Aug. 2, 1949. R. G. SCHULER 2,477,832

AUTOMATIC TRANSMITTER

Filed Dec. 20, 1947 4 Sheets-Sheet 1

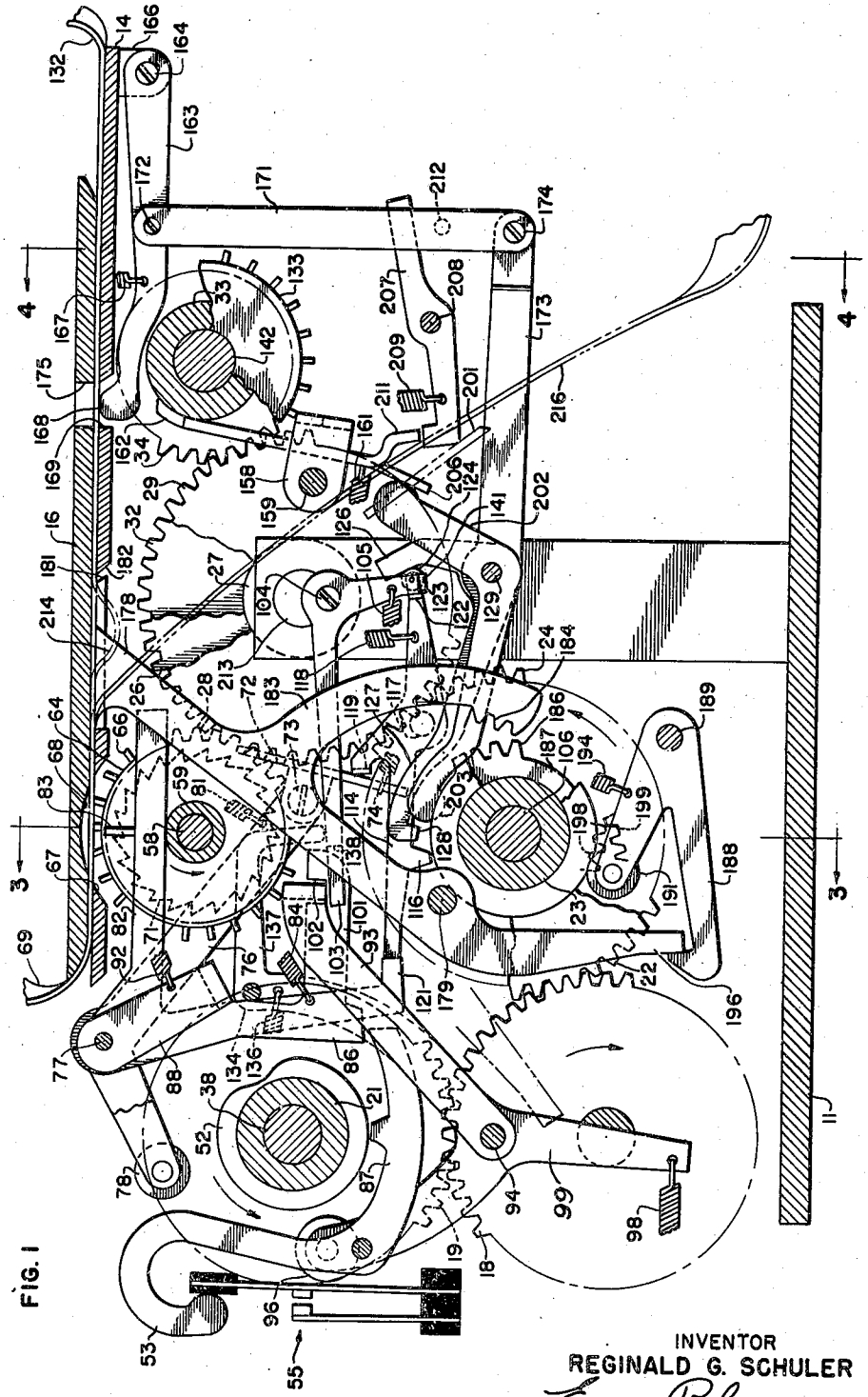

FIG. 1

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Filed Dec. 20, 1947 4 Sheets-Sheet 2

