

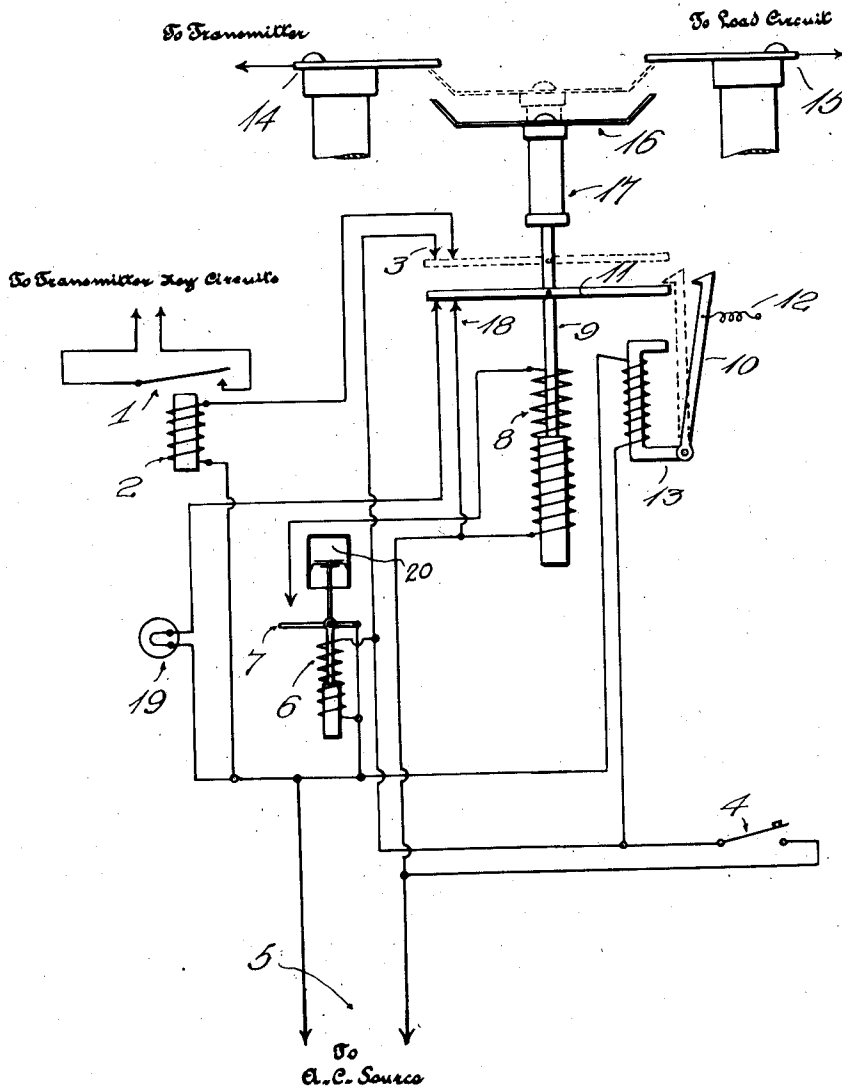
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SWITCHING AND RELAY SYSTEM

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SWITCHING AND RELAY SYSTEM

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My invention relates to switching systems in general and more specifically to combinations of switching and relay systems.

An object of my invention is to provide certain improvements in switching and relay systems whereby the apparatus and arrangement thereof provides certain circuit connections and the proper timing for the establishment of such circuits.

A further object of my invention is to provide a switching and relay system whereby any number of circuits may be established in a predetermined order in a manner substantially as described in the specification following.

Other and further objects of my invention are to provide certain structural features and arrangements of apparatus for controlling the operation of communicating systems.

A better understanding can be had of the switching and relay system of my invention by referring to the specification following and to the accompanying drawing which illustrates the switching and relay system of my invention.

The particular arrangement shown in the accompanying drawing is especially adaptable for use in radio transmitting systems. The switching and relay system of my invention may be employed in many different circuit arrangements and in combination with electrical apparatus other than radio transmitters. Reference is made to the following specification and to the accompanying drawing for the purpose of illustrating the principles of my invention, as applied to a switching and relay system for radio transmitters.

