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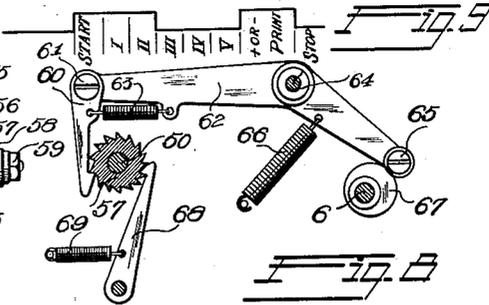
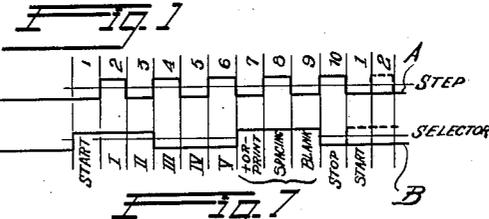
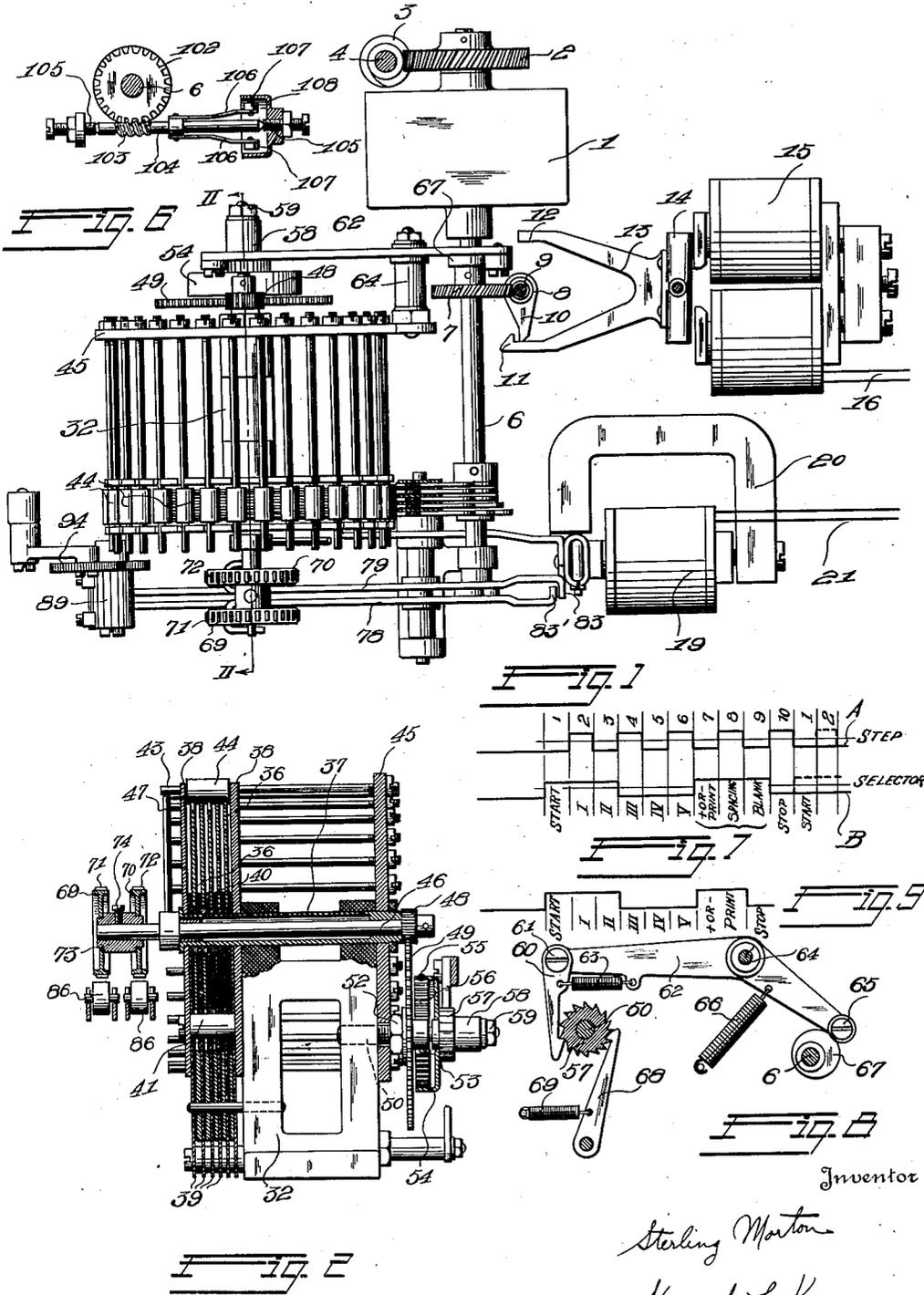
S. MORTON ET AL

1,821,109

SELECTIVE SYSTEM AND APPARATUS

Filed March 9, 1928

2 Sheets-Sheet 1



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SELECTIVE SYSTEM AND APPARATUS

