

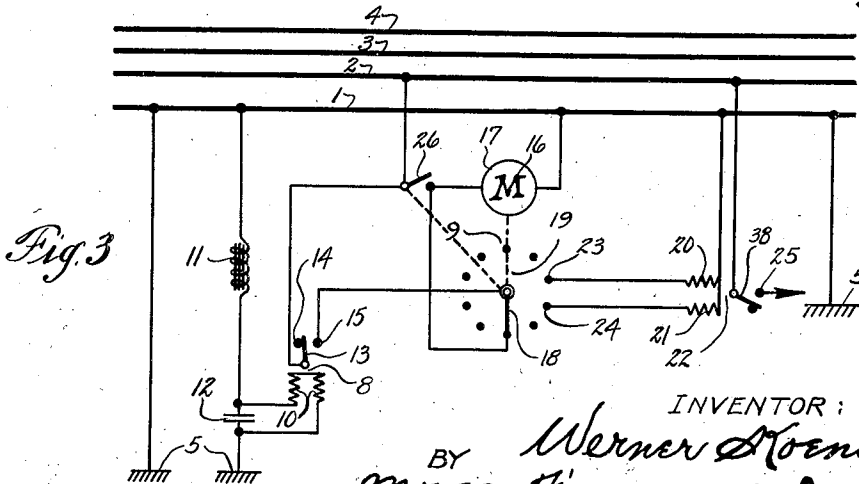
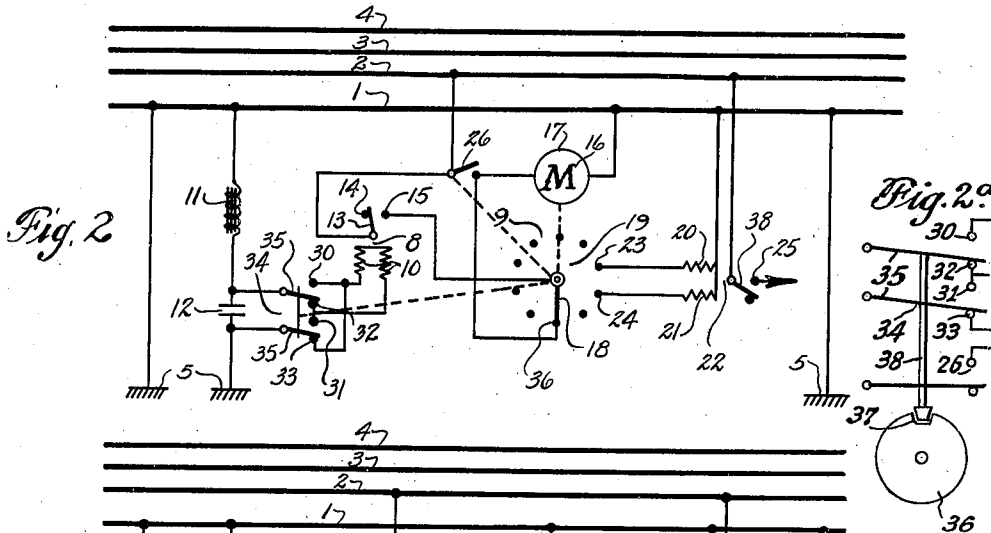
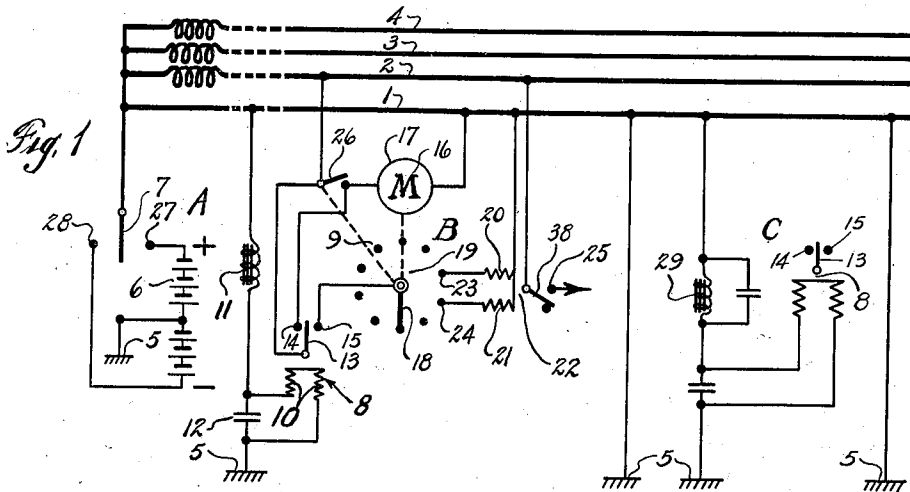
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REMOTE CONTROL SYSTEM

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REMOTE CONTROL SYSTEM

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1 Claim. (Cl. 177—352)

The invention relates to new and useful im-
provements in remote control systems and more
particularly to such improvements in the im-
pulse transmitting and impulse receiving devices
which control the function performing means at
the receiving station.

