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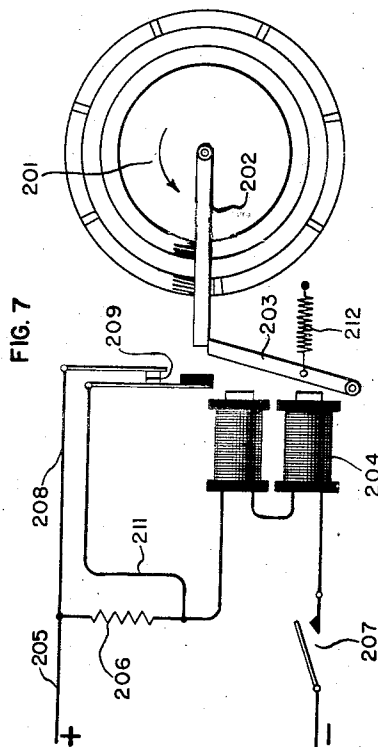
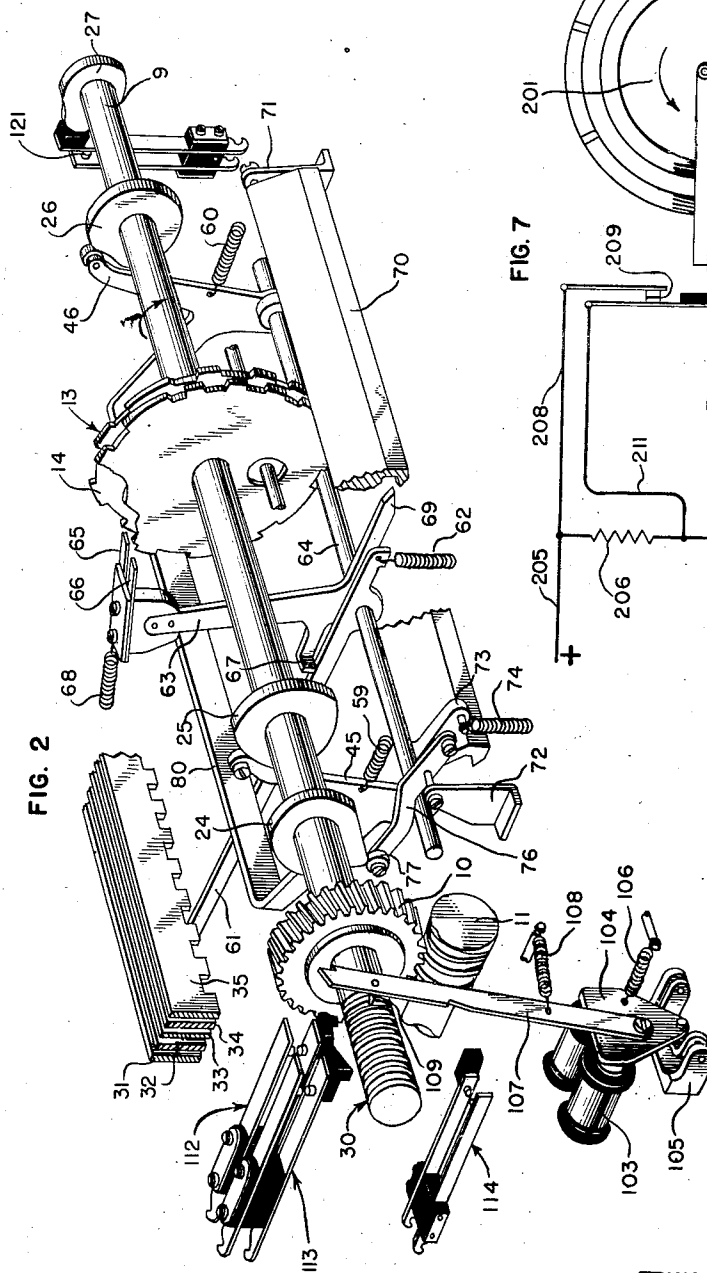
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TRANSMITTER

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TRANSMITTER

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The present invention pertains to printing telegraph transmitters and more particularly to control means therefor.

The principal object of the present invention is to provide a control circuit for electrically operated devices wherein the value of current is automatically controlled under different operating conditions.

Another object of the invention is to provide an improved arrangement for operating tape controlled facsimile transmitters more efficiently and economically.

A further object of the invention is to provide a means for controlling the current supplied to the stepping magnet of a tape transmitter.

Specifically, the present invention concerns the more effective control of a facsimile transmitter of the type disclosed in Patent No. 2,090,083 to E. F. Kleinschmidt. Briefly, the transmitter therein disclosed comprises a tape sensing device or record reader for sensing perforations in a tape perforated in accordance with a five-unit or Baudot code, which, through its electrical contacts, controls the energization of a plurality of electromagnets, one individual to each element of the permutation code. These electromagnets serve to control the selective position of permutation bars, which accordingly will be set in varying combinations in accordance with the code combination of perforations appearing in the perforated tape. The permutation bars for each permuted setting serve to select a pair of brushes. Individual to each pair of the brushes is a pair of code discs designed in accordance with a method of prescanning in which the characters or symbols to be transmitted are divided into any desirable number of sending units or areas. The several units and areas thus created are assigned in the order of scanning to the periphery of a code disc.