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2 Sheets-Sheet 2

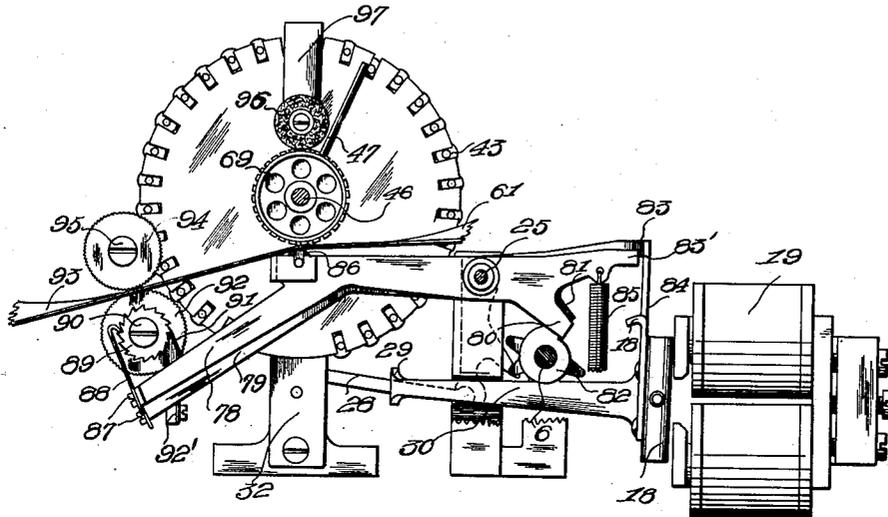


Fig. 3

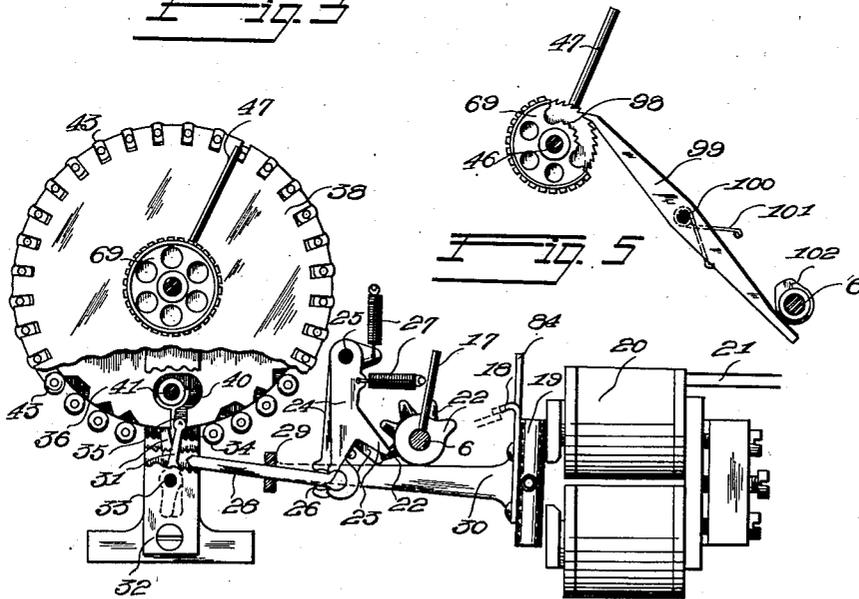


Fig. 4

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SELECTIVE SYSTEM AND APPARATUS

Application filed March 9, 1928. Serial No. 260,411.

The present invention relates to selective systems and apparatus therefor, and more particularly the invention relates to printing telegraph systems and apparatus especially adapted for use in stock ticker, police and fire telegraphs, and like signalling systems.

Present types of step by step stock tickers have been found to be too slow to handle the volume of stock quotation business of existing lines. The usual types of Baudot printing telegraph machines employing figures and letters case shift mechanism are not adapted for rapid transmission of stock quotations because the shift and unshift mechanisms are controlled by special code combinations of shift and unshift signals. These special signals decrease the speed of transmission materially, and errors are introduced by the failure of the operator to send the proper shift and unshift signals. In fire alarm, police telegraph, and similar emergency signaling systems requiring infallibility of operation, errors due to improper control of the shift mechanisms possible in the usual types of Baudot code printers resulting in false signalling, are fraught with serious consequences.

While the usual types of telegraph systems may, with comparative safety, employ the signalling impulse for synchronization, occasional errors being of little importance, in the above mentioned special classes of signalling systems accuracy is of outstanding importance and special synchronizing means are desirable. Special printers of these types are also required, while idle, to be in readiness for instant operation. Provision for maintaining a constant supply of energy available for operating the selectors and the printer is an essential part of the high speed printers required.

Accordingly a primary object of the present invention is to provide novel and accurate high speed printing systems and apparatus adapted for stock ticker and emergency signalling operations in which special shift signals are eliminated and novel synchronization and driving means are provided.

Another object of our invention is to pro-

vide compact selecting and printing mechanisms in which the parts are readily accessible, and which are cheap to manufacture, and of simple design.

Other objects of our invention are to provide novel means for rotating a type-wheel in a type wheel printer by means of stored mechanical energy; to provide means for maintaining the stored energy for driving the type-wheel between pre-determined values; and to provide means for transmitting energy to the type-wheel driving means as its energy is dissipated in rotating the type-wheel.

Further objects of our invention are to provide novel methods and means for maintaining printers in synchronism with their related transmitters; to provide novel synchronizing mechanisms controlled independently of the signal transmitting line for maintaining synchronism; and to provide means for adapting a printer, maintained in synchronism by the use of an extra synchronizing line, to the present day ticker two wire operation without synchronizing devices controlled by signalling impulses.

Still another object of our invention is to provide novel methods and apparatus for causing a printing operation following the type character selection.

Further objects of our invention are to provide novel means for normally maintaining a printer at rest, and starting it into operation by a special signal; to provide novel means for operating a plurality of printers in series; to provide novel means for maintaining energy stored and in preparation for operating the printer; and to provide a novel method and apparatus for securing an overlap of selection and printing.

Further objects, together with the foregoing, will appear in the following description of the preferred embodiments of the invention, and are such as may be secured by a utilization of the various combinations, sub-combinations, and principles hereinafter set forth and as defined by the terms of the appended claims.

As shown in the drawings:

Figure 1 is a plan view of a preferred form

of telegraph printer in complete assembly embodying our invention.

Figure 2 is a transverse sectional view substantially along line II—II of Figure 1.

5 Figure 3 is a side elevation of the form of invention shown in Figure 1.

Figure 4 is a side elevation of the invention showing the details of the selector for the preferred embodiment of the invention.

10 Figure 5 shows one of the preferred forms for latching the type-wheel until the selection has been completed.

Figure 6 is a modification of the synchronizing means to which the printer is adapted.

15 Figure 7 shows the impulse wave shapes for a typical selection and the simultaneous synchronizing impulses utilized in the preferred embodiment of the invention.

20 Figure 8 shows the details for supplying energy to, and for maintaining tension in, the type-wheel drive spring in the preferred embodiment of the invention.

Figure 9 shows the impulse wave for a six unit code with a prolonged printing period.

25 Referring to Figure 1, energy is supplied to the winding spring and dynamometer of well known construction by an electric motor (not shown) through the worm gear 2 meshing with worm gear 3 on the shaft 4 of the motor. When the winding spring of dynamometer 1 is wound to a pre-determined tension, the circuit of the motor is opened in a well known manner, and as soon as the spring tension has run down to a predetermined value, the motor circuit is closed and the spring is again wound up. It will be apparent to those skilled in the art that a weight motor or a spring wound by a key could be used in place of the dynamometer.

