

1,309,745.

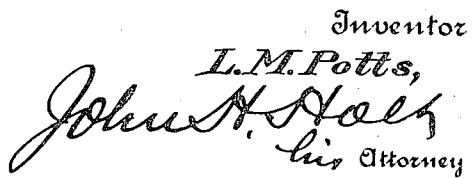
3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

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MACHINE-TELEGRAPH.

1,309,745.

Specification of Letters Patent.

Patented July 15, 1919.

Application filed May 1, 1916. Serial No. 94,622.

To all whom it may concern:

Be it known that I, LOUIS MAXWELL POTTS, a citizen of the United States, residing at Baltimore city, and State of Maryland, have invented certain new and useful Improvements in Machine-Telegraphs, of which the following is a specification.

The primary object of this invention is the production of a simple and efficient printing telegraph for operating multiplex without the use of selecting relays.

It is usual in multiplex printing telegraphs to operate selecting relays from a current distributor or sunflower device, and in turn operate magnets from these relays to set the combination mechanism according to the signals received. In many cases this is done because all of the elements of the combination device must be set simultaneously. Another reason for the use of selecting relays is that the magnets which act directly to set the combination mechanism are not sensitive enough to respond to the short impulses from the sunflower device directly in high speed operation.

The operation of combination setting magnets directly from a sunflower device, however, is not in itself new, but the present invention provides improved means for accomplishing this.

An important feature of the present invention is that electrical operation is reduced to a minimum. The combination device proper is entirely mechanical, while the selecting device which controls this embodies only one series of signal operated magnets and a single control magnet.

The present invention also provides for controlling in a purely mechanical way the recording operation from selecting elements, so that the recording mechanism will not operate unless some one of the selecting elements has previously operated.

The present invention also embodies means whereby the impulses which actually operate the magnets which set the selecting mechanism may be prolonged without the use of relays, so that said magnets may operate with a very short sunflower impulse.

The present invention also embodies improved means for returning certain parts of the selecting and control mechanism to nor-

mal, as well as other novel features which will be more particularly pointed out in the accompanying claims.

It should be understood, however, that this machine may be operated simplex as well as multiplex, and embodies improvements which are not limited to any special method of operation.

In order to more fully describe my said invention, reference will be had to the accompanying drawings wherein,

Figure 1, is a top plan view of one form of tape printing receiver embodying my invention;

Fig. 2, a fragmentary sectional elevation thereof;

Fig. 3, a diagrammatic view showing the arrangement of the driving gears of the printer;

Figs. 4 and 5, fragmentary detail views showing different operating positions of parts of the selecting mechanism;

Fig. 6, a fragmentary detail view showing the cam shaft and cams thereon at the end of the first step of their movement;

Fig. 7, a detail perspective view of one of the plunger detents;

Fig. 8, a fragmentary detail view of one of the control slides;

Fig. 9, a diagram illustrating one of the signals;

Fig. 10, an enlarged detail perspective view of the combination tumblers and cradle carrying the same, and showing a portion of one of the selector slides in connection therewith;

Fig. 11, a side elevation of the type wheel stopping ratchet;

Fig. 12, a side elevation of the four tumbler disks;

Fig. 13, a fragmentary front elevation partly in section of the selector and combination mechanism;

Fig. 14; a fragmentary detail side elevation of the printing mechanism;

Fig. 15, an electrical diagram showing the sunflower distributors and the magnets of the printer connected thereto, the method of operating these distributors in connection with the main line receiving apparatus, and the means for prolonging the impulses delivered to the selector magnets;

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Fig. 16, a current diagram referred to in connection with the prolongation of the impulses of the selector magnets, and

Figs. 17 to 20, details of a modification of the mechanism for returning the clutch control slide and the selecting slides to normal.

Before proceeding with the detail description of the mechanism, it may be well to first briefly describe the system of signals and code with which this machine was designed to operate.

The code here employed is substantially the same as what is generally known as the Baudot telegraphic code, which allots five equal code impulse periods to each signal interval, and in which the individual signals are formed by combinations of impulses occurring in these impulse periods. Fig. 9 is a diagram showing a single signal interval in which the spaces *a*, *b*, *c*, *d* and *e*, indicate the impulse periods. The actual signal shown consists of a combination of *a*, *c* and *d* impulses.