The code discs rotate continuously and the permutation bars are set permutably in response to the energization of electromagnets, as previously outlined. Energization of the electromagnets is under the control of a tape sensing mechanism which receives its operating impulse from a cam operated contact which is operated in timed relation with the rotation of the code discs. For each rotation of the discs and the indicated cam, an impulse is generated to effect the energization of an electromagnet of the tape sensing mechanism to withdraw its tape sensing fingers and advance the tape to present the next transverse row of perforations in alignment with the tape sensing elements of the sensing mechanism.

Under predetermined conditions, it is desired to arrest the operation of the transmitter or the tape sensing mechanism, and therefore, an arrangement under the control of the condition of the perforated tape is provided whereby the impulse generated cyclically through the operation of the transmitter pulsing cam will not be effective to energize the electromagnet of the tape sensing mechanism to withdraw the sensing fingers from cooperation with the tape and advance the tape.

In accordance with established practice, the tape is prepared by either a keyboard perforator or a signal controlled perforator and regardless of the manner in which the tape is prepared a section of tape intervenes between the perforator and the tape sensing mechanism. Dependent upon the condition of this intervening section of tape the impulse generated by the cam, which may be identified as the pulsing cam, is effective or ineffective.

Depending upon whether the tape between the perforator and the sensing mechanism is slack or taut, an electromagnet will be controlled for determining the position of an arm which is adapted to engage the threads of a continuously rotating screw; first, to engage and close contacts for establishing a condition to control the starting of the operating motor of the receiving printer at the receiving station, and second, to close contacts to render the impulse generated by the pulsing cam effective to permit operation of the tape sensing mechanism through the advancement of the tape to present the next transverse row of perforations in alignment with the sensing fingers and permit transmission of impulses in accordance with such transverse row of perforations. Such a condition prevails as long as the tape intermediate the perforator and the sensing mechanism does not become taut.

The present invention contemplates a new arrangement of tape transmitter pulsing mechanism. With the modified pulsing mechanism which controls the tape stepping mechanism of the tape transmitter, the tape stepping magnet is pulsed with one value of current and maintained during idle time of the system by a lower value of current. With the present invention, the control circuit for the tape transmitter is such that current is impressed on the tape stepping magnet during idle time of the transmitter as well as during operating intervals, said circuit having two resistances in series, and means comprising a screw and follower timing device and cam controlled instrumentalities for controlling, through

an electromagnetically operated switching device, the shunting in and out of one of said resistances to vary the value of current supplied to the tape stepping magnet. As previously mentioned, the pulsing of the tape stepping magnet to control the tape sensing function of the tape feelers is controlled by the pulsing cam carried on the end of the transmitting shaft, which also carries the facsimile transmitting discs. Since the shaft rotates continuously, the pulsing cam allows a contact in the circuit of the tape stepping magnet to open and close cyclically. This circuit contains two resistances to control the amount of current supplied to the tape sensing magnet. During operation of the tape transmitter, at which time the tape stepping magnet is pulsed cyclically by the rotation of the pulsing cam, it is desired to supply a higher value of current to the tape stepping magnet by shunting out one of said resistances. Mechanism according to the present invention is provided for controlling the switching in and out of said resistance. Moreover, the arrangement according to this invention increases the tape stepping margins and reduces the heating of the operating coils during idle time of the transmitter.

According to another embodiment of the invention, the control magnet of a distributor is protected against overheating by controlling the value of current supplied thereto during the initial operation thereof, as well as while the magnet remains energized during continuous operation of the distributor.

A more comprehensive understanding of the present invention may be had from the following description taken in conjunction with the accompanying drawings, wherein like reference characters represent similar parts throughout the several views, and in which;

Fig. 1 is a schematic view of certain elements of the transmitter operatively arranged with the tape sensing mechanism and control circuit for governing the pulsing of the tape stepping magnet of the tape transmitter mechanism;

Fig. 2 shows in perspective, elements of the transmitter adaptable for the achievements of the objects of the present invention;

Figs. 3, 4, 5, and 6 are views showing the various operating positions of the transmitter pulsing control mechanism; and

Fig. 7 is a schematic view of another embodiment of the present invention.

Having reference to the drawings, particularly to Fig. 2, it is noted that shaft 9 has secured thereto a pinion gear 10 which meshes with a worm gear 11 driven by power communicated from a continuously rotating motor (not shown). The relation between gears 10 and 11 is such as to cause rotation of shaft 9 at a speed calculated to effect the accurate and proper distribution of current impulses indicative of the characters to be transmitted. Secured also to shaft 9 are a plurality of code discs 13. These code discs, as best shown in the lower part of Fig. 1, are composed of a plurality of discs arranged in pairs; that is, a pair of code discs 13 constitute a unit, one disc of which corresponds to a lower case character, whereas the other disc corresponds to an upper case character.