35 Selector and printer drive shaft 6 supported in suitable journals from the printer frame-work is driven by energy supplied by the dynamometer 1. Secured to and rotatable with shaft 6 is a spiral gear 7 which meshes with and drives a pinion 8. Pinion 8 is secured to a spindle 9 supported in journals (not shown). Rotatable with spindle 9 is a stop arm 10, adapted to alternately engage projection 11 and end 12 of the forked escapement member 13 as will more fully hereinafter appear. Escapement member 13 is secured to and actuated by the pivoted armature 14 of polar magnet 15. Polar magnet 15 is connected in synchronizing line 16 over which alternating positive and negative impulses are transmitted under control of a suitable transmitter. The reversals of polarity in the circuit of magnet 15 caused by the line reversals attract armature 14 to its poles alternately, rocking the armature on its pivot. As the armature 14 rocks it operates the escapement member 13 releasing arm 10 to rotate one-half a revolution for each line reversal, and permitting the stored en-

ergy in the dynamometer to rotate the shaft 6 one step for each line reversal.

70 Secured to shaft 6 is a stop arm 17 (Figure 4) adapted to engage extension 18 of pivoted armature 19 of line magnet 20, when armature 19 is against the lower pole piece of the magnet locking shaft 6 against rotation. Magnet 20 is connected in series in signalling line 21. With the parts in normal or rest position armature 19 is held against the lower pole piece of magnet 20 by a stop condition on line 21 and pin 17 engages stop projection 18 arresting rotation of shaft 6 regardless of the operation of magnet 15. Upon the receipt of a start condition by magnet 20, armature 19 is attracted to the upper pole face of the magnet, removing extension 18 from the path of stop arm 17 and shaft 6 is released to be rotated under control of magnet 15 and the escapement member 13 by energy supplied from the dynamometer.

85 Secured on shaft 6 are a number of adjacent angularly spaced selecting cams 22, the number and spacing of the cams depending on the number of selections desired in a manner well known to those skilled in the art. Each cam 22 is adapted to engage extension 23 of selecting levers 24 individual thereto. Levers 24 are pivoted on fixed pin 25 and are held against stop rod 26 with extensions 23 thereof in the path of rotation of cams 22 by the action of springs 27 secured at one end to levers 24 and at the other end thereof to the frame of the printer.

90 Pivoted at the lower extremity of each of these selecting levers 24 is a push rod 28. Push rod 28 is supported between the laterally extending prongs of an extension 30 secured and carried by magnet armature 19.

105 In operation of the mechanism so far described, as shaft 6 rotates cams 22 are successively brought into engagement with their individual selecting lever 24 which are thereupon rotated on the pivot 25 in a clockwise direction and then returned under the influence of springs 27. This oscillating movement of levers 24 causes successive reciprocations of rods 28. Disposed in the path of movement of and individual to each rod 28 is a selector rocker 31 pivotally supported from the printer frame bracket 32 by pin 33. With armature 19 of selector magnet 20 attracted to the lower magnet pole face, due to the reception of a signalling impulse, extension 30 through the forked end 29 tilts the forward ends of push rods 28 downward causing them when reciprocated to engage the rockers 31 individual thereto below pivot 33. Similarly received impulses of opposite polarity will result in the push rods engaging the selecting rockers 31 individual thereto above pivot 33. In operation cams 22 successively operate their selector levers in synchronism with the received signalling impulses, and rocker selectors 31 are rotated

either clockwise or counter-clockwise in accordance with the polarity of these impulses. It will be apparent to those skilled in the art that rockers 31 may be utilized to operate notched permutation selector members of any well known bar or disk type and are not limited in use to operation of the mechanisms hereinafter described.

In the preferred embodiment of our invention, however, projection 34 of each rocker 31 is positioned in a slot 35 (Figure 4) of individual notched selector disks 36. Selector disks 36 are rotatably supported on a sleeve 37 which is supported in frame member 32 and are disposed between guiding comb plates 38. Disks 36 and rocker members 31 are separated by guide members 39 for selector members 28 and disks 36 are provided with V-shaped notches cut about their periphery in a manner well known in the art. Formed in the selector disks 36 are elongated slots 40 through which stop member 41 supported by comb plates 38 passes. Stop member 41 limits the rotary movement of the selector disks on sleeve 37.

Arranged about the circumference of the disks 36 and guided in slots formed in plates 38 are series of stop members 43 (Figures 3 and 4) provided with cam rollers 44 which are positioned between guide combs 38. Stop members 43 are spring pressed inward until rolls 44 are pressed against the disks 36. In the preferred embodiment of the invention the spring pressure is furnished by the stops themselves which are constructed of spring wire threaded into supporting plate 45 and locked in position by securing nuts. As the selectors are positioned by the rocker selections 31, a predetermined combination of the V-shaped notches will be moved into alignment in a well known manner, and the stop member which is opposite the aligned notches will then move into the aligned portion under its own spring tension.

Journalled in sleeve 37 is a typewheel shaft 46 which has secured thereto a stop member 47 of such length as to normally miss the non-selected stop pins as it rotates with the typewheel shaft, and to engage that pin which has dropped into the aligned notches, thereby bringing the typewheel shaft to a stop at a predetermined position depending on the particular stop member which has entered the alignment in the disks 35.

Secured to one end of the type wheel shaft 46 is a pinion 48 meshing with and driven by gear 49. Gear 49 is supported for rotation on the spindle 50 threaded on the main frame member 32 and held in position by the locknut and washer 52. Secured at one end to the hub gear 49 by screw 53, and at its other end to a housing 54 by screw 55 is a spiral driving spring 56. Housing 54 is secured to and rotates with ratchet wheel 57

which in turn is rotatably mounted on spindle 50 and held in position by locknut and washer 58.

Engaging the teeth of the ratchet wheel 57 is a pawl 60 pivotally secured by means of pin 61 to the end of an actuating arm 62. Pawl 60 is held against ratchet 57 by spring 63 (Figure 8). Arm 62 is pivotally supported from plate 45 (Figure 1) by means of pivot pin 64. Rotatably mounted on the end of arm 62 is a roller 65 which is held by a spring 66 (Figure 8) against a cam 67 secured to printer main shaft 6. Engaging the teeth of the ratchet 57 to prevent its rotation in a counterclockwise direction is a stop pawl 68 pivoted to the frame and held in position by a spring 69 secured at one end to the pawl and at the other end to the printer frame.

