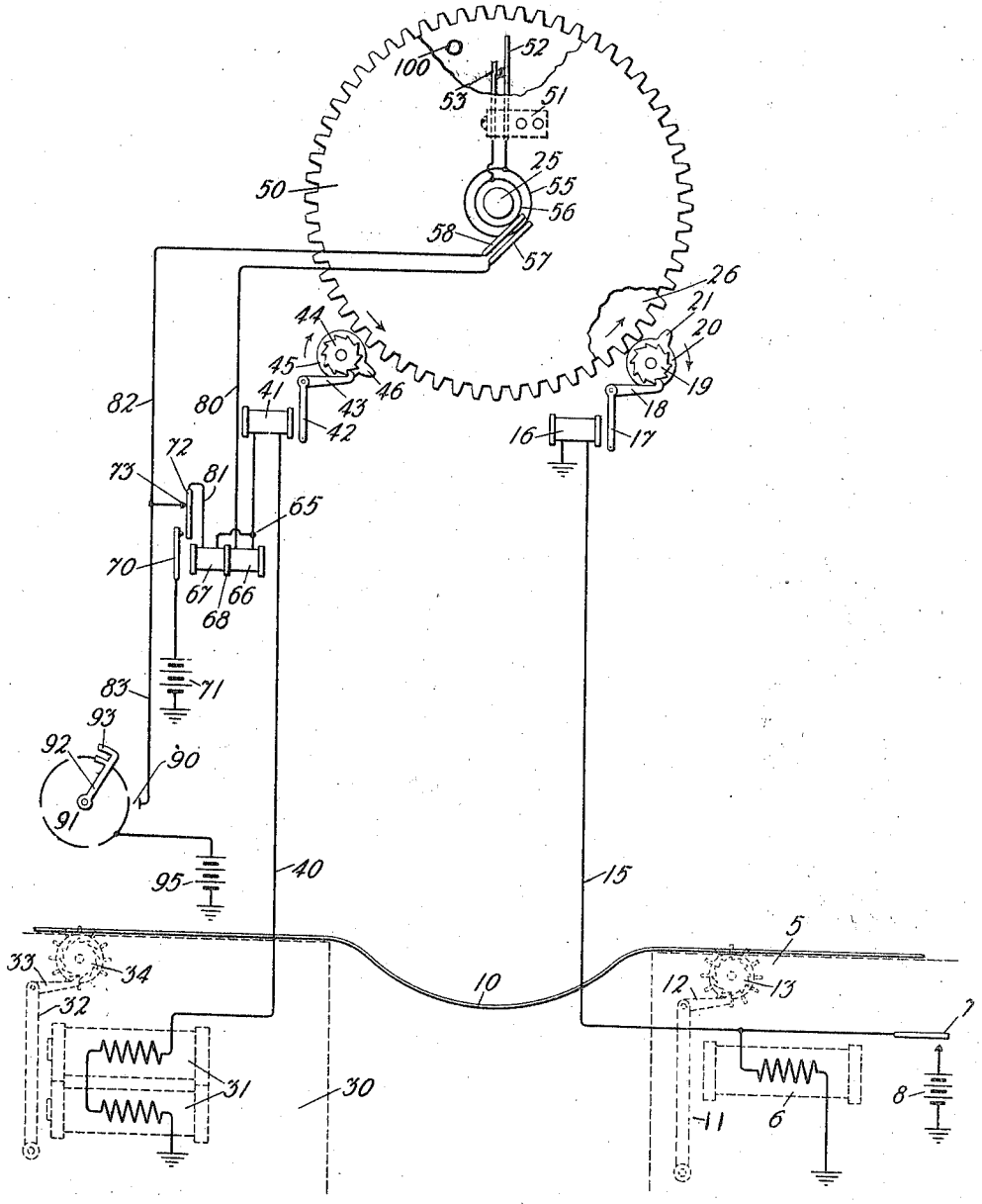
A. F. DIXON.

CONTROLLING SYSTEM.

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1,264,378.

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Witnesses:
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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.

CONTROLLING SYSTEM.

1,264,378. Specification of Letters Patent. Patented Apr. 30, 1918.

Application filed March 16, 1914. Serial No. 825,108.

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 a certain new and useful Improvement in Controlling Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to controlling systems of the type wherein the actuation of one mechanism is automatically governed by the persistence of operation of another independent mechanism, and its principal object is to provide a system of this type which performs its function independently of the condition of any material upon which the mechanisms are operating.

To this end a system is provided wherein one operating mechanism controls the movement of a member or series of members and a second operating mechanism controls the movement of a second member or series of members, the members or series of members coöperating to regulate the operation of the second mechanism.

The above and other objects of the invention will be fully set forth in the following description and claims, and will be more readily understood by reference to the accompanying drawing in which the invention is shown diagrammatically.

