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TELEGRAPH APPARATUS

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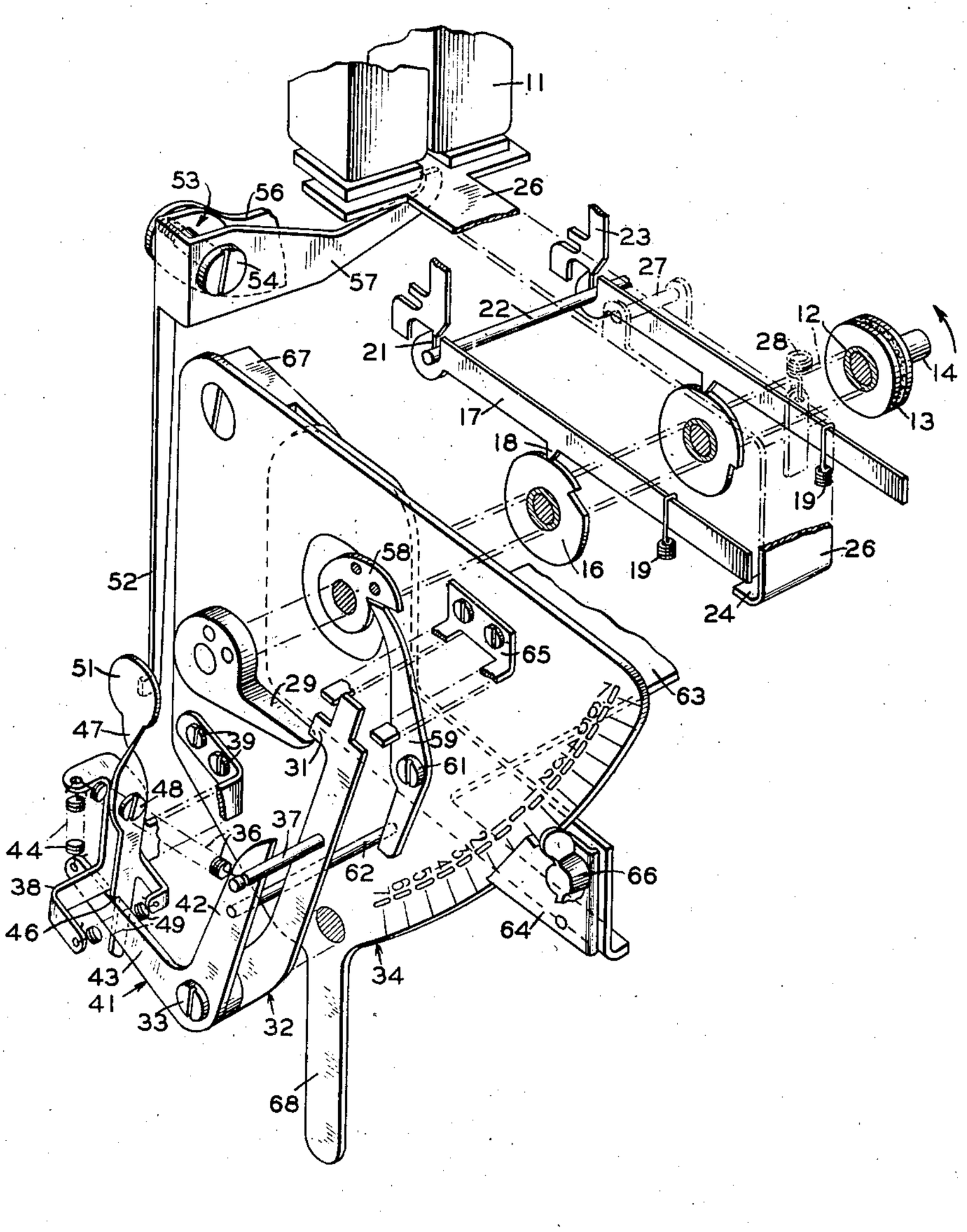

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TELEGRAPH APPARATUS

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9 Claims. (Cl. 178—53.1)

The present invention relates primarily to telegraph apparatus and more particularly to apparatus for controlling the rotation of a rotatable distributor member such as is usually employed in simplex or start-stop telegraph recording mechanisms.