Code discs 13 are designed according to a method of prescanning in which characters or symbols to be transmitted are divided into any desirable number of sending units or areas. The several unit areas thus created are assigned in order of scanning to the periphery of each of

the discs 13, the dark areas of a signal or message unit being the high surfaces 14 to engage a brush designed to cooperate therewith to send signal impulses. It is, of course, obvious that the depressed or reduced portions of the code discs 13 represent the light areas of the signal or message unit. Obviously, the light areas might be made to be high surfaces, depending upon the preferred method of transmission and of reproduction.

The term "mechanical prescanning" refers to the analysis of a character in the signals suitable for transmission and comparable to the scanning of the character. The production of the mechanical member or disc containing elements thereby correspond directly and individually to the signals and represents individual characters. For example, a character or letter may be prescanned by dividing its total area into a plurality of unit areas arranged in a predetermined number of vertical strips with a predetermined number of units within each strip. The character is thus divided into a plurality of strips laid out in a predetermined number of equal angular sectors on the discs 13, and each angular sector is divided into a predetermined number of angular units, each corresponding to a unit area of the corresponding vertical strips. The periphery of the code discs 13 is then laid out by recessing the corresponding disc unit sections of each sector whereby the respective unit areas are light; and where the units are dark, raised surfaces 14 are provided. With such a plan each of the code discs 13 is correspondingly developed.

From the foregoing explanation of the arrangement of the code discs 13, it is evident that the present invention contemplates a code disc for each character or symbol to be transmitted; that is, there will be a code disc 13 individual to each letter of the alphabet and each numeral or other special characters. These code discs, being secured to, but insulated from shaft 9, will rotate therewith continuously, and during their rotation, provided a selection has been established, will effect the transmission of signal impulses indicative of their allocated character.

The discs 13 are arranged in pairs, and being so arranged, it is necessary to interconnect a disc of each pair which, in turn, are connected to a collector ring 15 which is also secured to shaft 9. Likewise, other code discs of each of the pairs of code discs are interconnected and, in turn, are connected to a collector ring 16 which, as noted for collector ring 15, is also secured to shaft 9. Interconnection of the several code discs with the collector rings 15 and 16, respectively, is achieved through the provision of conductor rods 17 and 18. These rods 17 and 18 are parallel to shaft 9 and extend through the code discs 13 and are connected to alternate code discs of each pair of code discs. Rods 17 and 18 are as shown in Fig. 1 connected to collector rings 15 and 16, respectively.

In the operation of the transmitter constituting the present invention certain functional operations are required. Such functional operations are performed by cams 24, 25, 26, and 27 secured to shaft 9. These cams are positioned on shaft 9 with respect to each other and with respect to code discs 13 to perform their respective functions in timed relation with the other functional responses and the transmission of signal impulses as determined through the rotation of code discs 13. It is obvious, therefore, that the cams 24, 25, 26, and 27 may be oriented on shaft 9 with respect to each other to provide proper sequential opera-

tion in a manner fully contemplated by the present invention.

Positioned with respect to shaft 9 and the code discs 13 are a plurality of permutation bars 31, 32, 33, 34, and 35, one individual to each element of the code. According to the embodiment of the invention disclosed, a five-unit code is implied, and therefore there are five permutation bars, or one individual to each element or unit of the code. Operation of the permutation bars is attained through the arrangement of an electromagnet individual to each of the bars. Under such circumstances there are five electromagnets 37, 38, 39, 40, and 41. These electromagnets are selectively controlled from a tape sensing mechanism 43 and control, through their armature, a spring-held latch 44 which engages a shoulder formed on the upper edge of its permutation bar to hold it against the action of its individual spring (not shown).

The tape sensing mechanism 43, as is fully and completely disclosed in Patent No. 1,460,357 to E. E. Kleinschmidt of June 26, 1923, embodies a plurality of tape sensing fingers 47 which serve to set perforations in a tape 48, which has been perforated through the operation of a keyboard perforator or a signal controlled reperforator to form transverse rows of code perforations indicative of the characters or symbols of the message to be transmitted through the effectiveness of code discs 13. As is fully disclosed in the afore-mentioned patent No. 1,460,357, sensing fingers 47 are pivoted on a rod 49 and are movable about such rod by an electromagnet 50. Specifically, electromagnet 50, upon being energized, draws its magnetic yoke 51 to shift its core axially to push a nonmagnetic pivoted ball plate 52 against the five tape sensing fingers 47 and thus withdraw the sensing fingers 47 from engagement with the perforations in tape 48 and causes, following such withdrawal, the advancement of the tape through a ratchet and pawl mechanism (not shown) to present the next transverse row of perforations in alignment with the vertically projecting pins of the sensing fingers 47. The magnet core of the electromagnet 50 is, of course, so designed as to respond in well-known manner to the energization of said magnet, and said core is provided with nonmagnetic extensions which engage the bail 52.

