March 30, 1943. P. A. NOXON 2,315,009

TELEGRAPH ORIENTING DEVICE

Original Filed Oct. 10, 1936 4 Sheets-Sheet 1

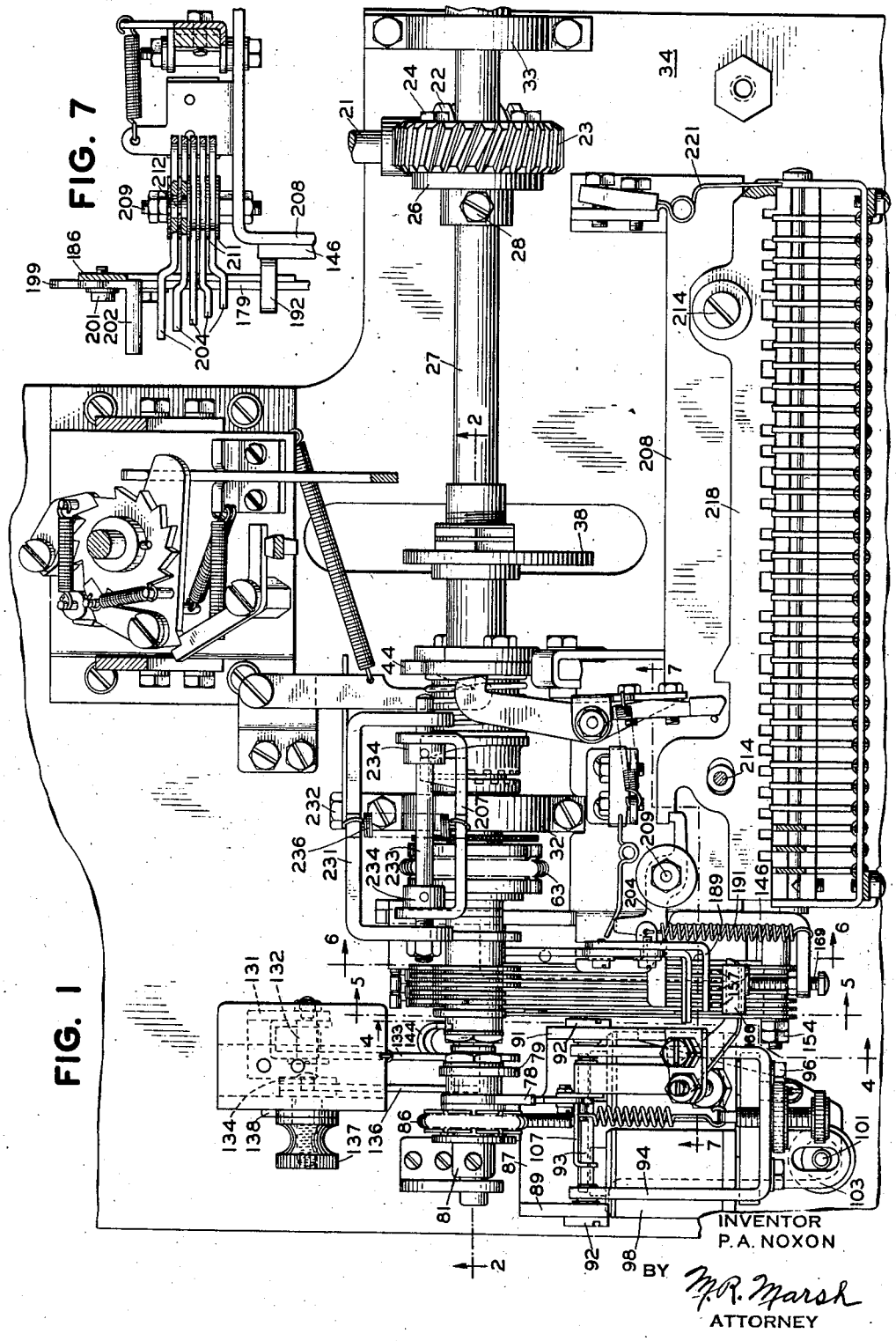

FIG. 7

FIG. 1

INVENTOR
P. A. NOXON
BY M. R. Marsh
ATTORNEY

March 30, 1943. P. A. NOXON 2,315,009

