April 22, 1930. F. FAVARGER 1,755,212

ELECTRICAL SELECTING CIRCUITS

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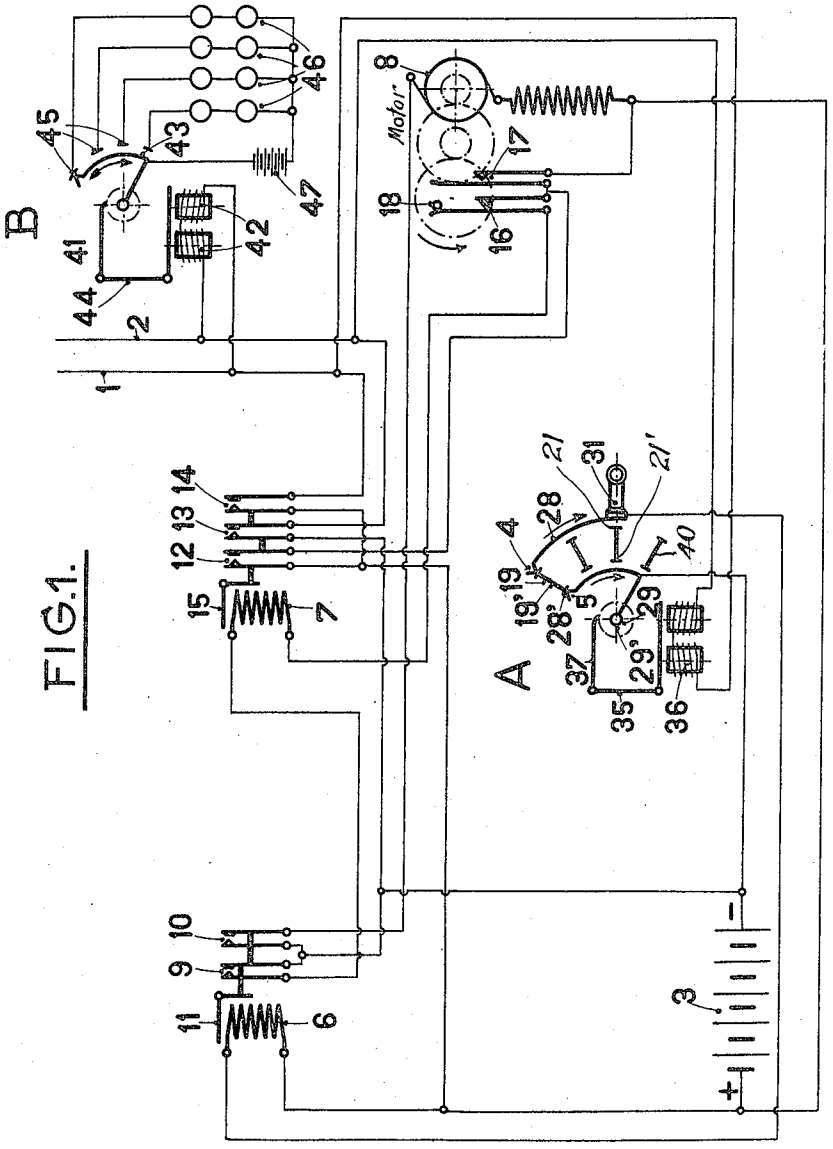


FIG.1.