Attached to and operated by each of the sensing fingers 47 is a contact spring 54. There being five sensing fingers 47, there are five contact springs 54 which cooperate with stationary contacts 55 to effect a circuit closure and cause, through the instrumentality of a battery, the energization of the electromagnets connected thereto; that is, electromagnets 37 to 41.

Assume, for example, that a sensing finger 47 encounters a perforation in tape 48. Through its contact spring 54 an energizing circuit for the electromagnets 37 to 41 connected thereto will be established. The electromagnet will be energized and latch 44 will be operated against the action of its spring to free the permutation bar individual thereto for action by its spring (not shown). Such permutation bar will be moved to the left as viewed in Fig. 1.

Under certain conditions of operation, it is desirable to prevent the operation of the tape sensing fingers 47, notwithstanding the fact that the electromagnet 50 may be energized cyclically. In order to achieve such a result, a control circuit for the transmitter pulsing mechanism is provided whereby, notwithstanding the fact that

the pulsing cam 27 rotates cyclically during idle time, a resistance will be introduced into the circuit which will reduce the current supplied to the magnet 50 and thus prevent its operation. On the other hand, when it is desired to operate the tape sensing mechanism under the control of the tape pulsing cam 27, said resistance will be shunted out automatically thereby increasing the current supply to the magnet 50 during each cyclic rotation of the pulsing cam 27. This arrangement will be described more fully herein-after.

As shown in Figs. 1 and 2, the lower edge of each of the permutation bars 31 to 35 is formed with a plurality of notches arranged permutably so that upon the permuted operation of electromagnets 37 to 41, corresponding operation of permutation bars 31 to 35 will result in an alignment of notches to effect the selection of one of a plurality of selectable bars 61. There is a selectable bar 61 individual to each pair of code discs 13. Each selectable bar 61 is individual to a brush carrier or support 63 (Fig. 2) carrying a pair of brushes 65 and 66 for each pair of code discs 13.

Each of the brush supports 63 has formed on one of its arms a horizontal projection 67 which lies in the path of its individual selectable bar 61, so that upon the operation of its bar 61, brush support 63 will be rotated in a clockwise direction about rod 64, as viewed in Fig. 2, against the action of its retractile spring 68; provided, however, the brush support 63 is at that instant free to move. As shown in Fig. 2, the brush support 63 has a horizontal extension 69 arranged with its end formed in a knife-like fashion to cooperate with a correspondingly shaped portion of a bail 70 which extends transversely of the code discs 13 and which is pivotally supported at its ends by brackets 71 and 72. Formed near the left-hand end of bail 70 is a projection 73 to which is attached a retractile spring 74 and a pivoted lever 76 which carries at its free end a cam roller 77 positioned to be operated cyclically by cam 24 which as previously described, is mounted on shaft 9. For each operation of cam 24, bail 70 will have its knife-shaped portion moved free of the correspondingly shaped projection 69 of the brush carrier 63 to release the brush carrier 63, whereupon it is restored to its normal position or the position shown in Fig. 2, by the action of its individual retractile spring 68.

Common to all selectable members 61 is a bail 80 which is pivotally mounted on rod 64 and which has vertically projecting arms 45 and 46 to which cam rollers operatively positioned with respect to cams 25 and 26, respectively, are secured. Retractable springs 59 and 60 are secured to arms 45 and 46, respectively. For each rotation of cams 25 and 26, bail 80 will be rotated counterclockwise, as viewed in Fig. 2, against the tension of springs 59 and 60 to move the selectable bars 61 free of the permutation bars 31 to 35 to permit their operation, and subsequently will release the selectable bars 61 to permit one of such bars to be selected through the alignment of a set of notches in permutation bars 31 to 35.

When the permutation bars 31 to 35 are positioned in various combinations in response to the permuted energization of electromagnets 37 to 41, a selectable bar 61 will be rotated about rod 64 by its spring 62 to engage projection 67 of brush carrier 63, since at this instance bail 70 is free of extension 69 of its brush carrier 63. The brush support 63 individual to the operated se-

selectable bar 61 will be moved against the action of its spring 68 to bring the brushes 65 and 66 into operative relation with respect to the pair of code discs 13 to which the operated brush support 63 is individual. Following the setting of the brush support 63, locking bail 70 is restored by its spring 74 to a position where it engages extension 69 of brush support 63 and holds such brush support in its set position. The selectable member 61 is thereupon free to be restored to its normal position out of cooperation with the permutation bar 31 to 35 through the action of bail 80, and thus the permutation bar may be reset to select either the same selectable bar or another selectable bar 61 identified with another pair of code discs 13. With such an arrangement it is possible to initiate a selection during the interval the brushes 65 and 66 are in engagement with the code discs 13 for the transmission of signal impulses characteristic of their peripheral formation.