In simplex telegraph mechanisms and particularly receiving mechanisms a rotatable distributor member, which in a normal position is at rest, is initiated into rotation at the beginning of each code group of impulses and is stopped at the end of each group. Heretofore various arrangements such as yieldable gates and latches and stops actuated directly by the selector magnet have been employed to initiate and arrest the rotation of the rotatable distributor member. However, these arrangements have numerous disadvantages, some of which are that they impose a load on the selector magnet and/or include a large number of parts in which there is likely to be excessive lost motion and in which the release of the rotatable member may not be uniform in all cycles of operation.

Accordingly, it is one of the primary objects of the present invention to provide a novel and improved arrangement for releasing the rotatable distributor member that may be employed in receiving telegraph mechanism which has none of the disadvantages of previously proposed arrangements.

Another object of the invention is to provide a non-yieldable stop member for the rotatable distributor member and one in which the power for operating the stop member to a releasing position is furnished by the rotatable member during the previous cycle of operation. Such an arrangement eliminates any excessive load on the selector magnet and enables the release of the rotatable member to occur uniformly in each cycle of operation.

Another object of the present invention is to provide a mechanism of the above type which permits orientation whereby compensation may be made for the variable length or effectiveness of the start impulses of the code groups of impulses so that the selector cams on the rotatable distributor member are effective on associated selectively positionable elements during the mid-portion or most effective portion of their respective signaling impulses.

The above and further object of the invention will be more apparent when taken in conjunction with the following detailed description and the accompanying drawing.

The drawing is an exploded perspective view of the elements comprising the present invention, showing the cooperation thereof with the principal elements included in a selector mechanism.

Telegraph selector mechanisms of the type with which the present invention is particularly adapted to cooperate include a set of selectors which are positioned into one or the other of two positions in accordance with received code impulses and are known as start-stop type of selectors. The selectors are equal in number to the number of intelligence impulses in each code group, and each code group is preceded by a start impulse of one line condition and followed by a rest impulse of an opposite line condition. Usually the start-stop signals are open and closed line conditions, with the start impulse an open line condition and the rest impulse a closed line condition; the intelligence impulses being permutations of both open and closed line conditions. Although open and closed line conditions are normally employed in start-stop signals, polar signals may be employed.

The invention is shown and hereinafter described as cooperating with a selector mechanism of the type disclosed in a copending application of R. F. Dirkes et al., filed October 31, 1938, Serial No. 318,021, but it should be kept in mind that the invention is not limited to this particular type of start-stop selector mechanism but may readily be adapted to cooperate with various other types of selector mechanisms.

The above-mentioned selector mechanism includes the selector magnet 11 which, in response to the open line condition start impulse, in a manner hereinafter described releases for rotation a rotatable distributor member or shaft 12. The shaft 12 is normally at rest and tends to rotate by power communicated thereto through a friction clutch 13 from a constantly rotating shaft 14 driven at the desired speed from a suitable source of power (not shown), such as an electric motor.

The shaft 12 has fixed thereto for rotation therewith a set of notched selector cams 16, equal in number to the intelligence impulses of each code group, with the notches arranged in a spiral progression. Only two of the cams 16 are shown, and associated therewith are selector latches 17, one individual to each of the selector cams. Cam following projections 18 adjacent the center of the selector latches 17 are in operative relation with the peripheries of their associated cams, being held in engagement therewith by associated individual springs 19. The selector

latches 17 have adjacent their right hand ends bifurcations 21 which engage a pin 22. The latches 17 normally latch associated selectors such as 23 in their normal unselected position, and the latches are selectively operated in accordance with the character of their respective signaling impulses to unlatch or retain in a latched position their associated selectors.

