Aug. 26, 1941. A. P. BLOXSOM 2,253,840

CONTROL CIRCUIT

Filed Aug. 12, 1939 2 Sheets-Sheet 1

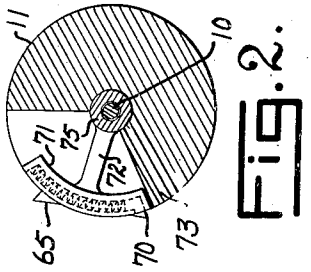


Fig. 2.

Fig. 1.

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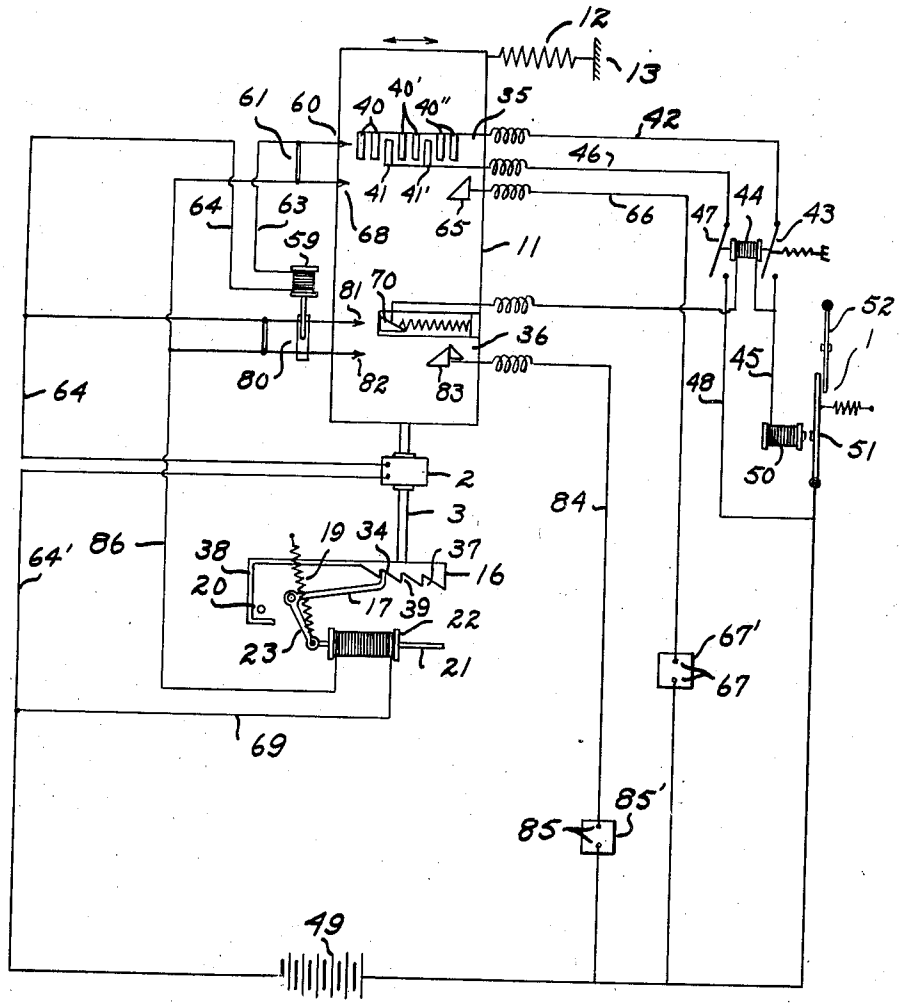


Fig. 3.

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Patented Aug. 26, 1941 2,253,840

UNITED STATES PATENT OFFICE

2,253,840

CONTROL CIRCUIT

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Application August 12, 1939, Serial No. 289,765

2 Claims. (Cl. 177—353)

The invention relates to a selective control system and particularly to a system for selectively controlling equipment from a point remote therefrom.

The invention broadly relates to a system for selectively controlling equipment generally but is of particular utility in conection with the recorder and reproducer constituting the subject matter of the invention disclosed in my Patent 2,154,722.

An object of the invention is to provide a device which may be utilized to selectively close electrical circuits at a point remote from that whence the control operation is initiated.