Following the selection of a selectable bar 61 and the operation of the brush support 63, a cam (not shown) mounted on shaft 9 is effective to operate through a system of levers as fully disclosed in Patent No. 2,176,740 to E. E. Kleinschmidt of October 17, 1939, to restore each of the released permutation bars 31 to 35 to their normal position, or the position shown in Fig. 1, wherein the bars are held against the action of their individual springs by latches 44.

As previously described, a code disc 13 of each pair of code discs is connected to collector rings 15 and 16, respectively. Continuously in engagement with each of these rings are brushes 82 and 83, respectively (Fig. 1). These brushes are connected through electrical conductors to contacts 84 and 85. Cooperating with these contacts is a contactor 86 pivoted at one end and engaged at its other end with a rockable member 87. Secured to member 87 are two oppositely arranged bell crank levers 88 and 89 arranged to move member 87 to the left or right, depending upon whether bell crank lever 88 or bell crank lever 89 is operated, to cause corresponding movement of contactor 86 to engage either contact 84 or contact 85.

Operation of bell crank levers 88 and 89 is achieved through selector bars 90 and 91 individual thereto. Upon the selection and operation of either of the selectable bars 90 and 91 the bell crank lever 88 or 89 individual thereto will be operated and corresponding movements of member 87 will be effected in well-known manner. Specifically, the selectable bars 90 and 91 identified with the "figures" and "letters" or shift and unshift signal combinations, respectively, and in accordance with the selection of the bars 90 and 91, the bar 87 will be shifted to switch the arm 86 into contact with contacts 84 or 85 which will thereupon connect the collector ring 15 or 16 to the signal line, it being understood that certain of the bars 13 are connected to the collector ring 15 and other of the bars of discs 13 are connected to the collector ring 16, hence the effective circuit will depend upon the position of contactor 86, which, as shown in Fig. 1, is connected to a radio frequency transmitter 78 which may be of any well-known design.

Positioned near the entrance end of the tape sensing mechanism 43 is a mechanism commonly referred to as a taut tape switching mechanism which responds to the condition of the tape to exercise control functions. Such a mechanism,

as exemplified in Fig. 1, embodies a bracket to which a lever 93 is pivotally mounted on a shoulder screw 94. A pin 95 is also mounted in this bracket and serves to limit a clockwise rotation of lever 43. One arm of lever 93 extends transversely of the tape 48 and is arranged to be engaged by the tape if and when it becomes taut between the tape sensing mechanism and the perforator which functions to supply the perforated tape. The other arm of lever 93 extends vertically and is positioned such that its free end engages an insulated block secured to the free end of an electrical contact 96 which cooperates with an electrical contact 97 to control an electrical circuit which extends from battery, through a manually operated switch 99, contacts 96—97 and the windings of an electromagnet 103 to ground. Of course, with the switch 99 open, the circuit for electromagnet 103 will not be completed; also, with contacts 96 and 97 open and with switch 99 closed, the circuit of electromagnet 103 will not be completed. However, with the lever 93 in the position shown in Fig. 1, which is its position when the tape 48 is looped as shown, contacts 96 and 97 will be closed, and with switch 99 closed electromagnet 103 will be energized.

As disclosed in Fig. 2, electromagnet 103 has its armature 104 pivotally mounted in a bracket 105 and held in its released position by a spring 106. Pivotally attached to armature 104 is a vertically extending lever 107 which is moved to the position shown in Fig. 2, by a spring 108 which has one end secured to arm 107 and the other end secured to a fixed spring post. Secured near the free end of arm 107 is a pin or worm follower 109 which, when electromagnet 103 is energized, engages the threads of worm 30, which as disclosed in Fig. 2 is formed in the left-hand end of shaft 9.

The upper end of arm 107, as disclosed in Fig. 2, is beveled and is arranged during its movement from right to left, as viewed in Fig. 2, when electromagnet 103 is energized and when follower 109 will be in engagement with the thread of worm 30, to operate successively contacts 112 and 113. The contacts 112 and 113, as more fully disclosed in copending application Serial No. 371,358 filed December 23, 1940, by R. E. Zenner, function to generate signal conditions which will cause operation of the radio transmitter 78 to transmit to the radio receiver 79 a signal effective to control the operating circuit of the driving motor of the receiving printer which is connected to the radio receiver network 79.

The electromagnet 50 is included in a circuit extending from battery, through the winding of the magnet 50, over conductor 116, through resistances 117 and 118, over conductor 119, and then through contact 121 (closed cyclically by cam 27) to ground. When the magnet 103 is energized upon the closing of switch 99 and tape switch contacts 96—97, as previously described, its armature 104 is attracted to bring the pin 109 on arm 107 into engagement with the threads of the worm 30, and since the worm 30 is constantly rotating, the arm 107 will be advanced toward the left and subsequently act to close the contacts 114. A circuit will then be completed from battery through the contacts 114, over conductor 122, then through the winding of an electromagnet 123 to ground.

