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SIGNALING SYSTEM

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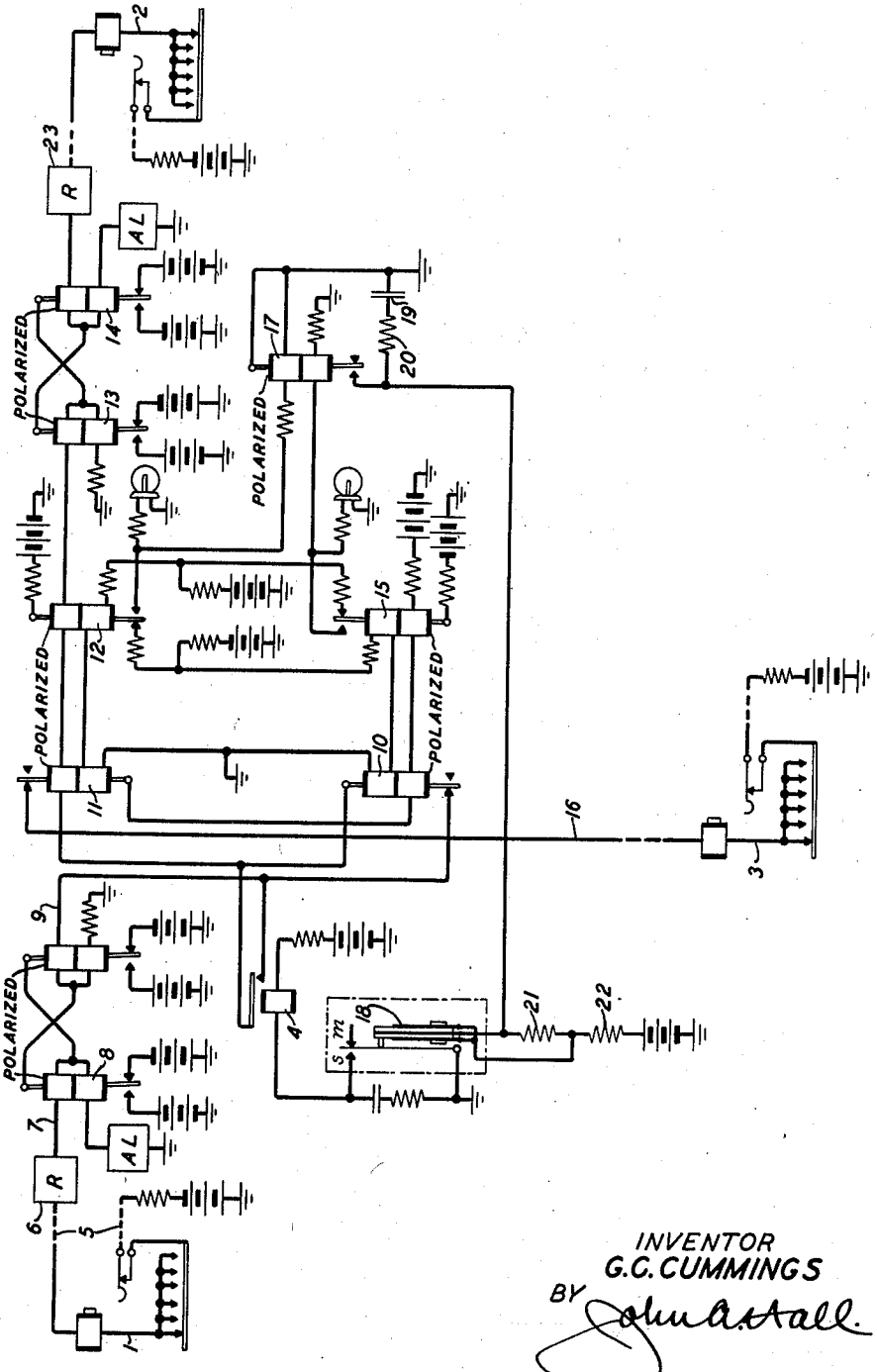

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SIGNALING SYSTEM

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5 Claims. (Cl. 178—69)

This invention relates to signaling means and particularly to electrical telegraph systems wherein a plurality of stations of relatively different importance are connected to a single line.