Objects and advantages of the invention will
be set forth in part hereinafter and in part will
be obvious herefrom, or may be learned by prac-
tice with the invention, the same being realized
and attained by means of the instrumentalities
and combinations pointed out in the appended
claim.

The invention consists in the novel parts, con-
structions, arrangements, combinations and im-
provements herein shown and described.

The remote control of operations such as the
switching on and off of street lights, stair lights,
the illumination of street numbers, hot water
reservoirs and refrigerators, the transmission of
air protection signals, the switching of tariff me-
ters and the control of other kinds of operations,
from a central transmitting station by way of
existing alternating or direct current networks
is well known. Among other things it has been
proposed to employ for the transmission of con-
trolling currents to the receiving station the mul-
tiple-grounded neutral wire of an alternating
current network and the ground, applying the
idea that even an extended grounding of the
neutral wire still offers such a resistance as to
make the remote control of operations possible
when certain conditions are observed.

In a known remote control arrangement em-
ploying the multiple-grounded neutral line of an
alternating current network and the ground the
method consists, for example, in providing the
receiving stations with rotating coil oscillating
relays, excited by rhythmic direct current im-
pulses sent from the transmitting station. What
takes place is that an oscillating member of an
oscillating relay oscillates, when excited by a
number of direct current impulses corresponding
to its natural frequency, to such a high degree
in a definite unit of time that the desired oper-
ation assigned to this series of direct current im-
pulses is carried out.

Though remote control installations provided
with such rotating coil oscillating relays make
possible per se the employment of the multiple-
grounded neutral line of an alternating current
network, they nevertheless have a number of
disadvantages which prevent their wide intro-
duction and use. One disadvantage consists in
that it makes possible the execution of only a

limited number of different operations, because
the individual series of direct current impulses
must differ as to frequencies in a sufficient de-
gree in order to obtain the required selectivity.
In addition, the safety from interference is very
slight, as a single interfering impulse of sufficient
strength can cause the oscillating relay to oper-
ate. Another disadvantage is that with the os-
cillating relays provided at the receiving sta-
tions only the execution of a single operation at
one time is practicable. For, if several oper-
ations are to be carried out at one receiving
point, a special oscillating relay must be em-
ployed for each operation. However, since in
most cases several operations must be executed
at one and the same receiving point, such a re-
mote control installation would be comparative-
ly expensive by reason of these additional os-
cillating relays that are required. Furthermore,
the possibility of fraudulent tampering, which
can be effected by simple means, must not be un-
derestimated.

The present invention concerns a remote con-
trol installation for carrying out operations at
receiving stations or points remote from a trans-
mitting station or point by means of direct cur-
rent impulses for the transmission of which
from the transmitting station to the receiving
station the multiple-grounded neutral line of
an alternating current network and the ground
are used. In this invention the drawbacks found
in the previously-mentioned remote control in-
stallations are largely reduced or obviated by a
highly sensitive direct current receiving relay
controlling at the receiving stations or points a
contact selector arrangement which starts the
execution of the various operations.

In such a remote control installation, the di-
rect current receiving relay can control a con-
tact selector arrangement driven by a syn-
chronous motor. The direct current relay pro-
vided at the receiving station may in such a
case be constructed so as to close for a short
time the exciting circuit of the synchronous mo-
tor when excited by a starting impulse and the
selector circuit of the contact selector arrange-
ment assigned to the selected operation when
excited by a selective impulse. It may also be
possible in this connection that the direct cur-
rent relay is excited by several selective impulses
for the purpose of closing for a short time sev-
eral selector circuits of a contact selector ar-
rangement operating according to the combina-
tion method or system.

The direct current relays themselves may be

constructed as polarized relays of any desired kind, as with one operating position, or with a middle position and two operating positions. These direct current relays may also be replaced by those of the rotating coil type. As a protection against harmful influences of the alternating current network, a choke coil or a stopper circuit may be connected in series to the direct current relay. In order to divert the alternating current away from the direct current relays, the exciting windings of the latter may be bridged by a condenser.