When the magnet 123 thus becomes energized, it will pull up its armature 124 against the action of a spring 125. Armature 124 and a lever

126 control the opening or non-opening of the pulsing contact 121 upon the rotation of cam 27. Lever 126 is mounted on pivot 127, as is also a control lever 128. Armature 124 is provided with an extension 129 carrying at its upper end a screw 131 which functions, upon the attraction of armature 124 by magnet 123, to close a contact 132 included in a shunt circuit around the resistance 118. Lever 128 is normally biased in a counterclockwise direction by a spring 133, and is provided with a lower horizontal arm, the free end of which cooperates with the left-hand spring of contact 132 in such a manner that when contact 132 is open, its left-hand spring acts to block or prevent the counterclockwise rotation of lever 128 by spring 133. Then, when the armature 124 pulls up, it causes the screw 131 to close contact 132 which frees the left-hand spring of contact 132 from engagement with arm 134 to permit counterclockwise rotation of lever 128 by spring 133 to the position shown in Fig. 6. In the position shown in Fig. 6, the lever 128 acts to lock the contact 132 closed against premature opening, which opening is governed, upon the de-energization of magnet 123, by the cam 27 acting upon the horizontal arm 135 of lever 128 so that the lever 128 is thereupon rotated clockwise to bring the arm 134 again under the left-hand spring of contact 132.

The upper spring of contact 121 is provided with an insulating portion which cooperates with lever 126 which in turn is adapted not only to cooperate with cam 27 but also to have latching relation with armature 124 of electromagnet 123. With this arrangement, the armature of magnet 123 under certain conditions of operation is latched behind (or to the left of) the latching projection on lever 126 (as shown in Fig. 5) so that the armature 124 cannot move toward the pole piece of magnet 123 (upon energization of said magnet) until cam 27 rotates lever 126 counterclockwise to raise the latching end thereof free of armature 124. With this construction, it would be possible to withdraw the armature 124 of magnet 123 from under lever 126 at any point in the operating cycle and therefore open the circuit to the tape stepping magnet 50 at an improper instant in the operating cycle. With the armature of magnet 123 obstructed by a projection on lever 126, however, the armature 124 cannot be removed from under the latching projection of lever 126 until this obstruction is removed by the proper positionment of cam 27 and this action provides the proper timing in the operating cycle. Some lost motion is provided between the lug 137 on lever 126 and contact 121, whereby contact 121 will not be opened unless armature 124 is removed from blocking relation with lever 126 (as shown in Figs. 3 and 6). When the lever 126 and the cam 27 are in the relation with each other as shown in Figs. 4 and 5, wherein these elements are shown in different blocking relation with the armature 124, the contact 121 will remain closed.

General operation

In the operation of the apparatus according to the present invention, the arrangement is shown in Fig. 1 in its idle condition. Upon closing the manual switch 99 (assuming that the contacts 96-97 are closed due to the presence of a loop in the tape 48, and further assuming that the transmitting shaft 9 is continuously rotating thus imparting rotation to cam 27) the contact 121 will be operated cyclically, the cir-

cuit for magnet 50 extending from positive battery, through the winding of magnet 50, over the conductor 116, through the resistances 117 and 118, and through contact 121 (when closed) to ground. With the two resistances 118 and 117 in the circuit, the value of the current flowing therethrough is not of sufficient strength to energize the magnet or solenoid 50. Thus, in this condition of operation, the contact 121 will be constantly opened and closed, but the solenoid 50 will not be operated. Moreover, in this condition of operation the solenoid 50 is independent of the manually operated switch 99. However, when the switch 99 is closed, and assuming that the tape control contacts 96 and 97 are also closed, a circuit will be completed from battery, through the switch 99, through contacts 96-97, over conductor 115 and through the magnet 103 to ground. Upon energization of magnet 103 its armature 104 will be attracted to bring the pin 109 on arm 107 into engagement with the threads of the worm 30 thus causing the arm 107 to travel leftwardly until it closes the contact 114, whereupon a circuit will be completed from positive battery, through the contact 114, over conductor 122, and through the winding of magnet 123 to ground. Upon energization of magnet 123 its armature 124 will be attracted, thus causing the screw 131 on the extension 129 to close the contacts 132. However, this closure of contact 132 will not occur until the cam 27 has reached its proper angular position with relation to the lever 126, so that the notched right-hand end thereof is clear of the armature 124, thus permitting the armature 124 to be pulled up completely by the magnet 123. When the armature 124 has been completely pulled up and the contact 132 has been closed, the arm 134 of lever 128 will be free to be rotated counterclockwise by the spring 133, thus locking the contact 132 closed for at least the ensuing cycle of rotation of cam 27. After cam 27 has rotated a predetermined amount it will cooperate with the arm 135 of lever 128 to impart clockwise rotation to said lever 128 against the action of spring 133 to attempt to bring the arm 134 under the left-hand spring of contact 132, but if the magnet 123 is still energized, the contact 132 will still be held closed, and the lever 128 will merely oscillate back and forth under the action of the cam 27. Thus, the lever 126 will bear a relation with the armature 124, as shown in Fig. 3, wherein the lever 126 is rocked counterclockwise and clockwise by the cam 27 under the influence of spring 136. In this connection it is noted that the lever 126 is provided with a laterally projecting lug 137 which cooperates with the insulated portion of contact 121 so that, as the cam 27 operates upon the lever 126 to urge it to its extreme counterclockwise position against the action of spring 136, the contacts 121 will be permitted to close due to their own spring tension, and the lug 137 will be moved free of the insulated portion. It is noticed that there is sufficient lost motion between the lug 137 and the insulated portion so that a certain degree of oscillation of lever 126 is permissible while it is held in the position shown in Figs. 4 and 5.