It will be seen that as the main printer shaft 6 rotates roller 65 maintained in engagement with cam 67 by means of the spring 66 will oscillate arm 62 about its pivot on pin 64. As the roller 65 rides over the large part of cam 67, arm 62 moves the tooth on pawl 60 downward into engagement with the next tooth on ratchet wheel 57. As roller 65 rides over the small part of the cam 67 by operation of spring 66, arm 62 and the pawl 60 are moved upwardly rotating the ratchet wheel 57 a distance of one tooth. The rotation of ratchet wheel 57 carries with it the housing 54 thereby tensioning spring 56 and tensioned spring 56 will tend to rotate typewheel shaft 46 through the gear 49 and pinion 48. As will be evident with the spring 66 maintaining the rollers 65 in engagement with cam 67 the ratchet wheel 57 operated by the pawl 60 rotates and tensions the spring 56. When therefore spring 56 has reached a predetermined tension, it will exert a rotating counter-clockwise torque through pawl 60 on arm 62 about pivot 64 which balances the clock-wise torque exerted by spring 66 on arm 62 and accordingly arm 62 will no longer oscillate on pivot 64 to maintain roller 65 in engagement with cam 67. Since the ratchet wheel 57 no longer rotates, the tension on spring 56 is not increased. From this it is evident that the maximum tension of spring 56 is determined by the strength of the spring 56 and its relative position in the lever arrangements that the driving power for the type wheel is maintained within certain limits. This insures a fixed rate of rotation for the type wheel and is therefore an important improvement.

Two typewheels 69 and 70, each provided with a plurality of type characters 71 and 72, respectively arranged about the periphery of the typewheels are mounted on the sleeve 73 secured to rotate with typewheel shaft 46 by means of the set screw 74. As the typewheels rotate the characters on the periphery are sequentially brought oppo-

site the printing hammers 78 and 79 (Figures 2 and 3), individual to each of the typewheels 69 and 70.

The printing hammers 78 and 79 are pivoted to pin 25 and provided with projections 80 and 81 respectively engaging the surface of cam 82 secured to and driven by main printer shaft 6 and with control extensions 83 and 83' adapted to engage a projection 84 of selector magnet armature 19. Extensions 83 and 83' are so arranged that with the armature projection 84 in one position, one printing arm is latched thereby and with the armature in its alternate position, the other is latched. By this arrangement an impulse following the character selecting code combination functions to select the printing hammer to be released. Fastened at one end to its individual printing hammer at its other end to the printer framework are springs 85 one individual to each printing hammer normally urging the platens 86, fastened by ears carried by the printing hammers, into engagement with the type characters.

Secured to one end of each hammer 78 and 79 by means of screws 87 is a spring pawl 88 engaging a tooth of the ratchet wheel 89 secured to a spindle 90 rotatably supported in journals (not shown). A stop pawl 91 suitably supported from the frame work as at 92' engages the teeth of the ratchet wheel 89 to prevent clockwise rotation thereof.

Rotatable with the spindle 90 is a tape feed roller 92 over which the printing tape 93 passes. A pressure roll 94 secured to spindle 95 properly secured to printer framework forces the tape 93 against the feed roller 92.

An ink roller 96 supported from frame bracket 97 presses against the periphery of and inks typewheels 71 and 72.

As shown in Figure 5 a ratchet wheel 98 is secured to one end of typewheel shaft 46 adjacent the typewheels. Wheel 98 is engaged by a stop pawl lever 99 pivotally supported from the frame at 100, which is forced into engagement with the teeth of the ratchet wheel by spring 101. A cam 102 on the main shaft 6 engages the end of and actuates lever 99. In operation of this mechanism, the typewheel shaft is normally latched against rotation. When, however, the main shaft 6 has rotated to a predetermined position, the cam 102 moves lever 99 out of engagement with the teeth of the ratchet wheel 98 and the typewheel shaft is permitted to make one revolution. If desired the speed of rotation of shaft 6 may be governed by the mechanism shown in Figure 6. This mechanism comprises a worm 103 mounted on shaft 104. Shaft 104 is supported for rotation between adjustable bearing members 105. Secured to shaft 104 are springs 106 on which centrifugal

brake members 107 adapted to engage stationary brake drum 108 are mounted. As shaft 6 is rotated, shaft 104 will be driven at high speed and members 107 will engage brake drum 108 regulating the speed of rotation of shaft 6. By this arrangement, the stepping magnet 15 may be done away with as the speed is controlled entirely by the governor.

It will also be evident that if desired, the stepping magnet 15 may be replaced by a governed drive of the shaft 6. In this modification, the apparatus operating without the stepping magnet 15 is connected in a system employing the standard code of a start impulse five selecting impulses, a printing and a stop impulse. The receiving relay 19 operates in response to the start and stop impulses to start and stop the shaft 6 once per revolution.

In adapting the device for straight six unit start-stop it will simply be necessary to prolong the sixth or printing impulse sufficiently long to enable the armature 84 to remain in position while the cam 82 operates either lever 80 or 81, as illustrated in Figure 9 in which the printing impulse period is shown of greater length than the other selecting intervals.

Operation

Upon receipt of stepping impulses over the synchronizing line 16, relay 15 is energized to operate the escapement mechanism 13 conditioning shaft 6 for rotation under influence of the winding spring of dynamometer 1 and upon the receipt of the start impulse over line 21, armature 19 of magnet 20 is actuated freeing stop member 17 from shelf 18 and permitting shaft 6 to rotate. As shaft 6 rotates, cams 22 are successively brought into engagement with their individual selecting levers 24 and the latter are rocked clockwise about their pivots 25 against the tension of their individual springs 27. As each lever rocks, its individual rod 28 is pushed forward and during its forward movement engages the rocker 31.

Signalling impulses received over the line 21 are received in time relation with the reciprocating movement of lever 28. Magnet 20 upon energization in response to the signalling impulses, shifts its armature 19 to its upper or lower pole piece in accordance with whether a spacing or marking impulse is received and moves extension 30 to position the fork 29. As the rockers 28 move forward they are either in the position shown or tilted according to the character of the received impulse and they engage their respective rockers 31 either above or below pivot 33. Rockers 31 are accordingly tilted either counter-clockwise or clockwise to impart an equivalent movement to selector disks 36 individual thereto. In this manner the selector disks are

selectively set to selectively align a set of notches in their periphery permitting a stop member 43 to move into the path of stop arm 47. Following the receipt of the fourth selecting impulse, the further rotation of shaft 6 causes cam 102 to actuate arm 99 releasing the typewheel shaft for rotation under influence of spring 56. As the typewheel shaft rotates the fifth selecting impulse is received permitting the selected stop member 43 to move into the path of movement of arm 47 and the stop arm 47 moves past all of the stop members 43 until the stop arm which has dropped into the notches is reached. At this position arm 47 engages member 43 and brings the typewheel shaft to a stop. Cam 82 on main shaft 6 is then positioned so that projections 80 and 81 of printing hammers 78 and 79 are released for a printing operation under influence of their springs 84.