The machine illustrated in the accompanying drawings comprises, among other parts, five selecting magnets 1^a , 1^b , 1^c , 1^d and 1^e , corresponding respectively to the five code impulse periods of a signal interval. All of these magnets are mounted upon an iron yoke 2 held between two cast iron side frames 3 and 4, all of which parts form a part of the magnetic circuit of the magnets 1^a — 1^e . Mounted between side frames 3 and 4 directly above these magnets, is a fixed iron plate 5 in which are mounted plungers 6^a , 6^b , 6^c , 6^d and 6^e , constituting armatures for the respective magnets 1^a — 1^e , and detents or pawls for restraining the motion of certain selecting elements hereinafter described. Each of these plungers is provided with a chamber in which is located a spring 7 bearing at one end upon the upper wall of the chamber, and at its other end upon a non-magnetic extension 8 on the core of its corresponding magnet. These springs serve to return the plungers to normal when released by their magnets. Each plunger 6^a — 6^e is provided at its upper end with a slotted extension 9 in which rest respectively five selecting slides 9^a , 9^b , 9^c , 9^d and 9^e , each of which slides is provided on its lower edge with a shallow notch 10 with which the lower portion of plunger extensions 9 may engage for the purpose of holding said slides to the left under the tension of individual coil springs 11. When so held, the selecting slides 9^a — 9^e are in their normal or unset positions. These slides are mounted for longitudinal movement in individual slots in two cross supports 12 and 13 rigidly mounted between side plates 3 and 4, and these slides are held against upward movement in said slots by rods 14 and 15 extending across their upper edges. In addition to the five combination or selecting

slides 6^a — 6^e , there is provided a clutch control slide 16 mounted for longitudinal movement in individual slots in cross supports 3 and 4, and held by rods 14 and 15 against movement upward. Control slide 16 is under tension of a spring 17, tending to pull it to the right (Figs. 1 and 2), but is normally held from movement in that direction by a lateral projection or hook 18 on one end of a lever 19, the upper edge of which projection is adapted to engage with a notch 20 near one end of slide 16. Lever 19 is also mounted in individual slots in guide supports 12 and 13, but it is narrower vertically than the other levers so as to be capable of movement vertically, but is prevented from moving longitudinally by the engagement of rod 15 with notch or slot 21 in its upper edge.

Lever 19 is under tension upward of a spring pressed plunger 22, acting upon its lower edge, and is under the control of a magnet 23 which acts thereon through a plunger armature 24 having a slotted extension 25 through which said lever passes. This armature acts upon lever 19 through a pin 26 extending across the top of the lever. Lever 19 is provided near its end opposite offset 18, with a slot or depression 27 in its lower edge, and adjacent this slot, with a shoulder or downward extension 28.

Each of the selecting slides 1^a — 1^e is adapted to abut at one end against a universal bar or plate 29 pivotally mounted as at 30 between the side frames 3 and 4. Slide 16 and lever 19 both extend over the upper edge of this bar and normally the latter is in register with slot 27 of lever 19, said bar being at all times under tension to the left, Fig. 2, of a spring 31.

Slide 16 is recessed or cut away along its lower edge at 32 to form a recess in which the upper edge of bar 29 is adapted to travel, and to form a shoulder 33 adapted to engage said bar as later described. This slide is pivotally connected at its end adjacent recess 32, to a clutch controlling arm 34, pivoted to side frame 4 as at 35. The upper end of arm 34 is normally in the path of a lug 36 on a cam 37 fast to a shaft 38 constantly tending to rotate in the direction of the arrow, Fig. 2, but normally prevented from doing so by the engagement of arm 34 with the forward face of lug 36. Shaft 38 is rotated by power supplied to it through a clutch 39, the details of which it is not necessary to here describe. It is sufficient to say that this clutch has two relatively rotatable parts, to one of which the driving power is positively applied, and the other part adapted to take up rotation from the power member of the clutch unless positively restrained, in which latter event the power member continues its rotation. In the present mechanism, the power member

of the clutch is continuously driven by a gear 40, and the normally stationary member of the clutch positively connected to shaft 38. Therefore when arm 34 is rotated clockwise (Fig. 2) far enough to pass from the path of lug 36, shaft 38 will rotate in a clockwise direction.

Clutch gear 40 meshes with a larger power gear 41 fast on a shaft 42, which is continuously driven from any suitable source of power, preferably an electric motor.