The invention is shown arranged to control the feed of a paper tape such as is used in automatic telegraphy where it finds a ready use in preventing the mutilation of feed openings and the consequent interruptions in service. It has been found in automatic telegraphy, where the tape is being passed directly from the perforator to the transmitter, that if the operation of the perforator is interrupted or slowed down, the tape may not be supplied to the transmitter in sufficient quantities to keep it from becoming taut, and the feeding action continuing, feed openings will be torn out and the further progress of the tape will be prevented, resulting in an erroneous transmission of signals. It is also important that no disturbing action be brought to bear upon the transmitter during the transmission of the impulses composing a character, but that such action take place after a combination of impulses has been imparted to the line. In the illustrated embodiment of the system, therefore, the operating mechanisms are represented diagrammatically as a keyboard perforator and an automatic tape controlled signal transmitter, such as used in multiplex printing telegraphy, while the medium operated upon by these mechanisms is a paper tape.

The perforator 5, among other things, comprises an electromagnet 6, a contact maker 7 and a tape feeding device. No detailed illustration or description of the perforator is necessary since any of the well known electromagnetic types may be used. Suffice it to say that the contact maker 7 is closed by the depression of each punch selecting key to complete a circuit for a source of energy 8, through the coil of magnet 6. The energization of magnet 6 not only forces the selected punches through a blank paper tape 10, but the attraction of its armature 11 causes the actuation of a pawl 12 and a toothed wheel 13 by means of which the tape is advanced step-by-step to present an unperforated surface to the punches. Joined in parallel with the coil of magnet 6 by conductor 15 is an electromagnet 16. Electromagnet 16 is provided with a movable armature 17 pivotally carrying an actuating pawl 18. The pawl 18 on its forward stroke engages the teeth of a ratchet 19 which is rotated thereby in the direction of the arrow. In rotating, the ratchet 19 carries with it a wheel 20 provided with a single gear tooth 21. Riding upon a shaft 25 is a wheel 26 provided with teeth on its circumference which are adapted to be engaged by the tooth 21 of wheel 20. Ratchet 19 is provided with ten teeth and it will be readily understood that upon each closing of contact maker 7 the ratchet 19 and wheel 20 will move one step, and that on each tenth step tooth 21 will engage one of the teeth of wheel 26 which is thereby rotated one step in the direction of the arrow. This ratio of movement between ratchet 19 and wheel 26 may be altered to suit any conditions without departing from the spirit of this invention.

The tape 10 passes directly from the perforator 5 to the transmitter 30 which may be constructed like any one of several well known types. It is provided with an actuating magnet 31 which, in addition to coöperating with the tape in controlling the action of circuit devices (not shown), provides for the step-by-step drawing or feed-

ing of the tape. This is accomplished by means of an armature 32, pawl 33 and feed wheel 34.

The coils of magnet 31 are connected to ground and by a conductor 40 to a magnet 41. This magnet is similar in all respects to magnet 16, and through the agency of its armature 42 and pawl 43 causes the step-by-step rotation of a ratchet 44, likewise provided with ten teeth. Ratchet 44 carries with it a wheel 45 which like wheel 20 has only one tooth 46. This tooth is adapted to engage the teeth on the circumference of a wheel 50, which also rides on shaft 25, so that for every ten steps of ratchet 45, wheel 50 is rotated one step in the direction of the arrow.

A bracket 51 secured to wheel 50 carries a pair of contact springs 52 and 53 which are connected to slip rings 55 and 56 respectively. A pair of brushes 57 and 58 bear upon the slip rings 55 and 56 respectively so that the rotating springs 52 and 53 may be connected in a circuit to be presently described.

The circuit for magnet 41 is continued to a point 65 where it divides and passes in parallel through the windings 66 and 67 of a relay 68. The windings 66 and 67 are arranged differentially so that when current is passing through both, an armature 70 will not be attracted, but when current is passing through only one winding, the armature will be drawn up. Armature 70 is connected to a source of energy 71 and is normally out of engagement with a movable contact 72 but is adapted to make contact therewith under conditions to be hereinafter described. Movable contact 72 normally engages a fixed contact 73 but is arranged to be separated therefrom when engaged and moved by armature 70. One terminal of winding 66 is joined to brush 57 by a conductor 80 and one terminal of winding 67 is joined to the movable contact 72 by a conductor 81. Conductor 82 interconnects fixed contact 73 and brush 58 and is continued by conductor 83 to one of a pair of contacts 90. Contacts 90 are located on a distributer 91 of a type well known in multiplex telegraphy whose rotating arm 92 carries a pair of trailing brushes 93. Once during each revolution of arm 92, after the character controlling impulses are transmitted, the brushes 93 interconnect contacts 90 to actuate the tape feeding mechanism of the automatic transmitter 30 from a source of energy 95. This method of driving a transmitter from a distributer is well known in the art. The circuit for accomplishing this movement is from grounded source of energy 95, brushes 93 and contacts 90, conductor 83, then in parallel to the point 65 by (first) conductor 82, brush 58, ring 56, springs 53 and 52, ring 55, brush 57, conductor 80 and winding 66, and (second) contacts 73 and 72, conductor 81 and winding 67, thence to magnet 41, conductor 40, coils of transmitter magnet 31 to ground. It will be apparent that upon each energization of the transmitter magnet 31, the magnet 41 is also energized and the ratchet 44 is advanced one step. It will also be observed that by the circuits, hereinbefore traced, current at such times is flowing through both windings of relay 68 and its armature 70 remains unattracted.

