

Nov. 1, 1938.

R. F. DIRKES

2,134,708

ELECTRIC SELECTOR MECHANISM

Filed Oct. 30, 1936

4 Sheets-Sheet 1

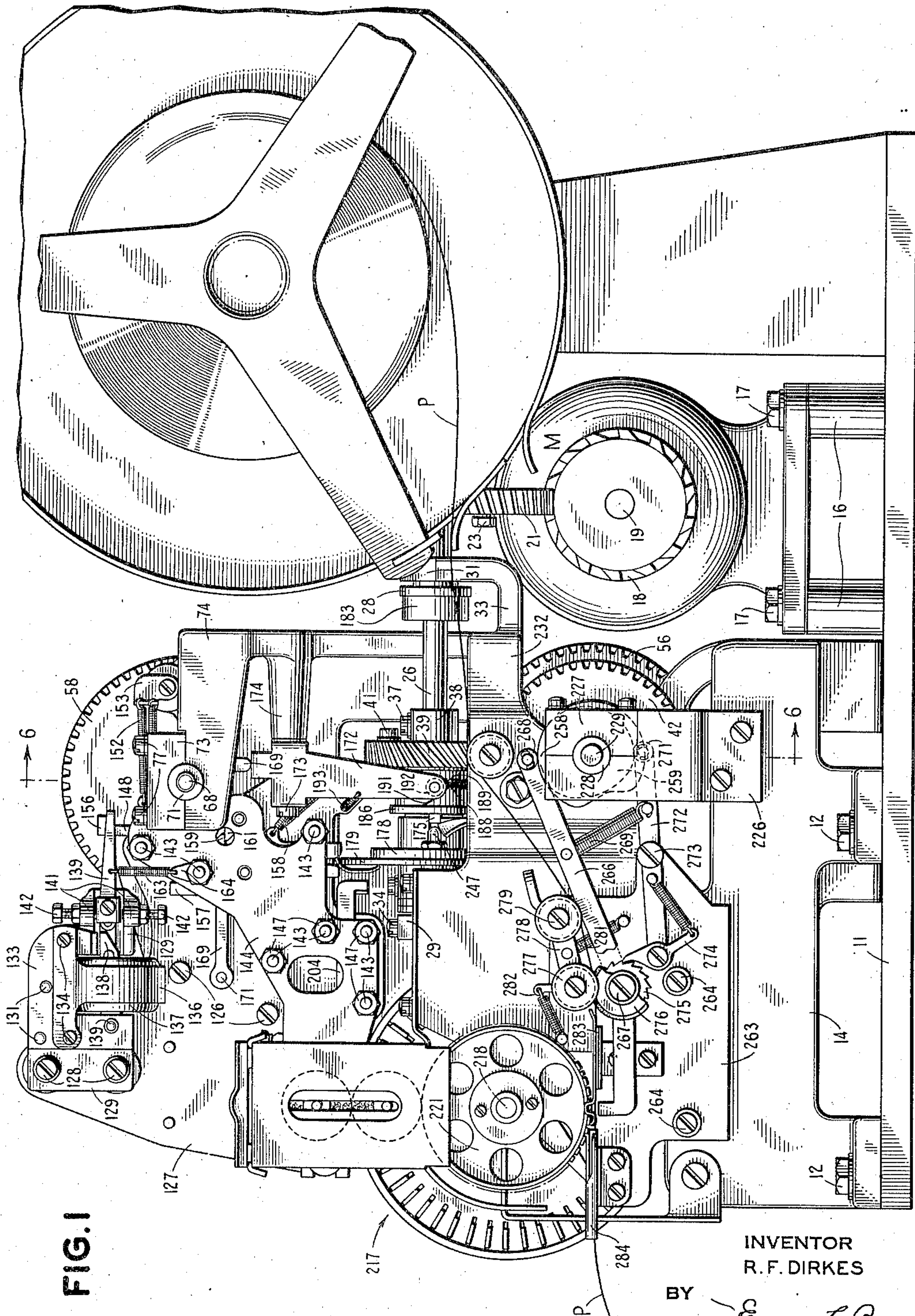


FIG. 1

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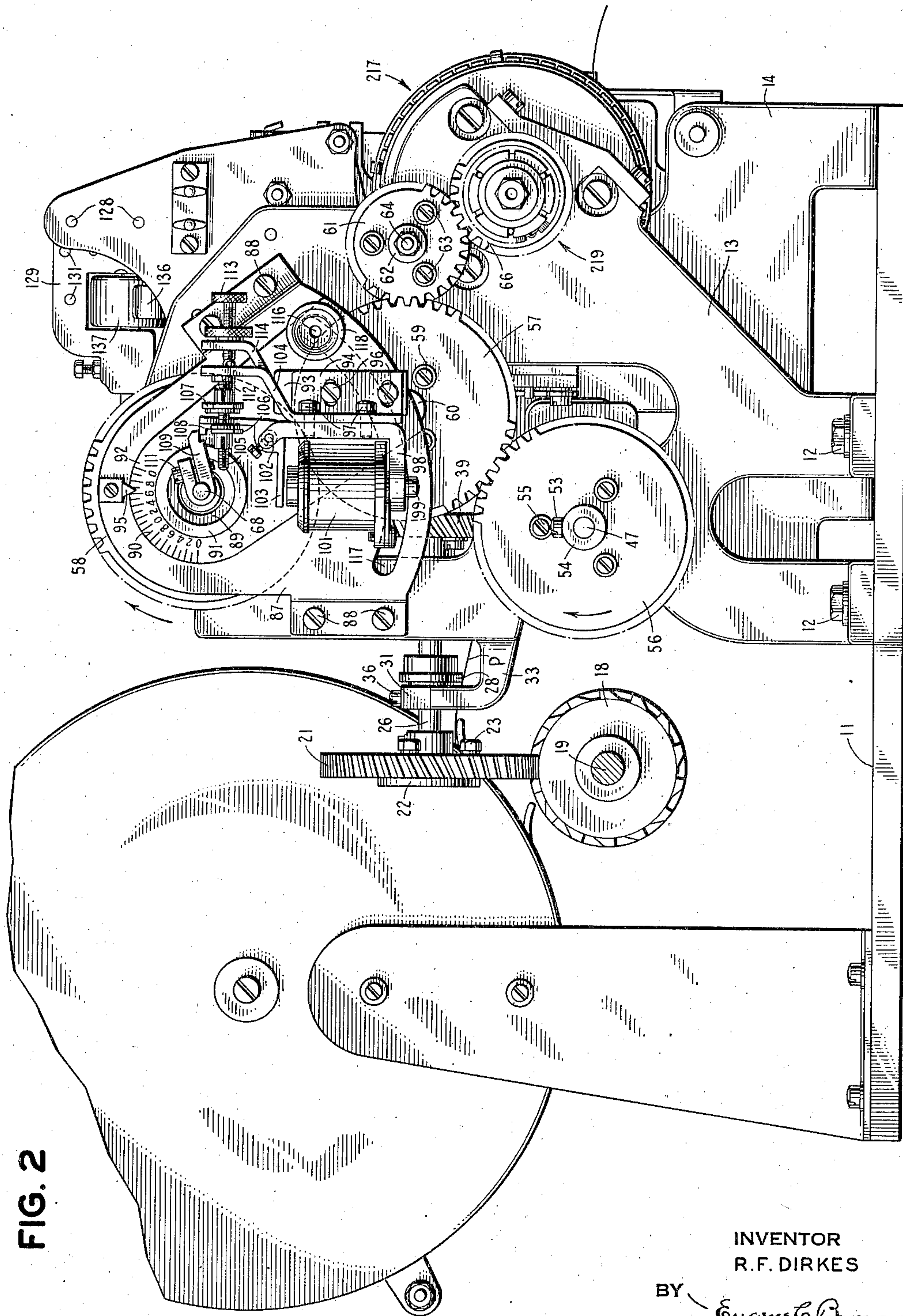
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

