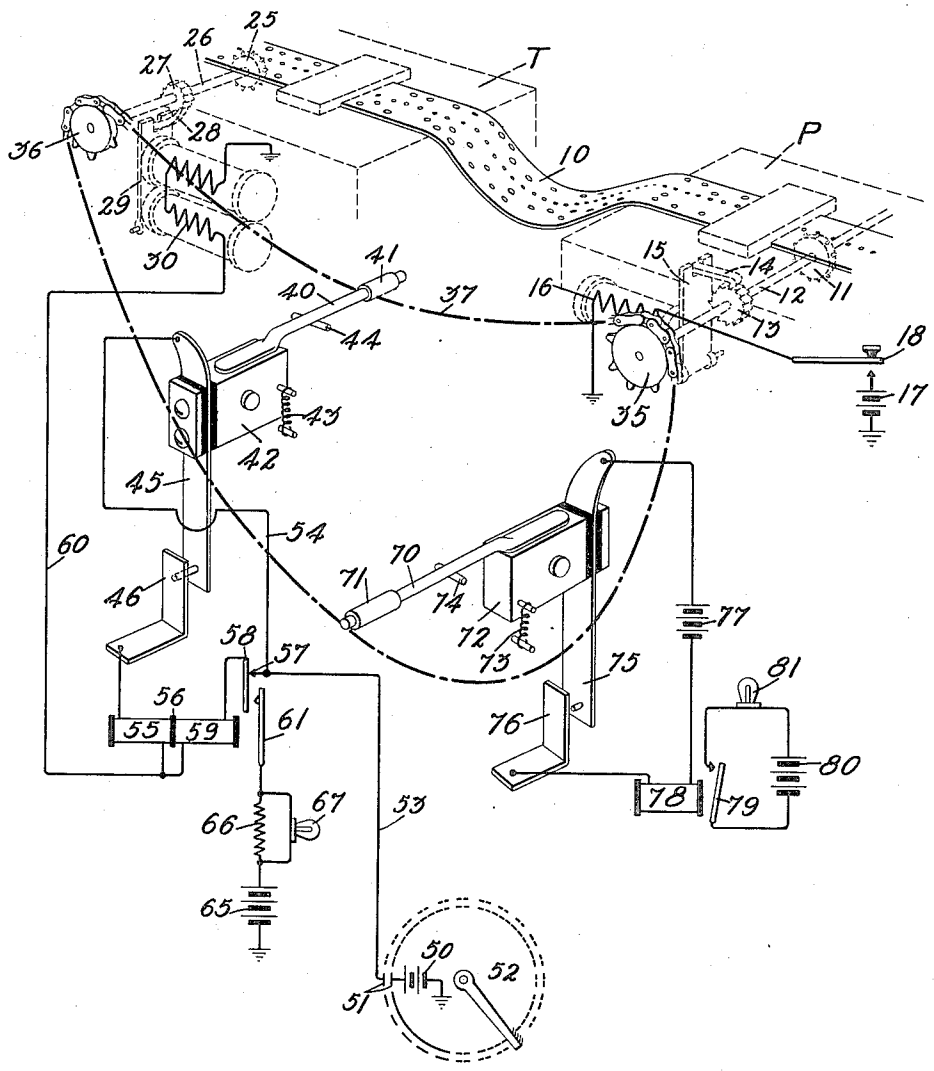
E. W. ADAMS.

CONTROLLING SYSTEM.

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CONTROLLING SYSTEM.

1,202,952. Specification of Letters Patent. Patented Oct. 31, 1916.

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To all whom it may concern:

Be it known that I, EDGAR W. ADAMS, a citizen of the United States, residing at 71 Haverstock Hill, Hampstead, London, England, have invented certain new and useful Improvements in Controlling Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to a system of apparatus for controlling or indicating the relative speeds or difference in speed between the feed mechanisms of two machines.

The apparatus of the invention is particularly applicable to an arrangement wherein two or more machines are adapted to successively act upon a band of material passing between them. In arrangements of this character if one machine feeds the band faster than it is being supplied by another, and the action of the first machine is not controlled, the tension or strain on the band may become sufficient to tear or mutilate it. On the other hand, if one machine supplies the band at a faster rate than it is being acted upon by a second machine, an undesirable accumulation of the band between the machines will result.

The principal object of the present invention is, therefore, to overcome these difficulties by automatically stopping the feeding of the band before a strain thereon, due to the slower feeding of a supplying machine, reaches an undesirable amount, and to automatically stop the supplying machine upon an undue accumulation of the band between machines when one supplies faster than another is using, or to indicate the presence of either or both of these conditions.