In timed relation with this release of the printer hammers the shift or hammer selecting impulse energizes magnet 19 and one of the printing hammer extensions is engaged by the armature extension 84 and latched against operation. A predetermined one of the hammers is thus released to engage its individual typewheel printing a letter or figure.

Following the printing operation, cam 82 moves the released hammer away from the typewheel against the tension of spring 84. Simultaneously the pawl 88 rotates the notched wheel 89 to space the tape. As the shaft 6 continues to rotate spring 101 moves lever 99 to again latch the typewheel. At the end of the revolution stop arm 17 engages stop projection 18, armature 19, shaft 6 is brought to rest, and a cycle of operations is complete.

As the succeeding code combination of signals is received to set up a new combination on the selector disks 36, the stop member previously moved into the aligned notches is cammed out by reason of the shape of the notches and the cycle of operations above set forth is repeated.

In Figure 7 the relation of the stepping or synchronizing current impulses to the signaling impulses is shown for a complete cycle of operation. The curve "A" represents the escapement impulses received over the line 16 and the curve "B" represents the signaling impulses received over a signaling line 21. Referring to curve "A" it will be seen that for each cycle of operation ten stepping impulses are received over line 16, during which the first six of which the start signaling impulse together with the combination of five selecting impulses is received. During the seventh stepping impulse, the figures or letters hammer selecting impulse is received. During the eighth and ninth impulse an interval is allowed for the spacing operation and during the tenth impulse, a stop condition

is received. The eighth and ninth impulse still further insure accurate synchronous operation. Normally the stop arm 17 is engaged by the extension 18 of armature 19 at the end of the eighth impulse. Should, however, the receiver printer fall behind the transmitter, two one half cycles are thus allowed for it to catch up. That is, during the interval while the eighth and ninth impulse is being received, the receiver printer will have time to reach normal position. Thus if the printer is entirely out of synchronism with the transmitter, it will be restored to synchronism within four or five signal periods. To illustrate this, it will be assumed that the receiver is at a position corresponding to the first impulse interval during the last signal interval. Since the receiver has ten signal intervals in which to complete one revolution while eight impulses are received it will, during the next cycle or signalling period, be two steps ahead of its first assumed position during the second signalling period assuming it to be rotating in synchronism with the rate at which the signals are being received. During this period, the printer will again advance two steps. It will be seen from this description that even when the receiver is entirely out of step, it will fall into synchronism in from four to five signal periods.

It will be noted that a definitely timed relation between the stepping impulses and the signaling impulses is maintained and it will be understood that a transmitting arrangement is provided for maintaining this timed relation between the stepping or synchronizing currents and the signaling impulses. Because of this definitely timed relation, the stepping impulses need be transmitted only during message transmission, and this system of operation is an important feature of our invention.

Having described preferred embodiments only of our invention, it will be apparent to those skilled in the art, that wide variations may be made in the details hereinbefore described without departing from the spirit of the invention as expressed in the appended claims. Accordingly, what is desired to be secured by Letters Patent and claimed as new is:

1. In a printing telegraph system, a rotatable receiver, a signalling line, means responsive to received code combinations of impulses received over said signalling line for operating said receiver, a synchronizing line, and means responsive to impulses received over said synchronizing line in timed relation with said signalling impulses for maintaining said rotatable receiver in synchronism with said code of impulses.

2. In a printing telegraph receiving system, a signalling line, a synchronizing line, a movable receiver responsive to receive code combinations of impulses received over said

signalling line, and means responsive to signals received over said synchronizing line for maintaining said receiver in timed relation with said signals received over said signalling line.

3. In a printing telegraph receiver, a typewheel, a tension spring for supplying energy to rotate said typewheel, means for maintaining the tension of said spring between predetermined values, selector mechanism responsive to received code combinations of impulses and spring means for providing the power to rotate the selector mechanism.

4. In a printing telegraph receiver, a typewheel, a tension spring for supplying energy to rotate said typewheel, a source of power, a cam driven by said source of power and means including a second spring and a follower on said cam for maintaining the tension of said tension spring between predetermined values.

5. In a printing telegraph receiver, a rotatable selector shaft, spring members for rotating said selector shaft, a plurality of type characters, a synchronizing line, an escapement mechanism controlled by impulses received over said synchronizing line for releasing said shaft for rotation, a signalling line and means controlled by impulses received over said signalling line operating in timed relation with rotation of said shaft for selecting said type characters.

6. In a printing telegraph receiver, a rotatable selector shaft, a rotatable typewheel shaft, said shafts being normally latched against rotation, a common spring member for transmitting energy to rotate said selector shaft and said typewheel shaft, and means responsive to a received impulse for releasing said selector shaft for rotation and means controlled by said selector shaft for releasing said typewheel shaft for rotation.

7. In a printing telegraph receiver, a rotatable selector shaft, a rotatable typewheel shaft, said shafts being normally latched against rotation, a common spring member for transmitting energy to rotate said selector shaft and said typewheel shaft, a plurality of notched selector disks rotatable about said typewheel shaft, means responsive to a received impulse for releasing said selector shaft for rotation, means controlled by code combinations of received impulses co-operating with said selector shaft for selectively positioning said selector disks and means operative following the positioning of said selector disks for releasing said typewheel shaft for rotation.

8. In a printing telegraph receiver, a plurality of selector members, an operating member individual to each of said selector members, means responsive to received code combinations of impulses for selectively positioning said operating members to engage their individual selector member for a predeter-

mined operation and a local source of energy for moving said operating members into engagement with said selector members in accordance with the positioning thereof.

9. In a printing telegraph receiver, a plurality of selector members, an operating member individual to each of said selector members, a single electro-magnetic means responsive to received code combinations of impulses for selectively positioning said operating members to engage said selector members each for a predetermined operation and a local source of energy for moving said operating members into engagement with said selector members in accordance with the positioning thereof.

10. In a printing telegraph receiver, a plurality of selectors, an operating member individual to each of said selectors, means responsive to code combinations of impulses for conditioning said operating members to engage said selectors in a pre-determined manner and local means operating in timed relation with said received impulses for operating said operating member into engagement with said selectors.