The wheel 26 is provided with a pin 100 projecting into the path of and adapted under certain conditions to be engaged by spring 52 and thus separate this spring from spring 53. This condition obtains when wheel 26 ceases to rotate or rotates less rapidly than wheel 50.

In operation magnets 6 and 16 are energized upon each depression of a perforator key by the closing of contact maker 7. Magnet 6 advances the tape 10 and magnet 16 advances ratchet 19 and wheel 26 as hereinbefore described. Upon each revolution of the arm 92 of distributer 91, if springs 52 and 53 are in engagement, transmitter magnet 31 and magnet 41 are energized, causing the drawing of tape 10 and the advance of ratchet 44 and wheel 50, as previously explained. This action will continue as long as the perforator is being operated rapidly enough to keep wheel 26 revolving as fast as wheel 50, so that pin 100 remains ahead of spring 52. When, however, the perforator stops or its action is sufficiently delayed, while the transmitter is allowed to run, spring 52 will overtake pin 100 and will be separated from spring 53. Now, upon the next revolution of distributer arm 92 the impulse from grounded source of energy 95 will pass through brushes 93, contacts 90, conductor 83, contacts 73 and 72, conductor 81, winding 67 of relay 68, magnet 41, conductor 40 and coils of magnet 31 to ground. Current flowing through only one winding of magnet 68 causes the attraction of its armature 70, whereupon the contacts 72 and 73 are separated and a holding circuit is established from grounded source of energy 71, armature 70, contact 72, conductor 81, winding 67, magnet 41, conductor 40 and coils of magnet 31 to ground. This holding circuit prevents the further actuation of the transmitter magnet 31 and the drawing of the tape will cease. If the perforator is again set in motion, the wheel 26 will be rotated and springs 52 and 53 will become reëngaged. Now, upon the next rotation of distributer arm 92, when the contacts 90 are bridged by brushes 93, an impulse from the source of energy 95 will flow through conductors 83 and 82, brush 58, ring 56, springs 53 and 52, ring 55, brush 57, conductor 80,

winding 66, magnet 41, conductor 40 and the coils of magnet 31. It will be observed that current is now flowing through both windings of relay 68, which thereupon becomes deënergized and its armature 70 is released. Hereafter as long as the springs 52 and 53 are together, the impulses from the source of energy 95, governed by distributer arm 92, will effect the advance of the tape 10 and the wheel 50. It is apparent that, since the stopping and starting of the transmitter occurs during the interval between the times of imparting the selecting impulses, there will be no tendency to transmit false combinations of signals. The minimum amount of slack tape between the perforator and transmitter may be varied to suit any conditions and when this minimum is reached, the transmitter will automatically cease, to be automatically started again when a surplus of tape, above this amount, is provided.

What is claimed is:

1. A controlling system for printing telegraphs comprising a tape perforator, a tape controlled transmitter, and separate independent mechanisms actuated by said perforator and said transmitter independently of the tape coöperating to stop the action of said transmitter when said perforator stops or its action is tardy.

2. In a controlling system, the combination of a machine, a movable member controlled thereby, a second machine, a second movable member controlled by said second machine, and switch elements carried by one of said members and controlled by the other said member, said switch elements being adapted when disengaged to effect a retardation of the movement of said second machine, for allowing variations in the speed of said machines in only one direction under certain conditions and variations in both directions under other conditions.

3. In a controlling system, the combination of two independently operable machines, separate independent mechanisms actuated by said machines, contact spring members carried by one of said mechanisms, means provided by the other of said mechanisms for causing the engagement and disengagement of said spring members, and means controlled by said spring members when disengaged for retarding the movement of one of said machines whereby the amount of operation of one of said machines may be unlimited and the amount of operation of the other of said machines may not exceed the amount of operation of the said first mentioned machine.

4. A controlling system comprising two independently operable machines, the rotation of one of which is to be controlled, separate independent rotating mechanisms actuated by said machines and adapted to rotate in the same direction, normally closed contact members carried by the mechanism operated by the controlled machine, and contact disengaging means located on the other of said mechanisms in the path and ahead of said contacts in the direction of rotation, said disengaging means being adapted to open said contacts when the former mechanism rotates faster than the latter mechanism, and means controlled by said contacts to retard the operation of the controlled machine during the disengagement of the contacts.

In witness whereof, I hereunto subscribe my name this 13th day of March, A. D. 1914.

AMOS F. DIXON.

Witnesses:
E. Edler,
N. E. Tuthill.