As the contacts 132 have now become closed, the resistance 118 is shunted out of the energizing circuit for the solenoid 50, thus permitting an increased value of current to flow through the energizing circuit therefor, and accordingly upon each closure of contacts 121 by the cam 27

the circuit will extend from ground, through contacts 121, over conductor 119, through contacts 132, through resistance 117, over conductor 116, and through the winding of the solenoid 50 to battery. Therefore, upon each rotation of the cam 27 which constitutes a pulsing operation for the solenoid 50, said solenoid will be energized to cause the feeler arm 47 to sense the perforations in the tape 48, thus closing the contacts 54 and 55 according to the code combination sensed in the tape and, in turn, causing the energization of corresponding magnets 37 to 41, and unlatching the corresponding latches 44 to permit the code bars 31 to 35 to be set accordingly to permit the selection of a selectable bar 61.

This operation will be repeated successively until the taut tape switch 96—97 has been opened by a taut or tight condition in the tape 48 (or by the opening of the manual switch 99), whereupon the magnet 103 will become de-energized, and upon release of its armature 104 the arm 107 will withdraw the pin 109 from the worm 30 thus permitting the spring 108 to draw the arm 107 away from the contacts 114 opening the same and breaking the energizing circuit for the magnet 123. Due to this de-energization of magnet 123 the armature 124 will tend to respond to the pull of its spring 125 to move away from the magnet 123. However, this movement of armature 124 is delayed by the lever 126 until the cam 27 has rocked the lever 126 sufficiently counterclockwise to permit the armature 124 to escape the latching end of the lever 126, thus causing the opening of contact 132. Then, when the cam 27 operates upon the arm 135 to rotate the lever 128 clockwise, the arm 134 will be brought underneath the left-hand spring of contact 132 and the lever 128 will be held in this clockwise position against the action of spring 133 until the magnet 123 will again become energized. The resistance 118 will again be introduced into the energizing circuit for the solenoid 50 due to the opening of the contacts 132, and hence insufficient current will be supplied thereafter to the solenoid 50 to prevent operation of the solenoid 50 and the tape sensing mechanism until a condition is created whereby the magnet 103 is again energized.

In Fig. 7 is illustrated a further embodiment of the present invention, wherein the magnet of a distributor is protected against overheating. In Fig. 7, the distributor 201 is provided with a brush arm 202 which cooperates with an armature 203 of the magnet 204. The energizing circuit for magnet 204 extends from positive battery, over conductor 205, through resistance 206, then through the coils of magnet 204, through switch 207, to negative battery. A shunt circuit is provided around resistance 206, including conductor 208, shunt contacts 209 and conductor 211. When the magnet 204 is de-energized, its armature 203 is biased by spring 212 into the path of brush arm 202 to prevent rotation thereof.

Upon closure of switch 207, an energizing circuit for magnet 204 is completed from battery, over conductors 205 and 208, through contacts 209, over conductor 211, through the winding of magnet 204, through switch 207, to negative battery. As the magnet 204 becomes energized, it pulls up its armature 203, and in so doing, the armature 203 acts to open the contacts 209 and thereby remove the shunt around the resistance 206, after which the energizing circuit for magnet 204 will extend from positive battery, over

conductor 205, through resistance 206, through the winding of magnet 204, through switch 207 to negative battery.

With this arrangement, strong current is initially supplied to magnet 204, sufficient to enable it to pull up its armature 203 against the tension of spring 212. Then when the magnet 204 has become fully energized and has operated its armature 203, and armature 203 has opened the shunt contacts 209, current of lower value will thereafter be impressed upon the winding of magnet 204, due to the introduction of resistance 206 into its energizing circuit. This current of lower value is of sufficient strength to permit the magnet 204 to hold its armature 203 attracted. Moreover, this holding current is not of sufficient strength to overheat the coil of magnet 204. Thus, with the present invention, an arrangement is provided for permitting sufficient current to be supplied to magnet 204 to permit it to perform its predetermined operation, and thereafter to reduce the value of said current by automatically introducing in the circuit a resistance of sufficient size to maintain the magnet 204 energized as long as it is desired to have the distributor 201 operate.