In the drawing, Figs. 1 to 3 show exemplarily three forms of embodiment of the invention. Fig. 1 shows the connecting arrangement of a remote control installation, with a transmitting point or station and two receiving points, or stations in which direct current receiving relays with a middle position and two operating positions are employed. In Fig. 2 and Fig. 3 one switching device at each receiving point is represented, showing a polarized direct current receiving relay with one operating position. Fig. 2A is a fragmentary detail view showing an operator for the switches at the receiving point, in Fig. 2.

In the switching arrangement of Fig. 1, the sender A and the receivers B, C are connected between the neutral line 1 of a multiple-grounded alternating current network 1, 2, 3, 4 and the ground 5. The transmitter A comprises a direct current battery 6, the middle of which is grounded, and the negative and positive poles of which may be connected to the neutral line 1 by means of a pole switch 7. The receiver B comprises the polarized direct current receiver relay 8 and a contact selector arrangement 9 controlled by it. The receiver C differs from the receiver B only by the switching of the direct current receiver relay 8. The contact selector arrangement 9 is therefore not shown in this receiver.

The polarized direct current receiver relay 8 of the receiver B possesses the well-known winding 10, connected on the one hand through the choke coil 11 to the neutral line 1, and on the other hand to the ground 5, as well as being bridged by a condenser 12. The switching contact 13 of the direct current relay 8, controlling the contact selector arrangement 9 and cooperating with the contacts 13 and 14, occupies three positions, namely a middle position shown in the figure and two operating positions. Contact 14 is connected to one side of the exciter winding 16 of the synchronous motor 17, contact 15 to the contact arm 18 of the contact selector 19, and the switching contact 13, across a neutral adjustment contact 26, controlled by the synchronous motor 17, to the exciter winding 16 of the synchronous motor 17 and also to the phase lead 2. The windings 20, 21 of the switching relay 22 intended for the execution of two operations are connected on the one hand each to a selector contact 23 or 24 of the contact selector 19, and on the other hand to the neutral line 1. The switching contact 38 connected to the phase lead 2 of the alternating current network cooperates with a contact 25 leading to the arrangement for carrying out the desired operation.

Now, if an operation is to be started at the receiving point B, the pole switch 7 provided at the transmitting point A must be momentarily connected for a short time with the contact 27 of the positive pole of the direct current battery 6. In the circuit now closed +27, 7, 1, 11, 10, 5—a direct current impulse must now arise which ex-

cites the direct current receiver relay 8. The switch contact 13 is then momentarily connected to contact 14, which causes the synchronous motor 17 to start. Shortly after the starting of the synchronous motor 17, the neutral position contact 26 is closed, making it possible to feed the exciter winding 16 of the synchronous motor 17 by way of this contact, when the switch contact 13 of the direct current relay 8 has returned again to its middle position.

As soon as the contact arm 18 reaches the selector contact 23, the throwing of switching contact 7 of the transmitting station A, that is to say the connection to the contact 28 of the negative pole of the direct current battery 6, will cause a negative direct current selective impulse to be sent. The direct current receiving relay 10 is then again excited, and now by the switching contact 13 being connected to contact 15. Accordingly the winding 20 of the switching relay 22 is excited for a short time, and the swinging contact 38 is connected to contact 25, which starts the desired operation. When the initial position of the contact arm 18 is reached, the neutral adjustment contact 26 is opened again. The circuit of the exciting winding 16 is then interrupted, causing the synchronous motor 17 to come to rest again. The arrangement, with the exception of the swinging contact 38 of the switching relay 22, now takes again the position shown in the figure.

If the working contact 38 of the switching relay 22 is to return to the previous position, the operation described already must be repeated. Only in that case the negative direct current impulse, that is to say the selective impulse, must occur when the contact arm 18 reaches the selector contact 24. In that case the winding of the switching relay 22 is excited and the swinging contact 38 is again changed over.

With the receiving arrangement shown in Fig. 1, the choke coil 11 insures protection of the direct current receiver relay against alternating potentials that may arise between neutral line and ground. As in the case of the receiver C, the same may be obtained by a stopper circuit 29.

In the receiving arrangement shown in Fig. 2, the exciting winding 10 of the polarized relay 8 is connected on the one hand to the contacts 30, 31, and on the other hand to the contacts 32, 33 of a pole switch 34, whose switch contact 35 controlled by contact selector 19 is in the transmission line. The polarized direct current receiving relay 8, possessing an operating position, contains a swing contact 13 which, like the swing contact 13 of the receiver B in Fig. 1, is connected to the phase lead 2 and across the neutral adjusting contact to the exciter winding 16 of the synchronous motor 17. Also connected to the exciter winding 16 of the synchronous motor 17 there is a selector contact 36, on which the contact arm 18 lies in the position of rest. The switching of the switching relay 22 is the same as in the arrangement shown in Fig. 1.