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FIG. 2

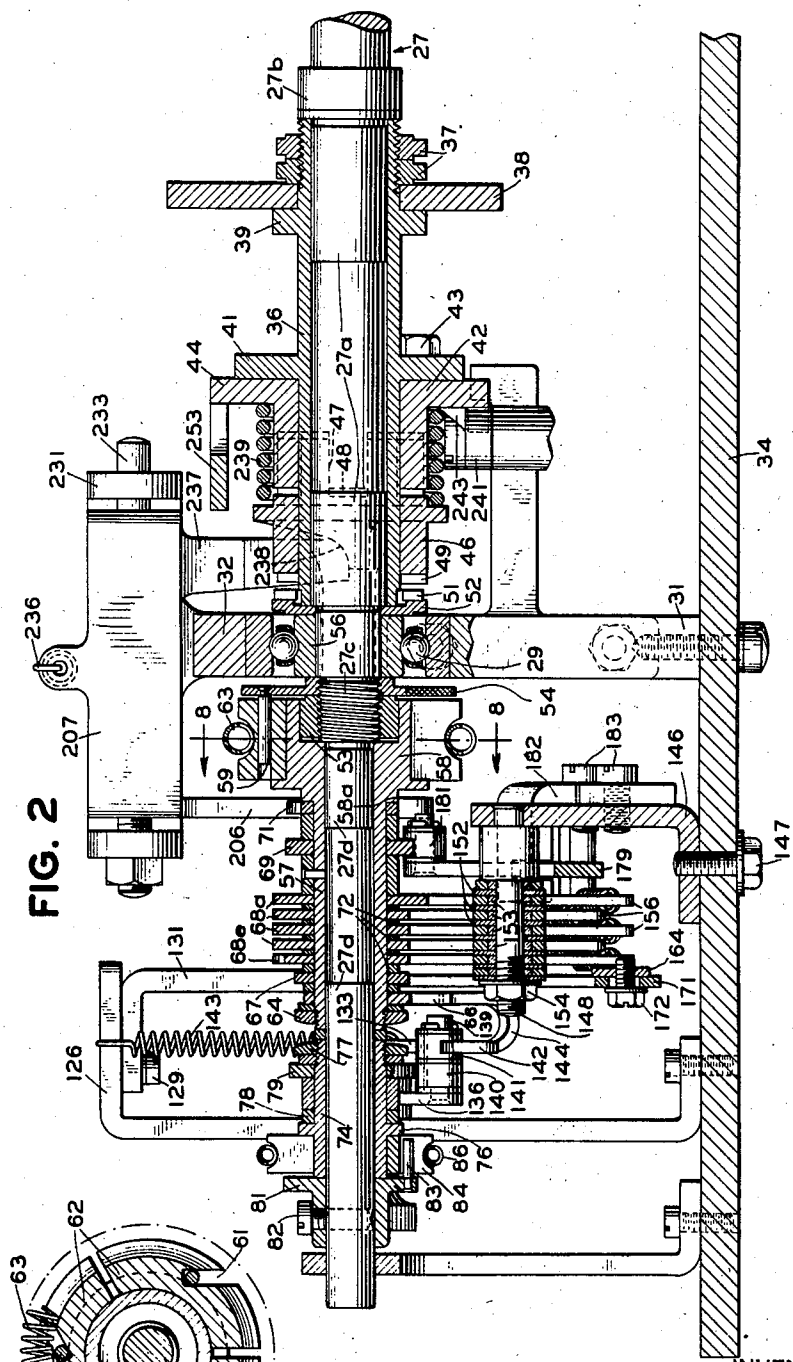

FIG. 8

INVENTOR
P. A. NOXON

BY P. R. Marsh
ATTORNEY

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FIG. 3

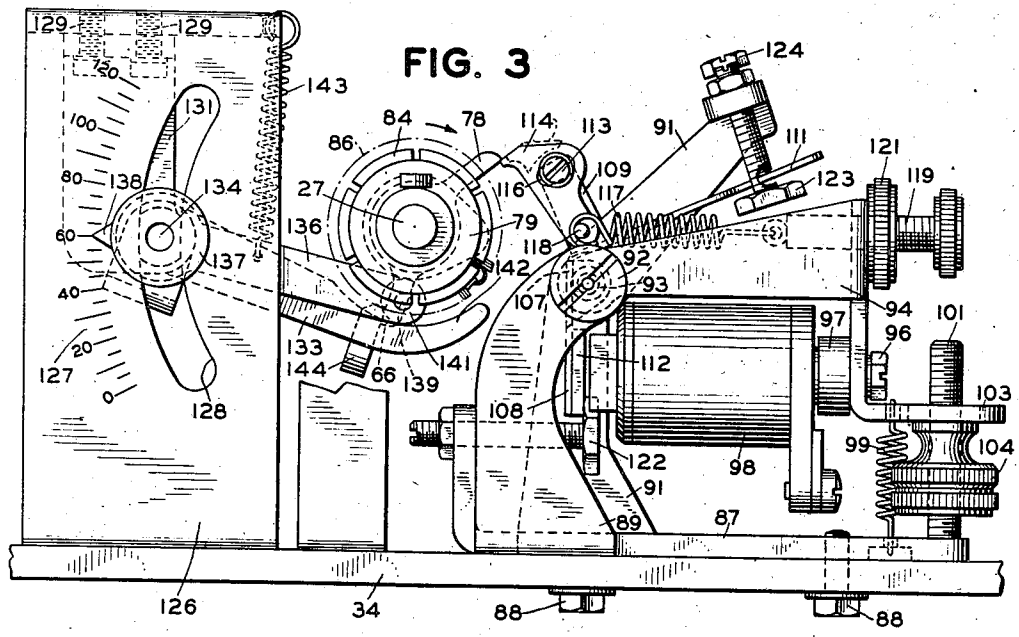
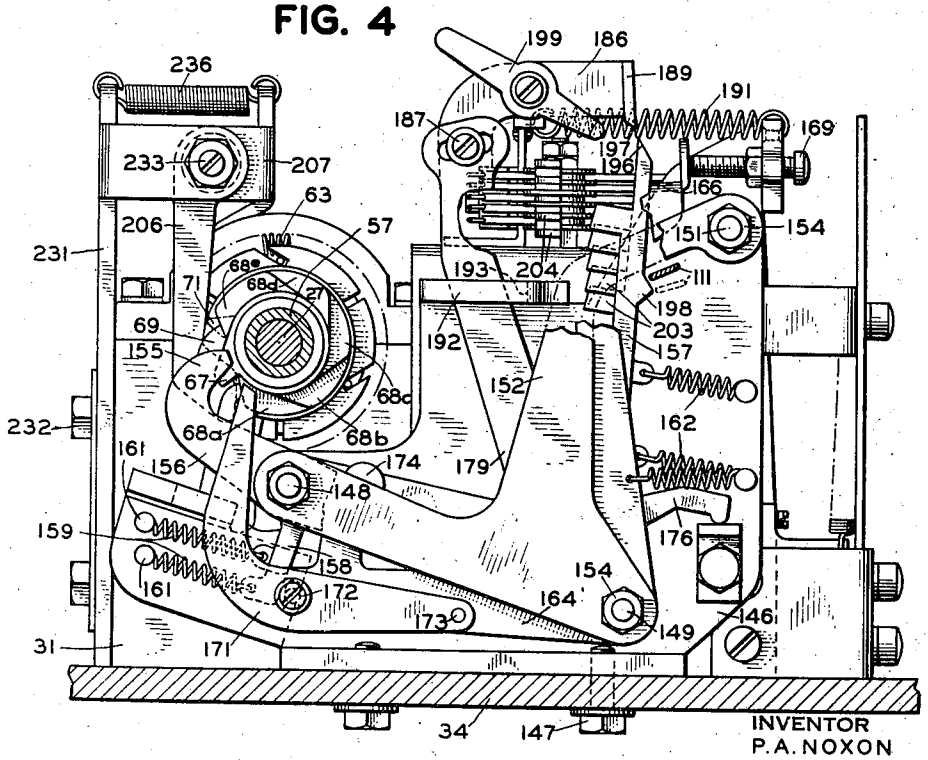