As will be later more fully described with reference to the electric diagram Fig. 15, magnet 23 receives an energizing local impulse at regularly recurring intervals whether any signals are transmitted or not. Now if no signal impulses are received, universal bar 29 will occupy the position indicated in Figs. 2 and 4, that is, with its upper end in register with recess 27 of lever 19. The point of application of the power of magnet 23 to lever 19, it will be observed, is between the resisting plunger 22 and the upper end of universal bar 29, and as the recess 27 permits an amount of vertical travel of lever 19 with respect to the upper end of bar 29 when the latter is in the position shown in Figs. 2 and 4, lever 19 will turn on the upper wall of slot 20 as a fulcrum to a limited extent in a clockwise direction, when magnet 23 becomes energized and pulls down on this slide. Therefore, when no code impulses are received, lever 19 may be acted on by magnet 23 without removing extension 18 from recess 20 of the control slide. In other words, so long as universal bar 29 is in register with recess 27 of lever 19, it does not make any difference how many times magnet 23 is energized, it will not release the clutch control slide 16 and start shaft 38 into rotation. If, however, the impulse which energizes magnet 23 is preceded by one or more code impulses, one or more of the magnets 1^a—1^e will be energized, according to the signal received. Whenever any of the magnets 1^a—1^e receives an impulse, it draws down its plunger armature, thus removing it from engagement with the recess 10 in the lower edge of its corresponding slide 6^a—6^e. This releases that particular slide and allows it to be drawn to the right Figs. 1 and 2 by its spring 11, causing the end of said slide abutting against universal bar 29 to rotate said bar clockwise on its pivot 30, to such position that its upper edge will lie directly below extension 28 of lever 19, as shown in Fig. 5. After one or more of the magnets 1^a—1^e have thus acted, according to the combination of impulses forming the particular signal received, magnet 23 receives its impulse. Magnet 23 being thus energized, pulls down its plunger armature 24 which, acting through pin 26 pulls down on lever

19. As the upper end of bar 29 is now directly under lever extension 28 (see Fig. 5), that end of the lever is positively restrained from downward movement. Spring plunger 22 now offering less resistance than bar 29 to the downward movement of lever 19, the latter will turn in an anti-clockwise direction on the upper end of bar 29 as a fulcrum to such an extent that extension 18 will be withdrawn downward from recess 20 of the clutch control slide, thus releasing said slide and permitting it to be drawn to the right (Figs. 1 and 2), whereupon it removes arm 34 from engagement with radial face of cam lug 36 and permits shaft 38 to rotate under power from its clutch 39. It will be seen from the foregoing, that lever 19 is capable of two degrees of motion, but susceptible to restraint from movement by two unequal resisting forces, one of which (spring pressed plunger 22) acts constantly, and the other of which (universal bar 29) is effective only when signals are received.

For each signal, shaft 38 is thus started into motion, rotates one revolution in two steps as later described, and is then brought to rest by the reengagement of arm 34 with stop lug 36. Also fast on shaft 38 is a cam 43 having a lug or shoulder 44 which, on the first step of the shaft 38, operates upon an extension or arm 45 of a tumbler supporting cradle 46 pivotally mounted between side plates 3 and 4 directly above selecting slides 9^a—9^e (see Fig. 10). This cradle consists of a substantially U-shaped frame, the arms of which are slotted near their free ends and in these slots are mounted five tumbler slides 46^a—46^e for individual movement transversely of the cradle. These slides are held down at one end by a plate 47 screwed down upon one arm of the cradle, and at their other ends by a jockey spring 48 which engages with either of two notches 49 or 50 to lock the tumblers in the position in which they have been set. On the lower edge of each tumbler slide is a downward beveled projection 51, and on the upper edge of each selecting slide 9^a—9^e are two oppositely sloping beveled portions or cams 52 and 53 (see Fig. 10) adapted to cooperate as hereinafter described with the extensions 51 of the tumbler slides to set the latter in combinations.

Each tumbler slide is provided with an upwardly extending projection or lug 54 arranged in two sets, those of slides 46^a, 46^c and 46^e constituting one set, and those of the slides 46^b and 46^d another set. Lugs 54 of the first mentioned set are adapted to interlock according to the setting of slides 46^a, 46^c and 46^e with one or the other of a pair of toothed or slotted tumbler disks 55, 56, while the projections 54 of tumbler slides 46^b and 46^d are adapted to similarly interlock with a pair of tumbler disks 57, 58.

These tumbler disks are fast upon a shaft 59 journaled for rotation in side frames 3, 4. This shaft is normally held at rest by a pawl 60 on the tumbler cradle engaging with a ratchet 61 fast to said shaft, but has a constant tendency to rotate.

The rotation of shaft 59 is effected through a friction clutch comprising a constantly rotating friction disk 62 positively driven by a gear 63, and a friction disk 64' positively connected to shaft 59 to rotate therewith, but movable longitudinally thereof, and pressed into frictional engagement with a face of disk 62 under tension of a spring 64. Gear 63 meshes with a larger gear 65 which in turn meshes with the main power gear 41.