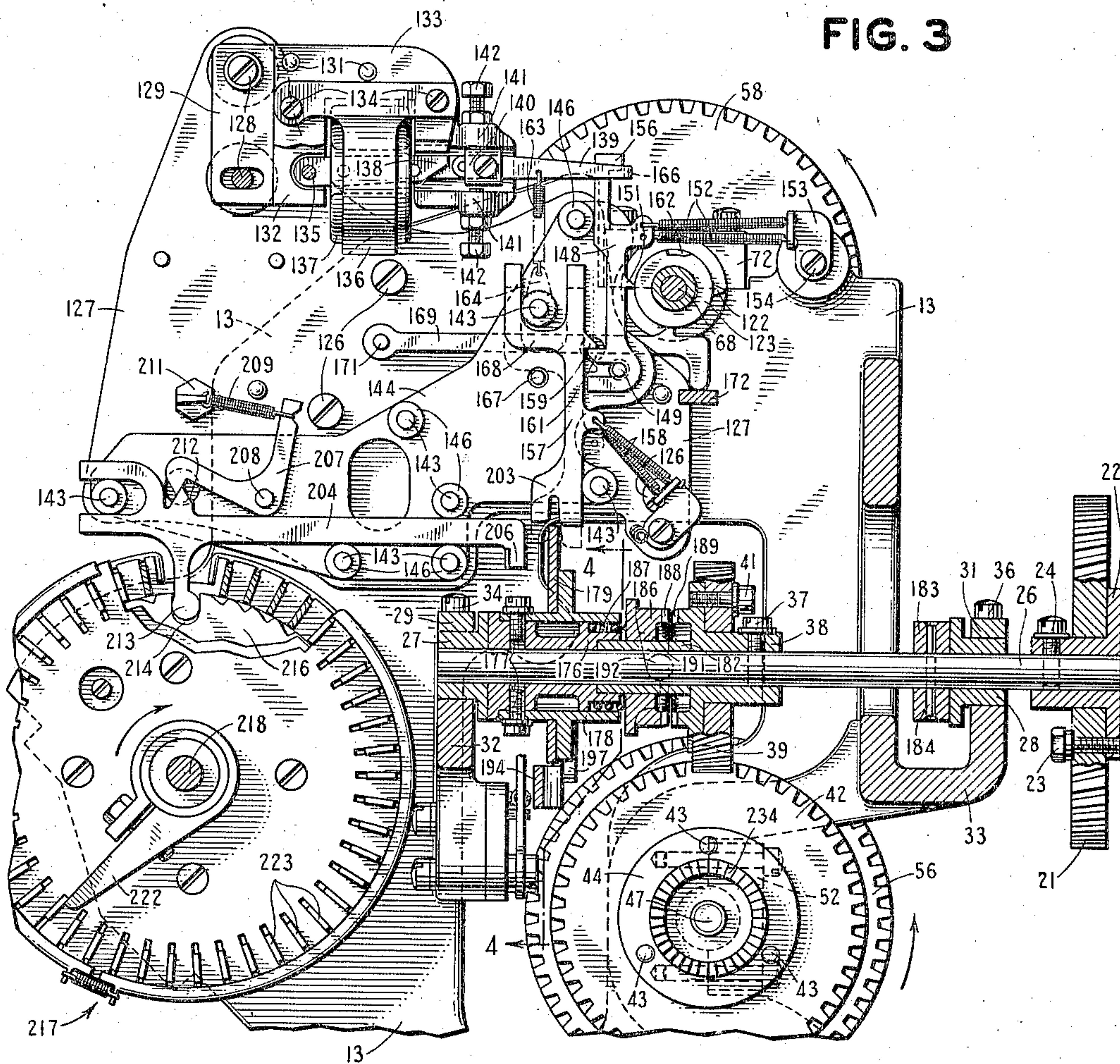


FIG. 4

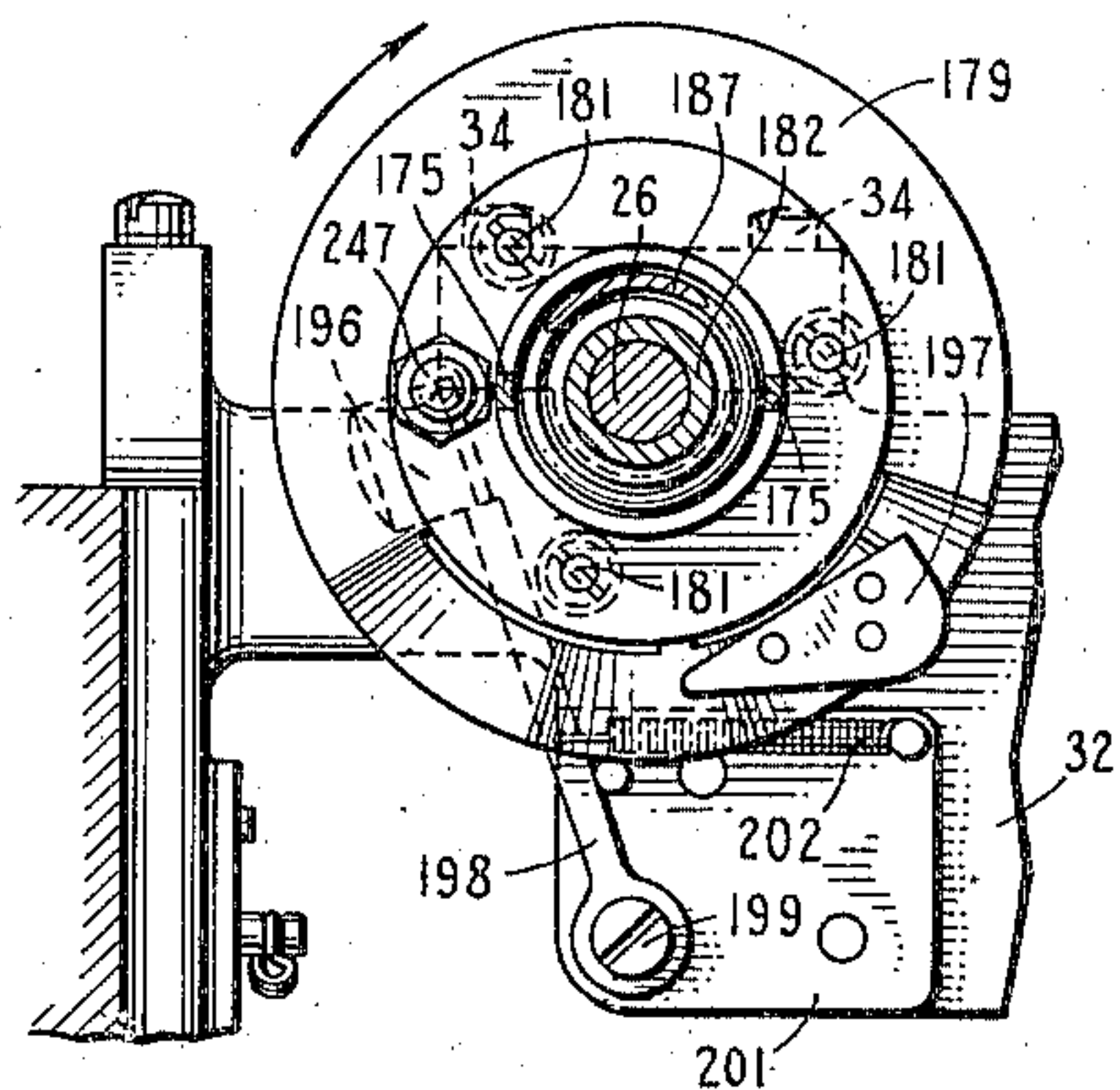
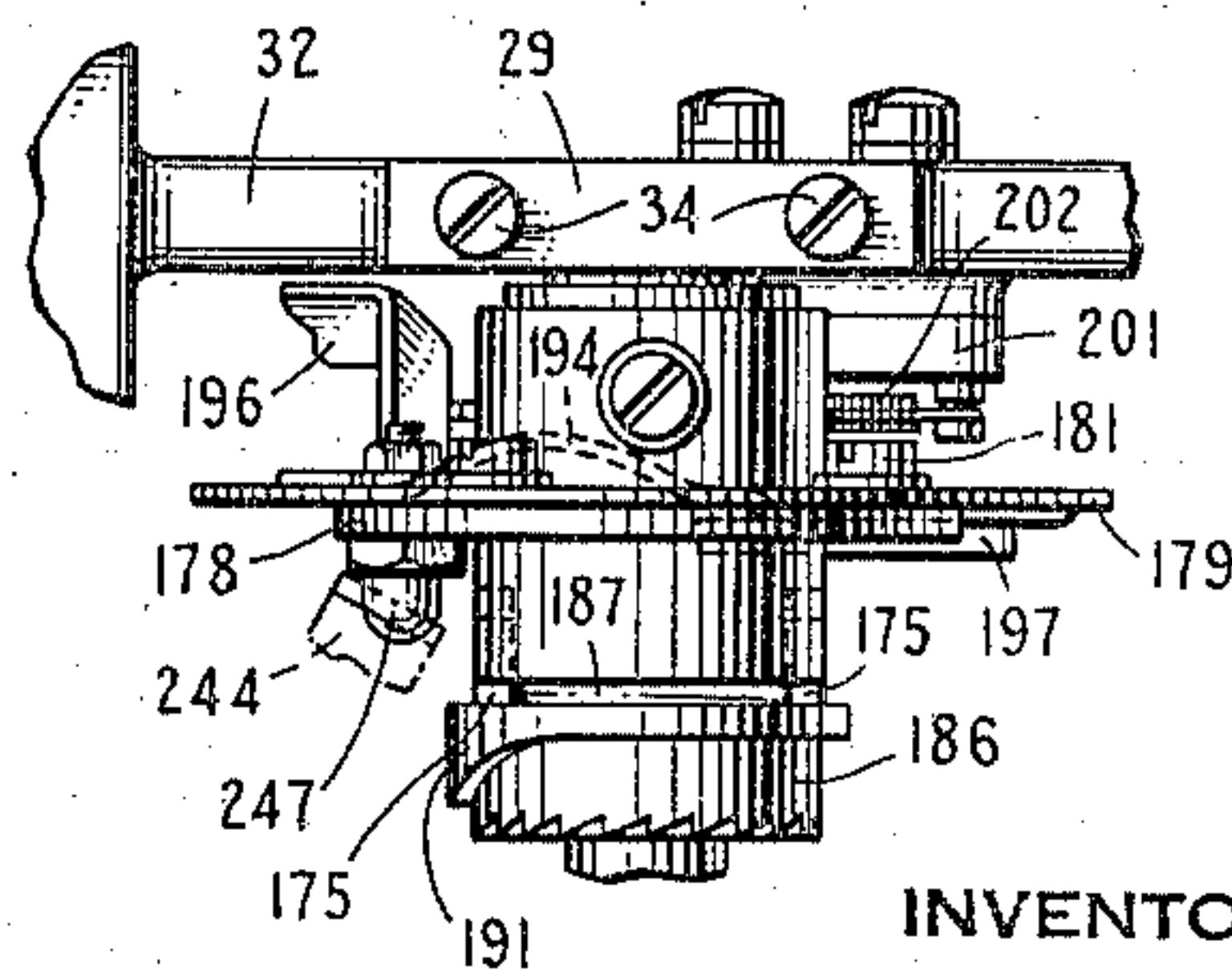


