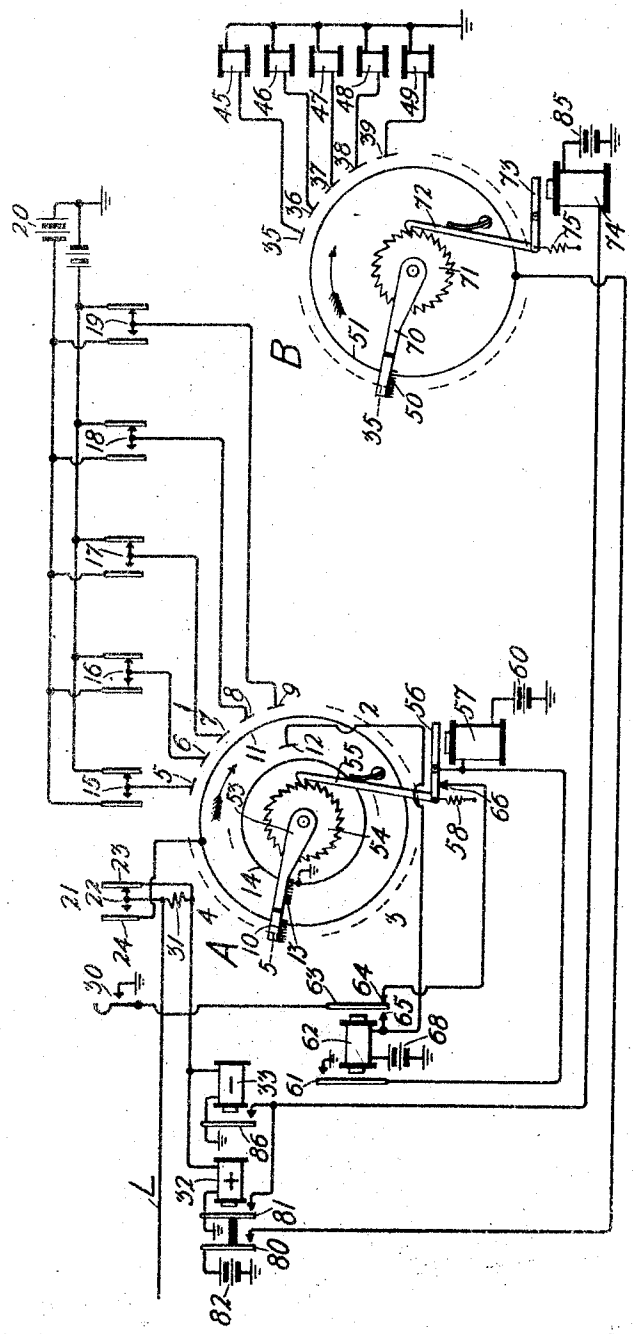
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SELECTING MECHANISM AND SYSTEM.

APPLICATION FILED MAR. 27, 1915.

1,210,912. Patented Jan. 2, 1917.



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UNITED STATES PATENT OFFICE.

AMOS F. DIXON, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTERN ELECTRIC COMPANY, INCORPORATED, A CORPORATION OF NEW YORK.

SELECTING MECHANISM AND SYSTEM.

1,210,912. Specification of Letters Patent. Patented Jan. 2, 1917.

Application filed March 27, 1915. Serial No. 17,361.

To all whom it may concern:

Be it known that I, AMOS F. 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 Selecting Mechanisms and Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to selecting mechanisms and systems of the electromechanical type.

In systems of the above type, wherein it is necessary that coöperatively operating apparatus should pass through corresponding stages of action at operatively the same time, it has been customary to adopt either of two well-known expedients, to employ extraneous synchronizing apparatus or depend upon a marginal construction of the elements to insure equal movement in equal times. Both of these arrangements are, however, open to objection. The first, that additional expensive apparatus is required and the second, that between the points of initiation and completion of the cycles of operation the elements of the system are independent of each other and may be said to be "running wild" during these intervals.

One of the principal objects of this invention is to overcome these objections and provide an improved system wherein apparatus located at more or less widely separated points, when acting together, dependently pass through each of the different stages of a cycle of operations.

Another object is to provide improved means for preventing the inadvertent repetition of a given cycle of effects.

A further object is to provide an improved and simple selecting mechanism and system particularly adapted for printing telegraphs.

For the accomplishment of these ends the invention contemplates a self-controlling step-by-step current collector coöperating with current control means, and a current distributer positively controlled in each stage of its operation by the collector, and acting to properly distribute the effects of current impulses whose characteristics are determined by the control means.

The invention further contemplates the association of the above elements with electromechanical means for positively arresting the action of the current collector when a given cycle of operations is completed to prevent an inadvertent repetition thereof and the consequent likelihood of erroneous selective actions.