Fast on shaft 59 just outside of side plate 3 is a type wheel 66 (see Fig. 14), with which is adapted to cooperate a pivoted print hammer 67 having an arm 68 to which is attached a spring 69 constantly tending to force the platen 70 of the hammer toward the periphery of the type wheel. The platen, however, is normally held away from the type wheel in the position shown in Fig. 14, by a slide 71 supported for longitudinal movement upon two shoulder screws 72 and 73 which pass through slots 74 and 75 respectively therein, said slide acting upon the print hammer through the engagement of one of its ends with an adjustable screw 76 in the print hammer arm 68. The other end of this slide rests against the periphery of a cam 77 fast on shaft 38, and is forced thereagainst under the pull of springs 69 and 78. The record receiving material 79 which we may assume is a tape, passes over a feed roller 80 against which it is held by a presser roller 81, and is fed forward by the action of a pawl 82 pivoted to slide 71 and engaging under tension of a spring 83 the teeth of a ratchet 84 fast to the feed roller. Backward rotation of the feed roller is prevented by a holding pawl 85 and ratchet 84.

The type wheel is inked by an inking roller 86 mounted upon a pivoted arm 87, to which is attached a spring 88 to hold the inking roller against the type wheel.

Slides 9^a—9^e and 16 are reset by the return of universal bar 29 to its initial position shown in Fig. 2, and this is effected by the engagement of lug 89 of a cam 90 fast on shaft 38 engaging with a beveled extension 91 fast to universal bar 29.

The operation of the mechanism thus far described is as follows:

Upon the receipt of a signal, one or more of the magnets 1^a—1^e becomes energized according to the combination of impulses forming the signal. If the signal is composed of the *a*, *c* and *d* impulses, for example, magnets 1^a, 1^c and 1^d become energized, whereupon they pull down their plunger

armatures and release corresponding slides 9^a, 9^c and 9^e, which, under the action of springs 11, are pulled to the right Figs. 1 and 2, forcing universal bar 29 to rotate clockwise to that position where its upper end will lie beneath projection 28 of control lever 19. At the end of the signal interval magnet 23 receives an impulse whereby it pulls down its plunger armature 24, which in turn pulls down on lever 19. Universal bar 29 now being under lever projection 28, prevents the downward movement of that end of said lever, so that it moves downward at its opposite end, removing extension 18 from slot 20 in the clutch control slide 16, whereby this slide is pulled to the right (Fig. 2) by spring 17, thereby rotating arm 34 in a clockwise direction and releasing cam 37, whereupon shaft 38 rotates in the direction of the arrow Fig. 2. As soon as this shaft starts to rotate, cam lug 44 acts upon arm 45 and causes the tumbler cradle to rock downward or in an anti-clockwise direction, whereby the beveled extensions 51 of the tumblers will be brought into engagement with cams 53 of those slides 9^a—9^e which have been set (which enter the particular combination of the signal received), and into engagement with cams 52 of those slides 9^a—9^e which do not enter the signal combination. The effect of this is to move those of the tumbler slides 46^a—46^e whose extensions 51 engage cams 53 to the right Fig. 10, so that the lugs 54 of those slides are shifted from the path of disks 55 and 57 to disks 56 and 58. The function of cams 52 is to return to the normal or unset position all the tumbler slides 46^a—46^e which were set by a previous signal, but which do not enter the present signal combination.

As soon as the tumbler cradle is rocked downward as described, it withdraws pawl 60 from ratchet 61, thus permitting shaft 59 to rotate. After shaft 38 has rotated but a small distance, the drop of cam lug 44 passes cradle arm 45, whereupon the tumbler slide end of the cradle will rise quickly under the action of spring 46' and bring tumbler lugs 54 into engagement with the periphery of disks 55—58 which are now rotating with shaft 59. As soon as this shaft has rotated to a point where all of the lugs 54 find openings in the disks 55—58, which they may enter, the tumbler end of the cradle rises and permits pawl 60 to engage with ratchet 61, whereby shaft 59 and the type wheel is stopped.

When shaft 38 is released by the withdrawal of arm 34 from lug 36 (Fig. 2), it rotates through a part of a revolution and is then brought to rest by the engagement of cam lug 36 with an extension 45' fast on the tumbler cradle, which when said cradle is rocked downward projects into the path

of cam shoulder 36 as shown in Fig. 6. During this rotation, cam 77 passes from the position shown in Fig. 14 to a position where the end of slide 71 will engage its periphery at a point about 180° from that shown, or just on the brink of the drop of said cam. During this rotation of cam 77 the end of slide 71 engages only that portion of the periphery of said cam which is circular or concentric with the axis of shaft 38 so that no effect will be had on slide 71. When the tumbler cradle rises, as described, due to the lugs 54 entering the slots in the selecting disks, extension 45 will disengage cam shoulder 36, whereupon shaft 38 will continue its rotation. Directly after said shaft thus takes up the second step of its travel, the drop of cam 77 will pass the end of slide 71, whereby the latter will be drawn quickly to the right (Fig. 14) under the action of springs 69 and 78, allowing the spring 69 to send the platen against the tape 79, thereby printing the character of the type wheel which has been stopped in the printing position. As cam 77 continues its rotation, the eccentric portion thereof acting on the end of slide 71 will force the same to the left (Fig. 14), withdrawing the platen from the paper (resetting the print hammer), and operating the pawl 82 and ratchet 84 to space the tape one step.