In radio transmitting systems it is a common practice to employ a master oscillator circuit arrangement. It is the general practice to interrupt the operation of the power amplifier in such systems, thereby controlling the radiation of energy from the transmitter. The master oscillator is allowed to remain in an oscillating condition thereby increasing the stability of operation. The power amplifier is associated with the master oscillator and is caused to amplify the energy from the master oscillator. The control is usually in the grid or control electrode

circuit of the amplifier and controlled by making and breaking the circuit or otherwise controlling the operation of the amplifier tube by means of a relay or key circuit.

Due to the inherent capacity of the tube electrodes the energy from the master oscillator is admitted to the high frequency load circuit where it is radiated or otherwise transmitted. The energy thus radiated is not infrequently of appreciable amplitude and gives rise to interference when receiving apparatus is operated in the vicinity. Such radiation performs no useful function and is undesired for a number of reasons. It is therefore desirable to prevent the radiation or transmission of energy from the load circuit when the key circuit is open. To provide relays of the ordinary design, as a means for controlling the association of a high frequency oscillator and amplifier system with the load circuit only when the key is depressed, introduces many problems such as the proper timing of the relays and the probability that the relays will not operate in unison. Other problems arise which offer considerable difficulty of solution and which are avoided with the switching and relay system of my invention.

The switching and relay system of my invention is illustrated in the accompanying drawing as adapted to the control of radio transmitting systems and for the purpose aforementioned. The key or relay circuit for controlling the operation of the amplifier is connected in series with the contact members associated with electromagnet armature 1. Electromagnet armature 1 is actuated by electromagnet 2 thereby completing the circuit to the key or relay control of the amplifier. In order that electromagnet 2 be energized and the circuit associated with armature 1 be completed, it is necessary that an electrical connection be established between contact members 3 and that key circuit 4 be closed. Source of control energy 5 is associated with key circuit 4 and electromagnet 6. The closing of key circuit 4 causes the energy from source 5 to energize electromagnet 6. Electromagnet 6 controls the movement of armature 7. Armature 7 is pro-

vided with suitable contact members whereby the energization of electromagnet 6 establishes a circuit and the deenergization of electromagnet 6 interrupts the circuit associated with armature and contact members 7. Armature 7 is provided with a suitable retarding device which permits a rapid closing of the circuit associated with armature 7 when the latter is energized by electromagnet 6 and which retards the interruption of the circuit when electromagnet 6 is deenergized. Any suitable dash pot may be employed for this purpose by which the circuit is immediately established and whereby the interruption of the circuit is greatly retarded. The circuit above referred to as associated with armature and contact members 7, is connected in series with electromagnet 8 and source of potential 5. Upon the energization of electromagnet 6 by means of key circuit 4, electromagnet 8 is energized. Electromagnet 8 actuates an armature member 9 which is attracted in the direction of the dotted lines immediately above the position shown. This attraction is prevented, however, at this instant by locking member 10 which is in the position shown by dotted lines. Since the closing of key circuit 4 is necessary to energize electromagnets 6 and 8, no attraction of armature 9 would occur when key 4 is in the open position. The closing of key circuit 4, in addition to completing the circuits for the energization of electromagnets 6 and 8, completes the circuit from source 5 to electromagnet 13. The energization of electromagnet 13 actuates locking member and armature 10 which engages with member 11 of armature 9, thereby preventing the movement of armature 9 and the establishment of the circuit by means of contact members 3. The opening of key circuit 4 deenergizes electromagnet 13 and locking member 10 is disengaged with member 11 due to spring 12. Although key circuit 4 is opened, armature 7 associated with electromagnet 6 is in the closed position, thereby maintaining connection between electromagnet 8 and source of energy 5 by virtue of the retarding action of a suitable dash pot 20 associated therewith. The closed position of armature 9 and member 11 causes the completion of the circuit including contact members 3, electromagnet 2 and source of potential 5. The circuit associated with armature 1 is thereby completed. Continued interrupting of key circuit 4 causes continued interrupting of the energization of electromagnet 2 and hence interruption of the transmitter key circuit or circuit associated with the operation of the amplifier tubes. A sufficient lapse in transmission or an interruption of the key circuit 4 over a considerable length of time results in the opening of armature 7, the deenergization of electromagnet 8 and interrup-

tion of the circuit including contacts 3, electromagnet 2 and source of potential 5.