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 circuit connections and mechanisms of the preferred embodiment are shown diagrammatically.

In the preferred form of the invention, wherein similar apparatus is situated at both ends of a transmission line for the purpose of producing signal current impulses, converting the impulses into desired mechanical effects or both simultaneously, each station is provided with a current collector A and a distributing apparatus P. The current collector A consists of contact groups 1, 2, 3 and 4, each comprising a plurality of insulated segments 5, 6, 7, 8 and 9 adapted, when an interconnecting contact brush 10 is moved in the direction of the arrow, to be successively connected to a common conducting ring 11. There is also provided an additional insulated segment 12 which is adapted to be connected by a brush 13 to a common conducting ring 14. Each collector may be composed of several groups of segments 5 to 9 inclusive and 12, either connected to the same or different apparatus, as desired, the greater the number of groups the smaller the arc necessary to be traversed by the brushes to complete cycle of operations. The collector in the accompanying drawing shows in dotted lines, the positions of the additional segments required to make up the three additional groups. The circuit connections of groups 2, 3 and 4 being identical with and pref-

erably connected to the same apparatus as group 1, are omitted to avoid confusion.

The insulated segments 5 to 9 inclusive, are connected to the movable contacts of a set of pole changers 15, 16, 17, 18 and 19 respectively, which make up a current control means for a divided source of energy 20 whereby the character of the impulses produced is determined as will be hereinafter explained. The pole changers 15 to 19 inclusive, are selectively controlled to connect either positive or negative current to the insulated segments 5 to 9 inclusive, by any suitable means as, for example, the well-known selecting apparatus controlled by keys arranged in the form of the ordinary typewriter keyboard, or by any of the well-known automatic devices whose operation is controlled by a perforated paper tape or the like. Preferably the apparatus which controls the pole changers also effects the movement of a line switch 21, moving a contact 22 thereof from a fixed contact 23 to a fixed contact 24. It also operates a starter switch 30 whose function will be hereinafter explained.

The movable contact 22 of line switch 21 is connected to a transmission line L and through a suitable resistance 31 to a pair of relays 32 and 33, while the fixed contact 24 of this switch is joined to the common ring 11 of collector A which is grounded as shown. The fixed contact 23 of switch 21 is likewise joined to the same terminals of the relays 32 and 33 as is the resistance 31. Relays 32 and 33 are polarized so that each responds to current impulses of a certain character. In the particular system shown, relay 32 is positively polarized while relay 33 is negatively polarized. These polarized relays coöperate with the distributing apparatus B to control such apparatus in the performance of its functions. This apparatus, like the current collector, consists of a number of groups of insulated segments 35, 36, 37, 38 and 39, there being as many groups of these segments as there are groups of segments on the corresponding current collector A. Preferably each of the segments 35 to 39 inclusive, of each group is grounded through the winding of an electromagnet 45, 46, 47, 48 and 49 respectively, which, in their operation, may control any desired form of selecting apparatus as, for example, the character and operation selecting mechanism of a printing telegraph receiver. Of course, it will be readily understood, however, that if multiplex operation is desired the segments of the several groups will be connected to electromagnets of different selecting apparatus, just as the groups of segments of collector A will be connected to different current control means. A rotating brush 50, when moved in the direction of the arrow, successively interconnects the segments 35 to 39 inclusive, and a common conducting ring 51.

Brushes 10 and 13 of current collector A are insulatively carried by a rotatable arm 53, the movement of which is accomplished through the agency of a ratchet wheel 54 and a pawl 55. Pawl 55 is pivotally carried on one free end of a pivoted armature lever 56, the other free end of which is adapted to be attracted by an actuating electromagnet 57. A suitable spring 58 returns the pawl and armature lever to their normal position when electromagnet 57 is deënergized, in the structure disclosed the brushes being moved forward upon the deënergization of this electromagnet and normally resting upon the first segment of one of the groups. The winding of electromagnet 57 is connected to a grounded source of energy 60 and to armature lever 56. It is also connected to an armature 61 of a control relay 62. This control relay, in addition to armature 61 is provided with an armature 63 connected to the movable contact of the starter switch 30, the fixed contact of which is grounded, and adapted to coöperate with a pair of fixed contacts 64 and 65. Contact 64 is connected to a contact 66 coöperating with armature lever 56, and fixed contact 65 is connected to segment 12 of collector A and one terminal of the winding of relay 62, the other terminal of which is connected to the grounded source of energy 68. Armature 61 of relay 62 coöperates with a front contact which is grounded.