11. In a printing telegraph receiver, a plurality of selectors, an operating member individual to each of said selectors, a single electro-magnetic means responsive to received code combinations of impulses for conditioning said operating means to engage said selectors and a local source of energy arranged to operate said operating means into engagement with said selectors in timed relation with said received impulses.

12. In a printing telegraph receiver, a plurality of stop members arranged about the periphery of said notched disks, means for selectively operating said disk members to bring certain of said notches into alignment and means whereby one of said stop members opposite the aligned notches moves into the notched space, said notches being so arranged that as said selectors move in response to the succeeding code combinations of impulses the stop members are cammed out therefrom.

13. In a printing telegraph receiver, a typewheel and a tension spring for supplying energy to rotate said typewheel and a main drive shaft, means including a lever connecting said shaft and said spring for supplying energy to said spring, a plurality of notched disk selectors, a stop member arranged about the periphery of said notched disks to bring certain of said notches into alignment, and means whereby one of said stop members opposite the alignment moves into the notched space to stop said typewheel at a predetermined position, said notches being so arranged that as said selectors move in response to the succeeding code combinations of impulses the stop members are cammed out therefrom.

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14. In a printing telegraph receiver, a typewheel and a tension spring for supplying energy to rotate said typewheel and a main drive shaft, a cam on said shaft, a ratchet connected to said spring, a second spring controlled by said cam for operating said ratchet whereby said spring is tensioned, a plurality of notched disk selectors, a stop member arranged about the periphery of said notched disks to bring certain of said notches into alignment, and means whereby one of said stop members opposite the aligned notches moves into the notched space to selectively operate said typewheel, said notches being so arranged that as said selectors move in response to the succeeding code combination of impulses the stop members are cammed out therefrom.
15. In a printing telegraph receiver, a typewheel, a source of mechanical energy for rotating said typewheel, a plurality of selectors for selectively controlling the operation of said typewheel, an operating member individual to each of said selectors, a single electro-magnetic means responsive to received code combinations of impulses for conditioning said operating means to engage said selectors and a local source of energy arranged to operate said operating means into engagement with said selectors in timed relation with said received impulses.
16. In a printing telegraph receiver, a typewheel, a tension spring for supplying energy to rotate said typewheel, a main drive shaft, a second spring tensioned by said shaft, means for transmitting the energy in said second spring to said first spring, the rate of transmission of said energy being controlled by said shaft, a plurality of selectors for controlling said typewheel, an operating member individual to each of said selectors, a single electro-magnetic means responsive to received code combinations of impulses for conditioning said operating means to engage said selectors in timed relation with said received impulses.
17. In a printing telegraph receiver, a rotatable typewheel, a plurality of selectors, electro-magnetic means responsive to received code combinations of impulses for directly controlling the operation of said selectors to select a predetermined character of typewheels for operation, a printing hammer individual to each of said typewheels, said electro-magnetic means being responsive to an extra impulse following said code combinations for directly controlling the release of one of said type hammers to operate said selected character.
18. In a printing telegraph receiver, a plurality of typewheels, a typehammer individual to each of said typewheels, a single electro-magnet responsive to code combinations of impulses for selecting a predetermined character on each of said typewheels for operation said electro-magnet being also responsive to a sixth impulse following said code combination for directly controlling the release of one of said printing hammers.
19. In a printing telegraph system, a receiver normally non-operating responsive to received code combinations of impulses, a normally non-operating source of power, an electro-magnetic means, a synchronizing line, said electro-magnetic means being responsive to impulses transmitted over said synchronizing line for source of power to operate said normally non-operating receiver.
20. In a printing telegraph receiver, a rotatable selector shaft, a rotatable typewheel shaft, said shafts being normally latched against rotation, a common driving means for said two shafts, a plurality of selector members loosely mounted and rotatable about said typewheel shaft, means responsive to a received impulse for releasing said selector shaft for rotation, means cooperating with said selector shaft and controlled by received code combinations of impulses for selectively operating said selector disks and means operative following the operation of said selector disks for releasing said typewheel shaft for rotation.
21. In a telegraph printer, a selector shaft, a typewheel shaft, a common driving means for said shafts, selector elements, means responsive to a predetermined signalling condition whereby said selector shaft is driven by said rotating means, said means being responsive to received variable code combinations of conditions and cooperating with said selector shaft for variably operating said selector elements, a plurality of selector members carried on said typewheel shaft having notches cut in their outer periphery, means for transferring the setting of said selector elements in accordance with received code combinations of impulses to said selector members on said typewheel shaft and means controlled by said selector members on said typewheel shaft and engaging said notches for controlling the angular rotation of said typewheel selectively.
22. In combination, a selector shaft, a typewheel shaft, a common driving means for said selector and said typewheel shaft, means responsive to a predetermined signalling line condition for conditioning said selector shaft for operation by said driving means, selectors operated during the rotation of said selector shaft in accordance with received code combinations of impulses, selector members carried by said typewheel shaft, means responsive to the operation of said first mentioned selectors for variably operating said selectors on said typewheel shaft and means operative following the operation of said selectors on said typewheel shaft in accordance with received code combinations of impulses for conditioning said typewheel shaft for rotation

tion by said driving means to a predetermined position in accordance with the operation of said selectors on said typewheel shaft.

23. In a printing telegraph receiver, a typewheel, a source of mechanical energy for rotating said typewheel, a plurality of notched selector disks, a plurality of stop members arranged about the periphery of said notched disks, means for selectively operating said disk members to bring certain of said notches in all selector disks into alignment, said stop members opposite the aligned notches thereupon moving into the notched space to selectively operate said typewheel, said notches being so arranged that as said selectors move in response to a succeeding code combination of impulses the stop member in the aligned notches are cammed out therefrom.

24. In a printing telegraph receiver, a typewheel, a tension spring for supplying energy to rotate said typewheel, means including a second spring for maintaining the tension of said spring between predetermined values, a plurality of notched disk selectors, a plurality of stop members arranged about the periphery of said notched disk members, means for selectively operating said disk members to bring certain of said notches into alignment, said stop members being arranged in such a manner about the periphery of said disks that when a predetermined combination of said selectors are operated, a notch of each selector is under one of the stop members, said stop member thereupon moving into said notches, said stop member controlling the angular rotation of said typewheel, said notches being so arranged that as said selectors move in response to a succeeding code combination of impulses said stop member in the notches is cammed out therefrom.