FIG. 5



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FIG. 6

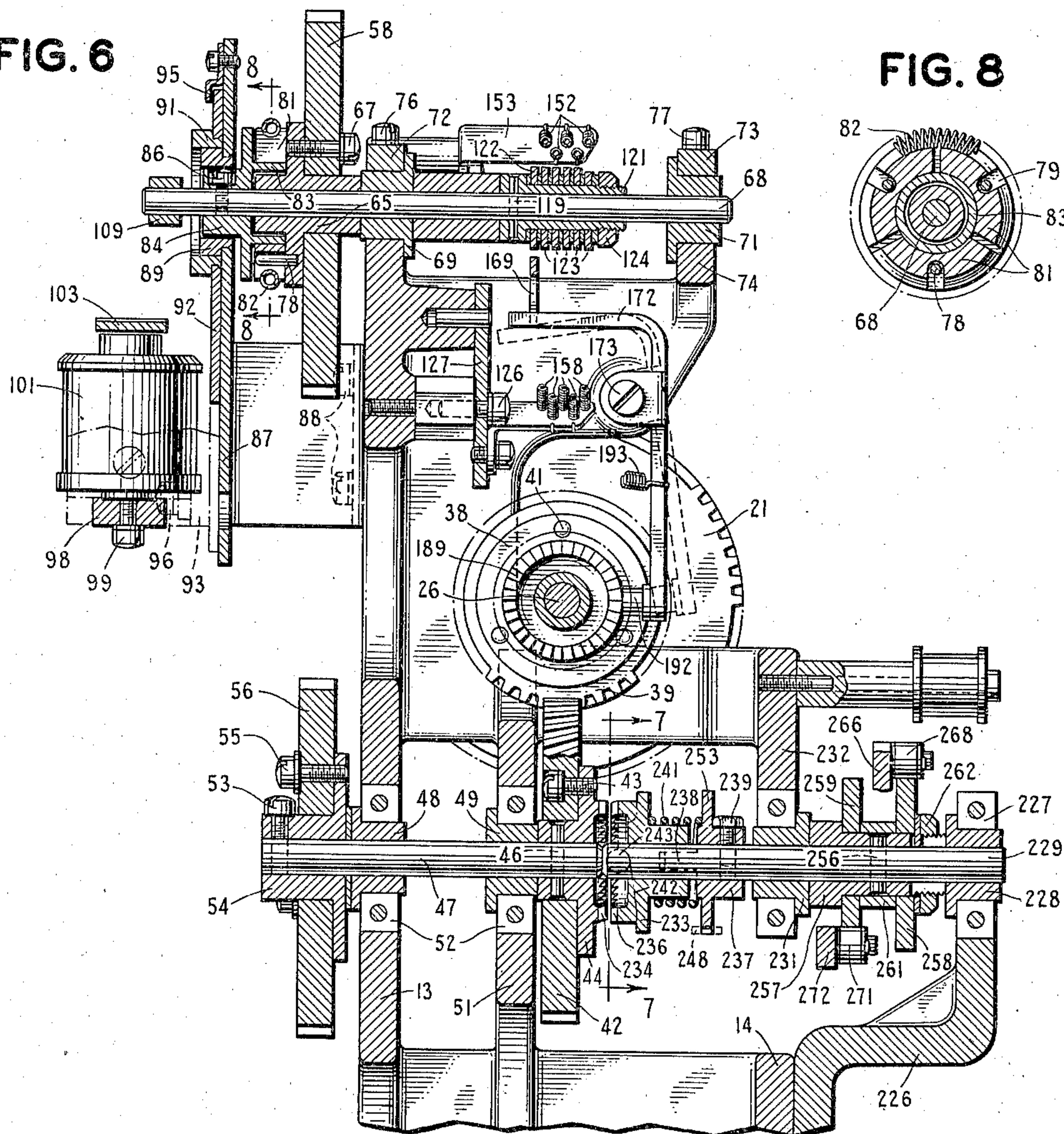


FIG. 8

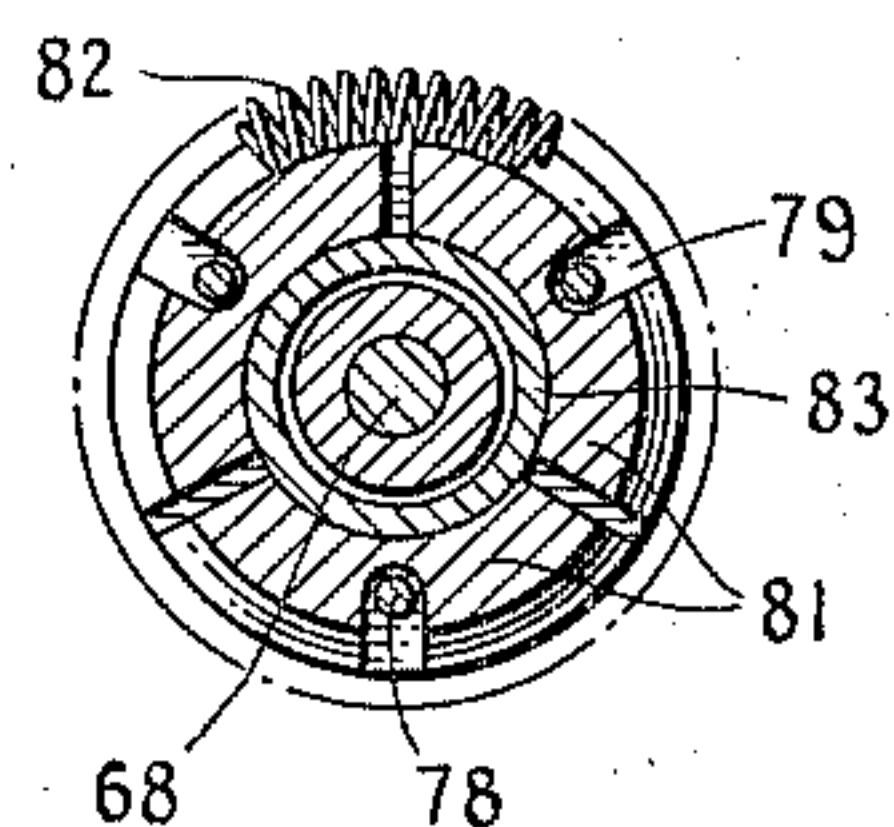


FIG. 7

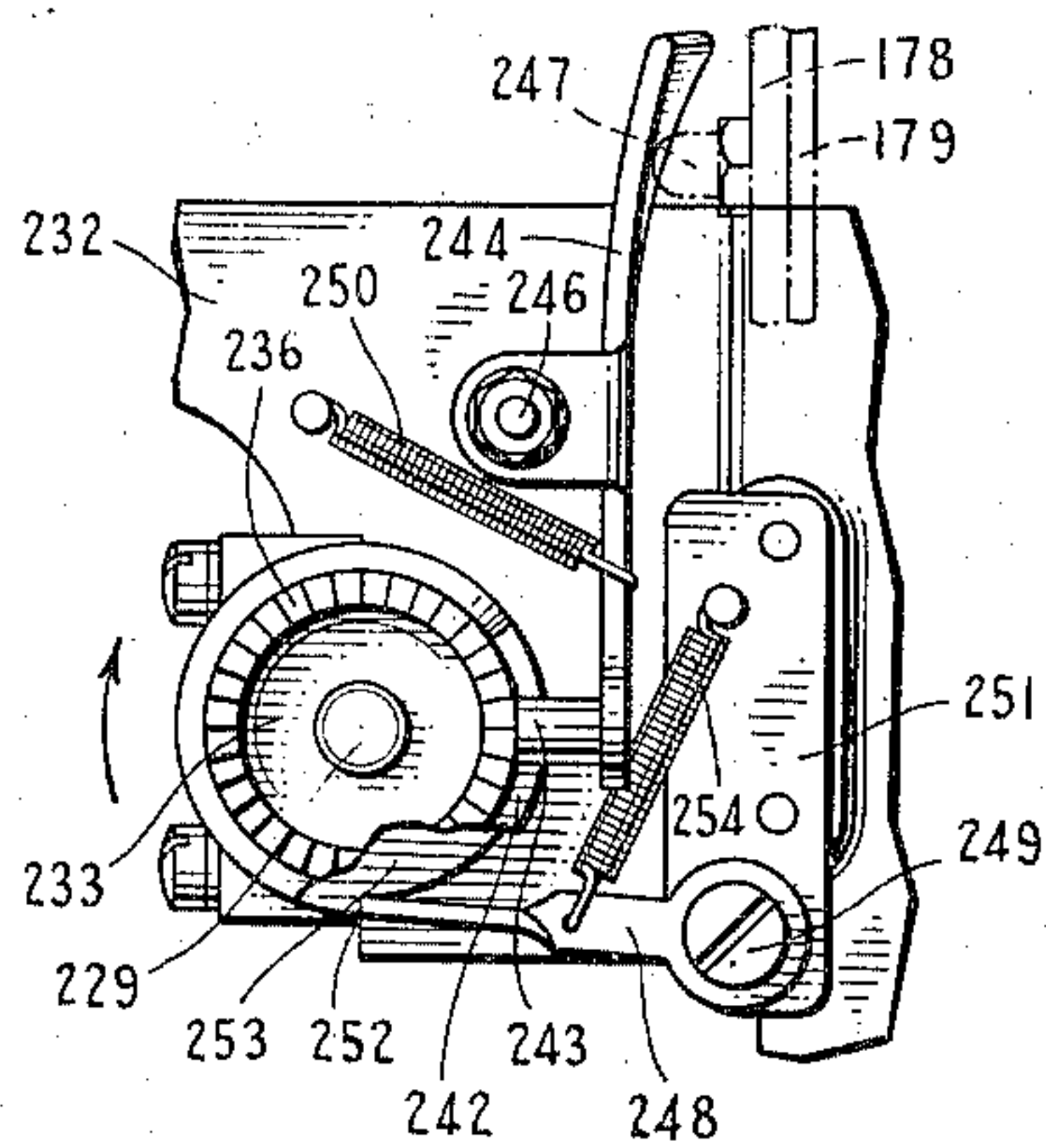
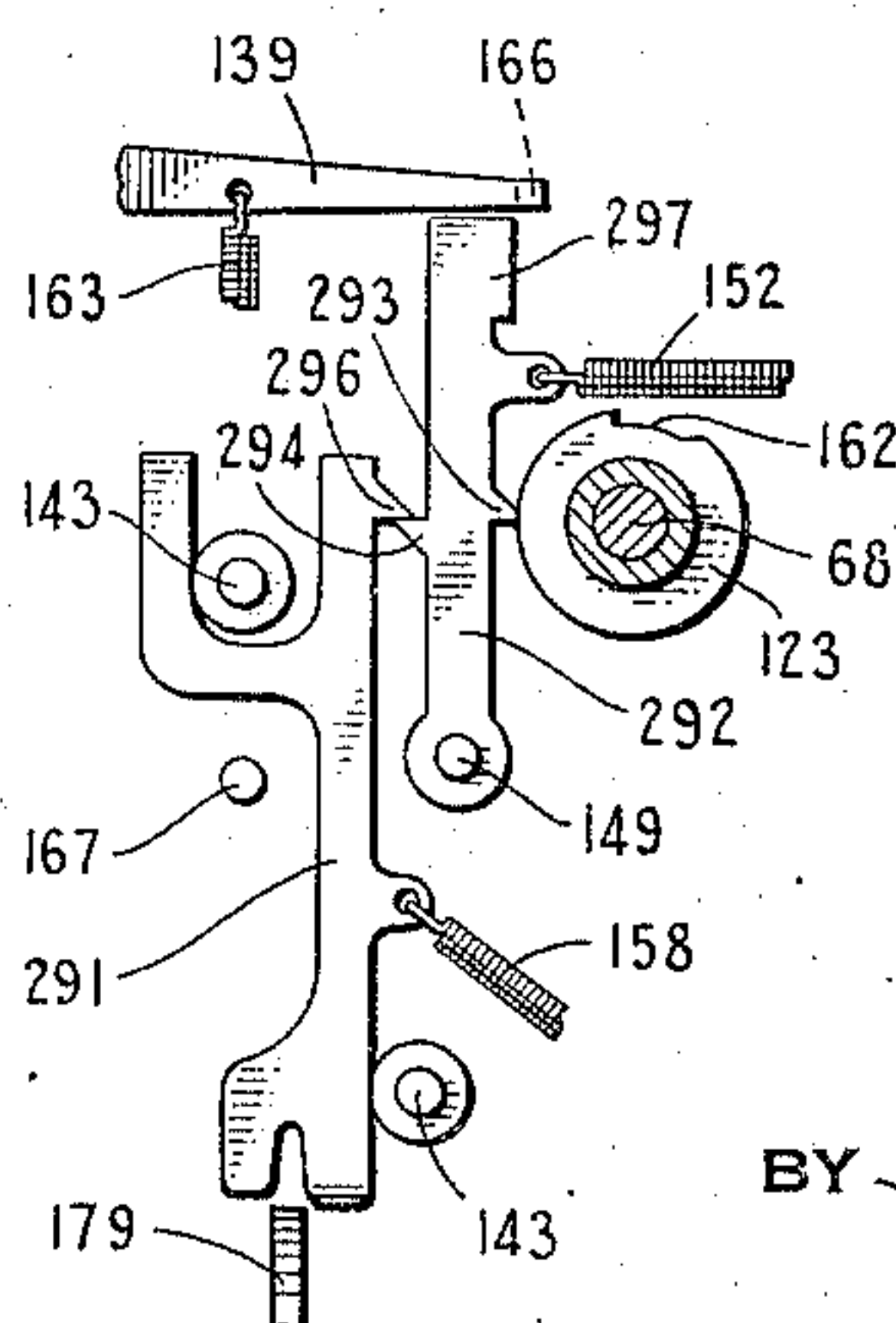


FIG. 9



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ELECTRIC SELECTOR MECHANISM

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Application October 30, 1936, Serial No. 108,492

35 Claims. (Cl. 178—34)

This invention relates primarily to electric selector mechanism of the type employed for effecting the selective operation of telegraph receivers, such as printers, reperforators or like apparatus and which comprise a set of selectors adapted to be selectively conditioned or positioned in response to received code signal permutations of two different line conditions or impulses extending throughout a definite number of successive time intervals. More particularly, the invention relates to a selector mechanism wherein the selectors are set in combinations representative of received code signal permutations under the joint control of a locally driven member, usually a rotatable shaft with a series of cams thereon, and a member variably and selectively operated by an electro-responsive means, usually a magnet and the armature thereof, in response to the received code combinations of electrical conditions. Heretofore, telegraph receivers of various types such as page printers, tape printers, tickers and reperforators, have each employed selector units of different types. Obviously, this results in the manufacture and maintenance of a plurality of types of selector units and such practice does not lead to the highest operating and maintenance efficiency and lowest manufacturing costs.

Accordingly, one of the primary objects of this invention is to provide a selector mechanism which is readily applicable to practically all the various types of telegraph receiving units mentioned above and others. This, of course, results in lower manufacturing cost per unit and a marked decrease in the number of repair parts and spare units to be kept on hand.

Another object of the invention is to provide a highly efficient selector mechanism of novel design which may be readily removed from a telegraph receiver as a unit and replaced by another unit when requiring repairs, adjustments or replacement.