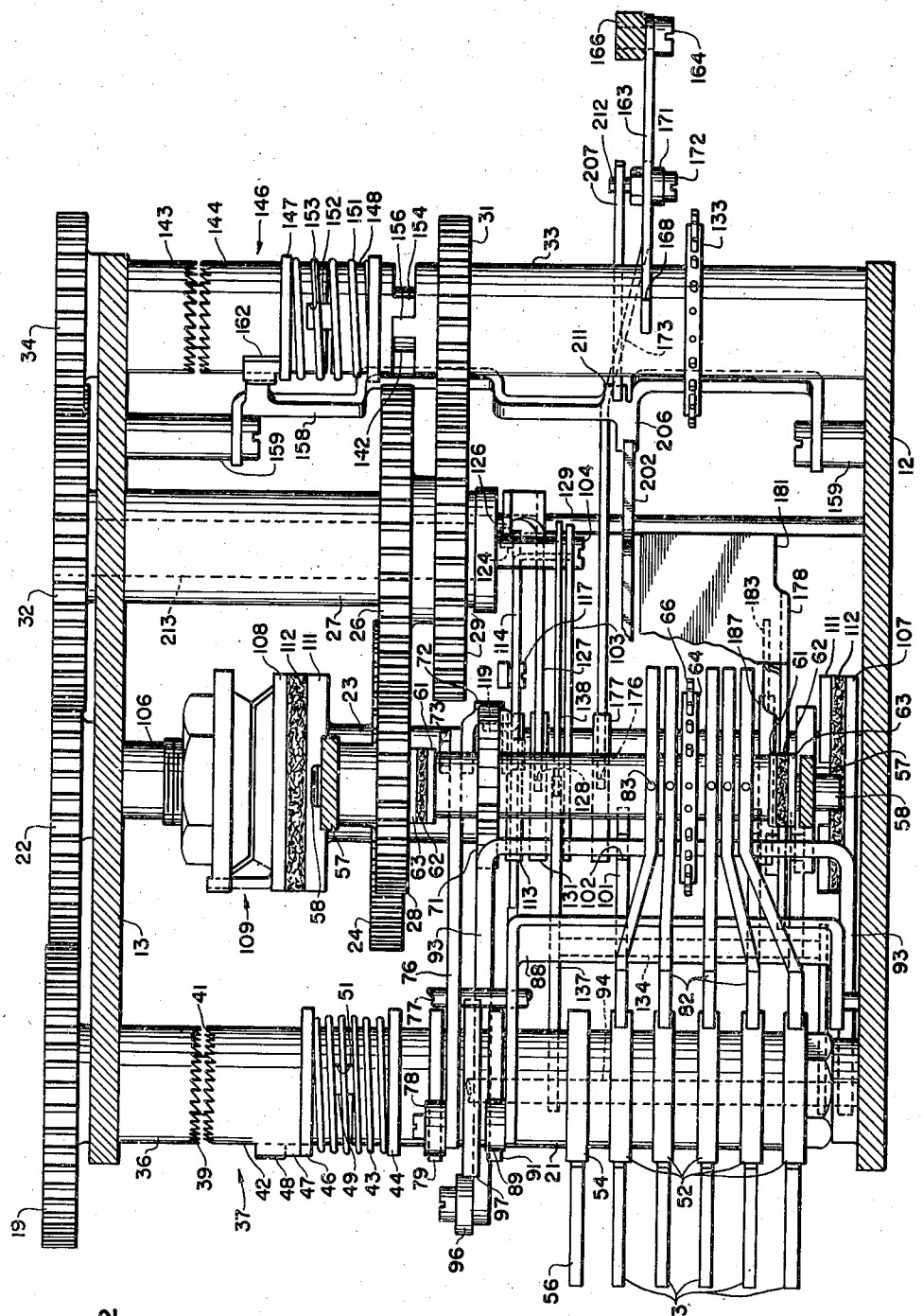

FIG. 2

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AUTOMATIC TRANSMITTER

Filed Dec. 20, 1947 4 Sheets-Sheet 3

FIG. 3

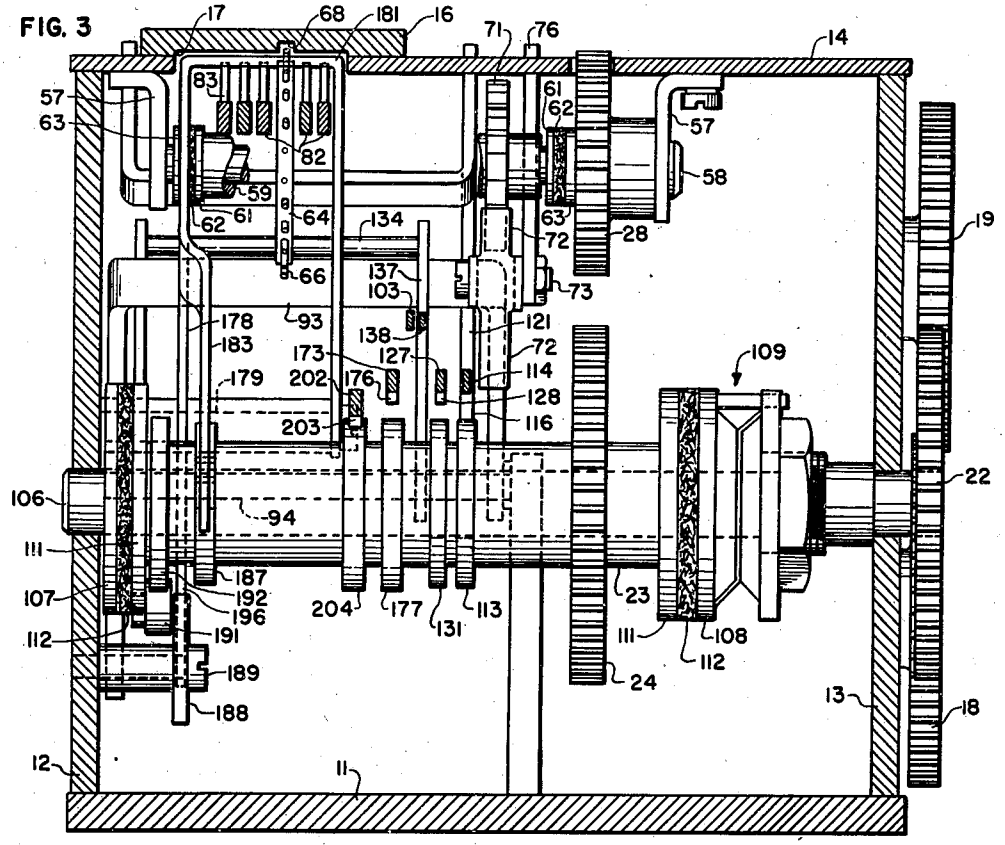
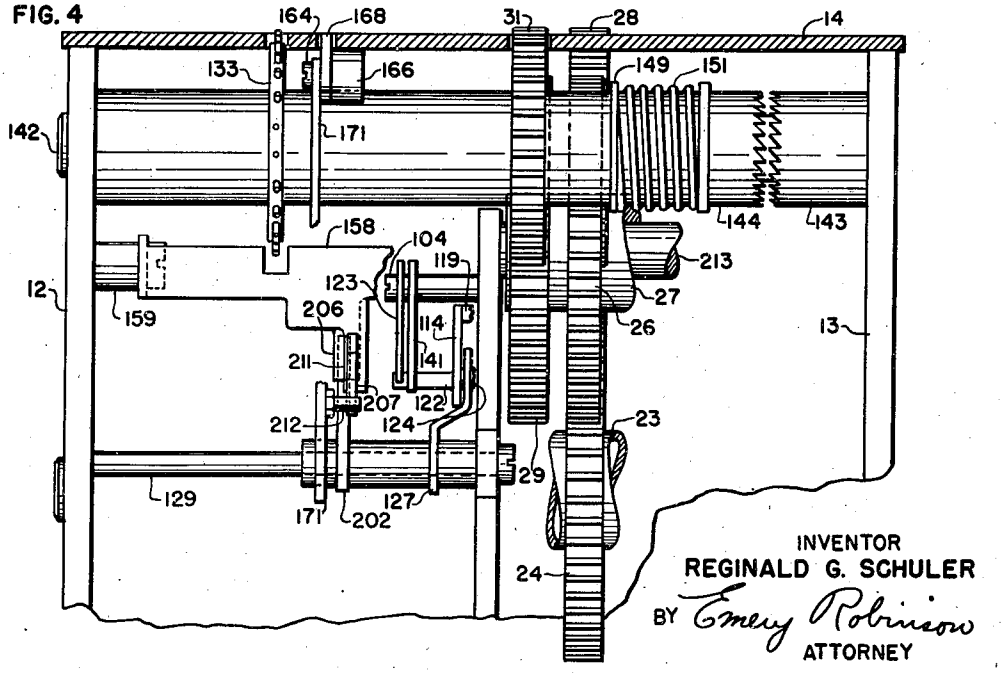