25. In a printing telegraph receiver, a typewheel shaft, a typewheel carried on said shaft, a plurality of notched selector disks loosely mounted on said typewheel shaft, said disks having notches arranged in the periphery thereof and having no normal position, a lever member in operative engagement with each of said selector disks, operative members in engagement with each of said levers, a source of local power for operating said operating members and means responsive to code combinations of received impulses for variably controlling the operation of said operating members whereby said levers are variably operated to in turn operate said selector disks.

26. In a printing telegraph receiver, a typewheel shaft, a typewheel carried on said shaft, a plurality of selector disks loosely mounted on said typewheel shaft, said disks having notches arranged in the peripheries thereof and having no normal position, a lever member in operative engagement with each of said selector disks, operating members in engagement with each of said levers,

a source of local power for operating said operating members, means responsive to code combinations of received impulses for variably operating said operating members whereby said levers are invariably operated to in turn operate said selector disks, a plurality of stop members arranged about the periphery of said selector disks and tending to enter into said notches of the disks one of said stop members dropping into the notches when such a notch in each disk is positioned beneath the stop members and means cooperating with said stop arm for selectively controlling said typewheel.

27. In a printing telegraph receiver, a typewheel shaft, a typewheel carried on said shaft, a plurality of selector disks having no normal position loosely mounted on said typewheel shaft, said disks having notches arranged in the periphery thereof, a lever member in operative engagement with each of said selector disks, operative members in engagement with each of said selector disks, operative members in engagement with each of said levers, a source of local power for operating said operating members and means responsive to code combinations of received impulses for variably controlling the operation of said operating members whereby said levers are variably operated to in turn variably operate said selector disks, a plurality of stop members arranged about the periphery of said selector disks and tending to enter into said notches of the disks, one of said stop members dropping into the notches when such a notch in each disk is positioned beneath the stop members, a stop arm rotating with said typewheel shaft, said stop members, except the member which has dropped into the notches, being normally out of the path of said stop arm, the particular stop member which has dropped in the notch being however in the path of said stop member whereby said stop arm and typewheel is brought to a stop at a predetermined angular position thereof.

28. In combination, a plurality of notched selector disks stop members extending across all of said disks and arranged around the circumferential edges of said disks, the notches in said disks being cut so that for each combination of setting of the disks, a notch in a disk is in alignment with a notch in each of the other disks, said stop members having spring means whereby the stop member opposite the aligned notches drops therein, stop notches being so cut that upon movement of said disk in accordance with a new code combination the stop member in the aligned notches will be cammed therefrom.

29. In combination, a plurality of notched selector disks, means for operating said disks into various combinations of positions in accordance with code combinations of impulses, stop members extending across all of said

disks and arranged around the circumferential edges of said disks, the notches in said disks being cut so that for each combination of setting of the disks, a notch in a disk is in alignment with a notch in each of the other disks, said stop members comprising spring acting material, whereby the stop member opposite the aligned notches drops therein, said notches being so cut that upon movement of said disk in accordance with a new code combination, the stop member in the aligned notches will be cammed therefrom.

30. In combination, a plurality of typewheels, a hammer for each typewheel having extensions, means for selectively rotating said typewheels to various angular positions and an electromagnetic means responsive to code combinations of impulses for controlling said first means, said electromagnetic means cooperating with said extensions for selectively controlling the operation of said hammers.

31. In combination, a plurality of typewheels, a hammer for each typewheel having extensions, selector mechanism for variably operating said typewheels, a line magnet, an armature for said magnet, said magnet being responsive to code combinations of impulses for variably operating said armature and mechanisms controlled by said armature for variably operating said selector mechanism, said armature controlling the extensions in accordance with an impulse of said code combinations.

32. In combination, a plurality of typewheels, a hammer for each typewheel, a rotating selector shaft, a line magnet responsive to received code combinations of impulses, an armature operated by said magnet and jointly operating with said shaft for variably controlling said typewheels and for variably directly controlling the operation of said hammers.

33. The method of operating a typewheel printer which comprises operating selectors in accordance with received code combinations of impulses, conditioning a stop position of the typewheel in accordance with the setting of the selectors, maintaining the typewheel latched until the selectors have been set and the selected stop position is determined in releasing the typewheel for rotation to the selected stop position.

34. The method of operating a typewheel printer which comprises operating selectors in accordance with received code combinations of impulses, conditioning a stop position of the typewheel in accordance with the setting of the selectors, maintaining the typewheel latched until the selectors have been set and the selected stop position is determined, releasing the typewheel for rotation to the selected stop position, and selectively releasing a typehammer when the typewheel has reached the selected stop position.

35. The method of operating a typewheel printer which comprises operating selectors in accordance with received code combinations of impulses, conditioning a stop position of the typewheel in accordance with the setting of the selectors, maintaining the typewheel latched until the selectors have been set and the selected stop position is determined, releasing the typewheel for rotation to the selected stop position, selectively releasing a typehammer when the typewheel has reached the selected position, and relatching the typewheel in last selected stop position while operating the selectors in accordance with a succeeding received code combination.

36. In a permutation code device, a series of notched selecting members; means for operating said selecting members to align said notches in selective combinations; selectable elements adapted to move into said aligned notches, each selective combination of said aligned notches permitting one of said selectable elements to move to selected position; said notches being operative when moving out of alignment to move the element selected thereby to unselected position.

37. In a permutation code device, a series of notched selecting disks; means for operating said selecting disks to align said notches into selective combinations; a series of elements variably selectable by the selective alignment of said notches; said notches when aligned permitting the selected ones of said elements to move to selected position, and when moving out of alignment being operative to move the elements selected thereby out of selected position.

38. In a permutation code device, a series of selecting members; means for variably operating said members; a series of elements each having a normal and a selected position; means whereby said elements are moved to selected position in accordance with operation of said members; and means to move the selected elements from selected to normal position by power applied by said selecting members.

39. In a permutation code device, a series of selecting members; means for variably operating said members simultaneously; a series of elements each having a normal and a selected position, said elements being moved to selected position in accordance with operation of said members; and means to move said elements from selected to normal position by power applied by said selecting members.

40. In a telegraph receiver, a plurality of notched selector disks; means responsive to received code combinations of impulse conditions for variably operating said disks to bring the notches at various circumferential points about said disks in alignment with each other; a plurality of groups of type

characters, a plurality of stop members arranged about the circumference of said disks cooperating with said aligned notches for selecting a type character in each group; and means responsive to a signalling condition allotted to each code combination for selecting a character in one of said groups.