Another object is to provide a selector mechanism whereby the recording of the preceding selection by the recording mechanism may be effected simultaneously with the receiving and selecting of the following selection. Obviously, this lends itself to the high speed operation of the receiving unit.

A still further object is to provide a selector that has smooth and quiet operation with a minimum of wearing parts and adjustments.

These and other objects and advantages of the invention will appear hereinafter in conjunction with the detailed description thereof.

For the purpose of illustration, the preferred embodiment of the selector mechanism is shown combined with and selectively controlling a type-wheel tape printer. The printing mechanism is fully disclosed in a copending application of V. R. Kimball et al., filed Oct. 22, 1935, Ser. No. 46,198, and only such parts thereof will be described herein as are thought to be necessary for a complete understanding of the invention. It should be kept in mind, however, that the selector mechanism is readily adaptable to selectively control other types of telegraph receiving units.

The preferred form of this invention is adapted to operate in conjunction with what is known in the art as the Simplex or "start-stop" five unit signalling code. As is well known, this signalling code comprises a start impulse of uniform line condition followed by five impulses in various combinations of two different line conditions which in turn are followed by a rest impulse of a uniform line condition and opposite to that of the start impulse. The start and the five variable impulses are of substantially uniform duration while the duration of the rest impulse is variable. Usually it is somewhat longer than the other impulses and approaches the length of one of the other impulses as the speed of the receiver approaches its maximum.

Operatively associated with the selector mechanism and controlled thereby is a typewheel positioning mechanism, a printing mechanism and a paper tape feeding mechanism. These sub-combinations are so arranged that they may be easily and rapidly removed and interchangeably replaced when requiring repairs or adjustments. Thus the replacement of the whole receiver is not necessary.

The selector mechanism comprises a set of five primary selectors, one for each variable impulse of the signalling code, an associated set of latches for holding the primary selectors in their normal position, a set of secondary selectors or transfer members, a start magnet, a selector magnet and two locally power driven members. The first locally driven member is released for operation by the start magnet in response to the start impulse and as it rotates in substantial synchronism with the received signals, it co-operates with the armature of the selector magnet to selectively and successively operate the latches in combinations representative of the received signals. The latches which are selectively operated allow their associated primary selectors to assume their selected positions to which they are urged by individually attached springs, and

the latches which are not selectively operated retain their associated selectors in their normal unselected positions. The first power driven member releases the second power driven member which operates in timed relation to the positioning of the primary selectors to transfer the selection set up therein to the secondary selectors and thereafter restore the selected primary selectors to normal whereupon they are free to be reselected in response to a following code combination of impulses. The transfer and restoration operations take place sequentially and in a relatively short interval of time, and thus give the tape advancing, printing and typewheel positioning mechanisms nearly the entire interval of one combination of impulses to perform their related functions.

The secondary selectors are individually and operatively associated with a set of five notched selector discs which selectively control the stopping position of the rotatable typewheel corresponding to the received code combination.

The printing and paper feeding mechanisms function sequentially following the positioning of the typewheel and are operated by individual cams on a third independently rotatable member.

A continuously rotating electric motor furnishes power for the operation of the various mechanism through appropriate gearing and clutch mechanisms while the armature of the selector magnet acts only to control the setting of the primary selectors; hence, the complete mechanism is capable of high speed operation.

A more complete and thorough understanding of this invention may be had from the following detailed description taken in conjunction with the accompanying drawings showing a preferred embodiment thereof, in which:

Fig. 1 is a front elevational view of a preferred embodiment of the invention;

Fig. 2 is a rear elevational view thereof;

Fig. 3 is an enlarged fragmentary sectional view taken about the center of the machine looking in the direction of the rear thereof;

Fig. 4 is a fragmentary sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a plan view of the mechanism shown in Fig. 4;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 1;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 6; and

Fig. 9 is a fragmentary view similar to a part of Fig. 3 and shows a modified form of the selector levers and latches.

Referring first to Figs. 1 and 2, a base plate 11 has attached to it by screws 12, a main frame casting comprising mainly two vertical plate sections 13 and 14 extending transversely of the machine and suitable integral connecting members therefor. These vertical plate members and their connecting members with various projections and sections of the main frame provide journal and mounting points for the various mechanisms. The connecting members and sections of the main frame will be given separate reference numerals when referred to hereinafter in this specification.

Referring to Figs. 1 to 3, the drive mechanism of the machine will now be described. A group of four posts 16 (two only of which are shown in Fig. 1) attached to the base 11 has mounted thereon, by screws 17, an electric motor M. A

pinion 18 secured to the motor shaft 19 meshes with a gear 21. The gear 21 is secured to a flanged hub 22 by screws such as 23, the hub 22 being attached by a screw 24 to an operating cam shaft 26 for rotation therewith. The operating cam shaft 26 is transversely journaled in flanged bushings 27 and 28 (Fig. 3) which are held in place by the bushing clamping members 29 and 31 respectively. The clamping members 29 and 31 are attached to the sections 32 and 33 of the main frame casting by screws 34 and 36, respectively. Fixed to the shaft 26 by a screw 37 is a flanged gear hub 38. A gear 39 is secured to the hub 38 by screws such as 41 for rotation therewith and meshes with a gear 42. The gear 42 is secured by screws, such as 43, to a flanged gear hub 44, best shown in Fig. 6, which in turn is secured by means of a pin 46 to a countershaft 47. The countershaft 47 is journaled in flanged bushings 48 and 49 which are held in the plate member 13 and in a section 51 of the main frame casting, respectively, by bushing clamping members 52, one of which is shown dotted in Fig. 3. Fixed by a screw 53 (Fig. 6) to the left hand end of the shaft 47 for rotation therewith is a gear hub 54 which carries a gear 56 by means of screws 55. Referring to Fig. 2, gear 56 meshes with an idler gear 57 which in turn meshes with a selector cam shaft drive gear 58. Idler gear 57 is fixed to a hub 60 by means of screws 59, the hub 60 being rotatably mounted on a stud in the plate frame member 13. In mesh with the idler gear 57 is another idler gear 61 fixed to a hub 62 by means of screws 63, the hub 62 being rotatably mounted on a stud 64 extending from the plate frame member 13. A typewheel shaft drive gear 66 meshes with the idler gear 61 and is driven therefrom. The typewheel shaft gear 66 and the selector cam shaft gear 58 serve to rotate their respective shafts in a manner that will be hereinafter described in connection with their respective mechanisms.

Selector mechanism

Referring now to Figs. 2, 3, 6 and 8, the arrangement and operation of the selector mechanism will now be described. As hereinbefore described, the gear 58 is continuously rotating due to the power communicated thereto from the continuously rotating motor M through the described gear train. The gear 58 is fixed by screws 67 to a flanged hub 65 loosely mounted on a selector cam shaft 68. The selector cam shaft 68 is transversely journaled in flanged bushings 69 and 71 which are held by bushing clamping members 72 and 73 attached to the top of sections 13 and 14 of the main frame casting by screws 76 and 77, respectively. The flange of the gear hub 65 carries a series of three pins 78 (Figs. 6 and 8) equally spaced around the left face thereof and extending axially therefrom. These pins engage radial slots 79 in associated Bakelite segments 81. A groove on the outer edge of the segments 81 has therein a circular coiled radially contractible spring 82 which causes the inner surfaces of the segments 81 to be frictionally engaged with a sleeve 83, extending from the right hand face of a hub 84. The hub 84 is fixed to the selector cam shaft 68 by a set screw 86 for rotation therewith in abutting relation with the left side of the gear hub 65. The right hand side of the gear hub 65 is in abutting relation with the left hand face of the flanged bushing 69. It can therefore be seen from the above description

that, as the gear 58 and hub 65 rotate together, the selector cam shaft 68 will tend to rotate therewith due to the action of the segments 81 frictionally engaged with the sleeve 83 of the hub 84 but is normally prevented from doing so, as will be hereinafter described.

Attached adjacent the upper left hand face of the plate section 13 of the main frame, by screws 88, as seen in Fig. 6, is a start unit mounting bracket 87. Peened onto the bracket 87 is a bushing 89 through which projects a portion of the hub 84. The hole in the bushing is substantially larger than the hub 84 and there is no engagement therebetween. Loosely mounted on the outer surface of the bushing 89 is another bushing 91 which is peened to an orienting plate 92. Thus the plate 92 is rotatable about the bushing 89 within certain limits hereinafter described. Attached to the plate 92 is a spacing plate 93, Figs. 2 and 6, to which in turn is adjustably attached by screws 96 a start magnet mounting bracket 94. Secured by screws 97 to the bracket 94 is the start magnet yoke 98 which by means of a screw 99 secures the start magnet 101 thereto and at the upper end supports a rod 102 upon which is pivotally mounted the bell crank shaped armature 103. From an upwardly projecting arm 104 of the bracket 94 extends a threaded stud 105 upon which are two self-locking flanged nuts 106 and 107. The flanges of these nuts 106 and 107 are engageable with the vertical arm of the bell crank armature 103 and thus limit the movement of the armature. Riveted to the vertical arm of the armature 103 is a striking plate 108 which is in operative relation with a stop-arm 109 clamped adjacent the end of the selector cam shaft 68, for rotation therewith, by a screw 111.

In the normal or rest position of the printer, the start magnet 101 is energized and the adjustment of the flanged nut 106 is such as to allow the striking plate 108 to be engaged with the stop-arm 109 and thereby hold the selector cam shaft from rotating. When the stop-arm 109 is engaged with the striking plate 108, the hereinbefore mentioned Bakelite segments 81 slide on the circumference of the sleeve 83, Fig. 6.

A retractile spring 112, Fig. 2, has one end attached to the vertical arm of the armature 103, the other end of which is attached to the left hand end of an adjusting screw 113 supported in an upwardly projecting arm 114 of the bracket 94. The spring tends to return the armature 103 to its retracted position against the action of the magnetic influence of the magnet 101.

A stud 116 extends through a curved slot 117 in the bracket 87 and through a hole in the orienting plate 92. A thumb nut 118 is in threaded engagement with the stud 116 and by loosening the thumb nut the orienting plate 92 with its attached members may be rotated within the limits of the curved slot 117 in the bracket 87, with the shaft 68 at the center of rotation. Thus the stop or rest position of the shaft 68 may be changed and this operation is known in the art as orienting. The purpose of orienting is to vary the rest position of the selector shaft so that the individual selector positioning operations take place at substantially the mid-portion or most effective portions of respective signal periods. A scale 90 etched on the orienting plate 92 cooperating with a pointer 95 secured to the bracket 87, serves to indicate the relative amount of orientation.

Secured to the selector cam shaft 68, Fig. 6, by a pin 119 is a cam sleeve 121. A single hump cam 122 and five notched selector cams, indicated in

general at 123, are clamped to the sleeve 121 for rotation therewith by a nut 124, in threaded engagement with the right hand end thereof.

Removably attached by screws 126, Figs. 1 and 3, to the upper part of the plate section 13 of the main frame casting is a selector unit mounting plate 127 on which are supported all the elements of the selector mechanism with the exception of the selector shaft 68. Thus the complete selector unit is readily removable when requiring repairs, replacement of parts, or adjustments. Adjustably secured by screws 128 to the upper section of the selector unit mounting plate 127 is a selector magnet casting 129, Figs. 1, 2 and 3, which has two locating pins 131 extending horizontally therefrom. On the locating pins is a laminated magnet yoke 132 and a front plate 133. Two screws 134 which extend through a magnet coil clamp 136, the front plate 133, and the magnet yoke 132, are threaded into the selector magnet casting 129 and clamp said members thereto. The magnet clamp 136 holds a hollow circular selector magnet coil 137 through which extends a horizontal laminated armature 138. The armature 138 is pivoted at its left hand end, as seen in Figs. 1 and 3, on a pin 135 supported by the selector magnet casting 129 and the front plate 133. Secured to the right hand end of the armature 138 is an armature extension 139 which has the right hand end bent to form a right angle with the main section thereof, extending toward the rear of the printer, the purpose of which will be hereinafter described. Supported in two horizontal projections 141 of the magnet casting 129 are two adjusting screws 142, one above and one below the armature extension 139. The ends of these screws cooperate with an armature hammer 140 to limit the movement of the armature 138 and the armature extension 139.