The right hand ends of the latches 17 are in operative relation with a short horizontal portion 24 on the depending section of the armature lever 26 pivotally mounted adjacent its center on a pivot pin 27, with the left hand end thereof in operative relation with the pole pieces of the selector magnet 11. A spring 28 normally tends to pivot the armature lever 26 in a counterclockwise direction to a retracted position, and in its retracted position the horizontal portion 24 thereof is out of the path of movement of the right hand end of the selector latches 17, whereas in an energized position the section 24 is positioned beneath and in the path of movement of the right hand ends of the selector latches. Thus, the position of the armature lever 26 at the time a notch in a selector cam 16 rotates into operative relation with the cam following projection 18 on the associated latch 17 determines whether the greater pivoting movement of the latch is about its left or right hand end. When a selector latch pivots about its left hand end on the pin 22, it remains in latching engagement with its associated selector 23, whereas in pivoting about its right hand end the associated selector is unlatched and permitted, by means not shown, to move to a selected position. The unlatched of the selectors 23 are subsequently employed to control an associated recording mechanism in the usual manner, following which they are returned into latching engagement with their associated selector latches 17. The manner in which the selectors 23 are employed to control a recording mechanism and the relatching thereof is fully described in the above-mentioned copending application.

The present invention has to do with the release of the shaft 12 at the beginning of each code group of signals and the stopping thereof at the end of a code group and, in addition, the arrangement for effecting orientation or the adjustment effected whereby the notches in the selector cam 16 are effective on the cam following projections 18 of their associated latches during the mid-portion or most effective portion of their respective signaling impulses. The orientation compensates for the line and other conditions which are variable and which affect the length and effectiveness of the start impulse.

Secured to the left hand end of the distributor shaft 12, as shown in the drawing, is a stop arm 29 which normally engages a projection 31 at the upper end of a lock arm 32, and thus the shaft 12 is normally held in its rest or stop position. The lock arm 32 is pivotally mounted at its lower end on a shoulder screw 33 extending from the outside face of a so-called range plate 34. A spring 36 attached to a pin 37 extending from the lock arm 32 normally tends to pivot the lock arm in a counterclockwise direction and biases the same to its normal position where the projection 31 is in engagement with or in the path of the stop arm 29. The opposite end of the spring 36 is anchored in a bracket 38 secured by screws 39 to the range plate 34.

Also pivoted on the shoulder screw 33 is a trip arm 41 in the form of a bell crank with an upwardly extending arm 42 and a leftwardly extending arm 43. A comparatively strong spring 44 anchored in the bracket 38 is attached to the end of the arm 43 and tends to pivot the trip arm in a clockwise direction. A shoulder 46 on the depending arm of a latch lever 47 pivoted on a shoulder screw 48 in the bracket 38 normally latches the trip arm in its normal position. A spring 49 biases the latch lever 47 so that the shoulder 46 thereon is in a latching or blocking position relative to the trip arm 41.

The latch lever 47 is so located that the upper rounded end 51 thereof is opposite the end of or in line with the axis of the shaft 12. Adapted to cooperate with the rounded end 51 of the latch lever 47 is the lower end of a depending arm 52 of a bell crank 53 pivotally mounted on a shoulder screw 54 supported in a section 56 comprising a part of the frame. The bell crank 53 also has a horizontal arm 57, the end of which extends beneath the section of the armature lever 26 in operative relation with the pole pieces of the selector magnet 11.

As hereinbefore stated, the normal condition of the line is closed, and accordingly the selector magnet 11 is energized to hold the armature lever 26 in its energized position. In receipt of the open line start impulse preceding each code group of impulses, the magnet 11 is rendered deenergized, whereupon the spring 28 is effective to pivot the armature lever 26 in a counterclockwise direction to a retracted position. This pivoting of the armature lever 26 causes the left hand end thereof to engage the end of the arm 57 of the bell crank 53 to pivot the bell crank in a clockwise direction, as shown in the drawing. Such pivoting of the bell crank 53 moves the lower end of the depending arm 52 leftwardly and into engagement with the rounded end 51 of the latch lever 47, causing the same to pivot in a counterclockwise direction against the action of its attached retractile spring 49 and moves the shoulder 46 thereon out of engagement with the horizontal arm 43 of the bell crank 41. This movement of the latch lever 47 permits the comparatively strong retractile spring 44 attached to the trip arm 41 to pivot the same in a clockwise direction, whereupon the upwardly extending arm 42 thereof strikes the pin 37 extending from the lock arm 32 a sharp blow and causes the said lock arm to pivot in a clockwise direction with the trip arm 41.