41. In a telegraph receiver; a plurality of notched selector disks; means for operating said disks in accordance with received code combinations to selectively align the notches on said disks at various positions about the circumference of said disks; a rotatable stop arm cooperating with said aligned notches; a typewheel having a plurality of groups of characters; means whereby said stop arm controls the printing of characters on said typewheel in accordance with the position of the aligned notches, and means responsive to a control condition accompanying each code combination for selecting the group from which a character is to be printed.

42. In a telegraph receiver; a plurality of selector disks provided with notches on their circumferential surfaces; means for operating said disks in accordance with received code combinations for aligning a notch on each of said disks with notches on the other disks at various positions about the circumference of the disks; a typewheel; a plurality of type characters on said typewheel for printing; a stop arm cooperating with said aligned notches for bringing said typewheel to a stop for printing selected characters; a tape whereon said characters are printed; and means whereby certain of said characters are printed in offset relation with respect to others of said characters on said tape.

43. In a printing telegraph receiver; a plurality of selector disks; a typewheel shaft; a typewheel on said shaft; a stop arm rotatable with said shaft; a stop mechanism for engaging said stop arm to lock said typewheel shaft from rotation; said selector disks when operated in accordance with a received code combination of conditions permitting said stop arm to engage said stop mechanism, and disengaging said stop arm from said stop mechanism automatically in response to the setting of said selectors in accordance with a new code combination whereby said typewheel shaft is immediately started into rotation to find the new selected position; a tape; means whereby said typewheel prints a character on said tape in accordance with the stop position thereof; and means whereby certain characters are printed in off-set relation on the tape with respect to the other characters.

44. In a printing telegraph; a rotatable typewheel; a typewheel stop rotating with said typewheel; a plurality of selector rings operated in accordance with code combinations of impulses for conditioning said typewheel stop to bring said typewheel to a stop

position; a tape; means whereby said typewheel prints a character on said tape in accordance with the stop position thereof; and means whereby certain characters are printed in off-set relation on the tape with respect to the other characters.

45. In a telegraph receiver; a plurality of selectors selectively operated in accordance with received code combinations of conditions; a set of disks; lever mechanism individual to and in operative relation with each of said disks, means for moving said lever mechanism toward and from said first mentioned selectors whereby said levers are variably operated to in turn variably operate said disks in accordance with the operation of said selectors; a tape; means whereby said typewheel prints a character on said tape in accordance with the stop position thereof; and means whereby certain characters are printed in off-set relation on the tape with respect to others of said characters.

46. In a telegraph receiver; a plurality of notched selector disks; means responsive to received code combinations of impulse conditions for variably operating said disks to bring the notches at various circumferential points about said disks in alignment with each other; a plurality of stop members arranged about the circumferential edge of said disks and cooperating with said aligned notches; a rotatable typewheel having a plurality of groups of characters; means cooperating with one of said stop pins for bringing said typewheel to a stop in accordance with the position of the aligned notches of said disks; and means responsive to a signalling condition allotted to each code combination for selecting one of said characters in each of said groups for printing.

47. In a telegraph receiver, a plurality of notched selector disks, means responsive to received code combinations of impulse conditions for variably operating said disks to bring the notches at various circumferential points about said disks in alignment with each other; a plurality of stop members arranged about the circumferential edge of said disks and cooperating with said aligned notches; a rotatable typewheel having a plurality of rows of characters, means cooperating with one of said stop pins for bringing said typewheel to a stop in accordance with the position of the aligned notches of said disks; and means responsive to a control condition allotted to each code combination for selecting one of said characters from said groups for printing.

48. In a telegraph receiver; a typewheel structure provided with a plurality of groups of characters; a first set of selectors responsive to receive code combinations of signalling conditions; a second set of selectors operated by said first selectors; means controlled by said second selectors for selectively stopping

said typewheel structure with a character of each group in printing position; printing mechanism for said typewheel structure; and means for selectively operating said printing mechanism to effect printing of a selected character from one of said groups.

49. In a telegraph receiver; a typewheel structure comprising a plurality of groups of characters; a first set of selectors responsive to received code combinations of signalling conditions; a second set of selectors operated by said set of selectors for selectively stopping said typewheel structure with a character of each of said groups in printing position; printing mechanism; a record tape; and means for selectively operating said printing mechanism to effect printing of selected characters from said groups in relatively offset relation.

50. In a telegraph receiver; a typewheel structure comprising a plurality of groups of characters; printing mechanism; a first set of selectors responsive to a received code combination of signalling conditions; a second set of selectors successively controlled by said first selectors for selectively stopping said typewheel structure with a character of each of said groups in printing position; and means for selectively operating said printing mechanism to record a selected character from only one of said groups.

51. In a telegraph receiver; a typewheel structure comprising a plurality of groups of characters; printing means for said typewheel structure; spring actuating means for operating said printing means; a first set of selectors responsive to received code combinations of signalling conditions; a second set of selectors controlled by said first selectors for selectively stopping said typewheel with a character in each group in printing position; means whereby said spring actuating means is tensioned for operating said printing means; and means for selectively permitting said spring actuating means to operate said printing means to print a character from one or the other of said groups.

52. In a telegraph receiver; a typewheel embodying a plurality of groups of characters; printing means; a first set of selectors responsive to a received code combination of signalling conditions; a second set of selectors successively controlled by said first selectors; means controlled by said second selectors for selectively stopping said typewheel with a character in each group in printing position; spring actuating means for said printing means; means whereby said spring actuating means are tensioned for operating said printing means; and means responsive to a condition accompanying each code combination of signalling conditions operative to cause said spring actuating means to selectively print a character from one of said groups.

53. In a selecting device, a series of notched selector disks operated in varying permutations, a plurality of circumferentially positioned stop pins selectively operated by said selector disks, said stop pins provided with anti-friction means to reduce the friction between said disks and said stop pins.

54. In a selecting device, a series of notched selector disks, operated in varying permutations, a plurality of circumferentially positioned selectable members, each of said members provided with an anti-friction roller, one permutation of said disks adapted to align a series of notches to permit the roller of one of said members to enter into the notched space, means to reoperate said disks in accordance with another permutation whereby said operated member is cammed out therefrom.

55. In a selecting device, a series of notched selector elements operated in varying permutations, a plurality of selectable members adapted to be selectively operated by said selector elements upon the alignment of the notches therein and restored upon the misalignment of said notches and antifriction means loosely mounted on said members to reduce the friction between said elements and said members.

In testimony whereof we affix our signatures.

STERLING MORTON.
HOWARD L. KRUM.

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