On the arrival of a positive direct current impulse, the direct current receiving relay 8 is excited and its swing contact 13 placed momentarily on contact 15, which starts the synchronous motor 17, which is kept running by the neutral adjusting contact 26 which is then closed. Furthermore, immediately after starting the synchronous motor 17, the switching-over contact 35 of switch 34 is thrown.

As soon as a negative direct current selector impulse now conducted by way of the contacts

32, 31 of the switch 34 arrives at a time when the contact arm 18 reaches the selector contact 23, connected to the exciter winding 20 of the switching relay 22, the throwing of the swing contact 13 of the now excited direct current relay 8 to the contact 15, excites the winding 20 of the switching relay 22, and the selected operation is carried out in consequence of the changing over of the swing contact 33 caused thereby. The swing contact 33 of the switching relay 22 is thrown again when the previously described sending or transmitting operation is repeated, it being of course necessary in this case that the negative selective impulse arrives at a time when the contact arm 18 reaches the selector contact 24.

In this receiving arrangement, though a direct current receiving relay with only one operating position is used, the switch 34 thus makes it possible to establish remote control by means of a positive starting impulse and one or several negative selective impulses.

Switch 26 is operated in a similar manner to the disclosure, Fig. 4, in the patent to Koenig No. 2,229,097 in the arrangements shown in Figures 1, 2 and 3. In Fig. 2A a cam 36 is shown, which is adapted to be driven with the selector switch by the synchronous motor 17. This cam is provided with a depression 37 which in the initial or neutral position of the selector switch is positioned so that contacts of switch 26 will be open, but, after starting the motor the high peripheral circular portion of this cam closes switch 26 until the switch has been rotated throughout its complete cycle of operation. Such an actuator is adapted for the operations of switch 26, as disclosed in Figs. 1, 2 and 3, and in addition, for the operation of the pole switch 34 shown in Fig. 2. In Fig. 2A the operator for switch 34 is illustrated as a mechanical bar connection 38 connecting the blades of switches 36 and 34 for simultaneous operation by the motor driven cam 36.

The receiving arrangement of Fig. 3 differs from the arrangement of Fig. 2 only by the exciting winding 10 of the polarized relay 8 being connected immediately in the transmission line, that is to say without the interposition of a pole switch 34. It will be clear that in consequence of the elimination of the pole switch, the arrangement will operate only with positive or negative direct current impulses. This receiving arrangement is thus more sensitive to interference impulses than the one shown in Fig. 2.

As will be readily seen from the exemplary embodiments shown that an extraordinarily great number of operations are possible with the employment of a contact selector arrangement in connection with the direct current receiving relay interposed between multiple-grounded neutral lines and the ground. An increased protection against influences by disturbing impulses is insured by being able to give a positive starting

impulse and one or several negative selective impulses for carrying out an operation. In addition means for eliminating interference may also be provided in the receiving arrangement itself. It will be clear, further, that the various receiving arrangements not only make possible the execution of a single operation, but that any desired number of operations may be carried out without it being necessary to provide additional direct current receiving relays, or to make radical changes in the contact selector arrangement. All that is required is to connect the additional switching relays needed for carrying out the operations to the corresponding selector contacts. Another advantage offered by the receiving arrangements is the fact that tampering with them is made comparatively very difficult.

It is clear that the receiving arrangements of the remote control installation can be constructed and connected otherwise than as described and shown. On the contrary, other possibilities of embodiment and connections of the direct current receiving relays and the contact selectors may be imagined.

What I claim is:

In a remote control system operable in conjunction with an alternating current power transmission line and wherein polarized control signal impulses are transmitted from a control station associated with the system to a receiving station with a receiver controlled to carry out particular functions in accordance with signal impulses transmitted from the control station, said receiver including a synchronously driven selector switch, a two position polarized relay biased to one position and operable to the other position on a given polarized impulse received from the control station, means whereby said relay when operated initiates the operation of the selector switch by applying driving power from the transmission lines thereto, means operated by the selector switch for maintaining the application of the driving power for driving said selector switch through a complete cycle of operation of the switch and disconnecting the same at the completion of the operating cycle and for reversing the connections of the relay to the transmission line for the duration of the cycle, selectable actuating means for each particular function having connections with the selective switch in the different positions thereof, and means for effecting the actuation of a selected actuating means connected with the selector switch by a succeeding timed polarized impulse from the control station of the opposite polarity actuating said polarized relay in its reversed connections including means operated by the relay to apply power from the power lines for operating the function actuating means selected by the switch in accordance with the timing of said second polarized impulse with respect to the first impulse.

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