Another object is to provide a selective circuit control system whereby the desired functioning of apparatus may be controlled by the use of a single control line.

It is also an object to provide a device of the class described which is automatically restored to initial or normal condition upon completion of a predetermined sequence of events in the circuit which is selectively closed thereby.

These and other objects will be apparent from the following description taken in connection with the drawings in which:

Fig. 1 is a schematic circuit diagram of an embodiment of the invention including elements of the construction shown in perspective to more clearly illustrate the construction and mode of operation of the system; and

Fig. 2 is a sectional view taken on line 2—2 in Fig. 1.

Fig. 3 is a diagrammatic across-the-line diagram illustrating the wiring of one embodiment of the invention.

The present invention is described as operable thru the use of incoming ringing signals over a telephone line. It is to be understood however that the invention is not confined to such use specifically but is of utility in any instance where the selective control of apparatus is to be effected thru the use of control impulses transmitted at regular intervals over a line from the point of control to the controlled mechanism remote therefrom.

Referring to the invention as controlled by ringing signals as used in telephony, the general embodiment of the invention comprises a line ringer 1 of conventional construction connected to control the operation of a motor 2 having output shaft 3 provided with a pinion 4 fixed thereon.

A shaft 10 has mounted thereon a cylinder 11, such shaft and cylinder being driven by the motor 2 thru the pinion 4 and a gear 5 mounted on the shaft. In this manner the cylinder 11 is rotated against the torsional force exerted by a spring 12 surrounding the distal end of the shaft 10 and having its opposite ends attached to the cylinder and a fixed anchor member 13.

An eccentric ratchet 16 is mounted upon the shaft 10 and is engageable by a bell crank lever 17 pivoted at 18 and having attached thereto a spring 19 which may assume a position at either side of the pivot 18. The spring 19 therefore urges the lever 17 to a terminal position which is determined by the stop pin 20 or the plunger 21 of solenoid 22 attached to the lower arm 23 of the bell crank lever 17. The uppermost position of the bell crank lever 17 is shown in dotted outline at 17'.

The cylinder 11 has spaced series of contacts generally designated as 35 and 36. Series 35 comprises contacts 40, 40', 40'', 41, and 41'. The contacts 40, 40' and 40'' of this series are connected by means of wire 42, the upper blade 43 of electromagnet switch 44 and wire 45 to the coil 50 of the circuit closing mechanism at the ringer 1. The coil 50, once energized, serves to maintain this circuit closed during a ringing interval. The contacts 41 and 41' are connected by means of wire 46, the lower blade 47 of the switch 44 and the conductor 48 to one terminal of the battery 49 which is also connected to the switch arm 51, engageable by the clapper 52 of the ringer 1.

The group of contacts to which reference has just been made are engageable with the wiping contact terminal 60 on arm 61 which is urged toward the cylinder 11 by means of the spring 62. The wiping contact 60 is in turn connected thru the conductor 63 to retarded relay 59 and thence through conductor 64 to motor 2 of which the other terminal is connected to the battery 49 thru lead 64'.

The series of contacts referred to as 35 also includes a wedge shaped contact 65 which is connected thru conductor 66 to one of the terminals 67 of a circuit to be closed by the device, which circuit is comparable to the recording circuit in my above mentioned patent and which is referred to generally as 67' in Fig. 3 of the drawings. Such closure takes place after the cylinder 11 has rotated thru a sufficient angle that a wiping terminal 68 on the arm 61 engages the contact 65. It should be noted that by virtue of the configuration of the contact 65 the arm 61 is lifted as the terminal 68 rides upon this contact and in this manner the circuit thru the wiping contact

60 and hence thru the motor 2 is opened, whereby the operation of the motor is terminated.

During rotation of the cylinder 11 as above described, the eccentric ratchet 16 moves the bell crank lever 17 so that the spring 19 crosses the pivot 18 and holds the lever with the upper arm hereof in engagement with the pin 20. Hence, upon deenergization of the motor 2 the spring 12 tends to return the cylinder to initial position. Such action is prevented since energy in the circuit just closed flows through a conductor 69 to solenoid 22 which pulls the bell crank lever 17 downwardly so that the notch 37 in the eccentric disc is engaged by the bell crank lever 17 and the shaft 10 is restrained from rotation so long as the solenoid 22 is energized.