The pivoting of the lock arm 32 moves the projection 31 at the upper end thereof out of engagement with the end of the stop arm 29, whereupon the stop arm, the shaft 12, and the selector cam 16 secured thereto are free to rotate with the shaft 14 through the action of the friction clutch 13. Thus, the distributor member or the shaft 12 and cams 16 are released for rotation at the beginning of each code group of impulses, and as the load imposed on the selectively operated armature lever 26 to effect release of the distributor member is comparatively light, the release of the distributor member is effected uniformly in each cycle of operation. The strength of the spring 44 attached to the trip arm 41 is considerably greater than that of the spring 36, tending to pivot the lock arm 32 in a counterclockwise direction, and hence the trip arm 41 is effective to pivot the lock arm 32 therewith. The inertia of the trip arm 41 in moving from its latched position to engage the pin 37 on the lock arm 32 also assists in overcoming the retractile effect of the spring 36 on the lock arm 32.

During the rotation of the selector shaft 12, the notches in the selector cams 16 are sequentially effective on their associated selector latches 17, in timed relation with the receipt of the selecting impulses, to effect selective positioning of the associated selectors 23. Following the receipt of the last selecting impulse, the closed line rest impulse is effective on the selector magnet 11 to energize the same, and during the latter part of a revolution of the shaft 12 a reset cam 58 fixed to the shaft engages and causes a reset lever 59 in operative relation with the cam to pivot in a clockwise direction. The reset lever 59 is pivotally mounted adjacent its center on a shoulder screw 61 carried in the range plate 34, and the above pivoting of the reset lever 59 causes the lower end to engage a pin 62 extending from the arm 42 of the trip arm 41 and pivot the said trip arm in a counterclockwise direction. This pivoting of the trip arm 41 moves the horizontal arm 43 thereof in a downward direction and, when moved sufficiently, the spring 49 pivots the latch lever 47 to place the shoulder 46 above the arm 43, as at this time the rest impulse is effective on the selector magnet 11 to permit the said latch arm 47 to return to its normal latching position. Accordingly, when the reset cam 58 subsequently passes out of operative relation with the reset lever 59, the trip arm pivots a slight amount in a clockwise direction to engage the upper side of the arm 43 thereof with the shoulder 46 to latch the same in its normal position. The pivoting of the trip arm 41 in a counterclockwise direction permits the spring 36 to pivot the lock arm 32 in a similar direction, which places the projection 31 thereof in the path of the stop arm 29 just before the stop arm completes a revolution, and thus the stop arm with its attached elements is stopped in its normal rest position.

From the above arrangement it is obvious that power stored in the spring 44 during a previous cycle of operation or during the previous rotation of the shaft 12, and principally during the latter part of a revolution thereof, is effective to operate the lock arm 32 to release the stop arm 29 at the beginning of a subsequent cycle of operation. Thus, the major part of the load imposed upon the shaft 12 by the resetting of the lock arm 32 to a locking position occurs after the distributing operation of the shaft 12, and any slight slippage of the friction clutch 13 driving the same occurring during the resetting of the lock arm does not adversely affect the operation of the selector mechanism as it would if the slipping occurred during the initial part of the rotation of the distributor shaft 12. Thus, no load is imposed upon the distributor shaft at the beginning of the revolution thereof to effect initiation of its rotation, as is the case where a yieldable stop is employed. Another advantage of the present arrangement is the trip arm 41 in moving to its operated position, in which position it remains for the major portion of a cycle of operation of the shaft 12, prevents the latch 47 from returning to its normal latching position, and hence the armature lever 26 in moving from an energized to a retracted position during the rotation of the shaft 12 does not have to overcome the effect of the spring 49 attached to the latch 47. A bifurcated bracket 65 secured to the range plate 34 straddles the upper end of the lock arm 32 to limit the movement thereof, the bracket being adjustable for obvious reasons.