The object of the invention is to provide relay means responsive to potential changes for operating what is known to those skilled in the art as a hit suppressor circuit. Such circuit has for its general purpose the provision of means to prevent a station of minor importance from interfering, either through faulty operation or otherwise, with traffic between stations of major importance. Where a main line extending between two stations of major importance has a branch line connected thereto and extending to a station of minor importance, means are provided for artificially blocking out the branch line throughout the period of use of the main line, allowing the branch line to break in at any time but particularly providing for rendering an accidental opening, spoken of as a hit, from being transmitted to the main line.

A feature of the invention is a timing circuit consisting of means for starting the flow of transient currents, such circuit being responsive to open circuit conditions on the branch line for counting time from the start of an open circuit and for maintaining the main line closed for an appropriate period so that a hit will not be transmitted to the main line. If an open circuit condition persists beyond a given period as measured by said transient current timing means, then such open circuit is deemed to be a signal and it becomes effective.

A further feature of the invention is the use of what might be termed a condenser relay, that is, one which responds to a difference in potential and requires for its operation only that amount of energy which may be measured by the charging current of a small condenser. By way of example, such a relay is shown herein as a piezoelectric crystal relay having a movable element similar in construction and operation to the motor element used by Sawyer in his Reissue Patent No. 20,213, December 22, 1936. In general also, a relay of this nature is shown in the application of Warren P. Mason, Serial No. 131,160, filed March 16, 1937.

The drawing is a circuit diagram illustrating the invention.

There are two stations, 1 and 2, of major importance, and a third station 3, of minor importance. These are all conventionally illustrated as teletypewriter substation circuits, though the invention is applicable to other systems as well. The system is arranged so that a hit occurring at station 3 or in line 16 extending between the repeater and station 3 will not interfere with traffic between stations 1 and 2. Normally, a relay 4 short-circuits the break point in the repeater responsive to station 3 and this relay 4 is maintained operated just so long as traffic is flowing between stations 1 and 2, and until station 3 makes an effective signal. If a hit should occur on station 3, that is, an open circuit condition of short duration, then means are started to release relay 4 but these means are immediately rendered ineffective by traffic flowing between stations 1 and 2.

The station 1 is connected over local loop 5 to a repeater 6 and thence over a long line 7 to a corresponding repeater including all circuits between line 7 and line 9 and having a relay 8. In response to code impulses from station 1 relay 8 is operated and this will reduce the current in line 9 which extends through the contact and armature of relay 10 and thence through the windings of relays 11, 12 and 13 to the armature of relay 14, where it connects to positive battery.

Under normal conditions current flows from negative battery on the armature of relay 8 to positive battery on the armature of relay 14 and consequently, relays 11 and 12 are normally energized through their upper windings and in this energized condition have their armatures in positions illustrated. When the sender at station 1 is operated, each spacing impulse will cause relay 8 to reverse the potential on its armature and thereby operate relays 11, 12 and 13. Relay 13 through the movement of its armature will operate the repeater 23 at the end of the line and through it the receiving magnet at station 2. Relay 11, through the movement of its armature, will open the loop 16 to station 3 and cause operation of the receiving magnet thereat. Relay 12 through the movement of its armature causes the current in the upper windings of relays 15 and 10 to be reversed so that they will maintain their armatures in the positions shown even though the circuit through their lower windings has been opened at the armature and contact of relay 11. In this manner messages may be transmitted from station 1 to stations 2 and 3 simultaneously and in like manner messages may be transmitted from station 2 to stations 1 and 3 simultaneously.

