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INDICATING AND RECORDING SYSTEM.

APPLICATION FILED JUNE 21, 1915.

1,251,190.

Patented Dec. 25, 1917.

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INDICATING AND RECORDING SYSTEM.


To all whom it may concern:

Be it known that I, Amos Frederick Dixon, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Indicating and Recording Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to indicating and recording systems and its principal object is to provide an improved and simplified system of the remote control type.

In accordance with its general characteristics, the invention contemplates a plurality of indicating or recording devices, such, for example, as character wheels, each controlled by a group of impulses separated by comparatively short intervals and electromagnetic switching apparatus operating during the comparatively long interval between groups of impulses for bringing the recording devices successively under the control of the impulses. The operation of the switching apparatus is effected through the agency of control means, which is preferably in the form of a slow-acting electromechanical mechanism. Means are provided for cooperating with the recording devices to effect the production of a permanent record, and arrangements are made for producing a special record when desired. This invention is particularly adapted for fire alarm or police signaling systems wherein in a plurality of outlying stations, each designated by a characteristic number, may produce a routine central office indication or record, or if occasion requires, effect the production of a special record. It will be readily understood, however, that the system of connections, apparatus and method of operation to be hereinafter described, are readily applicable to many other uses, as for example, the indicating of subscribers' numbers in telephone systems.

The above and other objects of this invention will be fully set forth in the following description and claims, and will be more readily understood by reference to the accompanying drawing wherein the system of connections and the preferred form of apparatus is shown diagrammatically.

The indicating or recording devices comprise a plurality of electromagnets 1, 2 and 3 and associated character wheels 11, 12 and 13. The character wheels are loosely mounted upon a shaft 14, and each is provided with an attached ratchet wheel 15. Electromagnets 1, 2 and 3 effect the rotation of the corresponding character wheels 11, 12 and 13, through the agency of an actuating pawl 16 which is connected to an armature 17 and engages the teeth of ratchet wheels 15 of the corresponding character wheels. Also mounted upon shaft 14 and attached to character wheel 11 so as to be rotated with it, is a special recording wheel 20 for producing a special record such as the word "Fire."

The current impulses for controlling the indicating or recording devices are transmitted in groups of one or more impulses each over a line conductor L interconnecting the central station with one or more outlying stations S, each of which may comprise a code transmitter of any desired type. In the drawings, the transmitter is illustrated by a code impulse wheel 24 which is provided with groups of conducting teeth for imparting groups of current impulses from a grounded source of energy 25 to the line. These impulses upon reaching the central station, pass into a pair of branch circuits 26 and 27.

Branch circuit 27 is adapted to be successively associated with electromagnets 1, 2 and 3, during the intervals between groups of impulses, by switching apparatus which becomes active only during these intervals. This switching apparatus comprises a primary switching relay 30, a decoder 31, a switching relay 31 and a switching control relay 32. Relay 30 is provided with three armatures 33, 34 and 35, while relay 31 has two armatures 36 and 37, and relay 32 has one armature 38. The secondary switching relay 31 is provided with an operating winding 40 and a holding winding 41. Its armature 36 is associated with a front contact connected to a grounded source of energy 45 and its armature 37 cooperates with back 106 and front contacts 43 and 44. Armature 33 of relay 30 is connected to one terminal of the winding of relay 32 and cooperates with a front contact connected with a grounded source of energy 45, while armature 34 cooperates with back and front contacts 46 and 47. Armature 38 of relay 32 cooperates with back and front contacts 48 and 49.