It should also be noted that the eccentricity of the ratchet disc 16 is such that when wiping contact 68 engages wedge contact 65, the spring 19 tends to pull the bell crank lever 17 upwardly to permit the cylinder 11 to return to initial position. Hence, upon completion of the sequence of events in the closed circuit and opening of that circuit, the solenoid 22 will be deenergized, the bell crank lever will be lifted by the spring 19 from engagement with notch 37 in the eccentric ratchet disc 16 and the spring 12 will then return the mechanism to initial condition.

The clockwise movement of the ratchet disc 16, as the mechanism returns to the condition shown in Fig. 1, will cause the arm 38 on this disc to engage the upper arm of the bell crank lever, as indicated in dotted outline, and move the lever downwardly so that the notch 39 of the ratchet disc will be engaged whereby the clockwise movement of the cylinder 11 under the influence of spring 12 is terminated.

The contact series 36 includes a movable contact 70 slidably fitting within the channeled segment 71 mounted upon the arm 72 (Fig. 2) within the slot 73 in the cylinder 11. The arm 72 is mounted upon a tubular shaft 75 surrounding the shaft 10 and extending axially of the cylinder 11.

The shaft 75 terminates in arm 76 at the end of the cylinder 11 and such arm may be moved angularly of the end of the cylinder 11 whereby the position of the contact 70 is determined. This arm may be fixed in any desired position by means of the manually operable latch pin 77 which is engageable with any of the openings 78 in the end of the cylinder 11. In this manner the movable contact 70 may be positioned peripherally of the cylinder 11, as desired, to serve a purpose that will be more fully apparent from the summary of the mode of operation of the device of the invention.

The arm 80 is lifted when the relay 59 is fully energized but, when the actuating impulses of the ringer 1 are produced in a predetermined manner, the solenoid will not be energized and the wiping contact 81 on the arm 80 will engage movable contact 70 to close the circuit from the battery 49 to the motor 2 thence by way of conductor 64 to contacts 81 and 70 to and through solenoid 44 and conductor 45 to the other terminal of the battery so that the cylinder 11 will be driven as indicated by the arrow 25. This operation will continue until the wiping contact 82 on the arm 80 engages wedge shaped contact 83 whereupon the arm 80 will be lifted and motor 2 will be deenergized.

The engagement of contacts 82 and 83 closes a circuit through conductor 84 to one of the terminals 85 of a second circuit to be closed. This circuit includes the conductor 69, solenoid 22 and wire 86 connected to wiping contact 82.

In explaining the operation of the invention it will first be assumed that it is desired to close a circuit across terminals 67. An incoming ringing signal vibrates the clapper 52 which moves the switch arm 51 to the left to close a circuit through the motor 2 and through the relay 59. This circuit includes the coil 50, conductor 45, switch arm 43, conductor 42, contact 40, wiping terminal 60, conductor 63, relay 59, conductor 64, motor 2 and conductor 64' to the other side of the battery 49. Energization of the relay 59 causes the arm 80 to be lifted and the drum 11 is driven by the motor 2 in the direction indicated by the arrow 25. The ringing signal continues during travel of the two contacts 40 beneath wiping contact 60. During the following silent period of the ringer 1, the wiping contact 60 engages contact 41 which is connected directly to the battery 49 through the conductors 46 and 48. This sequence of circuit closures continues as contacts 40', 41' and 40'' make engagement with wiping contact 60 until wedge contact 65 is engaged to effect closure of a circuit across terminals 67. During the period of rotation of the drum 11 the relay 59 holds the arm 80 outwardly and hence the circuit 85 cannot close but may be closed in the manner hereafter described.

As already explained, the cylinder 11 is then held, against the force exerted by the spring 12, by the engagement of bell crank lever 17 with notch 37 of ratchet disc 16 when solenoid 22 is energized, and all parts of the device remain static as the solenoid is energized during the sequence of operations in the closed circuit is completed. Since the solenoid 22 is connected to the circuit 67' which is closed, it is to be understood that such circuit includes a source of energy for the solenoid and that such circuit is opened and the solenoid 22 is deenergized when the desired sequence of events in the circuit is completed. The cylinder 11 is then returned to initial position under the influence of the spring 12.