When relay 12 operates it armature to its right-hand contact and closes the circuit from positive battery, armature and right-hand contact of relay 12, upper winding of polar relay 17

to ground, relay 17 moves its armature to its left-hand contact where it may remain even though the upper energizing winding of the relay is opened. Relay 17 through its armature and contact short-circuits the condenser 19 and resistance 20 and, therefore, places full ground potential on the middle conducting sheet of condenser type relay 18 and causes a certain current to flow through the resistances 21 and 22 to positive battery. Since the outer conducting sheets of condenser type relay 18 are connected between the resistances 21 and 22, there will be a certain potential difference between the outer and middle conducting sheets of this relay and it will move its armature to its left-hand contact. This will operate relay 4 and relay 4 in turn will short-circuit the contacts of relay 10. Normally these contacts are operated by spacing impulses or other open circuit conditions at station 3 but so long as relay 4 is operated, the open circuit caused by relay 10 is ineffective and can cause no interference with traffic between stations 1 and 2. Should such an open circuit occur, it would under normal conditions cause the operation of relays 10 and 15 and relay 15 in establishing a circuit from negative battery, its armature contact and thence through the lower winding of polar relay 17, would cause the movement of the armature of relay 17 to its right-hand contact. If such open circuit condition is of only short duration then any impulses coming over the main line and operating relay 12 would cause the immediate restoration of relay 17 to its left-hand contact. If such open circuit condition, however, is of longer duration, the relay 15 renders relays 11 and 12 ineffective and hence relay 17 will remain as shown. When armature of relay 17 is moved off its left-hand contact, condenser 19 starts to charge from ground on one terminal to positive battery through resistances 20, 21 and 22. The constants of condenser 19 and resistances 20 to 22 inclusive, are such that the transient charging current on condenser 19 is maintained for a period somewhat longer than a normal spacing impulse and during the flow of this transient current the potential difference across the crystals of a condenser type relay 18 is maintained sufficiently high to keep this relay operated. Any spacing impulse sent between stations 1 and 2 during this period will, if relay 15 has returned to the position shown, move relay 17 to its left contact and reestablish the full potential difference across the terminals of relay 18 and thus maintain relay 4 operated.

Station 3 may break in by sending a spacing impulse and operating relay 15 which will move the armature of relay 17 to its right contact. After a period timed by the transient current timing circuit comprising condenser 19 and resistances 20 to 22 inclusive, relay 4 will be released and spacing impulses sent by station 3 will be transmitted to both stations 1 and 2.

What is claimed is:

1. A signaling system comprising a plurality of stations of major and minor importance, a common line for said stations, a repeater in said line forming a junction point between branches extending to stations of major importance and a station of minor importance, means in said repeater for blocking the said branch extending to said station of minor importance, means responsive to signals transmitted by stations of major importance for operating said first means, means responsive to signals transmitted by said station of minor importance for releasing said first means, said first means including a condenser type relay responsive to a difference in potential and requiring for its operation only that amount of energy which may be measured by the operating current of a small condenser.

2. A signaling system as claimed in claim 1, wherein a piezoelectric crystal is employed as the moving element in said condenser type relay.

3. A signaling system as claimed in claim 1, wherein a Rochelle salt crystal is employed as the moving element in said condenser type relay.

4. A signaling system comprising a plurality of stations of major and minor importance, a common line for said stations, a repeater in said line forming a junction point between branches extending to stations of major importance and a station of minor importance, means in said repeater for blocking said branch extending to said station of minor importance, means responsive to signals transmitted by said stations of major importance for operating said first means, means responsive to signals transmitted by said station of minor importance for releasing said first means, said first means including a condenser type relay and a circuit responsive to a signal from said station of minor importance for starting the flow of transient currents therein and at the termination thereof for establishing a potential sufficient to operate said condenser type relay, the constants of said circuit being so arranged that said potential will be established only after an interval equal to a signal of unusual length.

5. A signaling system comprising a plurality of stations, a line connecting said stations, a repeater in said line forming a junction point for a branch line, means responsive to signals from other stations for normally blocking said branch line, means responsive to a prolonged open circuit condition on said branch line for releasing said blocking means, said releasing means including a transient current timing circuit constructed and arranged to establish a potential difference after an interval sufficiently long to be marked as a prolonged open circuit condition, and a condenser type relay responsive thereto.

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