FIG. 4



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AUTOMATIC TRANSMITTER

Filed Dec. 20, 1947 4 Sheets-Sheet 4

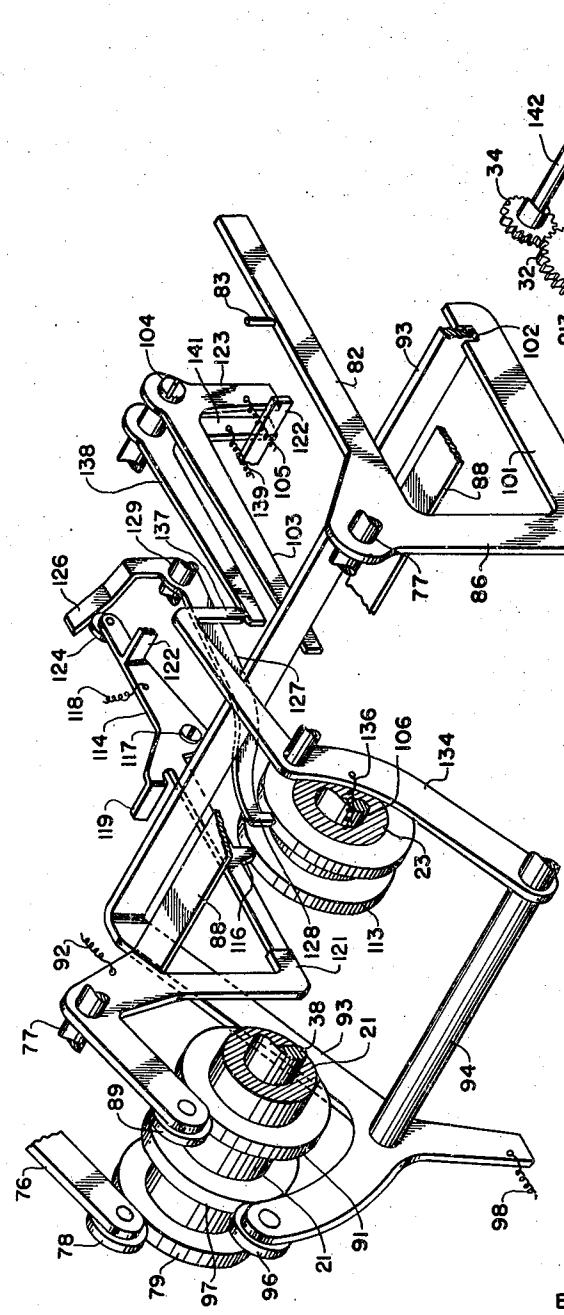

FIG. 6

FIG. 5

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Patented Aug. 2, 1949 2,477,832

UNITED STATES PATENT OFFICE

2,477,832

AUTOMATIC TRANSMITTER

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Application December 20, 1947, Serial No. 792,883

7 Claims. (Cl. 178—17)

1

This invention relates to telegraph tape transmitting apparatus and more particularly to apparatus for automatically feeding a telegraph tape into transmitting position upon the completion of transmission from a prior telegraph tape.

In a central telegraph exchange where an attendant is taking care of a series of telegraph transmitters this invention is particularly useful. By this invention an operator is able to keep a series of telegraph transmitters supplied continuously with tape messages without waiting for the end of the message currently being transmitted. When a particular transmitter is functioning, the attendant may insert the leading end of a new tape into position over an auxiliary feed wheel and thereafter, upon the completion of the current message, a blank or end of message signal will be sensed by the tape sensing levers which is automatically transmitted. When the blank or end of message signal is sensed a bail is allowed to move into a position whereby the mechanism is actuated for automatically feeding out the old tape and feeding the new tape into transmitting position. The leading end of the new tape having been fed to transmitting position, the entire new tape is then rapidly fed over an auxiliary feed wheel, thus making it possible for the attendant to position another new tape on the auxiliary feed wheel. In this manner the elapsed time between messages is only the very short interval of time necessary to feed the new tape into transmitting position from the auxiliary feed wheel.

An object of the invention is to provide an apparatus for automatically feeding a new tape into transmitting position upon the completion of transmission of a message from a prior tape.

Another object of the invention is to provide an apparatus for automatically transmitting blank space out signals during the interval of time between the completion of transmission of one message and the start of transmission of a succeeding message.

A further object of the invention is to provide an apparatus for rapidly feeding an entire tape, the leading end of which has been fed into transmitting position, over an auxiliary feed wheel to thereby render the auxiliary feed wheel in condition to receive a succeeding tape.

Other objects, features, and advantages of the invention, although not specifically recited above, will be apparent from the following detailed description when read in conjunction with the accompanying drawings, wherein:

Fig. 1 is a side elevational view of the transmitter, partly cut away to show more clearly the features of the invention;

2

Fig. 2 is a top plan view of the transmitter and the auxiliary tape feeding apparatus;

Fig. 3 is a sectional view taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is a fragmentary sectional view taken substantially along the line 4—4 in Fig. 1;

Fig. 5 is a fragmentary isometric perspective view of the mechanism which controls the automatic tape feed out and new tape feed in mechanisms; and

Fig. 6 is a fragmentary isometric perspective view of the gearing.

The present invention as disclosed herein is particularly adapted for use with a telegraph tape transmitter such as shown in the patent to M. T. Goetz, 2,296,845, dated September 29, 1942. It is to be particularly understood, however, that the transmitting system disclosed in the Goetz patent is modified in accordance with the present invention and for details of the description of the transmitter itself reference should be had to said patent.

In the drawings a transmitter base 11 supports a pair of side plates 12 and 13 on which is mounted a top plate 14. A cover plate 16 has a tape slot 17 therein and is removably mounted on the top plate 14. A power gear 18 is rotatably mounted on the side plate 13 and is to be considered as continuously rotating. The power gear 18 meshes with a transmitting sleeve gear 19 to supply rotational power to a transmtting sleeve 21. A gear 22 meshes with and is continuously rotated by the power gear 18 and serves as a source of power for the cam sleeve 23. A gear 24 secured to and rotatable with the cam sleeve 23 meshes with a gear 26 secured to a freely rotatable sleeve 27. The gear 26 in turn meshes with an automatic tape feed out gear 28. Another gear 29 also secured to the sleeve 27 meshes with a new tape advancing gear 31 secured to the rotatable sleeve 33. The gear 22 which is continuously rotating meshes with an idler gear 32 which in turn meshes with a continuously rotating new tape feed in gear 34.