Extending horizontally from the selector unit mounting plate 127 are a series of studs 143, Figs. 1 and 3, which have arranged thereon a plurality of selector guide plates 144 and spacers 146 intermediate therebetween. The plates 144 and spacers 146 are clamped together by nuts 147 in threaded engagement with ends of the studs 143.

A series of five selector lever latches, indicated in general at 148 in Fig. 3, are located in a substantially vertical position one behind the other intermediate with the guide plates 144. The lower ends of the latches 148 are horizontally bifurcated and are all slidably mounted thereat on a pin 149 extending horizontally from the mounting plate 127. Projections 151 adjacent the center of each latch 148 are operatively associated with the disc cams 123, each latch being associated with and in operative relation with a different one of the cams. At a point above the projections 151 on the latches 148 are attached individual tension springs 152 which tend to rock the latches in a clockwise direction with the pin 149 serving as the center of rotation, and keep the projections 151 in contact with their associated cams 123. The other ends of the springs are secured to a spring mounting bracket 153 which is adjustably secured to the plate section 13 of the main frame casting by a screw 154. The upper end of each latch 148 has a rightwardly extending projection 156 which is in operative relation and coacts with the right hand bent end of the armature extension 166 to cause the selective operation of the latches 148, as will be hereinafter described.

A series of five selector levers indicated in general at 157 in Fig. 3 are located between the guide

plates 144, one behind the other in a substantially vertical position. These selector levers 157 are bifurcated at both ends and like the latches 148 are slightly thinner than the spacers 146 and are therefore freely movable between the guide plates 144. Individual spring 158 attached to the selector levers 157 holds said levers to the right with the lower ends thereof against spacers on the stud 143 and the upper end against another stud 143 between the bifurcated upper end. These springs 158 tend to pull the selector levers 157 down into their selected position as shown by the dotted outline thereof in Fig. 3 but are prevented from doing so by means of a rightwardly extending horizontal projection 159 which normally engages with a leftwardly extending horizontal projection 161 on associated latches 148.

The manner in which the selector levers 157 are selected in a combination in response to and in accordance with a combination of code impulses will now be described. The normal or rest condition of the line is closed and thus an electrical impulse is transmitted for this condition. Therefore, when the selector mechanism is idle, the start magnet 101 and selector magnet 137, Fig. 2, which are connected in series with the line, are both energized. The start magnet 101, Fig. 2, being energized, causes the armature 103 to be in engagement with the stop-arm 109 which is secured to the selector cam shaft 68 and thereby keeps said shaft from rotating.

As previously described, the start impulse is of opposite line condition than the rest impulse and is an open line condition. When the start impulse is received on the start magnet, it will therefore allow the spring 112 to move the armature to its retracted position, as limited by the nut 107, and in so doing moves the striking plate 108 out from beneath the end of the stop-arm 109. The stop arm 109 and the selector shaft 68 are then free to rotate due to the rotative power communicated thereto through the described friction clutch comprising the rotating Bakelite segments 81 (Figs. 6 and 8) frictionally engaged with the sleeve 83 which is secured to the selector shaft 68.

The speed of rotation of the selector shaft 68 is such that it will complete a revolution in slightly less time than that required for a complete code combination to be received, as is the general practise in practically all start-stop telegraph mechanisms. The stop position of the selector cam shaft is adjusted, as described, to compensate for line conditions which may tend to vary the length and effectiveness of the start impulse so that during the midportion or most effective portion of the first variable signalling impulse following the start impulse, the selector cam shaft 68 will have rotated to a position to bring a notch 162, Fig. 3, in the first selector cam 123 into operative relation with the horizontal projection 151 on the first selector lever latch 148. If the first variable impulse represents a spacing or open line condition, the selector magnet 137 at this time will be deenergized and therefore will have allowed a retractile spring 163, secured at one end to the armature extension 139 and at the other end to an adjustable spring anchor member 164 on a stud 143, to have moved the armature 138 and armature extension 139 to their lower or spacing position. In this position of the armature extension 139, the bent right hand end 166 thereof will be below and out of operative relation with the projections 156 at the upper end

of the selector lever latches 148. Thus when the notch 162 in the first selector cam 123 comes opposite the projection 151 on the first selector lever latch 148, the associated spring 152 will cause the latch to rock in a clockwise direction with the pin 149 acting as a pivot therefor. As the selector cam shaft 68 continues to rotate the notch 162 passes out of engagement with the projection 151 and cams the selector lever latch 148 back into its original or normal position. During this movement of the selector lever latch 148, the projection 161 thereon remains engaged with the projection 159 on the associated selector lever 157; thus the position of the associated selector lever does not change on the receipt of spacing impulses or no-current intervals but remains in its normal or unselected position.

The operation of the selector lever latches 148 is quite different on the receipt of associated marking impulses or current intervals and the operation of one will now be described in conjunction with the receipt of a marking impulse. For marking signalling conditions the selector magnet 137 is energized and causes the armature 138 and extension 139 to be in their upper positions. As stated above, the speed of rotation of selector cam shaft 68 and spacing of the notches 162 in the selector cams 123 are such that the notches 162 successively come into operative relation with the projections 151 of their associated selector lever latches 148 in substantial synchronism with the mid-portion or most effective portion of their respective signalling conditions.

Assume that the selector magnet 137 is energized in response to a marking condition and consequently moves the armature 138 and extension 139 to their upper position against the action of the spring 163. At the most effective portion of this marking impulse which is some time after the positioning of the armature 138 and extension 139 to their upper position, the cam 123 corresponding to the associated marking impulse will have rotated sufficiently to bring the notch 162 therein into operative relation with its associated selector lever latch 148. The spring 152 attached to the latch 148 thereupon pulls the projection 151 into the notch 162 in the associated cam 123. As the projection 151 starts to enter the notch the spring 152 rocks the latch 148 in a clockwise direction about the pin 149. However, with the selector magnet 137 energized, the section 166 of the armature extension is in front of and in operative relation with the projection 156 on the upper end of the latches 148. Therefore, after the latch 148 has rotated a slight amount in a clockwise direction about the pin 149, the projections 156 and 166 of the latch and armature extension respectively engage and consequently stop further rotation in this direction. However, at this time the projection 151 will not have entered to the full depth of the notch 162 in the cam 123 and as the spring 152 continues to exert a tension on the latch 148, it will cause the latch to rock in a counter-clockwise direction with the projection 156 in contact with the armature extension 166 acting as the pivot point therefor, the lower horizontal bifurcated end sliding to the right on the pin 149.

Some time before the spring 152 pulls the projection 151 on its associated latch 148 to the full depth of the notch 162 in the cam 123, the latch 148 will have rocked a sufficient amount to disengage the projection 161 thereon with the projection 159 on the associated selector lever

157. Thereupon the spring 158 is effective on its associated selector lever 157 to pull it down into its marking or selected position as shown by the dotted outline thereof in Fig. 3. A pin 167 extending horizontally from the selector unit mounting plate 127 beneath the horizontal section 168 of all of the selector levers 157 limits the downward movement of the selector levers 157. Subsequent to the unlatching operation and prior to the receipt of the following signalling impulse the projection 151 passes out of the notch 162 in its associated cam 123 and is returned to its normal position. Each selector lever 157 has an associated latch 148 which in turn is associated with a cam 123 on the selector cam shaft.

From the above it is evident that for spacing signal impulses the associated selector levers 157 remain in their normal or unselected positions and that for marking signal impulses the associated selector levers 157 are positioned to their operated or selected positions. Thus the electrical signalling conditions are transferred into and represented by the mechanical selections of the selector levers 157.

At a predetermined point in the revolution of the selector cam shaft 68, the high part of the hump cam 122 engages the top-right end of a substantially T-shaped horizontal lever 169, the left end of which is pivoted on a pin 171, which extends from the selector unit mounting plate 127. The lower-right hand end of the lever 169 rests on the upper horizontal section of an operating cam trip lever 172, Figs. 1, 3 and 6, which is pivoted on a shoulder screw 173 in a section 174 of the main frame casting. Thus for every revolution of the selector cam shaft 68 the operating cam trip lever 172 will be tripped, for a purpose which will be hereinafter described.

Loosely mounted adjacent the left hand end of the operating cam shaft 26, Figs. 3, 4 and 5, is a hub 176. Attached to the hub 176 by screws 177 for rotation therewith is an operating cam hub 178 which in turn has an operating cam 179 attached to it by screws 181. A spacing sleeve 182 on the shaft 26 between hubs 38 and 176 assists in keeping the operative cam 181 properly aligned with its associated mechanisms. A collar 183 attached to the shaft 26 by a pin 184 in abutting relation to the flanged bushing 28 prevents the shaft 26 from moving to the right. A sleeve member 186 slidably mounted on the sleeve 182 is operatively connected to the hub 178 by means of interengaging tooth members 175, Fig. 1. The sleeve member 186 comprises the driven member of a ratchet clutch by means of which the independently rotatable operating cam 179 is rotated. A spring 187, Fig. 3, coiled about a sleeve portion of the hub 176 tends to keep teeth 188, disposed on the right hand face of the sleeve member 186, engaged with similar teeth 189 disposed on the left hand face of the constantly rotating gear hub 38. The gear hub 38 comprises the driving member of the ratchet clutch, it being attached for rotation therewith to the shaft 26. When the teeth 188 and 189 on the driven and driving members respectively are engaged, the operating cam 179 will rotate with the shaft 26.

A side cam surface 191, Fig. 1, disposed on the circumference of the driven member 186, is in operative relation with a cam follower 192, Fig. 6, secured to the lower end of the trip lever 172. With the teeth 188 and 189, Figs. 1 and 3, engaged and the operating cam 179 rotating with

the shaft 26, the side cam surface 191 is so arranged that it engages with the cam follower 192 on the trip lever 172 at a predetermined point in its rotation and as the sleeve member 186 rotates further, the action of the side cam surface 191 on the cam follower 192, slides the sleeve member to the left and consequently the teeth 188 thereon are disengaged from the teeth 189 of the driving member 38. A further projection of the side cam surface 191 which is substantially parallel with the shaft 26 then engages the cam follower 192 on the trip lever and brings the operating cam assembly to a stop in its predetermined rest position. When the trip lever 172 is tripped as hereinbefore described, the cam follower 192 and the side cam surface 191 are disengaged which allows the spring 187 to slide the driven member 186 to the right and cause its teeth 188 to be engaged with teeth 189 of the driving member 38 whereupon the operating cam will rotate with the operating cam shaft 26. Since the cam 122 and the T-lever 169 actuate the trip lever 172 for a short interval of time, the trip lever is quickly returned to its normal position by an attached spring 193, Fig. 6, whereupon the cam follower 192 rides on the circumference of the sleeve member 186 in the path of the side cam surface 191. Thus as the operating cam 179 nears the end of its revolution, the side cam surface 191 and the trip lever 172 cause the disengagement of the ratchet clutch as heretofore described and bring said operating cam to a stop in its predetermined rest position. The shaft 26 is geared to rotate a substantial amount faster than the selector cam shaft 68 and it will therefore complete its revolution and be stopped in its rest position before the cam 122 can actuate the trip lever 172 to again release the sleeve member 186 in conjunction with a following signal code combination.