It is apparent that as many contacts as desired may be provided on the cylinder 11 so that any number of series of impulses to the ringer 1 will effect closure of the circuit across terminals 67. That is, any desired number of contacts may be provided so that a desired and predetermined number of ringing impulses will take place before closure of the contacts 65 and 68.

It will now be assumed that the circuit 85' having across terminals 85 is to be closed. In such event the arm 76 is set so that a given number of ringing intervals or silent periods of the ringer 1 will bring the wiping contact 81 to a position for engagement with the movable contact 70. In the illustration a single ringing interval will accomplish this condition although it is apparent from the enclosed construction that adjustment may be made so that a plurality of ringing intervals will accomplish this purpose. Hence, ringing is terminated at the end of this ringing interval by the caller who desires to selectively close the circuit across the terminals 85. Such termination of ringing is effected by the calling party returning his receiver to its normal position upon its support. If the telephone instrument is part of a conventional automatic circuit the disconnect is automatic whereas the action of an intervening operator will be instrumental in effecting such disconnect in a manual

system. The bell crank lever 17 then engages notch 34 on the ratchet disc 16 under the influence of spring 19 since the bell crank lever is not moved sufficiently to move the line of force of the spring from below the pivot 18.

Thereafter ringing is again initiated from the remote point and initial current through conductor 45, switch operating magnet 44 contacts 70 and 81, wire 64 and the motor 2 will open the switch 43, 47 and the motor will be operated by virtue of current passing through contacts 70 and 81 and the associated circuit connections from the battery 49. This ringing may continue indefinitely but will effect desired closure of the circuit 85' when a predetermined number of impulses have taken place. When, however, the circuit 85' constitutes the transmitting or repeating circuit of my Patent No. 2,154,722, obviously ringing will be discontinued as soon as the desired closure of the circuit 85' is effected.

The mechanism will continue to operate until contact 82 rides upon wedge contact 83 when, as already explained, the circuit across terminals 85 will be closed. Engagement of the bell crank lever 17 with the notch 37 in the ratchet disc 16 will maintain the circuit closed until completion of the sequence of operations in the selectively closed circuit whereupon the solenoid 22 will be deenergized and the mechanism will be returned to initial condition ready for subsequent selective operation. It is to be noted that contacts 65 and 83 are spaced angularly upon the cylinder 11 and hence the contacts 65 and 68 are not in engagement when a circuit is closed through contacts 82 and 83 and vice versa.

Broadly the invention comprehends a mechanism for selectively controlling a plurality of mechanisms by signals from a point remote therefrom.

I claim:

1. A selector device for closing a first or a second of two work circuits in response respectively to a first or second series of impulses, comprising an impulse responsive circuit closing device, an electric motor, a drum biased to a normal position and driven by said motor against its bias, a series of circumferentially spaced contacts on the drum and a stationary contact cooperating therewith, certain of said drum contacts closing the motor circuit directly and certain others, including the contact at the normal position, closing the motor circuit through the impulse responsive circuit closing device, means whereby the drum closes the first of said circuits after a predetermined travel thereof in response to the first series of impulses which contains an impulse corresponding to each of the contacts closing the motor circuit through the impulse responsive contact device, additional contacts on the drum circumferentially spaced and an additional stationary contact cooperating therewith, means included in the motor circuit closed through any one of the said series of contacts for preventing the engagement of the additional stationary contact with its cooperating contacts whereby said stationary contact will be permitted to engage said additional contacts when no impulse is received when the cylinder is in a position wherein the first stationary contact engages the said certain other of said contacts of the series, a motor circuit closed through said second stationary contact, one of the additional contacts and the impulse responsive circuit closing means, means in said last circuit for rendering ineffective the said series of contacts and means for closing the second circuit including the second stationary contact and a second one of the additional contacts.

2. A structure as in the preceding claim and including means for retaining the drum in circuit selecting position against its bias until the work circuits are opened at another point.

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