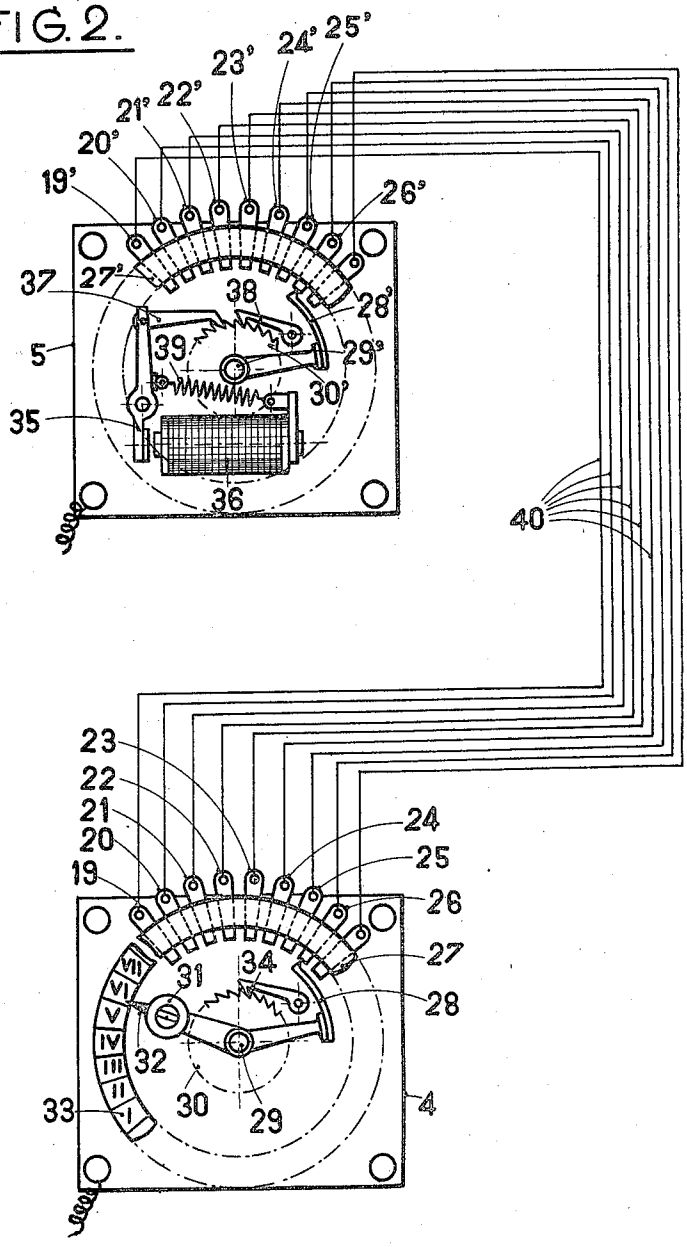
Inventor
François Favarger
By
Parmelee, Davis, Martin & Edmonds
Attorneys

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FIG. 2.



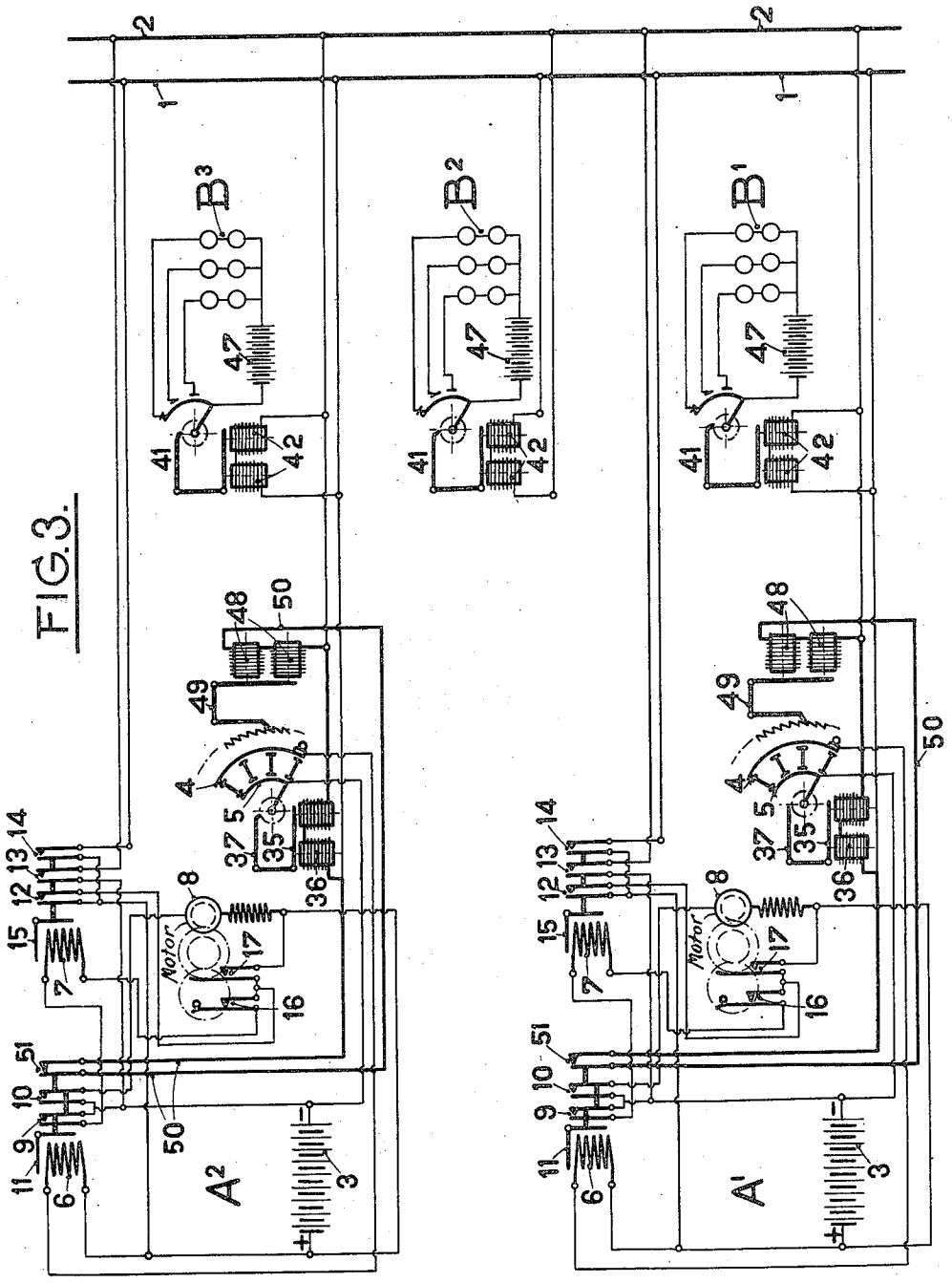
Inventor
Francis Favarger
By
Pennie, Davis, Marvin & Edmonds
Attorneys