A drive member 36 of a single revolution clutch indicated generally by the numeral 37 is splined to the shaft 38 and is continuously rotated due to the continuous rotation of the transmitting sleeve gear 19 which is also secured to the shaft 38. A toothed portion 39 on the drive member 36 cooperates with a toothed portion 41 on the driven member 42 to impart rotation thereto. A spring 43 abuts a collar 44 on the transmitting sleeve 21 and a collar 46 on the driven member 42 and

continuously urges the driven member 42 towards the drive member 36. A cam 47 on the driven member 42 is of such configuration that an electromagnetically actuated lever 48 operated by an electromagnet (not shown) will engage the cam 47 to disengage the driven member 42 from the drive member 36. A lug 49 on the transmitting sleeve 21 is fitted within a slot 51 in the driven member 42 whereby the transmitting sleeve 21 is rotated about the shaft 38 whenever the clutch members 36 and 42 are in engagement with one another. The lever 48 is adapted to engage the cam 47 whenever the electromagnet (not shown) is de-energized.

The transmitting sleeve 21 carries the usual series of transmitting cams 52 which cooperate with the usual series of gooseneck levers 53 for controlling a series of transmitting contacts 55. Also carried by the transmitting sleeve 21 is a start-stop cam 54 which cooperates with a gooseneck lever 56 to control a pair of start-stop contacts (not shown specifically).

A pair of brackets 57 journal frictionlessly a shaft 58 around which a sleeve 59 is rotatable. The sleeve 59 has a pair of collars 61 which cooperate respectively with a pair of friction washers 62 which in turn cooperate respectively with a pair of collars 63 secured to the shaft 58. The collars and friction washers assembly provide a friction clutch mechanism whereby the sleeve 59 can be rotated independently of the shaft 58 or can be rotated with the shaft 58.

The sleeve 59 has a tape feed wheel 64 thereon mounted for rotation therewith. The tape feed wheel 64 has a series of pins 66 spaced evenly around the periphery thereof which extend through a slot 67 in the top plate 14 and into a groove 68 in the cover plate 16 to thereby enter feed holes in a telegraph tape 69 to advance it through the transmitter. Also secured to the sleeve 59 is a ratchet wheel 71 which is adapted to be advanced step by step by a pawl 72 in order to advance the feed wheel 64. When the feed wheel 64 is advanced by means of the pawl 72 and ratchet wheel 71, the collars 61 will slip against the friction washers 62. The automatic tape feed out gear 28 also drives the feed wheel 64, but through the medium of the collars 61 and 63 and friction washers 62 assembly. Under normal transmitting conditions the ratchet wheel 71 and feed pawl 72 control the rotation of the feed wheel 64.

The pawl 72 is biased in a counterclockwise direction (Fig. 1) on its pivot bolt 73 by means of a spring 74 suitably secured at its other end to the transmitter frame. The pawl 72 is mounted pivotally by means of its pivot bolt 73 on a bell crank lever 76 which is mounted pivotally on a shaft 77 and carries a cam follower or roller 78. The roller 78 is held in operative engagement with a tape feed cam 79 on the transmitting sleeve 21 by means of a spring 81. The cam 79 has a configuration such that the low part thereof will present itself opposite the roller 78 when the tape 69 is not being sensed which allows the spring 81, at this time, to pivot the bell crank lever 76 counterclockwise causing the pawl 72, which is held against the ratchet wheel 71 by its spring 74, to advance the ratchet wheel 71 thereby advancing the feed wheel 64.

A series of tape sensing levers 82, each of which has a tape sensing pin 83 thereon, are supported pivotally on the shaft 77 and are biased in a counterclockwise direction by a series of springs 84. It is deemed desirable to note at this point that the tape out sensing lever and pin disclosed in the afore-mentioned Goetz patent have been omitted from this disclosure for the reason that it is contemplated that the transmitter herein described will be operating continuously which eliminates the necessity of means for declutching the transmitting sleeve 21 upon the completion of transmission from the tape.

Each of the sensing levers 82 has a depending portion 86 which cooperates with a corresponding horizontal arm 87 on each of the gooseneck levers 53, to thereby transfer signals sensed from the tape 69 by the sensing pins 83 to the transmitting contacts 55 controlled by the gooseneck levers 53. A bail 88 mounted pivotally on the shaft carries a cam follower or roller 89 which cooperates with a cam 91 on the sleeve 21. The roller 89 and cam 91 are held in cooperative engagement by means of a spring 92 on the bail 88. As the roller 89 rides up the high portion of the cam 91, the bail 88 is pivoted clockwise (Fig. 1) around the shaft 77 and engages all of the depending portions 86 of the tape sensing levers 82 to withdraw the tape sensing pins 83 from within perforations in the tape 69. As was heretofore stated it is at this time that the pawl 72 engages the ratchet wheel 71 to advance the feed wheel 64 a step. As the cam follower 89 rides off the high portion of the cam 91, the bail 88 recedes in a counterclockwise direction in response to the urging of the springs 84 and 92, thus allowing the sensing pins 83 to again sense the tape 69.

A bail 93 is mounted pivotally on a shaft 94 and carries a cam follower 96 which cooperates with a cam 97 on the transmitting sleeve 21. A spring 98 secured to a depending arm 99 on the bail 93 biases the bail 93 in a clockwise direction thus tending to keep the follower 96 in engagement with the cam 97. Each of the depending portions 86 of the sensing levers 82 carries a horizontal extension 101 having a notch 102 therein with which the bail 93 is adapted to cooperate. When the sensing pins 83 all sense spacing impulses in the tape 69, i. e., there is no perforations in the tape, all of the notches 102 are aligned beneath the bail 93. The configuration of the cam 97 is such that the bail 93 is held from engagement with the horizontal extensions 101 of the sensing levers 82 until sensing of the tape 69 by the sensing pins 83 is accomplished. At this time the low portion of the cam 97 presents itself opposite roller 96 which allows the spring 98 to urge the bail 93 into the notches 102 if all of the notches 102 are aligned beneath the bail 93 which occurs only when all of the sensing pins 83 sense spacing impulses in the tape 69. When the end of the message in the tape 69 has been reached a blank space out signal consisting of all spacing impulses will be sensed by the sensing pins 83 at which time it is apparent that the bail 93 will be urged into the notches 102. When the bail 93 is urged into the notches 102 it engages a bell crank lever 103 mounted pivotally on a bolt 104 to trip off a tape feed out and new tape feed in mechanism to be hereinafter described. The bell crank lever 103 is continuously urged in a clockwise direction by a spring 105.