The action of the switching apparatus is confined to the comparatively long intervals 110.
between groups of impulses through the agency of a control means or time-controlled switching mechanism 55. This apparatus comprises a constantly rotating screw 56 whose threads are adapted to be engaged by a spring-tensioned pawl 57. Pawl 57 is pivotedly carried by a pivoted lever 58 which is connected to a grounded source of energy 59 and co-operates with a contact 60. One end of lever 58 co-operates with a pivoted and spring-tensioned T-shaped control and stop lever 65, which is adapted to be actuated upon by an electromagnet 66 located in the branch circuit 26. If desired, the rotation of screw 56 may be started when the first impulse comes over the line by providing a clutch, controlled by an electromagnet, such as electromagnet 66, between the screw and source of power. The lower end of lever 65 is formed into a stop member 67 adapted in normal condition to engage the edge of a raised portion of a cam 68. Cam 68, through the agency of a spring or other motor, tends to rotate in the direction of the arrow, but is normally prevented from such rotation by the engagement of stop 67 and the edge of its raised portion. Cam 68 controls the operation of a switch 69, and its action is further controlled by a pivoted and spring-tensioned lever 70 adapted to be actuated upon by an electromagnet 71. If a permanent record of the characters selected is desired, the characters on the wheels 11, 12 and 13 are raised so that they may be impressed upon a paper strip brought into engagement therewith by suitable co-operating electro-mechanical means. This means comprises an impression member 75 operated by an impression magnet 76 whose action is adapted to impress a strip of paper 77 upon the character wheels. In order to produce the special record appearing upon the special recording wheel 20, there is provided a special impression member 80 actuated by a special impression magnet 81. The operation of this magnet is controlled through the agency of a lever 85, which forms a part of the previously mentioned control means, and to which is pivoted a spring-tensioned pawl 86 also adapted to engage the threads of screw 56. Lever 85 is connected to a grounded source of energy 87, co-operates with a contact 88 and is controlled by one extension of the lever 65. The attraction of the armature of electromagnet 81, in addition to causing the operation of impression member 80, also effects the closure of a switch 95, one element of which is connected to a grounded source of energy 96, and a switch 97, one element of which is grounded. Assuming that station S is designated by the number 542 which is produced by three groups of five, four and two impulses respectively, the operation of the system is as follows: The first impulse of the first group causes current from source 26 to flow through branches 26 and 27. The current through branch 26 energizes electromagnet 66 and that in branch 27 flows through armature 34 and contact 46 and energizes electromagnet 1. The energization of electromagnet 1, through the agency of armature 17, pawl 16 and ratchet wheel 15, causes character wheel 11 to advance one step. The current in branch 26 causes the energization of electromagnet 66 which rotates the T-shaped lever 65 about its pivot against the tension of its spring. This movement of lever 65 causes lever 58 to move about its pivot, carrying pawl 57 along the screw 56 so that when the electromagnet is de-energized, the co-operation of screw 56 and pawl 67 will cause a comparatively slow return movement of lever 58 in an attempt to restore the apparatus to the normal condition shown in the drawing. The movement of lever 58 has also broken its engagement with contact 60 which opens the circuit from source 59, to armature 35, and contact 45 of relay 32 through the winding of relay 30. The movement of lever 65 has also withdrawn one of its extensions from engagement with lever 58 and has withdrawn stop 67 from engagement with the elevated portion of cam 68. The release of lever 85 allows screw 56 and pawl 86 to rotate this lever about its pivot, but the movement performs no function at this time. The release of cam 68 allows it to revolve in the direction of the arrow until its elevated portion engages lever 70, when its movement is arrested. The movement of the cam has also effected the closure of switch 69, which prepares a circuit from ground, through 105 the winding of relay 30, contact 48 and armature 38 of relay 32, to contact 60. The succeeding four impulses of the first group arrive in such rapid succession that electromagnet 66 is not de-energized long enough to allow screw 56, through the agency of pawl 57, to return lever 58 to the position where it will engage contact 60. Each of these impulses, however, has energized electromagnet 1, causing character wheel 11 to 115 be advanced four additional steps, in which condition numeral 5 is in a position to be seen through a suitable window in the housing or to be impressed upon paper 77. In a similar manner, the short current impulses have not energized electromagnet 66 for a sufficiently long unbroken period to allow screw 56, through pawl 86, to cause the engagement of lever 85 and contact 88. During the comparatively long no current interval between the first and second group of impulses, electromagnet 66 is de-energized a sufficient length of time for lever 58 to be returned by screw 56 and pawl 57 to the position where it engages contact 60, and the 120
previously traced circuit through switch 69 and relay 30 is completed to ground. The flow of current in this circuit causes relay 30 to attract its armatures 33, 34 and 35. Armature 33 prepares a circuit from grounded source 45 through relays 32 and 30 to ground at switch 69, but it will be noted that as long as lever 58 and contact 60 are in engagement, this circuit is shunted so that relay 32 does not receive sufficient current for its energization. The attraction of armature 34 switches branch 27 from contact 46 to contact 47, so that the next impulse arriving over line L will cause the energization of electromagnet 2 instead of electromagnet 1. The attraction of armature 35 performs no function at this time.