In accordance with the present invention, a medium independent of the band of material acted upon, such as an endless band, belt or chain, is passed over two sprockets or toothed wheels, one of said wheels being driven in exact synchronism with the feed wheel of the supplying machine, and the second of said wheels being driven in exact synchronism with the feed wheel of the second machine. If the second machine feeds faster than the supplying machine after a time which can be regulated by the initial slackness of the belt between the wheels, the belt will become taut on the upper side of the wheels. When the belt thus becomes taut, or approaches its taut position, it is arranged to operate a lever which affects the electrical circuit arrangements in such a manner as to give an indication or stop the second machine. Similarly, if the supplying machine feeds faster than the second, the belt will become taut on the lower side of the wheels and will operate a lever for controlling the stoppage of the supplying machine or a signal to indicate that such machine should be stopped.

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 apparatus and circuit connections are shown diagrammatically.

If the invention forms an element of an automatic telegraph system, in which field it will be found most useful, it may be employed to control and indicate the condition of a perforated band of material 10 passing between and acted upon by a keyboard tape perforator P and an automatic current impulse controlling transmitter T. Since neither the perforating nor current controlling portions of these machines enter directly into the operation of the invention, none of their details, except the tape feeding elements, are shown. In the perforator the tape is fed through the agency of a toothed feed wheel 11, whose teeth coöperate with a centrally disposed row of openings therein, to insure its uniform advancement. Wheel 11 is carried by a shaft 12 to which is secured a ratchet wheel 13. Ratchet wheel 13 coöperates with a pawl 14, carried by an armature 15 of an electromagnet 16. Electromagnet 16 is energized by current from a grounded source of energy 17, when a switch 18, preferably controlled in any suitable manner by the punch controlling mechanism of the perforating machine, is closed.

In the transmitter, the tape feeding wheel 25 is carried by a shaft 26 which is also provided with a ratchet wheel 27. Ratchet wheel 27 coöperates with a pawl 28 carried by an armature 29 of an electromagnet 30, to which current is intermittently supplied to effect the feeding of the tape passing between the perforator and transmitter.

To control or indicate the condition of tape 10 in its passage between the perforator P and the transmitter T, shafts 12 and 26 are extended and provided with wheels 35 and 36, respectively. Intercon-

necting these wheels is an endless band 37. In order to prevent any slipping between the band 37 and its coöperating wheels 35 and 36, the surfaces of the wheels may be roughened or preferably toothed and the band may be in the form of a chain. It will therefore be obvious that when the perforator runs slower than the transmitter, slack will accumulate in the lower run of the chain while the upper run will lose its slack and approach a taut condition. When, on the other hand, the perforator runs faster than the transmitter, the slack accumulates in the chain's upper run and the chain approaches tautness in its lower run. Thus, the condition of the band or chain 37 may indicate the condition of band 10, since the two bands move at the same speed. By providing suitable circuit connections, signals may be displayed to indicate the above conditions or movement of the machines may be automatically controlled.

Above the upper run of chain 37 and adapted to be engaged thereby is a lever 40 provided with a friction reducing device 41. Lever 40 is carried by a pivoted block 42 and is normally held by a spring 43 against a stop 44. Block 42 insulatively carries a switch contact spring 45 normally engaging a companion spring 46. These contact springs, however, may be separated when the upper run of chain 37, becoming taut, elevates lever 40 against the tension of spring 43.