The gear 22 is secured to a shaft 106 on which is mounted a pair of friction clutch driving members 107 and 108. The driving member 107 is fixedly secured to the shaft 106 and the driving member 108 is under compression to the left (Fig. 3) by a compression member 109. The cam sleeve 23 mounted rotatably on the shaft 106 carries a pair of collars 111 which are adapted

to cooperate with a pair of friction washers 112. During normal operation of this invention the cam sleeve 23 is held in a stopped position during which time the collars 111 slip relative to collars 107 and 108. However, when the cam sleeve 23 is released it will be rotated due to friction between collars 111 and the continuously rotating collars 107 and 108.

Carried on the cam sleeve 23 is a cam 113 which is adapted to cooperate with a lug 116 on a blocking lever 114. The blocking lever 114 is mounted pivotally by a bolt 117 suitably secured to the main frame and is biased in a counterclockwise direction by a spring 118 which constantly urges the lug 116 towards the cam 113. The blocking lever 114 carries a shoulder 119 adapted to engage the pawl 72 whenever the blocking lever 114 is pivoted in a counterclockwise direction which thereby prevents the pawl 72 from engaging the ratchet wheel 71. The blocking lever 114 is adapted to engage a depending foot 121 on the bail 88 whenever the blocking lever 114 is pivoted in a counterclockwise direction which renders the bail 88 operative to prevent the sensing pins 83 from moving into sensing position. An arm 122 on the blocking lever 114 cooperates with a depending arm 123 on the bell crank lever 103, whereby the spring 118 may normally pivot the blocking lever 114 counterclockwise when the bail 93 engages the bell crank lever 103 to cause the depending arm 123 to slip off of the arm 122. The blocking lever 114 also carries a roller 124 which roller 124 cooperates with a cam arm 126 on a latching lever 127 in the form of a bell crank lever pivoted on a shaft 129. Such cooperation pivots the latching lever 127 causing a tooth 128 thereon to be disengaged from a latching cam 131 on the cam sleeve 23. The configuration of the cam 113 is such that when the blocking lever 114 is in the position shown in Fig. 1, the lug 116 is opposite a low portion of the cam 113 which allows the blocking lever 114 to pivot when released by the bell crank lever 123. The high portion of the cam 113 presents itself to the lug 116 when the sleeve 23 nears the completion of a revolution which pivots the blocking lever 114 clockwise to release the pawl 72 and the depending portion 121 of the bail 88, and to allow the depending arm 123 of the bell crank lever 103 to again engage the arm 122 on the blocking lever 114.

For reasons which will hereinafter appear it will now be assumed that a new tape 132 has been inserted over an auxiliary tape feed wheel 133. Under this set of conditions when a blank space out signal is sensed in the tape 69 by the sensing pins 83, the bail 93 will drop into the notches 102 pivoting the bell crank lever 103 which releases the blocking lever 114, allowing the blocking lever 114 to be pivoted counterclockwise by its spring 118. This in turn prevents further sensing by the sensing pins 83, pivots the pawl 72 from engagement with the ratchet wheel 71, and releases the cam sleeve 23 for rotation.

When a new tape is positioned over the feed wheel 64 there usually is a series of blank or all-space signals in the tape before the beginning of message signals. When such a blank signal is sensed by the sensing pins 83 all of the notches 102 in the horizontal extensions 101 of the tape sensing levers 82 are aligned beneath the bail 93 which actuates the mechanism which allows the cam sleeve 23 to start rotating. In order to alleviate this problem the following mechanism has been included.

A bail 134 is mounted pivotally on the shaft 94 and is biased in a counterclockwise direction by a spring 136 suitably secured to the main frame. The bail 134 carries a projecting arm 137 which is adapted to engage a bell crank lever 138 mounted pivotally on the bolt 104 and urged in a clockwise direction by a spring 139. The bell crank lever 138 has a depending portion 141 which is somewhat longer than the depending arm 123 on the bell crank lever 103 and which is also adapted to engage the arm 122 to prevent pivotal movement of the blocking lever 114. When a new tape is advanced into position over the tape feed wheel 64, the cam 113 will have already pivoted the blocking lever 114 in a clockwise direction sufficiently to allow both bell crank levers 103 and 138 to be pivoted clockwise by their springs 105 and 139 until the arm 122 on the blocking lever 114 is latched by the depending portion 141 of the bell crank lever 138. At this time, due to the fact that the depending arm 123 is shorter than the depending arm 141, the bell crank lever 103 is free from the arm 122, and the blocking lever 114 is held in unblocking position by the bell crank 138. If at this time a blank signal at the beginning of the new tape is sensed by the sensing pins 83, all of the notches 102 will be aligned beneath the bail 93; however, all that occurs is that the now free bell crank lever 103 will be pivoted against the action of its spring 105, and the blocking lever 114 will be held in unblocking position by the bell crank lever 138. Until the occurrence of a marking impulse in the new tape, there will be successive oscillations of the bail 93 into the notches 102 in the horizontal extensions 101 of the sensing levers 82. Upon the occurrence of the first marking impulse (perforation) in the new tape, the corresponding sensing pin 83 will sense this marking impulse which will cause the corresponding sensing lever 82 to pivot counterclockwise about shaft 77 whereupon the depending portion 86 will engage and pivot the bail 134 in a clockwise direction about the shaft 94. Such pivotal movement of the bail 134 causes the projecting arm 137 thereon to move downwardly to pivot the depending portion 141 of the bell crank lever 138 off of the arm 122 on the blocking lever 114. When this occurs the depending arm 123 on the bell crank lever 103 will be in a position to engage the arm 122 on the blocking lever 114 which prevents the blocking lever from moving to the position whereby the sleeve 23 is released for rotation. The bell crank lever depending arm 123 will remain in engagement with the arm 122 until an end-of-message signal is sensed by the sensing pins 83 whereupon the sleeve 23 will be released for rotation in the manner hereinbefore described.

When the cam sleeve 23 is released for rotation the gear 24 secured thereto drives the gear 26 which in turn drives the tape feed out gear 28 to rapidly advance the tape feed wheel 64 thereby feeding out the old tape 69.