In order to compensate for variable length start impulses or so that the notches in the selector cams 16 be effective on their associated latches 17 during the mid-portion or most effective portion of respective signaling impulses, the rest or stop position of the selector shaft 12 is changed. By this arrangement the selector shaft 12 has to make different amounts of rotation from a stop position to bring the notches into operative relation with the latches. The above arrangement is usually referred to as orienting the selector mechanism, and in the present invention it is accomplished by moving the range plate 34. The range plate 34 is pivotally mounted concentrically with the shaft 12 on a bracket member 63 comprising part of the frame structure. A clamping member 64 mounted on an extension of the bracket 63 is adapted to clamp the range plate against the said extension when a thumb nut 66 is tightened. By loosening the thumb nut the range plate 34 and all the elements mounted thereon are pivotable about the shaft 12, and such pivoting of the range plate changes the stop position of the shaft. A stepped member 67 attached to the upper left hand corner of the range plate loosely holds the same to the vertical section of the bracket 63, and a handle 68 extending from the range plate permits adjustment thereof when taking a "range" on the printer. As the rounded end 51 of the latch lever 47 is opposite the end of the shaft 12, the same remains in operative relation with the lower end of the depending arm of the bell crank 53 for any adjusted position of the range plate. Hence, for any adjusted position thereof the bell crank 53 is effective to operate the latch lever 51.

It is obvious, of course, that various modifications of the apparatus shown in the drawing and described herein may be made without departing from the spirit or essential attributes thereof, and it is desired, therefore, that only such limitations 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 machine, a frictionally driven rotatable distributor member normally tending to rotate, a stop arm rotatable with said member, a lock arm normally locking said stop arm to thereby hold said distributor member at rest, a signal responsive means, a resilient member, an inertia member operated by said resilient member and engageable with said lock arm to operate the same, said inertia member having a period of free movement before engagement with said lock arm, means controlled by said signal responsive means and including said resilient member and the inertia attained by said inertia member during said free movement period to operate said lock arm to unlock said stop arm and thereby permit rotation of said rotatable member and means operative during the rotation of said rotatable member to store energy in said resilient member to operate said inertia member to unlock said stop arm as controlled by said signal responsive device to initiate a subsequent revolution of said rotatable distributor member.

2. In a telegraph machine, a frictionally driven rotatable distributor member normally tending to rotate, a stop arm rotatable with said member, a lock arm normally locking said stop arm to thereby hold said distributor member at rest, a signal responsive means, a trip arm, a resilient means tending to operate said trip arm, said trip arm having an inertia attaining movement and

arranged to thereafter directly operate said lock arm partly by the attained inertia thereof to release said stop arm to permit rotation of said distributor member, a latch normally latching said trip arm in a normal position, means controlled by said signal responsive means for operating said latch whereupon said trip arm operates said lock arm to release said stop arm and thereby initiate rotation of said rotatable distributor member and means operated by said rotatable member during the rotation thereof to relatch said trip arm in said normal position.

3. In a telegraph receiver selectively controlled by received signal groups, a signal responsive device, a frictionally driven rotatable member normally tending to rotate and having a stop arm rotatable therewith, a non-yieldable stop member normally engaged with said stop arm to hold said rotatable member at rest in a normal stop position, a first resilient means holding said stop member in said normal position, a trip arm for operating said stop member to a releasing position, a second resilient means for operating said trip arm, a latch for holding said trip arm in a normal position, means controlled by said signal responsive device for operating said latch whereupon said second resilient means operates said trip arm to move said non-yieldable stop member against the action of said first resilient means out of engagement with said stop arm to initiate rotation of said rotatable member.

4. In a telegraph receiver selectively controlled by received signal groups, a signal responsive device, a frictionally driven rotatable member normally tending to rotate and having a stop arm rotatable therewith, a non-yieldable stop member normally engaged with said stop arm to hold said rotatable member at rest in a normal stop position, a first resilient means holding said stop member in said normal position, a trip arm for operating said stop member to a releasing position, a second resilient means for operating said trip arm, a latch for holding said trip arm in a normal position, means controlled by said signal responsive device for operating said latch whereupon said second resilient means operates said trip arm to move said non-yieldable stop member against the action of said first resilient means out of engagement with said stop arm to initiate rotation of said rotatable member, means operative during the rotation of said rotatable member to return said trip arm to said normal latched position against the action of said second resilient means and means including said first resilient means for returning said stop member to said normal position during the return to normal position of said trip arm.