According to our previous assumption, the second group of four impulses will now arrive from the transmitting station. These impulses find parallel paths to ground through branches 26 and 27. Those through branch 27 pass by way of armature 34 and contact 47 of relay 30 and armature 37 and contact 43 of relay 51 to electromagnet 2, causing it through its armature, pawl and ratchet wheel to advance character wheel 2 four steps. Numerals 4 of wheel 12 is now in position to be impressed upon the paper. The energization of electromagnet 66 actuates lever 58, as previously described, interrupting the circuit previously traced through relay 30, which re-engages the shunt from about relay 32, and this relay attracts its armature 38 against contact 49. A holding circuit, independent of contact 60, is now established from source 45 through relays 32 and 30 and switch 69.

As before, the impulses of the second group arrive in such quick succession that electromagnet 66 is not de-energized for a period long enough to allow lever 58 to reengage contact 60, but during the comparatively long interval between the second and third groups, this is accomplished and a circuit is completed from grounded source 59, through contact 60, armature 38 and contact 49 of relay 32, operating winding 40 of relay 31, to ground at switch 69. Relay 31 pulls up its armatures 36 and 37, armature 36 completing a holding circuit from grounded source 42 through holding winding 41 to ground at switch 69, and armature 37 switching the connection of branch 27 from electromagnet 2 to electromagnet 3. The two impulses of this last group now cause the interruption of the previously traced circuit from source 59, and cause character wheel 13 to be advanced two steps.

The first step of character wheel 13 causes the closing of a switch 100, whereupon a circuit is prepared from contact 60 through electromagnet 71, switch 100 and impression magnet 76 to ground. This circuit is completed through source 59, upon the cessation of the last impulse of the third group, by the re-engagement of lever 58 and contact 60. Current from source 59 thereupon flows through electromagnets 71 and 76. Electromagnet 76, through the agency of impression member 75, forces the paper against the character wheels, impressing thereon the characters selected, while electromagnet 71 withdraws the end of lever 70 from engagement with the raised portion of cam 68. Cam 68 thereupon completes its rotation until arrested by stop 67, in which condition switch 69 is opened. The opening of switch 69 breaks the previously traced circuits from sources 42 and 45 through relay 31 and relays 30 and 32, respectively; these relays release their armatures and the apparatus returns to normal. The character wheels can be returned at this time by any of the usual means, such, for example, as springs.

A time recording mechanism 101, which may comprise a self-contained clock and 90 time stamp or a remotely controlled time stamp of the usual character, may also be provided against which the impression member 75 carries the paper to impress thereby the time of making the record. In a well-known manner electromagnet 76 may also control a paper feeding device, so that after the production of each record the paper is moved to present a clean surface to the recording devices.

In case a special signal, such as the fire signal, is to be transmitted from any station, that station's characteristic group and impulse combination is sent over the line followed by a special set of impulses, which in the specific system disclosed, consists of two short impulses separated by an impulse of longer duration. The impulses characteristic of the particular station operate the recording devices and produce the record, and the apparatus returns to normal as previously described.

The first special impulse operates electromagnets 1 and 66 as before, and the special recording device 20, attached to character 115 wheel 11, is moved one step, in which condition the designation "fire" is in a position to be impressed upon the paper. The interval between the first and second impulses, being as long as that which ordinarily exists between groups, provides for the energization of relay 30. The long impulse now arrives and electromagnets 2 and 66 are energized. These electromagnets cause the actuation of character wheel 12 and lever 65 in the usual manner. This impulse, however, should be of sufficient duration to cause electromagnet 66 to be energized long enough for screw 56 and pawl 86 to carry lever 85 into engagement with contact 88. A circuit is thereupon closed.
completed from grounded source 87, lever 85, contact 88, armature 35 and its cooperating front contact of relay 30, electromagnet 81 to ground at switch 69. Electromagnet 81 attracts its armature and forces special impression member 80 against the special recording device 80, and the word "Fire" is printed upon the paper. The action of the armature of electromagnet 81 also causes the closing of switches 88 and 97. Switch 95 completes a holding circuit from grounded source 96, through electromagnet 81 to ground at switch 69, so that this electromagnet remains energized after its previously traced circuit has been broken by the separation of lever 85 and contact 88.