The brush 50 of the distributing apparatus B is insulatively carried by a rotatable arm 70 adapted to be moved by a ratchet wheel 71 and a coöperating pawl 72. The pawl 72 is pivotally carried by an armature lever 73 of an actuating electromagnet 74, and like the pawl 55, moves its coöperating arm 70 upon the deënergization of electromagnet 74 through the agency of a suitable spring 75. The normal position of brush 50 is such as to interconnect the first segment of a group and ring 51.

Polarized relay 32 is provided with two armatures 80 and 81. Armature 80 is connected to a grounded source of energy 82 and coöperates with a front contact connected to a common conducting ring 51 of the distributing apparatus B. Armature 81 is connected to ground and one terminal of the relay 32 and coöperates with a front contact connected to one terminal of the winding of the electromagnet 74, the other terminal of which is connected to a grounded source of energy 85. Relay 33 is provided with one armature only which is grounded and connected to one terminal of this relay and coöperates with a front contact connected to the same terminal of the winding of

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electromagnet 74 as is the front contact cooperating with armature 81 of relay 32.

The operation of the system and mechanisms, when used as a combined impulse transmitter and effect distributer, is as follows, it being understood that the station at the distant end of the transmission line L is provided with polarized relays similar to 32 and 33 and distributing apparatus similar to B. The distant station may, for the purpose of communication, be likewise provided with current control means and one or more current collectors similar to A, although it will be readily understood that this apparatus is unnecessary for the proper receipt and distribution of current impulse effects.

When the keyboard or the automatic selecting apparatus affects the pole changers 15 to 19 inclusive, reverses the connection of line switch 21 and closes starter switch 30, a circuit is completed from grounded source 60, through electromagnet 57, armature lever 56, contacts 66 and 64, armature 63 and switch 30 to ground, energizing electromagnet 57. The first impulse is of positive or negative polarity, depending upon whether the movable contact of pole changer 15 remains against the right-hand contact or is moved to the left-hand contact thereof, and finds a path to transmission line L in parallel with resistance 31 and the polarized relays 32 and 33 through contacts 24 and 22 of line switch 21. The energization of electromagnet 57 rotates armature lever 56 about its pivot against the tension of spring 58; advancing the pawl 55 into a position to engage the next tooth on the ratchet wheel 54. The movement of armature lever 56 likewise interrupts the circuit previously traced by disengaging itself from contact 66, whereupon electromagnet 57 is again deënergized. The retraction of armature lever 56 and pawl 55 by spring 58 advances arm 53 one step, whereupon brush 10 moves to a position where it interconnects segment 6 and ring 11. The first impulse is thereby terminated because of the breaking of the previously traced circuit from source 20, a no-current interval is produced by the insulation between segments 5 and 6 and the second impulse is initiated by the completing of a new circuit for source 20 through pole changer 16 and segment 6.

The second impulse is controlled by the condition of pole changer 16 and is terminated by the subsequent movement of arm 53, caused by the second automatic energization and deënergization of electromagnet 57. This self-interrupting action of the electromechanical actuating system for current collector A continues, resulting in the production of successive current impulses until brush 13 interconnects segment 12 and ring 14, in which condition of the collector the last impulse of a cycle is initiated, whereupon a new condition arises which will be presently explained.

When brush 10 is interconnecting segment 5 and ring 11, a positive or negative current will flow as hereinbefore described. If the impulse is of positive polarity, relay 32 alone will be energized. The attraction of armature 80 of this relay completes a circuit from grounded source 82, through ring 51, brush 50, segment 35 and electromagnet 45 to ground, whereupon electromagnet 45 performs its function in the selecting apparatus. The attraction of armature 81 closes a circuit including the grounded source 85 and electromagnet 74, causing this electromagnet to move armature lever 73 and pawl 72, so that the pawl is advanced into a position to engage the next tooth on ratchet wheel 71. The first impulse from battery 20 is terminated when pawl 55 moves brush 10 from segment 5, as hereinbefore described, whereupon relay 32 is deënergized, opening the previously traced energizing circuits for electromagnets 45 and 74. The deënergization of electromagnet 74 allows spring 75 to advance pawl 72 so that the brush 50 interconnects segment 36 and ring 51. If the first impulse however, had been negative instead of positive, relay 33 only would have been energized, and since this relay can have no coöperative relation with the electromagnets 45 to 49 inclusive, the selecting apparatus would remain inactive, the only effect being the energization and deënergization of electromagnet 74, resulting in the forward step of arm 70, as hereinbefore described. As brush 10 moves step-by-step over the remaining segments 6 to 9 inclusive, positive or negative impulses, depending upon the condition of pole changers 16 to 19 inclusive, are impressed upon transmission line L and the polarized relays 32 and 33. Whenever an impulse is positive, relay 32 is operated, resulting in the energization of the corresponding electromagnet 46 to 49 inclusive, and the step-by-step movement of arm 70. When, however, any impulse is negative only relay 33 is operated, resulting merely in the step-by-step movement of arm 70.