5. In a telegraph receiver selectively controlled by received signal groups, a signal responsive device, a frictionally driven rotatable member normally tending to rotate and having a stop arm rotatable therewith, a non-yieldable stop member normally engaged with said stop arm to hold said rotatable member at rest in a normal stop position, a first resilient means holding said stop member in said normal position, a trip arm for operating said stop member to a releasing position, a second resilient means for operating said trip arm, a latch for holding said trip arm in a normal position, means controlled by said signal responsive device for operating said latch whereupon said second resilient means operates said trip arm to move said non-yieldable stop member against the action of said first resilient means out of engagement with said stop arm to initiate rotation of said rotatable member, means operative during the rotation of said rotatable member to return said trip arm to said normal latched position against the action of said second resilient means, means including said first resilient means for returning said stop member to said normal position during the return to normal position of said trip arm, and means including said trip arm for holding said latch in an operated position until the return of said trip arm to said normal position.

6. In a telegraph receiver selectively controlled by received signal groups, a signal responsive device, a frictionally driven rotatable member normally tending to rotate and having a stop arm rotatable therewith, a non-yieldable stop member normally engaged with said stop arm to hold said rotatable member at rest in a normal stop position, a first resilient means holding said stop member in said normal position, a trip arm for operating said stop member to a releasing position, a second resilient means for operating said trip arm, said trip arm having a one-way lost-motion connection with said stop member, a latch for latching said trip arm in a normal position, means including said signal responsive device and said latch to release said trip arm whereby said second resilient means operates the same to move said stop member to a stop arm releasing position against the action of said first resilient means and means including the inertia of said trip arm in taking up the lost motion of the connection between the same and said stop member to assist in operating said stop member to a stop arm releasing position.

7. In combination, a telegraph selector mechanism including a signal responsive device, a rotatable member normally tending to rotate and a set of elements selectively operated by said rotatable member under the control of said signal responsive device, a stop arm rotatable with said rotatable member, a non-yieldable stop member engageable with said stop arm to hold said rotatable member at rest in a normal stop position, a resilient means, an inertia member operable by said resilient means as controlled by said signal responsive device, said inertia member being adapted to engage and move said stop member out of engagement with said stop arm to initiate rotation of said rotatable member, said inertia member having an inertia attaining movement prior to engagement with said stop arm whereby said attained inertia assists in the moving of said stop arm, means for changing the position of said stop member to stop said rotatable member in different angular positions relative to said selectively operated elements and means for controlling said stop member from said signal responsive device for any adjusted position thereof.

8. In combination, a telegraph selector mechanism including a signal responsive device, a rotatable member normally tending to rotate and a set of elements selectively operated by said rotatable member under the control of said signal responsive device, means for initiating said rotatable member into rotation and stopping the same after a revolution thereof, said means including a stop arm on said rotatable member and a non-yieldable stop normally engaged therewith, operating means for said non-yieldable stop having a resilient member and a one-way lost motion connection with said stop, means including the inertia of said operating means in taking up the lost motion of said connection to

operate said stop to release said stop arm, means including said signal responsive device for controlling said last-mentioned operating means, means for changing the position of said non-yieldable stop to stop said rotatable member in different angular positions relative to said selectively operated elements, and means operative during one revolution of said rotatable member to condition said non-yieldable stop operating means for operation to release said rotatable member for a subsequent revolution as controlled by said signal responsive device.

9. In a telegraph machine, a frictionally driven rotatable member normally tending to rotate, a stop arm rotatable with said member, a first resilient member, a lock arm normally held by said resilient member in locking relation with said stop arm to thereby hold said distributor member at rest, a signal responsive means, a second resilient member, means controlled by said signal responsive means and including said second resilient member for operating said lock arm against the action of said first resilient member to unlock said stop arm and thereby permit rotation of said rotatable member, means for changing the position of said lock arm relative to said signal responsive means to stop said rotatable member in various angular positions and means for controlling said lock arm by said signal responsive means for the various adjusted positions thereof.

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