The operating cam 179 is a disc with a portion 194 thereof, shown dotted in Fig. 5, disposed axially toward the left end of the machine. A gathering cam 196 and a reset cam 197 attached to the left and right sides respectively of the operating cam disc 179 rotate therewith. These three cams, namely, the operating cam 179, the gathering cam 196 and the reset cam 197, comprise what will hereinafter be referred to as the operating cam assembly. A latch lever 198, Fig. 4, is pivoted on a shoulder screw 199 screwed into a plate 201, which in turn is secured to the section 32 of the main frame casting. The end of the latch lever 198 is engageable with an edge of the gathering cam 196 when the operating cam assembly is in its stop position. A spring 202 attached to the latch lever 198 and to a pin in the plate 201 normally keeps the latch lever 198 in operative relation with the gathering cam 196. The purpose of the latch lever is to prevent any rebound or rotation in reverse direction of the operating cam assembly that might occur due to its sudden stop by the operating cam trip lever 172.

The bifurcated lower ends 204, Fig. 3, of the selector levers 157 are so placed in relation to the operating cam 179 that when they are in their selected or marking position, they straddle the disc of the operating cam 179, as shown by the dotted outline of a selected selector lever.

A series of five code disc transfer levers indicated in general at 204 in Fig. 3 are located one behind the other between the guide plates 144 and are horizontally slidable to and fro between predetermined limits. The spacers 146 on the

studs 143 guide the transfer levers 204 in their horizontal movements and are slightly thicker than the transfer levers which permits the levers to slide easily between the guide plates 144. Each transfer lever 204 is aligned with and associated with one of the selector levers 157 and, as will be hereinafter described, with a selector lever 157 in its lower or selected marking position, the bifurcated end 203 thereof is adapted to be operatively engaged with the right hand end of its associated transfer lever. Also, with a selector lever in its upper or unselected spacing position the bifurcated end thereof is not adapted to be operatively engaged with either its associated transfer lever or the cam 179.

Referring to Figs. 3, 4 and 5, as the operating cam assembly starts to rotate, when released as heretofore described, and has completed about a quarter of a revolution, the gathering cam 196, attached to the operating cam 179 and rotating therewith, comes into engagement with downwardly extending projections 206 on the right hand ends of the transfer levers 204. Due to the shape of the gathering cam 196 and its rotating movement, it progressively slides the code disc levers 204 which happen to be in their left hand position, to their right hand position. Some or all or none of the transfer levers 204 may be in their left hand position, depending on the previous character selected. Thus, following the movement of the gathering cam, all the transfer levers 204 are disposed to the right and in position to have the selection that is set up in the selector levers 157 transferred to them. As the operating cam assembly continues to rotate, the operating cam disc 179 slides in the bifurcated ends 203 of the selected selector levers 157 and after about half a revolution of said disc, the displaced portion 194 of disc 179 actuates the bifurcated ends of the selected selector levers to the left, thereby sliding corresponding ones of said transfer levers to the left into their marking position. As the bifurcated ends 203 of the unselected selector levers 157 are above and out of operative relation with the operating cam 179 these unselected levers will not be affected by the rotation of the operating cam 179. Therefore corresponding transfer levers 204 of these unselected selector levers will remain in their right hand or spacing position, as placed by the gathering cam 196.

Immediately following the movement of the lower ends of the selected selector levers 157 to the left by the displaced portion 194 of the disc 179, further rotation of the disc 179 rotates the displaced portion out of operative rotation with selector levers and in so doing allows their attached springs 158 to return them to the right into their selected position. Further rotation of the operating cam assembly then brings the reset cam 197 into operative relation with the bottom of the selected selector levers 157 and due to the shape of the reset cam and its rotating movement, it successively raises all the selected selector levers. As the selected selector levers 157 are thus raised, the upper surfaces of the projections 159 thereof which are beveled, engage the lower beveled surfaces of the projections 161 of associated latches 148 and the selectors are thereby cammed a slight amount to the left. When the selectors are high enough so that the projections 159 and 161 on the selectors and latches, respectively, are clear of one another, the selector springs 158 pull the selectors back into their vertical position. The reset cam 197 subsequently

passes out from beneath the selectors 157 and allows the projections 159 thereon to engage with the projections 161 on associated latches 148 and thereby hold them in normal position. Thus all the selectors are in their normal latched position ready for the next selection. The tension of the springs 158 and 152 attached to the selectors 157 and latches 148, respectively, is so adjusted that when the selected selectors are being raised by the reset cam 197, there is no movement of the lower ends of the latches 148 to the right, all the movement for relatching being in the selectors 157. As the latches 148 are not actuated on the relatching operation, no time is required for them to settle down and they are immediately operable in response to the next selection, which feature contributes to the high speed operation of the selector.

The transfer levers 204 remain in either their left or right hand positions corresponding to the selection transferred to them from the selector levers 157 until the first part of the subsequent revolution of the operating cam assembly, whereupon all the transfer levers in their left hand position are again moved back into their left hand position by the gathering cam 196.

Individual to each transfer lever 204 is a transfer lever detent pawl 207. These detent pawls 207 are pivoted on a common stud 208 attached to the selecting unit mounting plate 127. Individual springs 209 attached to an arm of each detent pawl and to a spring post 211, keep said pawls engaged with a wedge-shaped portion 212 of their associated transfer levers 204. The detent pawls 207 in conjunction with their associated springs 209 act as jockeys and tend to keep the transfer levers 204 in either their left or right hand position as set by the operating or gathering cams respectively.

Adjacent the left hand end of each of the transfer levers 204 are rounded-end depending projections 213 which are engaged in slots 214 of associated code discs 216. The discs 216 are five in number, corresponding to the number of selectors and comprise the selecting elements of a drum type typewheel stop unit, indicated in general at 217. The construction of this typewheel stop unit is fully described and shown in co-pending applications Ser. Nos. 34,080, 42,692 and 46,198, and it is thought that a complete description is not necessary herewith. In general, the typewheel stop unit 217 comprises a set of five differently notched code discs 216 which are rotatable from one of two positions to the other by the transfer levers 204 as the transfer levers are moved by the gathering cam 196 and operating cam 179. A typewheel shaft 218 extends through the code discs 216 and constantly tends to rotate due to the power communicated thereto through a slip friction clutch indicated in general at 219, Fig. 2, similar in construction to the selector cam friction clutch previously described in connection with Fig. 8. Fixed to one end of the typewheel shaft 218 for rotation therewith is a typewheel 221, Fig. 1, which has in a single row, on the periphery thereof, both upper and lower case characters. Also fixed to the typewheel shaft 218 for rotation therewith is a typewheel stop arm 222, Fig. 3, the end of which is in operative relation with a series of stop elements 223. The stop elements 223 are at right angles and equally spaced about the circumference of the code discs 216 and are guided in radial slots in two guide plates adjacent either end. The code discs 216 have V-shaped notches formed on the

periphery thereof and when the discs are selectively positioned by the transfer levers a row of notches will be in alignment, the notches being formed as is well known in the art so that a row of notches exists for each setting combination thereof. The stop elements 223 are urged into engagement with the code discs 216, by springs not shown, and when a row of notches therein occurs one of the stop elements enters the aligned notches, thus placing one end thereof in the path of the stop arm 222. As the stop arm 222 rotates, it engages this selected stop element 223 thereby arresting the typewheel in a selected angular position. A sixth disc called a "shift" disc is actuated from one of two positions to the other by one or the other of two stop elements. These two stop elements are selected in response to signals corresponding to case shift and unshift signals and position the shift disc so that all signals received after a case shift signal will be recorded properly. Thus the number of selections ordinarily available with a five unit code is increased to be nearly equal to that of a six unit code, although all possible selections are not employed in the embodiment shown. When the five selector discs 216 are all returned to normal by the action of the gathering cam 196 acting on the transfer levers 204, the selected stop element is cammed out of the notches in the discs 216 by the movement thereof, and thereby releases the stop arm 222 for rotation. The stop arm 222, typewheel shaft 218 and typewheel 221 then rotate until the stop cam engages another stop element, selected by a new combination of settings of the code discs 216 in response to a new code combination of impulses.

The printing and tape feeding mechanism will now be described. The mechanism is substantially the same as that shown and described in the above-mentioned co-pending application, Ser. No. 46,198, and consists chiefly of print and tape feed cams, corresponding levers therefor, and a clutch through which power is supplied to rotate the cams.

A bracket 226, Figs. 1 and 6, is attached to the front side of section 14 of the main frame and has clamped to the top right hand side thereof, a bushing clamping member 227. The bushing clamping member 227 holds a flanged bushing 228 in place in which is journaled the right hand end of an independently rotatable shaft 229. Another flange bushing 231 clamped to a section 232 of the main frame casting serves as another journal for the shaft 229 adjacent the center thereof. The shaft 229 and the above-mentioned countershaft 47 are on the same axis and the shaft 229 is adapted to be rotated from the countershaft by means of a ratchet clutch. The ratchet clutch comprises a driving ratchet integral with the hub 44, attached to the continuously rotating shaft 47 for rotation therewith and a driven member 233. Teeth 234 disposed on the right hand face of the driving ratchet 47 are adapted to be operatively engaged with similar teeth 236 disposed on the left hand face of the driven member 233. The driven member 233 is operatively engaged with a hub 237 by means of inter-engaging tooth members 238, shown dotted in Fig. 6. Hub 237 is fixed to the shaft 229 for rotation therewith by means of a screw 239. Thus the driven member 233 is keyed to the shaft 229 for rotation therewith but is adapted to be slid along said shaft to bring its teeth 236 into or out of engagement with the teeth 234 on the driving member 44. A circular coiled spring 241 around the sleeve portion of the

driven member 233 tends to keep the driven member engaged with the driving member.

A side cam surface 242, Fig. 7, formed on the hub portion of the driven member 233 is adapted to be operatively engaged with a cam follower 243 on the lower end of a trip lever 244. The trip lever 244 is pivotally mounted on a stud 246 in the frame section 232. A pin 247, Figs. 1, 4, 5 and 7, secured to the hub 178 of the operating cam assembly is arranged to engage the upper end of the lever 244 and cause the cam follower 243 on the lower end thereof to be withdrawn from engagement with the side cam surface 242, whereupon the driven member 233, by action of the spring 241, Fig. 6, is free to slide to the left and engage the continuously rotating driving member 44 and rotate therewith.

The driven member 233 upon engagement with the driving member 44 will be rotated thereby until cammed out of engagement therewith and stopped in its predetermined stop position at the end of one revolution. After being tripped, a spring 250, Fig. 7, attached to the trip lever 244 returns said trip lever to its normal position, whereupon the cam follower 243 rides on the hub of the then rotating driven member 233 and in the path of the side cam surface 242 until near the end of a revolution, at which time the cam follower 243 re-engages the side cam surface 242 to force the clutch members apart. The pin 247 on the operating cam assembly is adapted to actuate the trip lever 244 during the latter part of the revolution of the operating cam assembly.

A latch arm 248 is pivotally mounted on a shoulder screw 249 in a plate 251 attached to the frame section 232. The end of the latch is engageable with a radial shoulder 252 on a disc 253 integral with the hub 237. A spring 254 attached to the latch arm 248 tends to keep said arm and disc 253 operatively engaged. The purpose of the latch is to prevent rotation in a reverse direction, or rebound of the shaft 229 and its attached members, due to their sudden stop when the cam follower 243 engages the side cam surface 242 on the driven member 233.