If the controller is operating in connection with a multiplex telegraph system, current may be intermittently supplied to electromagnet 30 from a grounded source of energy 50, through local segments 51 and the brushes of a rotary current distributer 52 of the usual type. When the brushes interconnect segments 51, current flows through a conductor 53 and then in parallel through a conductor 54, contact springs 45 and 46 and a winding 55 of a relay 56, and a back contact 57, movable contact 58 and a winding 59 of relay 56 to conductor 60, and from thence through electromagnet 30 to ground. Windings 55 and 59 of relay 56 are differentially arranged so that when equal currents are flowing through them their effects are neutralized and an armature 61 is not attracted. Armature 61 is connected to a grounded source of energy 65 through parallel paths comprising a resistance 66 and a signal lamp 67. As long, therefore, as contact springs 45 and 46 are in engagement, whenever the brushes of distributer 52 interconnect segments 51, current momentarily flows from source 50 through the previously traced circuits through electromagnet 30, and bands 10 and 37 are advanced a step. When, however, the upper run of band 37 becomes sufficiently taut, due to the stoppage or slowness of the perforator feed, lever 40 is raised and contact springs 45 and 46 are separated. Upon the next interconnection of segments 51, the path through winding 55 of relay 56 being opened, all of the current from source 50 flows through winding 59 which results in the attraction of armature 61. The attraction of this armature breaks the circuit between back contact 57 and movable contact 58 of relay 56, and completes a circuit from source 65 through resistance 66 and signal 67, armature 61, movable contact 58, winding 59, conductor 60 and electromagnet 30 to ground. Electromagnet 30 remains continuously energized by the current in this circuit and is unresponsive to the interconnection of segments 51 as long as the upper run of band 37 is sufficiently taut to hold contacts 45 and 46 separated, and signal 67 gives a warning of the condition of the bands. When, however, there is an accumulation in the upper run, sufficient to allow spring 43 to depress lever 40 and cause the reëngagement of contacts 45 and 46, the next interconnection of segments 51 causes a flow of current through conductors 53 and 54, contacts 45 and 46, winding 55 of relay 56, conductor 60 and electromagnet 30 to ground. This current being made equal to the current flowing through winding 58 from source 65, causes relay 56 to release its armature 61, opening the previously traced holding circuit from grounded source 65, and reëstablishing the parallel circuit for source 50. The hereinbefore described intermittent feeding action of electromagnet 30 now can proceed as before the interruption occurred. The cooperation of chain 37 and lever 40 can thus prevent an undue tautness in band 10, provided sufficient initial accumulation was allowed in the band between the perforator and transmitter.

Projecting above the lower run of chain 37 is the free end of a lever 70 provided with a friction-reducing device 71. Lever 70 is carried by a pivoted block 72 and is normally held by a spring 73 against a stop 74. Block 72 insulatively carries a switch contact spring 75 adapted to coöperate with but normally separated from a companion spring 76. When contact springs 75 and 76 are brought into engagement with each other, a circuit is completed from a source of energy 77 through a relay 78. Relay 78 is provided with an armature 79 which is adapted to complete a circuit from a source of energy 80 through a suitable signal lamp 81.

Normally the tension in spring 73 holds lever 70 against stop 74, and contact springs 75 and 76 are separated. When, however, the perforator feeds faster than the transmitter, the lower run of chain 37 approaches a taut condition, and sooner or later, depending upon the initial location of the end

of lever 70, will engage this lever and move contact spring 75 into engagement with spring 76. Relay 78 is thereupon energized by current from source 77 and, pulling up its armature 79, causes current from source 80 to flow through and operate signal 81. In this way, an undue accumulation of band 10, which is moving at the same speed as chain 37, may be prevented, and in connection with that part of the apparatus hereinbefore described, the feeding action of the perforator and transmitter may be kept within certain limits.

Instead of controlling the feed of the perforator manually and causing the tautness in the lower run of chain 37 to merely operate a signal, the feeding action may be made automatic, and tension in the lower run of the chain may cause the feeding action to be automatically stopped precisely as in the case of the transmitter. On the other hand, if desired, the simple signaling apparatus controlled by lever 70 may be substituted for the automatic stopping apparatus controlled by lever 40, and the feeding of the transmitter left to manual supervision.

The invention claimed is:

1. A controlling system comprising two machines adapted to act upon a band of material passing between them, a normally independent driving motor for each machine, means controlled by the two machines and simulating the condition of said band of material, and control influencing apparatus affected by said means.

2. A controlling system comprising two machines adapted to act upon a band of material passing between them, means controlled by the two machines independent of said band of material and simulating the condition of said band, and apparatus affected by the tension of said means to influence the control of the condition of said band.

3. A controlling system comprising two machines adapted to act upon a band of material passing between them, means controlled by each of the two machines and simulating the condition of said band of material, and control influencing apparatus affected by different portions of said means.

4. A controlling system comprising two machines adapted to act upon a band of material passing from one to the other, means for controlling the movement of said band, and a flexible medium independent of said band and controlled by said machines for affecting said means.

5. A controlling system comprising two machines adapted to successively act upon a band of material passing between them, a second band independent of the first and passing between and controlled by said machines, and means affected by the condition of said second band for controlling the passage of said first mentioned band.

6. A controlling system comprising two machines adapted to successively act upon a band of material passing between them, a second endless band independent of the first said band and also passing between and controlled by said machines, means controlled by the condition of one part of said second band for affecting the movement of said first mentioned band, and a signal controlled by the condition of another part of said second band for warning of a condition of said first mentioned band.

In witness whereof, I hereunto subscribe my name this 10th day of July, A. D., 1915.

EDGAR W. ADAMS.