FIG. 4



INVENTOR
P. A. NOXON

BY W. R. Marsh

ATTORNEY

March 30, 1943. P. A. NOXON 2,315,009

TELEGRAPH ORIENTING DEVICE

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FIG. 5

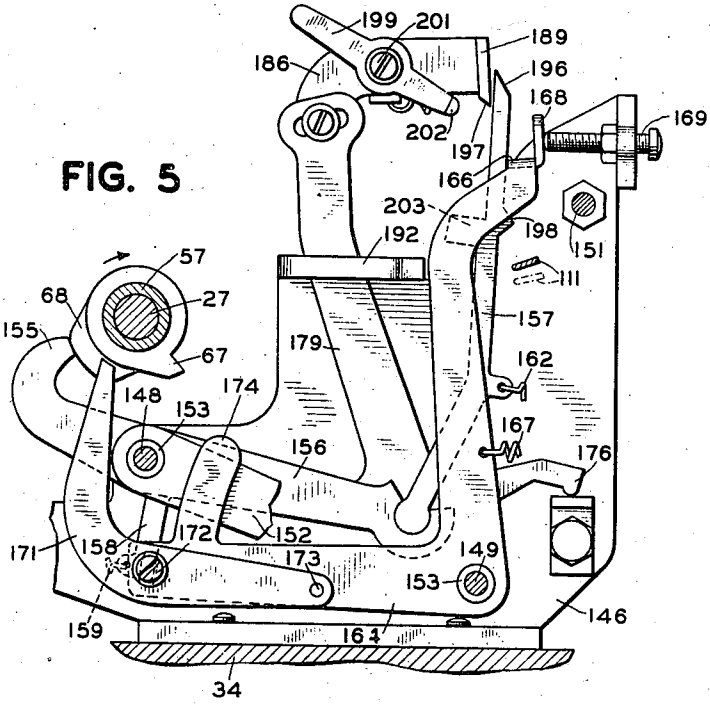
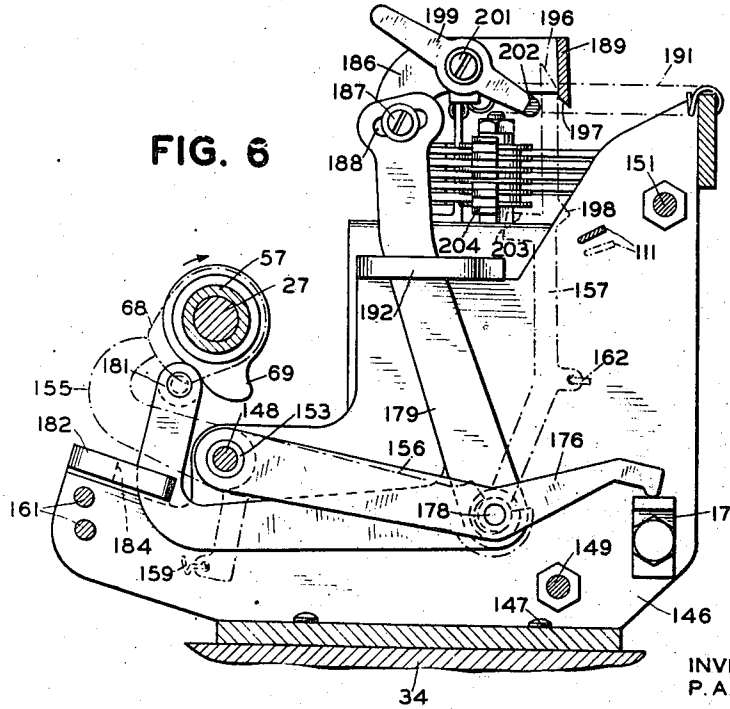


FIG. 6



INVENTOR
P. A. NOXON

BY M. R. Marsh
ATTORNEY

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UNITED STATES PATENT OFFICE

2,315,009

TELEGRAPH ORIENTING DEVICE

Paul A. Noxon, Tenafly, N. J., assignor to The Western Union Telegraph Company, New York, N. Y., a corporation of New York

Original application October 10, 1936, Serial No. 105,102, now Patent No. 2,209,998, dated August 6, 1940. Divided and this application August 6, 1938, Serial No. 223,384

7 Claims. (Cl. 178—53.1)

This invention relates primarily to telegraph receiving mechanisms and more particularly to an orienting device for use in conjunction with the selector mechanism of telegraph receiving mechanisms. The invention is particularly adapted for use in conjunction with electric selector mechanisms of the type used to selectively control telegraph receivers and like apparatus employing the Baudot code, i. e., one in which the character signals are represented by groups of two different line conditions such as permutations of positive and negative impulses or current and no-current impulses extending throughout a definite number of, usually five, consecutive time intervals or units.

The present application is a divisional application of a copending application Serial No. 105,102, filed October 10, 1936, entitled "Electric selector mechanism," now Patent No. 2,209,998, granted Aug. 6, 1940.

The novel features of this invention are particularly adaptable for use in conjunction with so-called start-stop or simplex telegraph systems, viz., those employing creep wherein a rotatable member or distributor, such as a selector cam shaft or brush arm of the telegraph receiver is rotated a slight amount faster than a similar distributor member on the sending apparatus and is kept in step or in synchronism therewith and the incoming line signals by a start-stop mechanism that initiates the rotation of the rotatable member at the receiver in response to a starting line condition preceding each code group of impulses and arrests the rotation thereof in response to a stopping line condition following each code group of impulses or during the interval between successive code groups.

As is well known in the art, it is advantageous and desirable in all such start-stop telegraph systems to provide a means for orienting, which operation in effect, entails the changing or varying the stop or rest position of the rotatable member at the telegraph receiver to compensate for line and other conditions which may tend to vary the length and effectiveness of the start impulse so that the rotatable member, such as the selector cam shaft, is operative on associated selectors during the midportion or most effective portion of respective signalling impulses. However, the practice of changing the rest position of the selector cam shaft has many inherent disadvantages, some of the most obvious of which will be pointed out hereinafter. Besides cooperating in the positioning of the selectors, the selector cam shaft usually performs, times, or initiates the operation of other auxiliary functions such as transferring the selection set up in the selectors to other elements, resetting the selectors, tripping off printing and letter spacing mechanisms, etc. Obviously, none of these functions should occur between the adjustable limits of the selector cam and consequently the adjustability of its rest position reduces the operating time of these auxiliary functions and crowds them together. Another disadvantage in this type of orienting is that unless a separate adjustable start magnet is employed, a somewhat complicated linkage is often required between the selector magnet and the start mechanism wherein there is apt to be considerable lost motion which results in reduced operating margin of the selector mechanism.