Toward the end of the first step of shaft 38, lug 89 of cam 90 engages extension 91 on the universal bar 29 and acts there-through to force the operated or set slides 9^a—9^e and slide 16 to the left, whereupon the plunger armatures 6^a—6^e corresponding to the operated slides 9^a—9^e will again engage recesses 10 therein, and recess 20 of slide 16 will be brought into locking engagement with offset 18 of lever 19, thus resetting these parts for the next signal.

Referring now to the electrical diagram Fig. 15, this shows one way of operating multiplex without selecting relays. In this diagram, 92 represents a main line in which are connected the coils of a receiving polarized relay 93. Each received impulse causes this relay to send its tongue against its forward contact 94 which is permanently electrically connected to a collector ring 95 of a sunflower device comprising also a segmented ring or commutator 96 having as many groups of insulated segments of five to the group, as there are printers to be operated on the line at that station. This sunflower device is provided with two electrically connected brushes 97 and 98 which sweep the rings 95 and 96 respectively. One terminal of each of the magnets 1^a—1^e and 23 connect through a resistance 99 to the positive terminal of a local source of direct current, while the other terminals of magnets 1^a—1^e connect respectively to the segments of a group in sunflower member 96. The nega-

tive terminal of magnet 23 connects permanently to an insulated segment 100 of a segmented ring 101 of the sunflower, said ring being swept by a brush 102 which is permanently electrically connected to another brush 103 which sweeps a collector ring 104 connected to the negative terminal of the source of local direct current. There is a segment 100 in ring 101 for each group of segments in ring 96, and the magnet 23 is connected to that one of segments 100 which corresponds in angular position to the first segment of the group of segments in ring 96 next following the group to which magnets 1^a—1^e are connected. In other words, if we assume that magnets 1^a—1^e are connected to segment group number one of ring 96, magnet 23 would be connected to that one of the segments 100 which corresponds in angular position to the first segment in group number two of ring 96, so that magnet 23 receives its impulse directly after the signal interval of five impulse periods corresponding to five segments in a group just previously passed over by brush 98.

Sunflower members 95, 96, 101 and 104 all occupy fixed relative angular positions to each other, and brushes 97, 98, 102 and 103 are all positively connected so as to be driven together and are rotated continuously in synchronism with the impulse operating main line relay 93. This synchronism may be effected in any desired way, and since it is not claimed as any part of this invention, need not be here described.

The tongue of relay 93 is connected to the negative terminal of the local source of direct current. Magnets 1^a—1^e become connected in succession to the forward contact 94 of this relay as the brush 98 sweeps the sunflower segments to which these magnets are connected and they become energized or not according to whether the tongue of said relay is or is not against its forward contact.

Shunted across the terminals of each of the respective selecting magnets 1^a—1^e are condensers 105, the purpose of which is to lengthen the energizing impulses of these magnets so that they may be operated directly from the sunflower device, when the line is operated at a high rate of transmission, in which event the impulses initially impressed on the sunflower may be quite short, too short indeed to properly operate magnets 1^a—1^e. The usual method in high speed multiplex operation is to employ sensitive relays operated directly from the sunflower, and then operate the selecting magnets of the printer from these relays. My improved method renders the use of such relays entirely unnecessary.

Due to the self induction of the coils of magnets 1^a—1^e, the current in them will rise

in value according to a curve something like curve A Fig. 16. If the time of contact with the sunflower segment to which these magnets are connected is short enough, the current will not reach its full value. If condensers 105 be connected in circuit with these magnets, as shown, its charging current will be somewhat like curve B, since there is substantially no self induction in series with it. As soon as the connection between the battery and the condenser is broken, the condenser begins to discharge through its magnet, and in the same direction as the original impulse from the sunflower, so that the impulse received by the magnet directly, and from its condenser discharge, will be represented by a curve such as C. The discharge current of the condenser would be represented by a curve such as D. As soon as the condenser has discharged, its magnet begins to demagnetize and generate current represented by curves E and F. This demagnetizing current also tends to lengthen the impulse, since it lengthens the time of magnetizing, by causing the magnet to do work in demagnetizing, which will lengthen the time of demagnetizing.