The invention has herein been described in a particular embodiment thereof. It is understood, of course, that the invention may be applied to other forms of apparatus without departing from the spirit and scope of the present invention, as defined by the appended claims.

What is claimed is:

1. In a telegraph system, a transmitter having a record strip feeding means, a control circuit therefor wherein current is supplied to the record strip feeding means during idle time of the transmitter as well as during operating intervals, said circuit having two resistances in series, and means comprising a screw and follower timing device and cam controlled instrumentalities for controlling, through an electromagnetically operated switching device, the shunting in and out of one of said resistances to vary the value of current supplied to said record strip feeding means.

2. In a telegraph system, a transmitter having a record strip feeding means, a signal line, means for rendering said transmitter effective to transmit control impulses over said line including means responsive to the condition of the record strip, a control circuit for said feeding means wherein current is impressed on said feeding means during idle time of the transmitter as well as during operating intervals, said circuit having two resistances in series, means controlled by said second mentioned means for rendering said record strip feeding means effective to transmit character signals over said signal line, and cam controlled instrumentalities for controlling, under the control of said second mentioned means, the shunting in and out of one of said resistances to vary the value of current supplied to said feeding means.

3. In a transmitter having strip feeding means, a control circuit for said means, pulsing means in said circuit, a plurality of current controlling means in said circuit, shunting means for certain of said controlling means, a supervisory circuit arrangement, and cam controlled instrumentalities effective in cooperation with said supervisory circuit arrangement for controlling said shunting means for varying the value of current supplied to said strip feeding means.

4. In a transmitter having tape feeding means,

a control circuit for said means, pulsing means in said circuit, a plurality of current controlling means in said circuit, shunting means for certain of said controlling means, a first cam controlled means for governing the operation of said pulsing means, and a second cam controlled instrumentality for controlling the operation of said shunting means for varying the value of the current supplied to said tape feeding means.

5. In a transmitter having tape feeding means, a control circuit for said means, pulsing means in said circuit, a plurality of current controlling means in said circuit, shunting means for certain of said controlling means, an electromagnetically controlled means, a first cam operated means for governing, under the control of said electromagnetically controlled means, said pulsing means, and a second cam operated instrumentality for operating said shunting means for varying the value of current supplied to said tape feeding means.

6. In a transmitter having strip feeding means, a control circuit for said means, pulsing means in said circuit, current controlling means in said circuit, shunting means for said controlling means, timing means, and cam controlled instrumentalities effective in cooperation with said timing means for controlling said shunting means for varying the value of current supplied to said strip feeding means.

7. In combination, a first circuit including a magnet, an armature for said magnet, means for establishing said circuit, a second circuit comprising pulsing means, current controlling means and an operating magnet, said operating magnet normally ineffective, shunting means for said current controlling means controlled by said armature, and cam controlled means effective in response to the operation of said armature upon the establishment of said first circuit for jointly maintaining said shunting means effective to shunt said circuit controlling means to render said operating magnet responsive to said pulsing means.

8. In a transmitter having tape feeding means, a control circuit for said means, pulsing contacts in said circuit, constantly rotating cam means for successively operating said pulsing contacts, current controlling means in said circuit, shunting means for said controlling means, timing means, and cam controlled instrumentalities

effective in cooperation with said timing means for controlling said shunting means for varying the value of current supplied to said strip feeding means irrespective of the successive operation of said pulsing means.

9. In a transmitter having strip feeding means, a control circuit for said means, pulsing means in said circuit, a plurality of current controlling means in said circuit, shunting means for certain of said controlling means, timing means, and cam controlled instrumentalities effective in cooperation with said timing means for controlling said shunting means for varying the value of current supplied to said strip feeding means.

10. In a transmitter having tape feeding means, a control circuit for said means, pulsing contacts in said circuit, a current controlling means in said circuit, shunting means for said controlling means, a supervisory circuit arrangement, and cam controlled instrumentalities effective in cooperation with said supervisory circuit arrangement for controlling said shunting means for varying the value of current supplied to said strip feeding means.

11. In a transmitter having tape feeding means, a control circuit for said means, pulsing contacts in said circuit, constantly rotating cam means for successively operating said pulsing contacts, current controlling means in said circuit, shunting means for said controlling means, a supervisory circuit, and cam controlled instrumentalities effective in cooperation with said supervisory circuit for controlling said shunting means for varying the value of current supplied to said strip feeding means irrespective of the successive operation of said pulsing means.

12. In a transmitter having tape feeding means, a control circuit for said means, pulsing contacts in said circuit, cam means for operating said pulsing contacts, current controlling means in said circuit, shunting means for said controlling means, a supervisory circuit including an electromagnetic device for operating said shunting means, means controlled by said cam for governing the effectiveness of said electromagnetic device, and further means controlled by said cam and effective under the control of said electromagnetic device for controlling said shunting means for varying the value of the current supplied to said strip feeding means.

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