Accordingly, the primary object of this invention is to provide a novel and simplified means for orienting telegraph receivers or compensating for variable starting line conditions without changing the rest position of the distributor member of the associated selector mechanism and thereby making the entire rotating time of the distributor member available for selector operation and auxiliary functions.

It is the usual practice in telegraph machines operating on the start-stop principle to have the selector magnet, or a separate start magnet in series or parallel with the selector magnet, release the rotatable distributor member, such as the cam shaft or sleeve. This shaft or sleeve is usually frictionally driven and normally tending to rotate, and as the cam shaft has a considerable amount of work to perform, a comparatively heavy friction clutch must be employed. Otherwise slippage might occur between the driving member and the cam shaft which would result in incorrect operation of the selector. With a heavy friction clutch, a heavier load is put on the start magnet or selector magnet to release the cam shaft for rotation and consequently the release is apt not to take place non-uniformly with respect to the start impulse. It is, therefore, another object of this invention to provide a mechanism whereby the load on the start or selector magnet armature for initiating the rotation of the selector cam shaft is reduced, and thereby enabling the start of the cam shaft to be more easily controlled.

Other objects of the invention reside in its reliability, its ease of adjustment, its simplicity, and minimum number of parts employed to accomplish the above objects.

These and other objects of the invention will be hereinafter pointed out, in conjunction with a

detailed description and drawings thereof, and particularly in the appended claims.

The preferred embodiment of the invention as shown in the accompanying drawings is particularly adapted for use in conjunction with the selector mechanism disclosed in the above mentioned copending application, which in turn is preferably used to control the operation of a type bar printer of the type disclosed in another copending application of P. A. Noxon et al., filed March 3, 1936, Ser. No. 66,906, and only such parts of the selector mechanism and the printer are shown and described herein as are thought necessary for a complete understanding of this invention. It should be evident, however, that the use of the orienting device is not limited to this particular type of selector but may readily be adapted for use in conjunction with practically any one or all telegraph receivers operating on the start-stop principle.

In the preferred embodiment of the invention the orienting mechanism consists of a frictionally driven rotatable member which is released for rotation by the selector magnet in response to the start impulse of each code combination. A manually adjustable means operated by this rotatable member causes the release of the selector cam sleeve of the associated selector mechanism and by use of the manually adjustable means, the time interval elapsing between the release of the first rotatable member and the selector cam sleeve is varied or adjusted to compensate for the variable start impulse of each group to allow the selector cams to cooperate with the selectors during the most effective portion of their associated signaling impulses.

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

Fig. 1 is a plan view of the invention and the essential parts of the associated selector and receiver necessary for a clear understanding of the invention;

Fig. 2 is an enlarged vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a left hand side elevational view of the orienting device and the selector mechanism;

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary vertical sectional view taken on line 5—5 of Fig. 1;

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

Fig. 7 is a fragmentary vertical sectional view taken on line 7—7 of Fig. 1; and

Fig. 8 is a fragmentary vertical sectional view taken on line 8—8 of Fig. 2.

Referring first to Fig. 1 a motor shaft 21 of a continuously rotating motor, not shown, furnishes through appropriate gearing and clutch mechanism, hereafter described, all local power for operating the receiver. A helical gear 22 fixed to the motor shaft meshes with another helical gear 23 located above. The helical gear 23 is fixed by screws such as 24 to a gear hub 26 which in turn is secured to the printer operating shaft 27 for rotation therewith by screw 28. The operating shaft 27 extends transversely the full width of the receiver and is journaled at the left of its center as shown in Fig. 2 in a ball bearing 29 which is supported by a bearing post 31 and clamped in position by a bearing clamping member 32. The right hand end of the operating shaft 27 is similarly journaled in a ball bearing which is supported by a bearing post and clamped in position by a clamping member 33, only the clamping member 33 being shown in Fig. 1. Both bearing posts are secured to and supported from a base plate 34 which comprises the base of the associated printer.

The operating shaft 27 and the elements thereon will now be described and throughout the description various sections of the operating shaft will hereinafter be referred to as sections 27*a*, 27*b*, etc. Referring to Fig. 2, a normally at rest printing operating cam sleeve 36 is loosely mounted on sections 27*a* of the operating shaft abutting at its right hand end a collar 27*b* integral with the shaft 27. The right hand end of the sleeve 36 is threaded and has nuts 37 thereon which clamp a printing cam 38 against a flange 39 of the sleeve 36 for rotation therewith. Another flange 41 adjacent the center of the sleeve 36 has a collar 42 clamped against the left hand side thereof for rotation therewith by screws such as 43. Integral with the collar 42 is an irregular disk 44 which comprises another operating cam of the printer. The operation of these cams and the manner in which they control the associated printer are fully described in the above mentioned copending application, Serial No. 105,102. Loosely mounted on the left hand end of the sleeve 36 is another collar 46 which is at all times operatively engaged with the collar 42 by means of interengaging tongues and grooves 47 and 48 formed on the collars 42 and 46. Thus the collar 46 is rotatable with the sleeve 36 but is slideable along the sleeve by means hereinafter described to bring ratchet teeth 49 disposed on the left hand face thereof into and out of engagement with similar teeth 51 disposed on the right hand face of a disk member 52.

The section 27*c* of the operating shaft is threaded and has a disk 54 thereon which clamps the inner race 56 of the ball bearing unit and the disk 52 against the larger section 27*a* of the operating shaft for rotation therewith. The disk 52 is also keyed to the shaft 27 and a lock unit 53 locks the disk 54 in place.

A selector cam sleeve 57 is loosely mounted on section 27*d* of the operating shaft 27 and has a hub 58 on the right hand end thereof which is recessed and extends over the lock nut 53. Extending horizontally from the left hand face of the disk 54 are a series of three pins 59, each of which is engaged in a slot 61, Fig. 8, in an associated segment 62 of a segmented ring composed of three segments of Bakelite of some other suitable friction material. Surrounding the segments 62 is a circular coiled radially contractable spring 63 which holds the inner surfaces of the segments 62 fractionally engaged with the outer surface of the hub 58. Thus as the disk 54 and pins 59 rotate with the continuously rotating operating shaft 27, the segments rotate therewith and also tend to rotate the sleeve 57. However, the sleeve 57 is normally held at rest by means hereinafter described. Mounted from let to right on the sleeve 57 is a stop arm 66, a cam 67, a series of five selector cams 68*a* to 68*e*, a selecting finger transfer cam 69 and a trip cam 71 intermediate with spacers 72. All these members and spacers are clamped together and against a shoulder 58*a* of the sleeve 57 by a nut 64 in threaded engagement with the left hand end of the sleeve 57.