The curves given in Fig. 16 are copies of oscillograms, and the time interval X—Y is 1/500 second. Curve A represents the current in one of the magnets 1^a—1^e with no condenser; curves B, D and E the current in condensers 105, and curves C and F the current in the magnet with condenser connected as in Fig. 15.

Referring now particularly to Figs. 17 to 20, inclusive, these show a modified arrangement for returning the latch which prevents the control shaft from rotating and a modified arrangement for returning the combination slides to normal. Independent cams are here provided for returning the control clutch latch and the selecting slides. The control clutch latch is returned by a positive motion from a cam and the selecting slides are returned by spring pressure. The advantage of returning the control clutch latch and the selecting slides independently is that it makes possible differently timing the two cams so that they can be more advantageously operated. The advantage of returning the selecting slides by spring power is that in the first place it prevents any possibility of jamming as may happen with a positive cam motion. It also has the advantage of allowing more time for the setting of the tumbler slides as well as making possible the use of a more gradual rise on the cam which moves the parts operating the universal bar, which will all be more clearly understood after the parts have been described.

In the modified arrangement here shown the control slide 16 is returned to normal through an arm 106 operated by a cam 107,

all of which mechanism is entirely independent of the mechanism which returns the selecting elements.

The selecting elements 9^a—9^e are adapted to engage at their right hand ends a pivoted universal bar 108 which is held to the left under tension of a light spring 109. The function of spring 109 is to prevent universal bar 108 from moving to the right unless one of the selecting slides 9^a—9^e is previously operated. Pivotaly mounted on rod 110 which supports bar 108, is an arm 111 having a projection 112 which engages a cam 113 fast on shaft 38. Cam 107 is also fast on shaft 38. Pivoted on a shoulder screw 114 carried by arm 111 is a bell crank pawl 115, the nose of which is adapted to engage a projection 116 on universal bar 108. An arm 117 of pawl 115 is adapted to engage a cam 118 under certain conditions, later described, such cam being fast on shaft 38. A spring 119 is attached to pawl arm 117 and exerts a tension to the left and thereby forces pawl 115 against a stop 120 on arm 111. When pawl 115 is so held against stop 120 tension is communicated to arm 111, also to the left, which forces projection 112 against cam 113. As shaft 38 rotates on its first step a cam 43^x, which replaces the cam 43, rotates cradle 46 as previously described, except that cam 43^x is longer than cam 43 and rises more gradually so that arm 45 drops from the high part of cam 43^x just shortly before shaft 38 comes to rest after its first step. Almost simultaneously with the time that arm 45 drops from the high part of cam 43^x projection 112 passes from the high part of cam 113. Arm 111 moves to the left under the tension of spring 119, and by the engagement of pawl 115 with projection 116, universal bar 108 is carried to the left and thus returns to normal all the selecting elements 9^a—9^e. Just at the time when universal bar 108 has carried all the selecting elements 9^a—9^e a little beyond their normal position, pawl arm 117 engages cam 118, when spring 119 then acts to disengage pawl 115 from projection 116. The object of disengaging pawl 115 from projection 116 is to allow all the selecting elements 9^a—9^e to set in the proper combination for the next character simultaneously with the setting of the type wheel of the previous character. On the second step of shaft 38 cam 113 returns arm 111 and pawl 115 to their normal positions ready to again return the selecting slides. In Fig. 20 the parts are shown just at the time when pawl 115 has been disengaged from extension 116. Cam 118 is of such shape that pawl 115 is kept out of engagement with projection or extension 116 until arm 111 has been moved to the extreme right so that it will in no way interfere with the setting of the next combination.

The invention here shown and described is susceptible of other modifications which may be made without departing from the spirit thereof.

5 What I claim is:

1. A machine telegraph, comprising a series of spring operated selecting elements, a series of detents holding said elements in their normal positions, a series of magnets
10 controlling said detents, means to transmit to said magnets electrical impulses to release corresponding detents and allow corresponding selecting elements to move to selected positions, a rotatable type wheel, a
15 second series of elements, and means to set said second series in combinations corresponding to the first series, and means controlled by said second series to control the motion of said type wheel.

2. A machine telegraph, comprising a series of spring operated selecting elements, a series of detents holding said elements in their normal positions, a series of magnets
20 controlling said detents, means to transmit to said magnets electrical impulses to release corresponding detents and allow corresponding selecting elements to move to selected positions, a recording element, a second series of elements, and means to set said
25 second series in combinations corresponding to the first series, and means controlled by said second series to control the motion of said recording element in a different manner for each signal to be recorded.