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FIG.3.



Inventor
François Favarger
By
Pennie, Davis, Marvin & Edmonds
Attorneys

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UNITED STATES PATENT OFFICE

FRANÇOIS FAVARGER, OF NEUCHATEL, SWITZERLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE TELEREGISTER CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

ELECTRICAL SELECTING CIRCUITS

Application filed January 21, 1926, Serial No. 82,884, and in Switzerland January 24, 1925.

The invention relates to an electric installation for the distant control by means of selector switches of receiving apparatus such as selectors, counters or indicating apparatus as, for example, apparatus indicating the course of the exchanges.

The installation forming the subject of the invention affords important advantages in relation to other known installations of the same kind, such as is disclosed in British Patent No. 192,055 of 1924. The objects of this invention include the provision of apparatus of the above indicated class which will be adaptable with a wide degree of flexibility to various operating conditions and which will be rapid, accurate and dependable in operation.

The accompanying drawings show by way of example two embodiments of the subject of the present invention.

Fig. 1 shows diagrammatically an installation comprising a single transmitting station connected to a single receiving station.

Fig. 2 shows the selector switches of a transmitting station, and

Fig. 3 is a diagram of an installation having two transmitting stations and three receiving stations.

The first embodiment, Figs. 1 and 2, comprises a transmitting station A and a receiving station B, connected together by two line wires 1, 2, fed by a source of current (battery of accumulators) 3. The transmitting station A comprises two selector switches 4, 5, electrically coupled to one another, two relays 6, 7, an electric motor 8, two contacts 9 and 10 actuated by the armature 11 of the relay 6, three associated contacts 12, 13, 14, actuated by the armature 15 of the relay 7, a switch 16 and a contact 17 actuated alternately by a pin 18 on a wheel driven by the motor 8.

The selector switches 4 and 5, Fig. 2, may be of any suitable construction, the body of one being electrically insulated from the body of the other. Each selector switch may comprise a certain number of contacts 19, 20, 21, 22, 23, 24, 25, 26, or 19′, 20′, 21′, 22′, 23′, 24′, 25′, 26′, mounted on a ring 27 or 27′ of insulating material. The contacts of each switch are insulated from one another and are disposed identically on the two switches. Each switch has a contact brush 28 or 28′ keyed on a spindle 29 or 29′ on which is fixed a ratchet wheel 30 or 30′.