A third sleeve 74 hereinafter referred to as the pilot sleeve is loosely mounted adjacent the left hand end of the operating shaft 27. Clamped

against the flange 76 of the pilot sleeve for rotation therewith by a nut 77 is a pilot sleeve stop arm 78 and a selector sleeve trip cam 79. Abutting the left hand end of the pilot sleeve 74 is a collar 81 which is secured by a screw 82 to the operating shaft 27 for rotation therewith. Extending from the right hand face of the collar 81 are a series of pins 83 which engage segments 84 of a segmented ring. A spring 86 surrounds the segments 84 and holds them in frictional engagement with the outer circumference of the section of the pilot sleeve 74 at the left of a flange 76. The segments 84 are substantially similar to the segments 62 which serve to rotate the selector cam sleeve 57 but are an appreciable amount smaller. The spring 86 surrounding the segments 84 has considerably less compression force than the spring 63 surrounding segments 62 and because of this fact the frictional force tending to rotate the selector cam sleeve 57 is considerably more than that tending to rotate the pilot sleeve 74. The reasons for this construction and the advantages thereof will hereinafter appear.

Referring now to Figs. 1 and 3, the arrangement of the selector magnet will now be described. A selector magnet mounting bracket 87 is secured to the front left hand corner of the base plate 34 by screws such as 88 and extending upwardly from the bracket are two supports 89 and 91 in which are threaded two hollow ended screws 92. Extending horizontally between the two screws and pivotally supported therein is a selector armature lever pivot rod 93. Pivotally mounted on shoulders at the inner ends of the screws 92 is a substantially U-shaped selector magnet mounting cradle 94 which has secured thereto by screws 96 a magnet yoke 97 and the two coils of the selector magnet 98. A spring 99 attached to the cradle 94 tends to pivot the cradle and selector magnet in a clockwise direction as shown in Fig. 3 and hold a section 103 of the cradle in engagement with the top of a thumb nut 104 threaded on a stud 101 extending vertically from the bracket 97. By adjusting the nut 104 the cradle 94 with its attached members may be moved whereby the magnetic air gap between the pole pieces of the magnet 98 and the armature is varied.

Secured to the armature pivot rod 93 for pivotable movement therewith is an armature lever 107 which has three extensions 108, 109 and 111. The section 108 of the armature extends in a downward direction and has riveted thereto a magnet armature 112 in operative relation with the poles of the magnets 98. The rightwardly extending projection 111 of the armature lever cooperates with the selectors as will be hereinafter described to selectively position the same. The substantially vertical arm 109 of the armature lever has adjustably secured thereto by screws such as 113 a pilot sleeve stop arm anvil 114. A slot 116 in the anvil 114, through which the screw 113 extends, permits relative adjustment between the armature lever extension 109 and the anvil 114. With the selector magnet 98 energized, which is its normal condition, the tip of the anvil 114 is in the path of or engaged with the end of the pilot sleeve stop arm 78 and thereby normally arrests the rotation of the pilot sleeve 74. On deenergization of the magnet 98 a spring 117 secured to a pin 118 in the armature extension 109 and to an adjusting screw 119 pivots the armature lever in a clockwise direction to withdraw the anvil 114 from out of engagement with the stop arm 78 whereupon the pilot sleeve 74 is free to rotate with the operating shaft 27. The adjusting screw 119 is supported in the selector magnet cradle 94 and is locked in position by a lock nut 121. Two adjusting screws 123 and 124 supported in the section 91 of the selector magnet bracket are engageable with the extension 111 of the armature lever and limit its movement. Another adjusting screw 122 cooperates with the armature 112 to limit its movement when the selector magnet is energized. The two stops 122 and 124 are employed for the armature lever 107 to eliminate any bending or whip that might occur in the comparatively long and light armature extension 111, the movement of which for reasons hereinafter apparent must be accurately controlled between comparatively small limits.

Secured to the base plate 34 at the left of the operating shaft 27 as shown in Fig. 3 is an orienting plate 126, the front side of which has a radial scale 127 etched thereon and a curved slot 128, the radius of curvature of which is equal to the distance therefrom to the center of the operating shaft 27. Attached to the horizontal top section of the orienting plate 126 by screws such as 129 is a downwardly extending bracket 131. Mounted on the lower end of the bracket 131 is a shoulder screw 132 shown dotted in Fig. 1 which has pivoted thereon at its left hand end a selector cam sleeve releasing lever 133, the right hand end of which extends beneath the operating shaft 27. Extending through the slot 128 in the bracket 126 is another shoulder screw 134 which has pivotally mounted thereon at its left hand end a pilot sleeve operating lever 136 which also extends beneath the operating shaft 27 and this lever with the selector cam sleeve releasing lever 133 cooperate with one another to release the selector cam sleeve 57 as will be hereinafter described. A thumb nut 137 on the screw 134 permits it to be clamped in any adjusted position in the curved slot 128 while an indicating member 138 movable with the screw 134 cooperates with the scale 127 to indicate the amount of movement of the screw from one position to another.

In the right hand end of the lever 136 is a horizontal stud 139 which pivotally supports two rollers 140 and 141, Fig. 2. The roller 140 is in operative relation with the selector sleeve trip cam 79 and the roller 141 engages the right hand curved section 142 of the lever 133. A spring 143 secured to the lever 133 tends to pivot it in a counter-clockwise direction as shown in Fig. 3 and holds the curved section 142 in engagement with the roller 141, and as the rollers 140 and 141 are on a common stud, the spring 143 also holds the roller 140 in contact with the periphery of the selector sleeve trip cam 79. Extending from the side of the lever 133 is a curved projection 144, Figs. 1, 2 and 3, the end of which is normally engaged with the end of the selector sleeve stop arm 66 and thereby keeps the selector sleeve 57 and its attached elements from rotating. When a start pulse is received on the selector magnet 98, which is an open line condition, the spring 117, Fig. 3, withdraws the anvil 114 from out of engagement with the pilot sleeve stop arm 78 whereupon the pilot sleeve 74 is free to rotate. After the pilot sleeve has rotated about a quarter of a revolution from its rest position, the hump section of the selector sleeve trip cam 79 rotates into operative relation with the roller 140 to force it downward and cause a clockwise pivoting movement of the lever 136 about its left hand end on the shoulder screw 134. The roller 141 also moves downward with the roller 140 and in so

