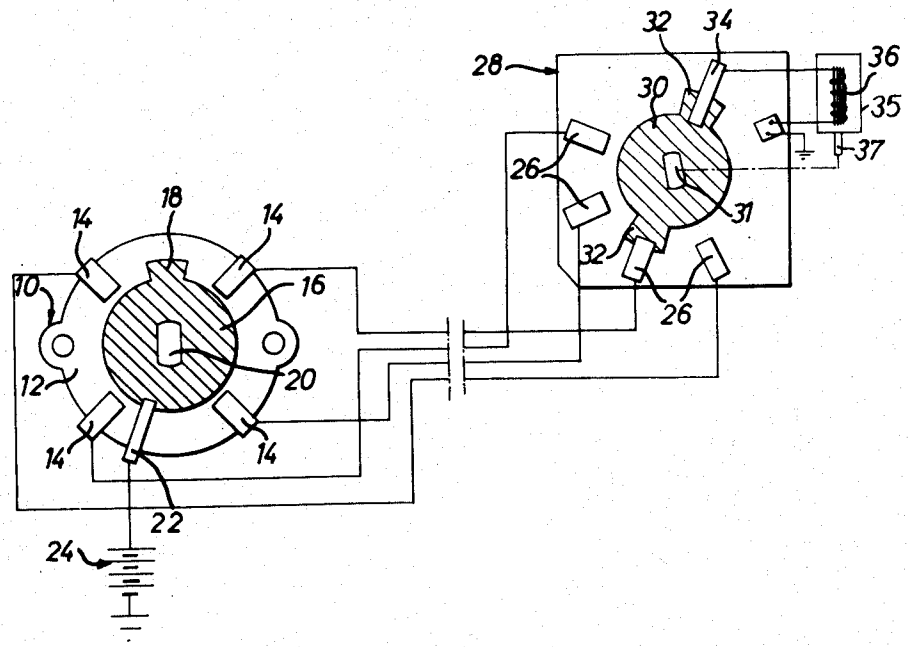
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ELECTRICAL SIGNALLING AND REMOTE CONTROL CIRCUIT ARRANGEMENTS

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ELECTRICAL SIGNALLING AND REMOTE CONTROL CIRCUIT ARRANGEMENTS

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This invention concerns electrical signalling and remote control circuit arrangements.

According to the present invention, each of the stationary contacts of a rotary electrical switch is only momentarily traversed by the switch rotor as the latter passes from one rest position to the next, each of said contacts being connected to a corresponding stationary contact of a second rotary switch having its rotor carried by the driven shaft of a solenoid-operated stepping mechanism, and said stepping mechanism is arranged to have its solenoid-energising circuit completed through corresponding pairs of stationary contacts on the two switches when said pairs of stationary contacts are momentarily connected together, and thereafter to place the rotor of said second switch in connection with the stationary contact of said second switch corresponding to the stationary contact of the first switch which is next to be traversed by the rotor of said first switch.

More particularly, the present invention provides an electrical signalling and remote control arrangement comprising a first rotary switch having a plurality of stationary contacts arranged in a circular row, a rotor having a plurality of rest positions arranged one intermediate each adjacent pair of stationary contacts and adapted on rotation to make momentary connection with successive stationary contacts, and a common contact permanently in sliding engagement with said rotor, a second rotary switch having a plurality of stationary contacts arranged in a circular row and corresponding in number to the number of stationary contacts of the first switch, a rotor having a plurality of rest positions arranged one in register with each of said stationary contacts and adapted to make and remain in electrical connection with the appropriate stationary contact in each of said rest positions, and a common contact permanently in sliding engagement with said rotor, each of the stationary contacts of the first rotary switch being electrically connected with one of the stationary contacts of the second rotary switch, and a solenoid operated rotary stepping mechanism having its solenoid-energising circuit completed through said two common contacts and a driven shaft arranged to rotate the rotor of said second switch, said last-mentioned rotor being initially set and thereafter retained by said stepping mechanism in register with the stationary contact of said second switch corresponding to that stationary contact of said first switch which is next due to be momentarily traversed by the rotor of said first switch.

Since the only time during which corresponding stationary contacts of the two rotary switches are connected together is during operation of the first rotary switch to move it from one rest position to the next succeeding rest position, the energising circuit of the stepping mechanism is itself only momentarily energised and at all other times the supply source is disconnected. Moreover, due to the arrangement whereby the rotor of the second switch always rests on the stationary contact corresponding to that in the first switch which is next to be traversed by the rotor of the first switch, the angular position of the latter rotor is an indication of the next position or condition to be assumed by the stepping mechanism. This indication is valuable, for example, in remote control arrangements where the stepping

mechanism also acts as a remote control device for carrying out some desired function under the control, at a position remote from said stepping mechanism, of the first rotary switch. Conversely, the arrangement proposed by the invention may be used as a signalling arrangement to indicate that some remotely controlled function has, in fact taken place; thus, for example, where a hydraulic transmitter is used to actuate a remotely situated hydraulic receiver, the latter may be coupled to the rotor of the first rotary switch, and the stepping mechanism, situated at the transmitter position, then indicates by its driven shaft the condition of the hydraulic receiver.

The invention will be described further, by way of example, with reference to the accompanying drawing, which shows diagrammatically one circuit arrangement embodying the invention.