Associated with armature 9 is a contact member 16 which may comprise a strip of spring metal supported on armature 9 by means of insulator 17. Contact member 16 completes the electrical circuit between contacts 14 and 15 which latter may be associated with the transmitter and load circuit respectively. As heretofore mentioned the load circuit may comprise a space radiating system. The load circuit may be the input circuit or the output circuit of a thermionic tube employed in any suitable arrangement. Contact members 18 may be provided whereby a circuit including pilot lamp 19 and source of potential 5 indicates the opened position of armature 9. The pilot lamp may be positioned adjacent to the compass-bearing equipment serving to warn the operator to apply a correction factor in the determination of the bearing. The bearing as indicated by most systems is influenced by the presence of complete circuits such as would be the case with the closed antenna circuit.

I realize that many modifications of the switching and relay system of my invention are possible without departing from the spirit of my invention. Any number of movable armatures may be employed in combination with electromagnets and the same provided with suitable contact members, depending upon the particular application of the system. It is to be understood that the embodiments of my invention are not to be restricted to the accompanying drawing or the foregoing specification but only as defined in the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A switching and relay system comprising in combination a source of electrical energy, a plurality of electromagnetic relays each having a winding and an armature member provided with contact members, a common control circuit associated with said source of energy and the windings of said electromagnetic relays for energizing said windings, a movable armature associated with an electromagnet energized in common with the energization of said relays, said movable armature being disposed in locking relation to the armature of one of said relays for preventing the actuation of said last mentioned relay for a given time interval after said control circuit is closed, and means for releasing said interlock and prolonging the energization of said last mentioned relay for given time intervals irrespective of the subsequent opening of said control circuit.

2. A switching and relay system comprising in combination a source of electrical energy, a plurality of electromagnetic relays each including an armature and an operating

solenoid and having the solenoids thereof energized by said source of energy, a control circuit in common with said relays, an electromagnet control device associated with a movable armature and energized in common
5 with said solenoids, the movable armature of said electromagnet control device being disposed in interlocking relation to the armature of one of said relays adapted to mechanically prevent the mechanical operation of
10 the armature of the last mentioned one of said relays, and means for prolonging the energization of said last mentioned relay after said control circuit is opened.

3. A switching and relay system comprising in combination a main electromagnetic relay, a plurality of electromagnetic relays associated with a source of electrical energy, an armature and contact system controlled by each of said relays, a common control circuit for connecting certain of said relays with
15 said source, an electromagnetic locking device for preventing the mechanical movement of the armature associated with one of said relays, said electromagnetic locking device
20 being controlled by the closing of said common control circuit, and a slow motion mechanism connected to one of said relays for prolonging the energization of the relay which has its armature controlled by said
25 electromagnetic locking device for a predetermined time after the opening of said control circuit.

4. A switching and relay system comprising in combination a main electromagnetic relay, a plurality of auxiliary electromagnetic relays, associated with a source of electrical energy, a common control circuit, said
35 electromagnetic relays each comprising an electromagnet and a movable armature adapted to control a plurality of circuits, an electromagnetic locking device disposed adjacent the armature of said main relay for preventing the mechanical movement of the armature
40 associated therewith when the electromagnet thereof is energized by closing said control circuit, said electromagnetic locking device being controlled by said common control circuit, and one of said auxiliary relays being
45 adapted to prolong the energization of said main relay for a given time interval after the opening of said control circuit.

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