doing pivots the selector sleeve release lever 133 in a clockwise direction about its left hand end on the shoulder screw 132. This pivoting movement of the lever 133 withdraws the end of the projection 144 from out of engagement with the selector sleeve stop arm 66 whereupon the selector sleeve 57 is free to rotate with the main operating shaft 27 through the action of its associated friction clutch hereinbefore described. The radius of curvature of the section 142 of the lever 133 is equal to the diameter of its associated roller 141 plus the normal radius of the selector sleeve trip cam 79 and when the left hand end of the lever 136 on the shoulder screw 134 is moved within the limits of the curved slot 128, the roller 140 moves along the curved section 142 of the lever 133. Throughout the adjustable position of the lever 136 the roller 140 is not engageable with the hump of the cam 79 and therefore adjusting the left hand end of the lever 136 will not cause the release of the selector cam sleeve 57.

From the above it is evident that by moving the shoulder screw 134 and the left hand end of the lever 136 within the limits of the curved slot 128 the amount of rotation of the selector sleeve trip cam 79 and the pilot sleeve 74 from their normal rest position necessary to cause the release of the selector sleeve 57 may be varied. In this manner the variable lengths of the starting impulses due to line and other conditions may be compensated for and allows the selecting cams 68*a* to 68*e* to be operatively associated with their respective elements during the midportion or most effective portions of their respective signaling impulses as will be hereinafter described. Obviously the adjustment of the lever 136 can be made equally well with the selector mechanism operating or at rest and it being adjustable while the selector is in operation greatly facilitates making its proper adjustment. Thus the time of release of the selector sleeve 57 with respect to a received group of signals may be varied without changing the rest position of said cam sleeve and the operations performed thereby can be distributed substantially throughout the complete revolution thereof.

The speed of rotation of the shaft 27 is such with respect to the incoming line signals that the pilot sleeve 74 will complete a revolution while the rest impulse of the code group which caused its release is being received at the selector magnet 98. The rest impulses are closed line conditions which energize the magnet 98 and cause the anvil 114 to be moved into the path of the pilot sleeve stop arm 78. Therefore, when the pilot sleeve subsequently completes its revolution the stop arm 78 and anvil 114 engage to stop the rotation of the pilot sleeve and it will remain at rest during the remainder of the rest impulse or until the start impulse of the following code group. The selector cam sleeve 57 and the pilot sleeve 74 are rotated from the same shaft 27 and therefore rotate at the same speed. Accordingly the selector cam sleeve 57 will also be brought to rest at the completion of every revolution for a length of time equal to the time pilot sleeve is at rest. However with code combinations being received in a continuous succession which results in shorter rest impulses the two sleeves may not be at rest at the same time since the pilot sleeve 74 has to rotate a substantial amount before it can cause the release of the selector cam sleeve 57.

All the work the pilot sleeve has to perform is done by the cam 79 pivoting the levers 133 and 136 against the action of the spring 143. The spring 143 may be comparatively weak and the slope of the cam 79 gradual and therefore the frictional force tending to rotate the pilot sleeve 74 may be very small. With a small frictional force tending to rotate the pilot sleeve the anvil 114 may be easily withdrawn from engagement with the pilot sleeve stop arm 78 and consequently the amount of work performed by the selector magnet to initiate the operation of the selector mechanism is comparatively small. This feature is another advantage of the above arrangement and very helpful when the selector is operating in response to weak signals.

Referring now to Figs. 2, 4, 5 and 6 a bracket 146 is secured to the base 34 by screws 147 in front of the operating shaft 27 and substantially opposite the selector cam sleeve 57. Extending horizontally from the bracket 146 are a series of studs and posts parallel with the shaft 27 on which are pivoted and mounted the selecting elements of the selector mechanism. Figs. 4, 5 and 6 are vertical sectional views taken progressively along the selector cam sleeve 57 and show the manner in which the selector elements cooperate with the cam sleeve.

Supported on three studs 148, 149 and 151 extending from the bracket 146 are a series of guide plates 152. In order to more clearly illustrate the elements of the selector mechanism the guide plates 152 are not fully shown in Figs. 5 and 6 but the shape thereof can readily be seen in Figs. 2 and 4. A series of collars or spacers 153 are located on the studs 148, 149 and 151 between the guide plates 152 and serve to space the guide plates along the studs. A set of nuts 154 threaded on the ends on the studs clamp the plates 152 and collars 153 together. In between the spaces formed between the guide plates 152 are a series of five selector levers indicated in general by reference numeral 156, Fig. 5, which are pivotally supported on the spacers 153 on the stud 148. The selector levers 156 are slightly thinner than the spacers 153 and therefore free movement thereof between the guide plates 152 is permitted. The left hand end 155, Fig. 5, of each of the selector levers 156 is in operative relation with an associated one of the selector operating cams 68*a* to 68*e* on the selector cam sleeve 57. The right hand end of each selector lever 156 is shaped to form a socket in which is pivotally carried the lower end of an associated selecting finger 157. A depending arm 158 of each of the selector levers 156 has attached thereto one end of an individual spring 159, Fig. 4, which tends to pivot the lever in a clockwise direction and holds the left hand ends 155 of each lever in engagement with its associated cam 68. The other ends of the springs 159 are anchored to a post 161 in the bracket 146. Attached to each one of the selecting fingers 157 adjacent the center thereof are individually associated springs 162 which tend to pivot the fingers in a clockwise direction.

Pivoted on a spacer 153 on the stud 149 between the first and second guide plates 152 and in front of the selector levers 156 as shown in Figs. 4 and 5 is a bell crank 164. Extending horizontally toward the rear from the upper end of the substantially vertical arm of the bell crank 164 is a section 166 against which the right hand upper ends of the selecting fingers 157 are normally held by their attached springs 162. A spring 167 attached to the bell crank 164 tends to rock it in a clockwise direction and normally holds a section 168 at the upper end against and

adjusting screw 169. Another bell crank 171 adjustably secured by a screw 172 and pin 173 to the leftwardly extending arm of the bell crank 164 has the upper end thereof in operative relation with the cam 67 on the selector sleeve 57. A section 174 of the bell crank 164 extends upward between the first two guide plates 152 and serves to keep the bell crank 171 in alignment with its associated cam 67.