3. A machine telegraph, comprising a sunflower device, a series of selecting elements, a magnet individual to each of said selecting elements, means to operate said magnets
30 controlled by said sunflower device, a rotatable type wheel, and means entirely mechanical controlled by said selecting elements to control selectively the motion of said type wheel.

4. A machine telegraph, comprising a series of selecting elements, means including
45 a sunflower device to operate said elements selectively, a second series of elements, a frame in which said second series of elements is mounted and means including a rotatable shaft to move said frame and cause said
50 second series of elements to engage the first series and thereby operate the second series in combinations, and means controlled by said sunflower device to start said shaft in motion.

5. A machine telegraph, comprising a sunflower device, a series of selecting elements, recording means, a rotatable shaft having means mounted thereon to operate said
60 recording means, means controlled by said sunflower device to start said shaft in motion, and means mechanically controlled by said elements to prevent the starting of said shaft unless one or more of said selecting
65 elements have been previously operated.

6. A machine telegraph, comprising a sunflower device, a series of selecting elements, means controlled by said sunflower device to set said elements individually, recording means mechanically controlled by said selecting elements, a rotatable shaft, means
70 mounted on said shaft to operate said recording means, and means acting subsequently to the setting of said elements and coacting with the said elements to start said shaft in motion.

7. A machine telegraph, comprising a sunflower device, a series of selecting elements, means to operate said elements individually, recording means selectively controlled by
80 said elements, a rotatable shaft, recording means and means operated by said shaft to control the last mentioned recording means, a latch normally preventing the rotation of said shaft, a detent normally acting to prevent
85 said latch from allowing the rotation of said shaft, and means to operate said detent from said sunflower to permit said latch to release said shaft.

8. A machine telegraph, comprising a sunflower device, a series of selecting elements, means to operate said elements individually, a rotatable type wheel selectively controlled
90 by said elements, a rotatable shaft, a printing platen and means operated by said shaft to control said printing platen, a latch normally preventing the rotation of said shaft, a detent normally acting to prevent said
95 latch from allowing the rotation of said shaft, and means to operate said detent from said sunflower to permit said latch to release said shaft.

9. A machine telegraph, comprising a series of selecting elements, means including a sunflower device to operate said elements
105 individually, a rotatable type wheel, a second series of selecting elements controlling the motion of said type wheel, and means including a rotatable shaft to operate said second series of elements in combinations
110 corresponding to the first series, and means carried by said rotatable shaft to return said first series of elements to normal.

10. A machine telegraph, comprising a sunflower device, a series of selecting elements, means controlled by said sunflower
115 device to operate said elements individually, a rotatable type wheel, and means entirely mechanical controlled by said elements to selectively control the motion of said type wheel.

11. A machine telegraph, comprising a sunflower device, a series of selecting elements, means controlled by said sunflower device to operate said elements individually,
125 a rotary type wheel normally at rest, power means to rotate said type wheel on the receipt of a signal, and means entirely mechanical and selectively controlled by said elements to effect stopping of said type
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wheel in different printing positions corresponding to the signals received.

12. A machine telegraph, comprising a sunflower device, a series of selecting elements, means controlled by said sunflower device, to operate said selecting elements individually, a second series of elements, means to set or return to normal said second series of elements in combinations by the engagement of the second series with the first series, and recording means controlled by said second series.

13. A machine telegraph, comprising a sunflower device, a series of selecting elements, means including said sunflower device to operate said elements individually, recording means controlled by combinations of said selecting elements, means acting upon each revolution of the sunflower device tending to initiate the recording operation, and means entirely mechanical to prevent the initiation of the recording operation unless one or more of said selecting elements have been previously operated.

14. A machine telegraph, comprising a sunflower device, a series of selecting elements, means including said sunflower device to operate said elements individually, a rotatable shaft, means operated upon each revolution of said sunflower device tending to start said shaft in motion, and means entirely mechanical controlled by said selecting elements acting in combinations to prevent the rotation of said shaft.

15. A machine telegraph, comprising a distributor, a series of selecting elements, means to operate said elements under the control of said distributor, a rotatable shaft, and operative connection entirely mechanical between said elements and said shaft to stop said shaft in varying positions according to the elements operated.

16. A machine telegraph, comprising a sunflower device, recording means, a series of elements operative in combinations to control said recording means, a lever controlling the initiation of the operation of said recording means, means to operate said lever invariably in each revolution of said sunflower device, means whereby the operation of said lever is ineffective to start the operation of said recording means when none of said elements have been operated, and effective to start the operation of said recording means when one or more of said elements have been operated.