During the interval between the long and short impulses, relay 31 is energized and circuit 87 is switched to electromagnet 8, as previously described. The last impulse energizes electromagnets 3 and 68. Electromagnet 3 causes character wheel 12 to advance one step, effecting the closure of switch 100, whereupon, after the cessation of this impulse when lever 58 engages contact 59, a circuit is completed from grounded source 59, through electromagnet 71 and switches 100 and 97 to ground. While electromagnet 76 is also grounded, it will be noted that it is short-circuited so that impression member 75 does not act. The current in this circuit energizes electromagnet 71 which allows cam 68 to complete its rotation and the apparatus is restored to normal as previously described, the holding circuit for relay 81 being broken upon the opening of switch 69.

Thus, in the specific system disclosed, three groups of impulses, each of which, it is understood, may comprise one or more impulses, may selectively control the positioning of the three character wheels and produce a characteristic indication or a record upon a suitable medium. When desired, these characteristic records may be supplemented by a special record. Of course, the number of wheels may be changed and many other modifications may be made without departing from the spirit of the invention.

It is to be understood that in the claims the word "group" is used to signify one or more impulses.

The invention claimed is:

1. An indicating system comprising a plurality of indicating devices, each controlled by a group of current impulses, and automatic electromagnetic switching apparatus made active during the interval between groups of impulses for bringing said devices successively under the influence of the impulses.

2. A recording system comprising a plurality of recording devices, each controlled by a group of current impulses, automatic switching apparatus operating between groups of impulses for bringing said devices successively under the influence of the impulses, and means cooperating with said devices for effecting the production of a permanent record.

3. An indicating system comprising a plurality of indicating devices, each controlled by a group of current impulses separated by comparatively short intervals, automatic electromagnetic switching apparatus for bringing said devices successively under the influence of the impulses, and control means affected by the impulses for controlling the operation of said apparatus during the comparatively long interval between groups of impulses.

4. A recording system comprising a plurality of recording devices, each controlled by a group of current impulses separated by comparatively short intervals, automatic electromagnetic switching apparatus for bringing said devices successively under the influence of the impulses, control means affected by the impulses for effecting the operation of said apparatus during the comparatively long interval between groups of impulses, and means cooperating with said devices for effecting the production of a permanent record.

5. An indicating system comprising a plurality of indicating devices, each controlled by a group of current impulses, an automatic switching relay for bringing said devices successively under the influence of the impulses, and a slow acting electromechanical control means for effecting the operation of said relay.

6. A recording system comprising a plurality of recording devices, each controlled by a group of current impulses, a switching relay for bringing said devices successively under the influence of the impulses, an impression means cooperating with said device for effecting the production of a permanent record, and an automatic slow acting electromechanical control means for controlling the operation of said relay and said impression means.

7. In a recording system, the combination of a plurality of recording devices, each controlled by a group of current impulses, an automatic electromagnetic switching apparatus operating between groups of impulses for bringing said devices successively under the influence of the impulses, and means controlled by impulses for producing a special record.

8. In a recording system, the combination of a plurality of recording devices, each controlled by a group of current impulses, an automatic electromagnetic switching apparatus for bringing said devices successively under the influence of the impulses, an impression means for producing a special record, and a slow acting control means for effecting the operation of said apparatus and said control means.
In a recording system, a transmission line, a plurality of recording devices located at a central station and adapted to be operated sequentially by groups of line current impulses, automatic switching apparatus operating between groups of line current impulses for bringing said devices successively under the influence of the line impulses, a time-controlled switching mechanism, and electromechanical means cooperating with said devices and said switching mechanism for effecting the production of a permanent record.

In witness whereof I hereunto subscribe my name this 18th day of June, A. D. 1915.

AMOS F. DIXON.