In the drawing, a first rotary switch generally denoted **10** has a carrier member **12** provided with four equiangularly spaced stationary contacts **14** arranged around its periphery. Centrally of the carrier member **12**, there is provided a rotor **16** having a radially projecting wiper **18** adapted to make a sliding connection with successive stationary contacts **14** as the rotor is rotated. It will be noted that the angular spacing between adjacent stationary contacts **14** is greater than the width of the wiper **18** which is arranged, in each rest position of the rotor, to lie between an adjacent pair of stationary contacts. This is accomplished by mounting the rotor **16**, by means of a central slot **20**, on a driving shaft (not shown) of a suitable indexing mechanism. Such indexing mechanisms are commonly used to operate rotary manual switches, for example, and often employ a dimpled detent plate and resiliently loaded detent ball cooperating therewith, each rest position of the rotor being defined by the engagement of said ball in a dimple of the plate. Using such a mechanism, it is possible to ensure that the detent ball cannot remain intermediate two adjacent dimples in the detent plate, and hence that the wiper **16**, in passing from one rest position to the next, makes only a momentary connection with the stationary contact **14** intermediate those two positions. As shown, the rotor is in permanent sliding engagement with a common contact **22** connected to the positive terminal of a battery **24** having its negative terminal connected to earth.

Each of the stationary contacts **14** of the switch **10** is connected to a corresponding stationary contact **26** of a second rotary switch **28** having a rotor **30** with radial wipers **32** adapted to engage successive contacts **26** as the rotor **30** is rotated. The switch **28** also has a common contact **34** which is in permanent sliding engagement with the rotor **30** and which is connected to one end of the solenoid **36** of a rotary stepping mechanism **35**, the other end of the solenoid **36** being connected to earth. The solenoid **36** may, for example, operate a ratchet (not shown) which rotates a driven shaft **37** carrying the rotor **30** by means of a slot **31** therein, the arrangement being such that, as shown, the rotor **30** rests on one of the stationary contacts **26** at the end of each ratchet operation. Moreover, the stationary contact **26** upon which the rotor **30** then rests corresponds to that stationary contact **14** of the switch **10** which is due next to be traversed by the wiper **18**.

In operation of the described circuit arrangement for remote control purposes, the rotor **16** of the switch **10** is manually rotated from one rest position to the next succeeding rest position, and during this movement, momentarily engages with the stationary contact **14** between said two positions, thus momentarily connecting the solenoid **36** to the battery **24**, by way of the corresponding stationary contact **26** of switch **28**, the rotor **30**

and common contact **34** of that switch. The stepping mechanism **35** therefore operates, and moves the wiper **32** on to the next succeeding contact **26** of switch **28**, ready for a subsequent operation of the switch **10**. At all other times, the arrangement whereby the wiper **18** of switch **10** normally lies between two adjacent contacts **14** ensures that the solenoid, energising circuit is interrupted. In the meanwhile, the position of the driving shaft (not shown) of the rotor **16** indicates the instantaneous condition of the stepping mechanism.

When the circuit is used for signalling purposes, the rotor **16** of the switch **10** is actuated by the remotely controlled element of a remote control system, and the stepping mechanism **35** is arranged at the control position of said system. The stepping mechanism **35** thus follows the actuation of the switch **10** to confirm that operations of said remotely controlled element have taken place, and in addition to the rotor **30** of switch **28**, the driven shaft **37** of the mechanism may be arranged to carry or to operate a rotary disc or other indicating means to actually identify the operations which have taken place.

I claim:

1. An electrical signalling and remote control circuit arrangement comprising a first multiple position rotary switch including a plurality of stationary contacts and a rotor arranged successively and momentarily to traverse each of said contacts in passing from one switch position to the next succeeding switch position, a second rotary switch including a second rotor and a second plurality of stationary contacts each electrically connected to a corresponding one of the stationary contacts of said first switch, a solenoid operated stepping mechanism including a driven shaft, said second rotor being rotatable by said driven shaft, and a solenoid energising circuit momentarily completed through each connected pair of stationary contacts on the two switches whenever said rotors simultaneously register with the respective contacts of said pair, whereby said driving shaft steps said second rotor into connection with the stationary contact of said second switch corresponding to the stationary contact of said first switch which is next to be traversed by said first rotor.

2. An electrical signalling and remote control arrangement comprising a first rotary switch having a plurality of stationary contacts arranged in a circular row, a rotor having a plurality of rest positions arranged one intermediate each adjacent pair of stationary contacts and adapted on rotation to make momentary connection with successive stationary contacts, and a common contact permanently in sliding engagement with said rotor, a second rotary switch having a plurality of stationary contacts arranged in a circular row and corresponding in number to the number of stationary contacts of the first switch, a rotor having a plurality of rest positions arranged one in register with each of said stationary contacts and adapted to make and remain in electrical connection with the appropriate stationary contact in each of said rest positions, and a common contact premanently in sliding engagement with said rotor, each of the stationary contacts of the first rotary switch being electrically connected with one of the stationary contacts of the second rotary switch, and a solenoid operated rotary stepping mechanism having its solenoid-energising circuit completed through said two common contacts and a driven shaft arranged to rotate the rotor of said second switch, said last-mentioned rotor being initially set and thereafter retained by said stepping-mechanism in register with the stationary contact of said second switch corresponding to that stationary contact of said first switch which is next due to be momentarily traversed by the rotor of said first switch.

No references cited.