The sleeve 33 is rotatably mounted on a shaft 142 to which shaft is secured the new tape feed in gear 34. A toothed clutch drive member 143 secured to the shaft 142 cooperates with a toothed driven member 144 which is slidable longitudinally on the shaft 142. The drive member 143 and driven member 144 are both part of a single revolution clutch 146 of the same type as that designated by the reference numeral 37 herein. The driven member 144 carries a collar 147 and a sleeve 148 carries a collar 149 between which collars a compression spring 151 is fitted for con-

tinually urging the driven member 144 towards the drive member 143. Relative rotation between the sleeve 148 and driven member 144 is prevented due to a lug 152 on the sleeve 148 which is seated within a slot 153 in the driven member 144. The sleeve 148 carries a lug 154 which cooperates with a lug 156 on the sleeve 33 in order that rotational movement of the sleeve 148 may be transmitted to the sleeve 33; and due to the cooperation between the lugs 154 and 156 it is possible to rotate the sleeve 33 almost one complete revolution relative to the sleeve 148. A clutch throwout lever 158 is pivoted on a pair of bolts 159 secured to the transmitter side plate 13 and is biased in a clockwise direction against the driven clutch member 144 by a spring 161 suitably secured to the main frame. The clutch throwout lever 158 cooperates with a cam (not shown) and a lug 162 on the driven member whereby the driven member 144 is cammed from engagement with the drive member 143 against the urging of compression spring 151 whenever the clutch throwout lever 158 engages the driven member 144.

A new tape sensing lever 163 is mounted pivotally on a screw 164 which extends into a block 166 secured to the top plate 14 and is biased clockwise by a spring 167 suitably secured to the top plate 14. The new tape sensing lever 163 has a tape sensing portion 168 which extends through apertures 169 and 175 in the top plate 14 and cover plate 16, respectively. When a new tape 132 has been positioned in the tape slot 17 over the auxiliary tape feed wheel 133 the tape sensing portion 168 will sense the new tape 132 in the tape slot 17, and pivotal movement of the new tape sensing lever 163 into the aperture 175 in the cover plate 16 will be prevented. It is to be noted that the sensing portion 168 of the new tape sensing lever 163 is adapted to engage the new tape 132 a short distance beyond the point where the feed pins on the auxiliary feed wheel 133 engage the new tape. The reason for this is that it is necessary to insure that the new tape 132 is engaged by the auxiliary feed wheel at the time it is sensed. If the sensing portion 168 is positioned alongside the tape engaging portion of the auxiliary feed wheel 133, an unevenly torn new tape 132 might conceivably be sensed whereas it would not yet be engaged by the auxliary tape feed wheel 133. A link 171 is secured pivotally by a bolt 172 to the new tape sensing lever 163 and is connected pivotally to a latching lever 173 by means of a bolt 174. The latching lever 173 is mounted pivotally on the shaft 129 and has a tooth 176 which cooperates with an indentation (not shown) in a locking cam 177 on the cam sleeve 23. At a time when a new tape 132 has been positioned over the auxiliary feed wheel 133 this new tape 132 will be sensed by the new tape sensing lever 163 which will cause the tooth 176 on the latching lever 173 to be disengaged from the locking cam 177 which allows the sleeve 23 to rotate when released by the latching lever 127.

A trap door lever 178 is mounted pivotally on a bolt 179 and carries a trap door 181 which is adapted to be pivoted into position within an aperture 182 in the top plate 14 to form a support for a tape in the tape slot 17. The trap door lever 178 carries a rack arm 183 having a toothed portion 184 thereon which is adapted to cooperate with a segment of teeth 186 on a collar 187 secured to the sleeve 23. A latch 188 mounted pivotally on a bolt 189 secured to the side plate 12 carries a roller 191 which follows a cam 192 due to the constant urging of a spring 194. The trap door lever 178 has a depending portion 196 thereon which cooperates with the latch 188 whereby the trap door 181 is held in the aperture 182 of the top plate 14. When the sleeve 23 is released for rotation it rotates and carries therewith the cam 192 and segmentally toother collar 187. The segment of teeth 186 when in the dotted position 198 (Fig. 1) engages the toothed portion 184 when in the dotted position 199 and the trap door lever 178 is carried to the position thereof as shown in Fig. 1. At this time the latch 188 engages the depending portion 196 of the trap door lever 178. Thereafter as the sleeve 23 continues its rotation the high part of the cam 192 presents itself to the roller 191 thereby pivoting the latch 188 from engagement with the depending portion 196 and allowing the trap door 181 to drop to its dotted position 201 (Fig. 1).

A clutch trip-off lever 202 is mounted pivotally on the shaft 129 and a cam follower 203 thereon rides a cam 204 secured to the sleeve 23. The clutch trip-off lever 202 cooperates with a depending arm 206 on the clutch throwout lever 158 to actuate the clutch throwout lever 158. A latch lever 207 mounted pivotally on a shaft 208 and biased in a clockwise direction by a spring 209 is adapted to latch a second depending arm 211 on the clutch throwout lever 158 when the clutch throwout lever 158 has been actuated by the clutch trip-off lever 202. A stud 212 secured to the link 171 cooperates with the latch lever 207 whereby the latch lever 207 is released from latching engagement with the depending portion 211 of the clutch throwout lever 158 whenever there is no new tape 132 in the tape slot 17 above the auxiliary tape feed wheel 133. When the clutch throwout lever 158 is thus released by the latch lever 207 further rotation of the auxiliary feed wheel 133 through the medium of the clutch 146 is prevented.

Assuming that the cam seelve 23 has been released for rotation, as was heretofore stated, the feed wheel 64 will be rotated through the medium of gears 24, 26, and 28 to rapidly feed out the old tape 69. Rotation of the gear 26 also causes gear 29 to rotate since both are secured to the common sleeve 27 rotatable about a shaft 213. During that portion of rotation of sleeve 23 when the teeth on the collar 186 are travelling from the position shown by numeral 198 to the position shown by numeral 186 (Fig. 1) an arc of missing teeth on the gear 29 is opposite the gear 31. By the time the sleeve 23 has travelled to the position thereof shown in Fig. 1, the trap door 81 will have been raised to its upper position forming a bottom for the tape slot 17, and the teeth on the gear 29 will mesh with gear 31 which will rotate the auxiliary feed wheel 133 to advance the new tape 132 towards the feed wheel 64. The number of teeth on the gear 29 is the exact number required to advance the new tape 132 to the position where one feed hole therein is engaged by a feed pin 66 on the feed wheel 64. Thereafter the high part of cam 204 causes the clutch trip-off lever 202 to trip the clutch 146 to allow the auxiliary feed wheel 133 to be advanced through the medium of the continuously rotating gear 24.