A lever 176, Fig. 6, is pivoted at its left hand end on the spacer 153 on the stud 148 behind the selector levers 156. The right hand end of the lever 176 rests on a bracket 177, extending from the main bracket 146. A pin 178 in the lever 176 pivotally supports a bell crank 179, the leftwardly extending arm of which pivotally carries a roller cam follower 181 which is in operative relation with the hereinbefore mentioned selector finger transfer cam 69. A plate 182 attached to the bracket 146 by screws such as 183, Fig. 2, has a slot 184 therein which guides the left hand end of the bell crank 179. Supported on its lower end on the pin 178, Fig. 6, is a knife arm 186 which is adjustably secured to the bell crank 179 by a screw 187 extending through an elongated slot 188. The right hand end of the knife arm 186 has a bent vertical section 189 which is parallel to the operating shaft 187 and located a little to the left and above the upper ends of the selecting fingers 157 when they are in their normal or unoperated position. A spring 191 attached to the knife arm 186 tends to pivot the knife arm and bell crank 179 in a clockwise direction and keeps the cam follower 181 engaged with its associated cam 69. A horizontal section 192 of the bracket 146 has a slot 193 therein which guides the bell crank 179 and knife arm 186.

The operation of the selector cam sleeve and its associated elements will now be described. In general the selecting operation consists of three separate operations which are as follows: first, successively raising the selecting fingers 157 in timed relation with received signalling impulses and selectively positioning the upper ends thereof to one side or the other of the knife section 189 in accordance with received signals; second, the transfer operation which is performed by the movement of the knife section 189 which causes the selecting finger 157 on the left side thereof to trip associated latches normally latching associated permutation bars in a normal position; and, third, the reset of the knife section 189 and selecting fingers to a normal position.

In Fig. 4 the selector cam sleeve 57 and its associated elements are shown in their normal rest position while in Figs. 5 and 6 some of the elements are shown in their operated positions. The rotation of the cam sleeve 57 is initiated as hereinbefore described an adjustable length of time after the receipt of the start impulse so that the selector cams 68 are effective to cooperate with associated selecting elements to selectively position the same during the mid-portion or most effective portion of respective signalling impulses. While the selector cam sleeve 57 is rotating the selector magnet 98, Fig. 3, positions the selector armature lever 107 in accordance with the received impulses. After a sufficient length of time to insure the proper positioning of the armature lever and extension 111 in accordance with the first signalling impulse, the first selecting cam 68*a* rotates into engagement with the projection 155, Figs. 4 to 6, on its associated selector lever 156. If the first signalling impulse is marking, the magnet 98 will be energized and position the armature extension 111 accordingly. In Figs. 4 to 6 a section of the armature extension 111 is shown by full lines in its marking position and by a dot-dash outline in its spacing position.

As the selector cam 68*a* engages the projection 155 of its associated selector lever 156 it pivots the lever in a counter-clockwise direction about the stud 148 upon which it is mounted. This pivoting movement of the lever 156 causes its associated selecting finger 157 to rise with a substantially vertical and linear movement. It will be noted, as shown in Fig. 4, that with the selecting finger in its normal position the upper end is a little to the right and below the lower edge of the knife section 189. The upper ends of the selecting fingers 157 are bevelled toward the right and the lower edge of the knife section 189 is bevelled toward the left. With the first impulse of a group assumed to be marking the armature extension 111 will be positioned accordingly and as the selecting finger 157 rises a bevelled projection 198 on the right hand side thereof engages the armature extension 111. This engagement of the projection 198 with the armature extension 111 causes a slight pivoting movement in a counter-clockwise direction of the selecting finger 157, which is sufficient to bring the top bevelled surface 196 thereon beneath the bevelled surface 197 on the knife section 189. Further upward movement of the selecting finger 157 then causes the bevelled surfaces 196 and 197 to engage and move the finger a slight amount toward the left and it passes to the left of the knife section 189 to a position as shown in Fig. 6. This selecting finger 157 thereupon remains in this position until near the end of a revolution of the selector cam 57 when it is returned to its normal position as hereinafter described. A member 199 adjustably secured to the knife arm 186 by a screw 201 has a horizontal section 202 parallel to the knife section 189. The purpose of the section 202 is to prevent overthrow of the selecting fingers 157 as they are being markingly positioned which might cause premature tripping of hereinafter mentioned latches.

Following the positioning of the first selecting finger 157 the armature lever 107 and armature extension 111 are positioned in accordance with the second selecting impulse and if this impulse is assumed to be a spacing impulse, the armature extension will be moved to its spacing position, after which the high part of the selector cam 68*b* engages the end of the second selector lever 156. This raises the associated selecting finger 157, and with the armature extension 111 in its spacing position the bevelled projection 198 on the finger will not engage the extension 111. Thus the second selector finger 147 slides upward on the section 166 of the bell crank 164 and the upper end thereof passes to the right of the knife section 189 as shown in Fig. 5. In a similar manner the third, fourth and fifth selecting fingers 157 are successively positioned to the left or the right of the knife section 189 in accordance with received marking and spacing impulses respectively.

After the selective positioning of the selecting fingers 157 the next function is the transfer operation. This function is performed by moving the knife section 189, and only the selecting fingers 157, markingly positioned or on the left hand side of the knife section, enter into this

transfer function. The transfer is performed by the transfer cam 69, Fig. 6, pivoting its associated bell crank 179 to cause the knife section 189 to move toward the left. This leftward movement of the knife section pivots the selecting fingers 157 on the left hand side thereof a slight amount in a counter-clockwise direction. As the selecting fingers 157 are thus pivoted, individual projections 203 formed in a stepped relation on the upper left hand sides engage associated latches 204, Fig. 7, to trip the same as will be hereinafter described.

During the time the knife section 189 is holding the markingly positioned selecting fingers to the left, the cam 67, Fig. 5, rocks the bell crank 164 which pivots the spacingly positioned selecting fingers a slight amount in a counter-clockwise direction. This pivoting movement of the spacingly positioned selecting fingers is not sufficient, however, to cause their projections 203 to trip associated latches. While the spacingly and markingly positioned selecting fingers are thus held to the left by the bell crank 164 and knife section 189 respectively, the sections 155 of the selector levers 156 simultaneously pass out of operative relation with the high part of their associated selected cams 68 whereupon the selecting fingers drop down and those markingly positioned pivot clockwise to engage the section 166 of the bell crank 164 which shortly thereafter returns to its normal position, allowing all the fingers to do the same. The purpose of pivoting the spacingly positioned selecting fingers a slight amount in a clockwise direction prior to their return to a normal position is to prevent the beveled projections 198 from engaging with the armature extension 111. Near the end of a revolution of the selector cam sleeve 57 the cam 71, Fig. 4, engages an arm 206 of a trip lever 207 to initiate the operation of the operating cam sleeve 37.

