respectively, and means for actuating the other of said switches.

2. In an electrical control system for a closure member, a source of electric current, a two-position selector switch having a pair of terminals and a member movable to selectively contact one or the other of said terminals, circuit means connecting said movable member to one side of said source, a two-position reversing switch, an operating motor adapted to be connected to the closure to open and close the same and connected for energization through said reversing switch to be driven in either direction depending upon the current polarity applied thereto by said reversing switch, and conductors connecting, respectively, said terminals of said selector switch with said reversing switch, whereby said motor is energized only upon predetermined coincidence in the positions of said switches, one of said switches being adapted to be actuated by the closure as it reaches its open and closed positions, respectively, and means for actuating the other of said switches.

3. Apparatus according to claim 1 wherein said switch-actuating means comprises a radiant energy receiver having its output connected to said other switch.

4. Apparatus according to claim 1 wherein said switch-actuating means comprises a pair of radiant energy receiving means having their output connected to said other switch and tuned to different carrier frequencies to produce an electrical output only upon simultaneous reception of proper frequencies by said receiving means.

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