When arm 53 is in such a position that brush 10 interconnects segment 9 and ring 11, brush 13 is interconnecting segment 12 and ring 14, whereupon a circuit is completed from grounded source 68, control relay 62, segment 12, brush 13 and ring 14 to ground. Relay 62 pulls up its armatures 61 and 63, armature 61 completing a circuit for electromagnet 57 causing pawl 55 to be advanced ready to move arm 53 an additional step to the first segment of the next group when the circuit is interrupted.

Armature 63, by moving from contact 64 to contact 65, completes a holding circuit for control relay 62 through starter switch 30, and interrupts the energizing circuit for actuating electromagnet 57 as long as the starter switch is closed. This arrests the step-by-step movement of arm 53 and prevents the inadvertent repetition of a given combination of impulses, necessitating that starter switch 30 at least, be opened and again closed between each group of impulses. The opening of switch 30 deënergizes relay 62 whereupon the circuits of electromagnets 57 and 74 are opened allowing pawls 55 and 72 to move their respective brushes forward to the first segment of the next group and the apparatus is again in normal position ready to begin a new cycle of operations.

The operation of a distributing and selecting apparatus such as B, and the electromagnets 45 to 49 inclusive at the distant station, or the operation of this apparatus in the station shown by impulses arriving over line L instead of from source 20, is the same as hereinafter described. In this case, however, the current collector A and its actuating mechanism and the pole changers 15 to 19 inclusive remain inactive.

What is claimed is:

1. A selecting system comprising current-polarity control means, a revoluble step-by-step current collector coöperating therewith to form a succession of polarity-selective current impulses, and a step-by-step current distributing apparatus controlled by the current impulses so produced.

2. A selective system comprising current polarity control means, a current collector coöperating therewith, an electromagnet for effecting the intermittent operation of said collector to form a succession of current impulses of unvaried number but selectively variable polarity, current distributing apparatus, and an electromechanical actuator therefor controlled by the current impulses so produced.

3. A selecting system comprising electromechanical selecting apparatus, distributing apparatus to deliver current thereto, a plurality of polarized relays each controlling the action of said selecting and said distributing apparatus, current control means for determining the character of each impulse, and an electromechanical current collector coöperating with said means to form a succession of impulses to act upon said relays.

4. A selecting apparatus comprising a current impulse collector, an electromagnet for providing an intermittent movement therefor, current control means for determining the character of the impulses and coöperating with said collector to form a succession of impulses of selectively variable polarity, and a current distributing apparatus controlled by the current impulses so produced.

5. A selecting mechanism comprising current-polarity control means, a current collector coöperating therewith to form a succession of current impulses of unvaried number, and a self-interrupting electromechanical system for giving a step-by-step movement to said collector.

6. A selecting mechanism comprising a current collector, electromechanical means for actuating said collector, a switch for initiating the operation of said means, and an electromagnetic device controlled by the current collector for arresting the operation of said means independently of said switch.

7. A selecting apparatus comprising a current impulse collector, means for actuating said collector, current control means for determining the character of each impulse and coöperating with said collector to form a succession of impulses of unvaried number, for effecting each character selection, and current distributing apparatus controlled by the current impulses so produced.

8. A selecting system comprising a current collector, electromechanical means for actuating said collector, said means being adapted to open and close its energizing circuit intermittently, current-control means coöperating with said collector to form groups of impulses of selectively variable polarity, the impulses of each group cooperating to produce one selection, and apparatus coöperating with said collector and said control means for controlling the operation of said electromechanical means.

9. A selecting system comprising a selecting mechanism, a transmission line for providing a selectable succession of current impulses of opposite polarity, a distributer adapted to be operated step by step, a plurality of relays each responsive to line current impulses of different character and cooperating with said distributer and said mechanism whereby said mechanism is controlled by the polarity of the line impulses, and an electromechanism controlled by the line current impulses and coöperating with said relays for stepping said distributer in unison with said impulses.

10. A selecting system comprising a selecting mechanism, a transmission line for providing a selective succession of current impulses, a distributer for delivering current to said mechanism, and an electromechanical actuator for giving a step-by-step movement to said distributer, said actuator being controlled by all of the line current impulses, and said mechanism being actuated only by impulses of a given polarity.

11. A selecting system comprising current polarity control means, a current collector

coöperating therewith, an electromagnet for effecting the intermittent operation of said collector to form a succession of selective current impulses of variable polarity, current distributing apparatus, and an electromechanical actuator therefor controlled by the current impulses so produced.

In witness whereof, I hereunto subscribe my name this 26th day of March, A. D. 1915.

AMOS F. DIXON.

Witnesses:
E. EDLER,
K. L. STAHL.