The shaft 47 is geared to rotate a substantial amount faster than the selector cam shaft 68 and therefore the shaft 229 will complete its revolution and be in its rest or normal position before the trip lever 244 is again actuated to initiate the rotation of the shaft 229 in conjunction with another code combination of impulses.

A cam sleeve 257 is attached to the shaft 229, Fig. 6, for rotation therewith, by a pin 256. The left and the right hand ends of the sleeve 257 are in abutting relation to the flanged bushings 231 and 228, respectively, and prevent longitudinal movement of the shaft 229. The cam sleeve 257 has a section thereof of smaller diameter upon which are placed a print cam 258, a tape feed cam 259 and a spacing collar 261. The cams and spacing collar are clamped against a flanged portion of the sleeve 257 to rotate therewith, by means of a nut 262 in threaded engagement with the right end of the sleeve.

Referring to Fig. 1, a plate 263 is attached by screws 264 to the front of section 14 of the main frame casting. This plate 263 serves as a mounting plate for the print and tape feeding mechanisms. A print lever 265 is pivoted on a shoulder screw 267 and has a cam follower 268 on the right hand end thereof, held in engagement with the periphery of the print cam 258 by a spring 269. As the cam follower 268 enters the depression in the print cam 258 the spring 269 causes the

left hand end of the print lever 266 to force a paper recording tape P against the typewheel 221 and thereby take an impression therefrom. Concomitant with the printing operation, a cam follower 271, Fig. 6, on the right hand end of a tape feed lever 272 enters the depression in the tape feed cam 259 and allows the spring 269 to rotate the tape feed lever 272 about its mounting screw 273, Fig. 1. A pawl 274 pivotally carried on the left hand end of the lever 272 is in operative relation with a toothed ratchet 275 rotatable with a feed roller 276 both of which are pivoted on the shoulder screw 267. A pressure roller 277 pivoted on the left hand end of a lever 278, which in turn is pivoted on a shoulder screw 279, holds the paper P in engagement with the feed roller 276 by means of a spring 281. Thus for every revolution of the tape feed cam 259, the feed roller 276 is rotated an amount equal to one tooth of the ratchet 275 thereby advancing the tape P an amount equal to one letter space to present a fresh section of the tape in printing position. A retaining pawl 282, only the upper end of which is shown in Fig. 1, is pivoted on a shoulder screw in the plate 263 and has the lower end engaged with the ratchet 275. This pawl 282 prevents reverse rotation of the feed roller 276 as the operating pawl 274 moves backward to pick up a new tooth. Two substantially U-shaped members 283 and 284 guide the tape P to and from the printing position respectively.

A modification of the selector levers and selector latches is shown in Fig. 9 and their construction and operation will now be described. The elements cooperating with these modified selector levers and latches, viz., the armature extensions 139 and 166, the latch springs 152, the selector cams 123, the pin 149, the selector springs 158 and the operating cam assembly are exactly the same as those employed in the preferred embodiment, and therefore the same reference numerals are used, whereas the modified selector levers and latches have new reference numerals. The modified selector levers and latches are located one behind the other between the guide plates 144 and are indicated in general in Fig. 9 by reference numerals 291 and 292, respectively. The operation of the modified selector levers 291 is exactly the same as that of the preferred selector levers 157. The modified latches 292 are pivotable about only one point and pivot about this point to unlatch associated selector levers 291 or are restrained from pivoting about this point and thereby retain their associated selector levers in a latched position in accordance with received signal impulses. The latches 292 are pivotally mounted at their lower ends on the pin 149 and each have a projection 293 adjacent the center thereof in operative engagement with an associated selector cam 123 as held by the attached spring 152. Opposite the projection 293 on each of the latches 292 is another projection 294 which engages with a projection 296 on each of the selector levers 291 and normally holds the selector levers 291 in their normal position. The upper end of each latch has a projection 297 which cooperates with the armature extension 166 to prevent or allow the pivoting of the latches 292 as will be hereinafter described.

The rotation of the selector cam shaft 68 is initiated in response to the start impulse as heretofore described, and it rotates at such a speed to bring the notches 162 in the selector cams 123 into association with the projections 293 on the latches 292 in synchronism with the received

signalling impulses. The operation of a latch 292 will now be described in conjunction with the receipt of a spacing signalling impulse on the selector magnet 137. The spacing impulse is an open line condition and therefore the armature extension 166 will be in its lower position as moved by the spring 163. Assuming that this spacing impulse is the first signalling impulse, then during the mid-portion or most effective portion of this impulse, the notch 162 in the first selector cam 123 will come into operative relation with the projection 293 on the first latch 292. The latch spring 152 at this time urges the projection 293 into the notch 162, causing the latch to pivot about the pin 149. However, before the projection 293 enters to the full depth of the notch 162, the projection 297 at the upper end of the latch 292 engages with the armature extension 166 and prevents further pivoting of the latch. This amount of pivoting of the latch 292 is not sufficient to disengage the projection 294 thereon and the projection 296 on the associated selector lever 291. Thus the associated selector lever 291 is retained in its normal latched position and prior to the beginning of the next signalling impulse the notch 163 rotates out of operative relation with the projection 293 and causes the latch 292 to be returned to its normal position.

On a marking impulse the selector magnet 137 is energized and causes the armature extension 166 to be above and unengageable with the projections 297 on the latches 292. Therefore, in conjunction with marking impulses the spring 152 is allowed to pivot the latches 292 to allow the projections 293 to enter to the full depth of the notch 162 in the selector cams 123. This amount of pivoting of the latch 292 causes the projection 294 thereon to be disengaged with the projection 296 on an associated selector lever. Thereupon a selector spring 158 is effective on its associated selector lever 291 to pull it down into its marking or selected position. The pin 167 limits the downward movement of the selector levers. From this point on the operation and movements of the selected selector levers 292 are identical with those of the selected selectors 157 of the preferred embodiment and it is thought that further description of their movements here is not necessary. Thus the marking and spacing impulses of the signalling impulses are transferred to and represented by their associated selector levers 291 being in their selected and normal positions, respectively.

While this invention has been shown and described in but one form and a single modification thereof, it will be obvious to those skilled in the art that it is not so limited but is susceptible to various other changes and modifications, without departing from the spirit or essential attributes, and it is desired, therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

What is claimed is:

1. In a telegraph receiver, a set of selectors having an unselected and a selected position, a set of associated selector latches holding said selectors in their unselected position, each latch having a plurality of varieties of motion, means for determining the variety of motion through which each latch moves, means whereby said latches in one variety of motion unlatch associated selectors and means for actuating each of said unlatched selectors to its selected position.

2. In a telegraph receiver, a set of selectors having an unselected and a selected position, a set of associated selector latches normally holding said selectors in their unselected position, each latch having a plurality of varieties of motion, a rotatable member and electromagnetic means cooperating therewith for determining the variety of motion through which each latch moves and means whereby each of said latches in moving through one of said varieties of motion unlatches its associated selector.

3. In a telegraph recorder, a plurality of selector elements each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching associated selectors in an unselected position, each latch being pivotable about a plurality of points, a rotatable member with a series of notches therein, said notches being movable past said latches in synchronism with received code combinations of impulses to allow pivotal movement of said latches into said notches, means tending to pivot said latches about one of said pivot points, electromagnetic means responsive to received code combinations of impulses for selecting the effective pivot point of each of said latches for unlatching each selector element upon pivotal movement of its associated latch about a predetermined one of said pivot points.

4. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, a rotatable member having a series of elements, each rotatable past its associated latch in synchronism with received code combinations of impulses and invariably actuating the same, an electro-responsive means cooperating with said rotatable elements whereby each of said latches are selectively actuated in accordance with received code combinations of impulses and means for causing selectively operated latches to unlatch their associated selectors.

5. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, each of said latches having two modes of operation, individual means tending to operate said latches, a rotatable member for sequentially allowing said latches to operate in synchronism with received permutation impulses, means responsive to received permutation impulses for determining the mode of operation of said latches, positively operating means for returning said latches to normal following either of said modes of operation and means for causing said latches, in one of said modes of operation, to unlatch their associated selectors.

6. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, each of said latches having a cycle of operation of least normal restraint and a cycle of operation of greater normal restraint, operating means for said latches, means for sequentially conditioning said latches for a cycle of operation in synchronism with received permutation impulses, electromagnetic means operating in response to received permutation impulses for selectively controlling the

operation of said latches either through the cycle of operation of least normal restraint or through the cycle of operation of greater normal restraint and means for unlatching an associated selector during only one of said cycles of operation.

7. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, means responsive to received permutation of impulses for selectively operating said latches to unlatch said selectors, individual resilient means for moving unlatched selectors to a selected position, means operative thereafter for positively operating said selected selectors to control a recording mechanism and means comprising said individual resilient means and other positively operating means, operative after said first positive operation of said selected selectors, for returning said selected selectors to said unselected position.

8. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, means responsive to received permutation of impulses for selectively operating said latches to unlatch said selectors, means for moving unlatched selectors to a selected position, a recording mechanism, means employing only selected selectors for selectively controlling said recording mechanism and means operative thereafter for relatching said selected selectors in unselected position.

9. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, means responsive to received permutations of impulses for selectively operating said latches to unlatch said selectors, means for moving unlatched selectors to a selected position, a recording mechanism, means employing selected selectors for selectively controlling said recording mechanism, means operative thereafter for relatching said selected selectors in unselected position, and means for retaining said latches at rest during said relatching operation.

10. A telegraph receiving apparatus comprising a series of selectors and an associated series of latches, each of said latches having a plurality of varieties of motion but normally restrained from motion, power operated means to allow the operation of said latches, signal controlled means to positively restrain the movement of said latches in one variety of motion and thereby allow the movement thereof in a second variety of motion, in combinations in accordance with received signals, means comprising said power operated means for positively returning said latches to normal from either of said varieties of motion and means for causing said latches, in one variety of motion, to unlatch their associated selectors.

11. A telegraph receiver comprising a series of movable and normally latched selecting elements, a corresponding and associated series of latches therefor, means for operating said latches in marking and spacing cycles in accordance with received signals to selectively unlatch associated of said selecting elements, a plurality of notched code members having normal and operated positions, means for moving said notched code members to their normal position in successive order,

means engaging said unlatched selecting elements for moving said code members into their operated positions successively in combinations according to the position of said selecting elements and means for operating said last two mentioned means in overlapped relation whereby the first notched code member is moved into operated position prior to the movement of the last notched code member to normal.

12. In a telegraph recorder, a first group of selecting members, a series of latches therefor, a second group of selecting members, means for selectively actuating said latches in cyclic order in response to received code combinations of impulses to allow said first group of selecting members to be selectively positioned, transfer means for successively transferring the selection set up in said first selecting members to said second selecting members, means whereby the transfer of the selection in the first group of selecting members is started and completed after the selective operation of the last operated latch, printing means and means controlled by said second group of selecting members for controlling said printing means.

13. In a telegraph receiver, a group of primary members, signal responsive means, a selecting cam acting directly on said members and cooperating with said signal responsive means to selectively control the operation of the same, a secondary group of members, means for operating the secondary members under control of the selective operation of the associated primary members, a third group of members and transfer means for successively transferring the selection set up in the secondary members directly to the third group of members, said transfer operation occurring in a time interval less than that required to actuate the primary members.