The contact brush of each selector switch may turn within the series of contacts and may be brought into contact with any one of the same.

The brush 28 of the selector switch 4 may be operated by means of a crank 31 having a pointer 32 cooperating with a dial 33. 34 is the detent of the ratchet wheel 30.

The brush 28′ of the selector switch 5 is controlled electrically by the armature 35 of an electro-magnet 36 through the medium of an impulse pawl actuating the ratchet wheel 30′. 38 indicates the detent of the ratchet wheel 30′; 39 is the recoil spring of the armature 35.

Each contact 19, 20, 21, 22, 23, 24, 25, 26, of the selector 4 is electrically connected with the corresponding contacts 19′, 20′, 21′, 22′, 23′, 24′, 25′, 26′ of the selector 5 by means of wires 40.

In the diagram illustrated in Fig. 1, the selector switches 4 and 5 are shown mounted back to back. The same figure shows moreover how the electrical connections of the brushes 28, 28′, and of the electromagnet 36 are effected.

The receiving station B comprises a selector 41 electrically controlled by an identical means to that controlling the selector switch 5. The electro-magnet 42 of the selector 41 is connected to the line wires 1, 2. The brush 43 is controlled by the armature 44 of the electro-magnet 42 and may contact with any one of the contacts 45 to close the circuit of any desired one of the electro-magnets 46 which may be operated by a local battery 47 at the receiving station. It is apparent that numerous receiving stations similar to that indicated at B may be connected to the same line wires 1 and 2.

The operation of the arrangement illustrated is as follows.

Assuming that the brushes 28, 28′ of the selector switches 4 and 5 are in engagement with contacts 19, 19′ then these brushes will

be interconnected by one of the wires 40 and a circuit will be established from battery 3, positive pole, through the magnet winding of relay 6, brush 28, contact 19, wire 40, contact 19′, brush 28′, to the negative pole of the battery. Relay 6 is thus normally energized and maintains its contacts 9 and 10 normally open.

If the operator moves the crank handle 31 so as to displace the brush 28, this circuit of relay 6 will thereupon be interrupted and the relay will "drop out" thus closing the circuits of contacts 9 and 10. It will be observed that the closing of the contacts 10 serves to connect the battery to start the motor 8. The motor through suitable gearings as indicated causes a switch operating pin 18 to be rotated so as alternately open the circuit of contacts 16 and close the circuit of contacts 17. The closing of contacts 17 completes a circuit from the battery through contacts 9, the winding of the auxiliary relay 7, contacts 16 and contacts 17 to the battery return connection. Relay 7 thus energized, closes circuits through its contacts 12, 13 and 14. The closing of contacts 12 completes a "stick circuit" for the relay 7 running from the battery through contacts 12 and 16, coil of relay 7, and back to the battery through contacts 9, this circuit being closed as soon as the rotating pin member 18 closes the contacts 17. This "stick circuit" remains closed until the pin member 18 opens the circuit by separating the contacts 16. Accordingly during that part of the revolution of the member 18, between the time that it closes contacts 17 and opens contacts 16, the relay 7 will remain "picked up". Hence, the contacts at 13 and 14 during this interval will remain closed, which contacts respectively serve to connect the battery to the line wires 1 and 2. Therefore, during this interval an impulse will be transmitted over the line. During the time between the opening of the contacts 16 by the rotatable pin member 18 and the time that the contacts 17 are again closed, the relay 7 will remain deenergized. Therefore, upon continued rotation of the member 18 a series of spaced impulses may be imparted to the line 1—2. If the contacts 16 and 17 are operated when the rotatable pin 18 is at diametrically opposite positions, then the impulses imparted to the line 1—2 will be of equal durations and also spaced apart by intervals of the same duration, and the length of the impulses in respect to the duration of the interruptions may be determined or varied by the relative positions of the contacts 16 and 17.

These line impulses will serve to energize the electromagnets as at 42 of any selectors connected to the line, and also electromagnet 36 of the selector switch 5. The selector brushes as at 43 and also the selector switch brush 28′ will thus be moved step by step into successive engagement with their respective contacts.