In the following description of the operation of the invention it is assumed that a new tape 132 has been positioned over the auxiliary feed wheel 133 which causes the latching lever 173 to

be disengaged from cam 177, and that the message in the tape 69 has been transmitted leaving the first blank space out signal in the tape 69 in a position where it is sensed by the sensing pins 83. It should be recalled that at this time the bell crank lever 138 is disengaged from the arm 122 on the blocking lever 114.

As the sensing pins 83 sense the first blank space out signal in the tape 69, the notches 102 in the sensing levers 82 align themselves beneath the bail 93 which at this time is pivoted clockwise by the spring 98. As the bail 93 moves in this manner it engages and pivots the bell crank lever 103 thus unlatching the blocking lever 114. Unlatching of the blocking lever 114 from beneath the vertical arm 123 of the bell crank lever 103 allows the spring 118 to urge the blocking lever 114 into the position thereof shown in Fig. 1, where the tooth 116 rides the cam 113, which results in the camming of the latching lever 127 from engagement with the latching cam 131, the blocking of the bail 88 due to engagement of the blocking lever 114 with the depending foot 121 thereof, and the disengagement of the pawl 72 from the ratchet wheel 71. Disengagement of the latching lever 127 from the latching cam 131 releases the sleeve 23 for rotation through the medium of the friction washers 112.

During the time while the old tape 69 is being rapidly fed out of the transmitter the sensing pins 83 are prevented from performing a sensing operation due to the blocking of the bail 88 by engagement between the blocking lever 114 and the depending foot 121 of the bail 88. At this time the transmitting cam sleeve 52 is continuously rotating so that blank space out signals will be transmitted automatically.

At the start of rotation of the sleeve 23, the teeth 186 on the collar 187 are in the position represented by numeral 198, so that subsequent rotation of the collar 187 with the sleeve 23 raises the trap door 181 to its upper position within the aperture 182 in the top plate 14. The gear 24 rotates with the sleeve 23 and by means of the gears 26 and 28 rotates the feed wheel 64 to rapidly feed the remaining portion of the tape 69 over the feed wheel 64 and out of the transmitter. The gear 29 also rotates when the sleeve 23 rotates, but due to the arc of missing teeth on gear 29, rotational motion will not be transmitted to the gear 31 until the trap door 181 has been latched in its upper position. With the trap door 181 in its upper position the teeth on the gear 29 mesh with and rotate the gear 31 only until the new tape 132 has been advanced to the position where a feed hole therein is entered by one of the feed pins 66 on the feed wheel 64.

By the time one of the feed pins 66 on the feed wheel 64 engages the new tape 132 the high part of the cam 192 will engage the roller 191 to trip the latch 188 from engagement with the depending portion 196 of the trap door lever 178 which allows the trap door 181 to drop to the position indicated by numeral 201. Also at the time when a feed pin 66 has engaged the new tape 132, the high portion of the cam 113 has reached the position opposite the tooth 116 on the blocking lever 114 which causes the blocking lever 114 to be pivoted from blocking engagement with the depending portion 121 of the bail 88, thus allowing the sensing pins 83 to sense the new tape 132. Pivotal movement of the blocking lever 114 by the cam 113 also causes the shoulder 119 to be withdrawn from engagement with the pawl 72

which allows the feed wheel 27 to be advanced through the medium of the pawl 72 and ratchet wheel 71, after which transmission from tape 132 is immediately commenced.

When the blocking lever 114 is pivoted by the high portion of the cam 113, it is pivoted sufficiently to cause the depending arm 141 of the bell crank lever 138 to latch the arm 122 of the blocking lever 114. Also at the time when the new tape 132 has advanced to the position where it may be sensed by the sensing pins 83, the high portion of cam 204 causes the clutch trip-off lever 202 to be pivoted to trip the clutch throwout lever 158 from engagement with the lug 162 which releases the sleeve 33 for rotation through the medium of the gear 34. When the clutch throwout lever 158 is tripped from engagement with the lug 162, the latch lever 207 engages the depending arm 211 to hold the clutch throwout lever 158 in tripped position.

As the trap door 181 has already dropped to the position shown by reference numeral 201, the new tape 132, as it is further advanced by the auxiliary feed wheel 133, forms a loop 214 and falls through the aperture 182 to eventually assume the position shown by reference numeral 216. At the moment when the entire new tape 132 has been advanced over the auxiliary tape feed wheel 133, the tape sensing portion 166 on the new tape sensing lever 163 senses the end of the tape 132 and the spring 167 urges the new tape sensing lever 163 in a clockwise direction about the bolt 164. This pivotal movement of the new tape sensing lever 163 raises the link 171 causing the latching lever 173 to pivot bringing the tooth 176 against the latching cam 177 and also causing the stud 212 on the link 171 to pivot the latch lever 207 from engagement with the depending arm 211 on the clutch throwout lever 158. Due to the fact that at this time a low portion of the cam 204 is opposite the cam follower 203, the clutch throwout lever 158 pivots against the driven clutch member 144 to disengage the members of the clutch 146 which stops the rotation of the auxiliary feed wheel 133.

In the case when the end of message signal has been sensed in the tape 69 but a new tape 132 has not been placed over the auxiliary tape feed wheel 133, the new tape sensing lever 163 will sense no tape which causes the tooth 176 on the latching lever 173 to engage the indentation in the locking cam 177, thus preventing rotation of the sleeve 23, while it is otherwise released for rotation by the latching lever 127. At this time the blocking lever 114 has pivoted to the position shown in Fig. 1 and remains in this position whereby the pawl 72 is disengaged from ratchet 71 and the bail 88 is blocked, locking the sensing levers 82 in the position shown in Fig. 1. Only a release of the sleeve 23 by the latching lever 173 will allow the old tape 69 to be fed out over the feed wheel 64. However, the tail of the tape 69 may be manually withdrawn, the pull necessary being only that required to overcome the friction between the collars 61 and friction washers 62. Whether the tail of the tape 69 is manually withdrawn from or left in position over the feed wheel 64 makes no difference in subsequent operations, for in either case the sleeve 23 will commence rotation as soon as it is released therefor by the latching lever 173. When it is desired to transmit a message from a new tape 132 this new tape is inserted over the auxiliary tape feed wheel 133 in the ordinary manner. This new tape 132 is then sensed by the new tape sensing lever 163

which pivots the latching lever 173 to release the sleeve 23 for rotation. The subsequent sequence of operations is the same as those hereinbefore described when a new tape 132 has been positioned over the auxiliary feed wheel 133 while a message is being transmitted from the tape 69.

Various changes and modifications may be made in the present invention without departing from the spirit and scope thereof.