14. In a telegraph receiver, a group of primary members, signal responsive means, a selecting cam acting directly on said primary member and cooperating with said signal responsive means to effect selective and unselective operation thereof under the selective control of line signals, a second group of members having normal and selected positions, means for operating the second members under control of the selective operation of the associated primary members, a third group of members, transfer means for successively transferring the selection set up in said second group of members directly to said third group of members, and means for restoring said second members to normal position, said transfer and restoring operations occurring in less time than that required to actuate the primary members.

15. In a telegraph receiver, a group of primary selectors having normal and selected positions, a group of latches therefor normally holding said selectors in normal position, a selecting cam acting directly on said latches under the selective control of line signals to allow selective operation thereof whereby said primary selectors are allowed to be selectively positioned, a secondary group of selectors having normal and selected positions, means for successively gathering said secondary selectors into their normal position, transfer means for successively transferring the selection set up in said primary selectors directly to said secondary selectors and means for restoring said primary selectors to their normal position, said gathering, transferring and restoring operations occurring in a time interval less than

that required to actuate the primary selector latches.

16. A telegraph receiving apparatus comprising a series of elements having varieties of motion but normally restrained from motion, individual means tending to operate said elements in said varieties of motion, power operated means for sequentially allowing said elements to operate in substantial synchronism with received signal impulses, signal controlled means to positively restrain the movement of said elements in a first variety of motion whereby said individual operating means moves said elements in a second variety of motion, means individual to each of said elements for returning said elements to normal position against the action of said operating means and means controlled by said elements in said second variety of motion for controlling a recording mechanism.

17. In a selector mechanism, a series of selector elements having a normal latched position, an unlatched position and an operated position, resilient means for moving said elements from latched position to unlatched position, a first power operated means for moving said elements from unlatched position to operated position, resilient means for returning said elements from operated position to unlatched position and a second power operated means for returning said elements from unlatched position to normal latched position, said selector actuating means operating in the order named.

18. In a selector mechanism, a series of selector elements having a normal position, a partially operated position and a fully operated position, resilient means for moving said elements from normal position to partially operated position, a first power operated means for moving said elements from partially operated position to fully operated position, said resilient means acting to return said elements from fully operated position to partially operated position and a second power operated means for returning said elements from partially operated position to normal position, said selector actuating means operating in the order named.

19. In a selector mechanism, a group of selectors having a normal latched position, an unlatched position and an operated position, an associated group of latches normally latching said selectors in normal position, means for selectively actuating said latches to unlatch associated selectors in accordance with received signal impulses during said signal impulses, individual resilient means for moving said unlatched selectors from normal to unlatched position, a first common power operated means for successively moving said selectors from unlatched to operated position, means comprising said individual resilient means for moving said selectors from operated to unlatched position and a second common power operated means for successively moving said selectors from unlatched to latched position.

20. In a selector mechanism, a group of selectors having a normal latched position, an unlatched position and an operated position, an associated group of latches normally latching said selectors in normal position, means for selectively actuating said latches to unlatch associated selectors in accordance with received signal impulses during said signal impulses, individual resilient means for moving said unlatched selectors from normal to unlatched position, as said selectors are unlatched, a power operated means

successively associated with said unlatched selector for positively moving such selectors from unlatched to operated position and concomitantly tensioning said resilient means, said power operating means thereafter successively allowing said resilient means to return said selector from operated to unlatched position, said last two operations occurring in overlapped relation whereby said selectors are not all in operated position simultaneously and means comprising said power operated means operative thereafter for successively moving said unlatched selectors from unlatched to latched position.

21. In a selector mechanism, a group of selectors having normal and operated positions, an associated group of selector latches normally latching said selectors in normal position, said latches being pivotable about two points adjacent either end thereof, means for normally pivoting said latches about one of these points, means adjacent the normal pivot point of each latch for latching associated selectors, power operated means for successively allowing said latches to pivot about one or the other of said pivot points in synchronism with received signal impulses, means responsive to received signal impulses for determining about which of said pivot points said latches pivot and means for disengaging said latching means when said latches pivot about the point other than said normal pivot point.

22. In a selector mechanism, a group of selectors having normal and operated positions, an associated group of selector latches normally latching said selectors in normal position, said latches being pivotable about two points adjacent either end thereof and normally pivoting about one of these points, individual resilient means for pivoting said latches, rotatable means operating in synchronism with received signal impulses for successively allowing said resilient means to pivot said latches, said resilient means and said rotatable means being attached to and operating on said latches respectively at points intermediate the pivot points, electromagnetic means for determining the pivot point of said latches in accordance with received signal impulses, means whereby said latches unlatch associated selectors in pivoting about the off-normal pivot point and means comprising said rotatable member for positively returning said latches to normal during the receipt of respective signal impulses.

23. In a selector mechanism, a group of selectors having normal and operated positions, an associated group of selector latches normally latching said selectors in normal position, said latches being pivotable about two points adjacent either end thereof and normally pivoting about one of these points, individual resilient means for pivoting said latches, rotatable means operating in synchronism with received signal impulses for successively allowing said resilient means to pivot said latches, an electromagnetically operated member selectively movable, in response to received signal impulses, into the path of said latches in pivoting about said normal pivot point and thereby preventing further such pivoting, said latches thereafter pivoting about a point in contact with said electromagnetically operated member and means whereby said latches in pivoting about said last mentioned pivot point unlatch associated selectors.

24. In a selecting mechanism, a group of selectors having normal and selected positions, an

associated group of pivotable selector latches normally latching said selectors in normal position, pivoting means for said latches, rotatable means operating in synchronism with received code combinations of impulses for successively allowing said pivoting means to pivot said latches, said latches invariably starting to pivot about a predetermined point thereof, a member electromagnetically operated in response to received code combinations of impulses, means comprising said member for selectively preventing substantially all pivoting motion of said latches about said predetermined pivot point and concomitantly allowing further pivoting of said selector about said member and means for unlatching associated selectors when said latches pivot about said electromagnetically operated member.

25. In a telegraph receiver, a plurality of selectors each having a selected and an unselected position, a plurality of latches, one individual to each of said selectors and normally latching said selectors in an unselected position, each of said latches having a cycle of operation of least normal restraint and a cycle of operation of greater normal restraint, operating means for said latches, means for sequentially conditioning said latches for operation in synchronism with received permutation impulses, electro-magnet means operating in response to received permutation impulses for selectively controlling the operation of said latches either through the cycle of operation of least normal restraint or through the cycle of operation of greater normal restraint, and means for causing said latches to unlatch their associated selectors during the cycle of operation of greater normal restraint.

26. In a telegraph receiver, a plurality of latchable selector elements having a normal latched and a selected unlatched position, means for selectively unlatching said elements in response to and in accordance with received code combinations of impulses, a typewheel positioning mechanism, means operative only on unlatched ones of said selector elements to selectively control said typewheel positioning mechanism and means operative thereafter for relatching unlatched of said selector elements.

27. A telegraph receiver comprising a series of elements each having a normal cycle of operation and a selected cycle of operation, means operative to actuate said elements in successive order, signal controlled means operative in accordance with received impulses to select the cycle of operation of each of said elements, a recording mechanism, means released by said elements in said selected cycle of operation, means for operating said released means and means employing said released means to selectively control said recording mechanism.

28. In a telegraph receiver, a group of primary selectors having normal and selected positions, a group of latches therefor normally holding said selectors in normal position, a selecting cam acting directly on said latches under the selective control of line signals to allow selective operation thereof whereby said primary selectors are allowed to be selectively positioned, a secondary group of selectors having normal and selected positions, means for successively gathering said secondary selectors into their normal position, transfer means for successively transferring the selection set up in said primary selectors directly to said secondary selectors and means for restoring said primary selectors to their normal

position, said gathering and transferring operations occurring in overlapped relation and in a time interval less than that required to actuate the primary selector latches.

29. In a selecting mechanism, a plurality of selecting members having a normal and a selected position, means tending to actuate said selectors to selected position, a set of latches normally retaining said selecting members in their normal position, a single magnet responsive to received combinations of impulses and cam members acting directly on said latches for selectively effecting predetermined operation of said latches to allow the selective positioning of associated selecting members in accordance with said impulses, a typewheel stop mechanism, means to further actuate said selectively positioned selecting members to control said typewheel stop mechanism and means for restoring said selectively positioned selecting members to their normal position.

30. In a telegraph receiver, a series of selectors having a normal and a selected position, an associated series of latches normally latching said selectors in normal position, said latches being normally pivotable about a point adjacent one end thereof, means tending to pivot said latches, a rotatable member for sequentially allowing said pivoting means to operate in synchronism with received signal impulses, electromagnetic operated means for selectively preventing the pivoting of said latches about said normal pivoting point and allowing the pivoting thereof about a point adjacent the other end and means whereby said last mentioned pivoting operation causes the unlatching of associated selectors.

31. In a selector mechanism, a group of selectors having a normal latched position, an unlatched position and an operated position, an associated group of latches normally latching said selectors in normal position, means for selectively actuating said latches to unlatch associated selectors in accordance with received signal impulses during said signal impulses, individual resilient means for moving said unlatched selectors from normal to unlatched position, as said selectors are unlatched, a power operated means successively associated with said unlatched selectors for positively moving such selectors from unlatched to operated position and concomitantly tensioning said resilient means, said power operating means thereafter successively allowing said resilient means to return said selector from operated to unlatched position, said last two operations occurring in overlapped relation whereby said selectors are not all in operated position simultaneously, means comprising said power operated means operative thereafter for successively moving said unlatched selectors from unlatched to latched position and concomitantly tensioning said resilient means, and means for performing said last two operations in overlapped relation whereby the movement of the first selector to latched position occurs prior to the movement of the last selector to unlatched position.

32. In a telegraph receiver, a plurality of se-

lector elements each having a selected and an unselected position, a plurality of latches, one individual to each of said selector elements and normally latching said selector elements in an unselected position, signal responsive means, means cooperating with said signal responsive means for selectively operating said latches to successively unlatch said selector elements in accordance with received code combinations of impulses, individual resilient means for moving unlatched of said selector elements to a selected position, a recording mechanism, means employing only unlatched of said selector elements for selectively controlling said recording mechanism and means operative following the operation of said last mentioned means for camming unlatched of said selector elements past associated of said latches whereby said selector elements are relatched in normal position.

33. In a telegraph receiver, a plurality of selector elements, each having a normal and selected position, a latch individual to each of said selector elements normally latching said selectors in a normal position, means responsive to received permutations of impulses for selectively actuating said latches to unlatch associated selector elements, means for linearly moving unlatched of said selector elements to a selected position, a recording mechanism and means employing unlatched of said selector elements for selectively controlling said recording mechanism.

34. In a telegraph receiver, a plurality of selector elements each having a normal and selected position, a latch individual to each of said selector elements normally latching said selector elements in a normal position, means responsive to received permutations of impulses for selectively actuating said latches to successively unlatch associated of said selector elements, individual resilient means for linearly moving unlatched of said selector elements to a selected position, a recording mechanism and means employing only unlatched of said selector elements for selectively controlling said recording mechanism, means operative following the operation of said last mentioned means for relatching unlatched of said selector elements and means whereby said selector elements in said relatching operation have a combined linear and pivoting movement.

35. In a selector mechanism, a series of selector elements having a normal position, a partially operated position and a fully operated position, resilient means for linearly moving said elements from normal position to partially operated position, a first power operated means for pivotally moving said elements from partially operated position to fully operated position, said resilient means acting to return said elements from fully operated position to partially operated position, and a second power operated means for returning said elements in a combined pivoting and linear movement from partially operated position to normal position, said selector actuating means operating in the order named.

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