Assuming that the operator has moved the crank handle 31 to bring the brush of selector switch 4 into engagement with contact 26, then after a sufficient number of impulses have been imparted to the magnet 36 to step the brush 28′ into engagement with contact 26′, the holding circuit of relay 6 will be reestablished through one of the wires 40. The contacts 9 being separated again at this moment, the relay 7 will be deenergized, thus preventing the transmission of any further impulses and the stepping magnets as at 36 and 42 will cease to be impulsively energized. Thus a number of impulses will be transmitted corresponding to the extent of movement which has been imparted to the crank handle 31. That is, if the brush 28 has been moved from contact 19 to contact 26, a total of 7 impulses will be transmitted during the time that the stepping magnet 36 advances the brush 28′ over the corresponding 7 contacts on the selector switch 5. The apparatus will then be at rest ready for the transmission of the next selective group of impulses.

The transmission of impulses may be alternatively controlled from any one of several transmitting stations according to an embodiment of the invention shown in Fig. 3, comprising two transmitting stations, A^1 and A^2, and three receiving stations, B^1, B^2 and B^3. These latter are of the same type as the apparatus B described with reference to Fig. 1. The same remark applies, with the exception of some details of construction, to the transmitting stations A^1 and A^2. Each of these stations, like the station A, described with reference to Fig. 1, comprise two associated selector switches 4 and 5, a motor 8 actuating a switch 16 and a contact 17, a battery 3, two relays 6 and 7 and the associated contacts 9, 10 or 12, 13, 14, controlled by these relays.

Furthermore, in this embodiment the manually controlled selector switch 4 of each transmitting station may also be equipped with electric controlling mechanism, as shown in Fig. 3, similar to that which actuates the selector switch 5. This mechanism comprises thus an electro-magnet 48, the armature 49 of which controls the contact brush 28 of the selector switch 4. The exciting circuit 50 of the electro-magnet 48 is opened and closed by means of a contact 51 associated with the contacts 9 and 10 and actuated by the relay 6. The contact 51 is closed when the relay 6 is excited; it is opened as soon as this relay is no longer traversed by a stop current, which occurs each time the manual control of the selector switch 4 of the transmitting station, to which the relay belongs, is operated.

The contact 51 has for its object to inter-

rupt the exciting circuit of the electro-magnet 48 of the transmitting station, serving for control, that is to say, when the selector switch 4 is controlled by hand, in such manner that the electric controlling mechanism of this selector switch may be put out of action during operation, so that the latter will not advance in relation to the other selectors of the installation.

As a result the positions of all the selectors and selector switches of the installation will again be in perfect correspondence after each displacement which the operator communicates to the manually controlled selector switch of a transmitting station, assuming that any transmitting station which is not served with manual control functions as a receiving station.

While the invention has been described in detail with respect to certain particular preferred examples which give satisfactory results, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made wthout departing from the spirit and scope of the invention, and it is intended therefore in the appended claim to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent of the United States is:—

In an impulse transmitting arrangement for the distant control of indicators associated with a line circuit, a plurality of similar impulse transmitting devices, each comprising, a multiposition selector switch manually movable to different positions, a second movable multiposition selector switch, means whereby the second selector switch is moved from position to position in response to impulses applied to the line circuit, means whereby the first selector switch is additionally moved from position to position in response to impulses applied to the line circuit, a relay having a circuit controlled by the relative positions of said two selector switches, means including a second relay controlled by the operation of the first relay when the selector switches are moved out of coincidence for applying a number of impulses to the line circuit proportional to the amount of relative movement of the selector switches, whereby when any one of the manually operated selector switches is moved relatively to the second selector switches, the first and second relays cooperate to supply the line circuit with a number of impulses proportional to the amount of movement and thereby also cause the operation of the impulse responsive moving means of each first and second selector switches, and means controlled by the first relay of a selector switch which is at the time controlling the supply of impulses to the line circuit to disassociate its associated additional impulse responsive moving means from the line circuit during the operation of such relay.

In testimony whereof I have signed my name to this specification.

FRANCOIS FAVARGER.