What is claimed is:

1. In a telegraph transmitter including transmitting means, a main feeding means for advancing a telegraph tape past a tape sensing position at tape sensing speed, a secondary feeding means for causing said main feeding to advance a tail of said telegraph tape out of said tape sensing position at a speed greater than said tape sensing speed, tape sensing means normally operable to actuate the transmitting means in accordance with signals sensed in said telegraph tape, a receiver for receiving a new telegraph tape, an auxiliary feeding means normally inoperable for advancing said new telegraph tape into said tape sensing position, an end of message responsive mechanism rendered operable when an end of message signal is sensed in said telegraph tape for disabling said main feeding means and said tape sensing means, and for rendering said secondary feeding means operable to cause said main feeding means to advance said tail of said telegraph tape out of said tape sensing position at said speed greater than said tape sensing speed, and for rendering said auxiliary feeding means operable to advance the new telegraph tape into tape sensing position, and means effective when the new tape has reached the tape sensing position for rendering said tape sensing means and said main feeding means operable to sense and advance the new tape and for simultaneously disabling said secondary feeding means.

2. In a telegraph transmitter including transmitting means, a main feeding means normally operable for advancing a message control form past a message control form sensing position at a message sensing speed, means for rendering said main feeding means operable to advance a message control form out of sensing position at a speed greater than said message sensing speed, message control form sensing means for normally controlling the transmitting means, a normally ineffective auxiliary feeding means for advancing a new message control form into the message control form sensing position, an end of message responsive mechanism rendered operable when an end of message signal is sensed in said first-mentioned message control form for disabling said sensing means, for actuating said means for rendering said main feeding means operable to advance a message control form out of sensing position at a speed greater than said message sensing speed, and for rendering said auxiliary feeding means effective to advance the new message control form into said message control form sensing position, and means effective when the new message control form has reached the sensing position for rendering said message control form sensing means operable and for rendering said main feeding means operable for advancing the new message control form past the sensing position at message sensing speed.

3. In a telegraph transmitter including transmitting means controlled by a message control form sensing means, a main feeding means for feeding a message control form, an auxiliary feeding means for feeding a new message control form into transmitting position for advancement thereafter by said main feeding means, a control form receiver for receiving a new message control form, a control form senser operable on the new message control form when received by said control form receiver, a latch associated with said control form senser and operable therewith for conditioning said auxiliary feeding means when said control form senser is operated by the new message control form, an end of message responsive mechanism effective when an end of message signal is sensed in a prior message control form for rendering inoperable the message control form sensing means, said end of message responsive mechanism being further effective when said auxiliary feeding means has been conditioned for rendering said auxiliary feeding means effective to feed the new message control form into transmitting position, and means effective when the new message control form has reached the transmitting position for rendering the message control form sensing means operable to sense the new message control form and control the transmitting means.

4. A telegraph transmitter including transmitting means and a message control form sensing means, a main feeding means for feeding a message control form, an auxiliary feeding means for feeding a new message control form into transmitting position for advancement thereafter by said main feeding means, means controlled by the new message control form for conditioning said auxiliary feeding means for operation, a mechanism effective normally when a blank signal in the control form is sensed by said message control form sensing means for rendering the message control form sensing means inoperable, said mechanism also being effective normally when a blank signal in the control form is sensed by said message control form sensing means and when said auxiliary feeding means is conditioned for operation for rendering said auxiliary feeding means effective to feed the new message control form into transmitting position, means controlled by the message control form sensing means for rendering inoperative said mechanism until a signal different from a blank signal is sensed by the message control form sensing means, and means effective when the new message control form has reached the transmitting position for rendering the message control form sensing means operable to sense the new message control form and control the transmitting means.

5. A telegraph transmitter including a transmitting means and a message control form sensing means, a main feeding means for feeding a message control form, an auxiliary feeding means for feeding a new message control form into transmitting position for advancement thereafter by said main feeding means, means controlled by the new message control form for conditioning said auxiliary feeding means for operation, mechanism effective normally when a space out signal in the control form is sensed by said message control form sensing mean for rendering the message control form sensing means inoperable, said mechanism also being effective normally when a space out signal in the control form is sensed by said message control form sensing means and when said auxiliary feeding means is conditioned for operation for rendering said auxiliary feeding means effective to feed the new message control form into transmitting position, means controlled by the message control form sensing means for rendering inoperative said

mechanism until a signal different from a space out signal is sensed by the message control form sensing means, and means effective when the new message control form has reached the transmitting position for rendering the message control form sensing means operable to sense the new message control form and control the transmitting means.

6. In a telegraph transmitter including transmitting means controlled by a message control form sensing means, a main feeding means for feeding a message control form, a feed wheel for feeding a new message control form, a first means for actuating said feed wheel to advance a leading end of the new message control form into transmitting position, a second means for actuating said feed wheel for advancing the remainder of the new message control form over said feed wheel, said main feeding means being operable to feed the new message control form after it has been advanced to transmitting position by said feed wheel and said first means for actuating said feed wheel, a control form receiver for receiving the new message control form, means for conditioning both of said feed wheel actuating means when the new message control form is received by said control form receiver, an end of message responsive mechanism effective when an end of message signal is sensed in a prior message control form for rendering ineffective the message control form sensing means and the main feeding means, said end of message responsive mechanism being further effective when both of said feed wheel actuating means have been conditioned for first actuating the first of said feed wheel actuating means, and when the leading end of the new message control form has been advanced into transmitting position, for simultaneously rendering effective the second of said feed wheel actuating means and said main feeding means, and means also effective when the leading end of the new message control form has been advanced into transmitting position for rendering the message control form sensing means effective to sense the new message control form and control the transmitting means.

7. In a telegraph transmitter including transmitting means controlled by a message control form sensing means, a main feeding means for feeding a message control form, an auxiliary feeding means for feeding a new message control form, a directing means for directing a leading end of the new message control form from said auxiliary feeding means into transmitting position to be thereafter advanced by said main feeding means, a control form receiver for receiving a new message control form, means for conditioning said auxiliary feeding means when a new message control form is received by said control form receiver, an end of message responsive mechanism for rendering inoperable the message control form sensing means, said end of message responsive mechanism being further effective when said auxiliary feeding means has been conditioned for rendering said auxiliary feeding means and said directing means effective to respectively feed and direct the new message control form into transmitting position, means effective when the new message control form has reached the transmitting position for rendering the message control form sensing means operable to sense the new message control form and control the transmitting means, and means for rendering said directing means ineffective to thereby allow said auxiliary feeding means to feed the entire new message control form.

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The following references are of record in the file of this patent:

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