Attached to the base plate 34 is an inverted U-shaped member 208, Figs. 1 and 7, which has extending vertically therefrom a stud 209. Bushings 212 on the stud 209 intermediate with spacers 211 pivotally support the hereinbefore mentioned latches 204. Slidably mounted on two screws 214 extending vertically from the member 208 are a series of five individually notched permutation bars 218. Normally the permutation bars are in their right hand position as held by their associated latches 204 against the action of individually single wire springs 221.

Referring now to Figs. 4, 5 and 6, if it is assumed that the first, fourth and fifth of the selecting fingers 157 are positioned to the left of the knife section 189, their associated projections 203 will engage the ends of the first, fourth and fifth latches 204 from the top as the knife section moves to the left. This allows the first, fourth and fifth of the permutation bars to slide to the left and selectively control the associated recorder.

Referring now to Figs. 1, 2 and 4, a bracket 231 attached to the bearing post 31 by screws 232 pivotally supports a rod 233 upon which is mounted the above mentioned trip lever 207 between collars 234. A spring 236 attached to the trip lever keeps the depending arm 237 in contact with the periphery of the collar 46. A side cam surface 238 on the collar 46 cooperates with the depending arm 237 to control the engagement and disengagement of the teeth 49 on the collar 46 with the teeth 51 on the collar 52 in a well known manner.

The operation of the operating cam sleeve 36 and the manner in which it controls the associated printer is fully described in the copending application of Noxon et al., Ser. No. 66,906.

Although this invention is shown and described in conjunction with a selector mechanism controlling a recorder of a particular type, it is obvious, of course, that it may be employed in conjunction with various other types of selectors and that various modifications of the apparatus shown and described herein may be made without departing from the spirit or essential attributes of the invention, 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 receiving selector mechanism responsive to received code combinations of electrical impulses comprising an electro-magnet, a first rotary means initiated in rotation by the actuation of said electro-magnet immediately preceding the reception of each of said code combinations and arrested in rotation immediately following the reception of each of said code combinations, a set of selecting fingers and a second rotatable member, adjustable means interposed between said first and second rotatable members for releasing said second rotatable member a variable length of time after the release of said first rotatable member and means employing said second rotatable member and said electro-magnet for selectively positioning said selecting fingers in accordance with the received code combinations.

2. In a selecting mechanism, a shaft and means for rotating the same, a first and second rotatable members frictionally driven by said shaft, an electro-magnet, means controlled by said electro-magnet to release said first rotatable member for rotation, first and second pivoted levers, means operated by said first rotatable member to pivot said first lever, means operated by said first lever to pivot said second lever and means controlled by said second lever to release said second rotatable member for rotation.

3. In a selecting mechanism, a shaft and means for rotating the same, first and second rotatable members frictionally driven by said shaft, an electro-magnet, means controlled by said electro-magnet to release said first rotatable member for rotation, first and second pivoted levers, means operated by said first rotatable member to pivot said first lever, means operated by said first lever to pivot said second lever, means controlled by said second lever to release said second rotatable member for rotation, and means for adjusting said first lever whereby it is pivoted by said first rotatable member at various points in the rotation of said first rotatable member.

4. In a selecting mechanism, a shaft and means for rotating the same, first and second rotatable members frictionally driven by said shaft, an electro-magnet, means controlled by said electro-magnet to release said first rotatable member for rotation, first and second pivoted levers, means operated by said first rotatable member to pivot said first lever, means operated by said first lever to pivot said second lever, means controlled by said second lever to release said second rotatable member for rotation, means for adjusting said first lever whereby it is pivoted by said first rotatable member at various points in the rotation

of said first rotatable member, and means for indicating the relative adjustment of said first lever.

5. In an electrical selecting mechanism, a rotating shaft, a rotary distributor member normally at rest and tending to rotate with said shaft, a second rotatable member normally at rest and tending to rotate with said shaft, an electro-magnet response to received code combinations of impulses, means controlled by said electro-magnet to release said second rotatable member for rotation with said shaft at the beginning of each combination and arrest the same after one revolution at the completion of each combination, a first pivoted lever having a manually adjustable pivot point and adapted to be pivoted by said second rotatable member during the rotation thereof, a second pivoted lever normally restraining said distributor member from rotation, means operated by said first lever to pivot said second lever thereby releasing said distributor member for rotation with said shaft and means for adjusting the pivot point of said first lever whereby said second lever is pivoted to release said distributor member at any point within a predetermined part of the revolution of said second rotatable member.

6. In an electrical selecting mechanism, a rotating shaft, a rotary distributor member normally at rest and tending to rotate with said shaft, a second rotatable member normally at rest and tending to rotate with said shaft, an electro-magnet responsive to received code combinations of impulses, means controlled by said electro-magnet to release said second rotatable member for rotation with said shaft at the beginning of each combination and arrest the same after one revolution at the completion of each combination, a first pivoted lever having a manually adjustable pivot point and adapted to be pivoted by said second rotatable member during the rotation thereof, a second pivoted lever normally restraining said distributor member from rotation, means operated by said first lever to pivot said second lever thereby releasing said distributor member for rotation with said shaft, means for adjusting the pivot point of said first lever whereby said second lever is pivoted to release said distributor member at any point within a predetermined part of the revolution of said second rotatable member, a set of selectors and means embodying said distributor member and said electro-magnet for selectively positioning said selectors during the rotation of said distributor member in response to and in accordance with received combinations.

7. In a selector mechanism, a driving means, a first and second rotatable members, means comprising a comparatively light and a comparatively heavy friction clutch interposed between said driving means and said first and second rotatable members respectively tending to rotate the same, a magnet, means controlled by said magnet to release said first rotatable member for rotation, means operated by the rotation of said first rotatable member to release said second rotatable member for rotation and means for manually adjusting the point in the rotation of said first rotatable member at which said second rotatable member is released, said last mentioned means being adjustable while said rotatable members are at rest or in rotation.

PAUL A. NOXON.