17. A machine telegraph, comprising a lever, a yieldable member normally forming a fulcrum for said lever, a magnet operatively connected to said lever to cause the same to turn on said yieldable member as a fulcrum, a movable member adapted to be brought into the path of said lever on the opposite side of its connection with said magnet from said yielding fulcrum to op-

pose the motion of said lever in one degree and thereby cause its motion in another degree when acted on by said magnet, means to energize said magnet at regularly recurring intervals whether code signals are being received or not, a series of selectively operated elements adapted to operate said movable member only when code signals are being received, and recording means controlled by the said lever.

18. A machine telegraph, comprising a series of movable selecting elements, a series of magnets, one for each of said elements and operatively associated therewith to control them individually, a movable member common to all said elements and operative by any one or more thereof, a member capable of two degrees of motion but normally prevented from movement in one of said degrees by said first mentioned movable member, a magnet operatively connected to said second mentioned movable member for moving it in either of said degrees, recording means, a rotatable shaft and means operated thereby for controlling said recording means, a latch for stopping the rotation of said shaft in certain positions, and a detent normally acting on said latch to stop the rotation of said shaft and operative by said member having two degrees of motion when one or more of said selecting members act, to release said latch and thereby permit the rotation of said shaft.

19. A machine telegraph, comprising a series of selecting slides under spring tension tending to move them all in the same direction, a detent individual to each slide and normally holding them in their normal positions against said spring tension, a magnet for each of said detents operative thereon to release said slides individually to permit their operation under said spring tension, a bar common to all said slides and adapted to be operated by any of them when released by their detents, a lever having two degrees of motion but prevented from movement in one of said degrees by said bar when all of said selecting slides are in their normal or unset positions, a spring operated control slide, a detent connection between said control slide and lever whereby said slide is held against operation by its spring as long as said bar prevents the movement of said lever in one direction, said detent being operative by said lever to release said control slide when the resistance of the movement of said lever by said bar is removed, a rotatable shaft, means tending to constantly rotate said shaft, a latch operated by said control slide for controlling the starting and stopping of said shaft, and recording means controlled by said shaft.

20. A machine telegraph, comprising a rotary type wheel, means constantly tending to rotate said type wheel, mechanism

acting to normally hold said type wheel against rotation and to arrest its motion when in rotation, a mechanical combination device comprising two interlocking elements, one of which comprises a series of slotted members bearing a fixed relation to each other and movable with said type wheel and the other element comprising a series of movable tumblers adapted when set in prearranged combinations to interlock with or engage the slots in the other element, a series of movable selecting elements under spring tension tending to move them all in the same direction, a detent individual to each of said selecting elements opposing their movement by said spring tension, a magnet individual to each of said detents for operating the same to release said selecting members and permit their movement under said spring tension, cams on said selecting elements for moving said tumblers by engagement therewith to set them in combinations corresponding to those in which said selecting elements are released by their magnets, a movable support on which said tumblers are mounted, and means to move said support to send said tumblers into engagement with the cams on said selecting elements.

21. A machine telegraph, comprising recording means, a shaft for controlling said recording means, means tending constantly to rotate said shaft, a latch acting normally to prevent the rotation of said shaft, a spring acting on said latch and tending to operate it to release said shaft to permit it to rotate, a detent normally opposing the operation of said latch by said spring, a series of magnets operative in combinations according to the signals received, a magnet and means to operate it independently of the character of the signals received, and means operated by the conjoint action of said series of magnets and said independently operated magnet to release said detent and thereby

permit said spring to release said latch and allow said shaft to rotate.

22. In a multiplex telegraph, a series of spring operated selecting elements, detents to hold said elements in normal position, selective signaling means to release said detents in combinations and so permit said selecting elements to set in corresponding combinations, and spring operated means to return said selecting elements to normal.

23. In a multiplex telegraph, a series of spring operated selecting elements, detents to hold said elements in normal positions, selective signaling means to release said detents in combinations and so permit said selecting elements to set in corresponding combinations, spring operated means to return said selecting elements to normal, and power operated means to return said element returning means to normal.

24. In a machine telegraph, recording means, constantly operating power means, means to couple said power means to said recording means, including a clutch and latch to control the operation of said clutch, electrical signal controlled means to operate said latch, and means carried by said recording means to return said latch to normal.

25. In a machine telegraph, a series of selecting elements, electrical signaling means to set said elements in combinations, spring operated means to return said elements to normal, recording means, a rotatable shaft, means carried by said shaft to operate said recording means, and means carried by said shaft to return the element returning means to normal.

In testimony whereof I affix my signature in the presence of two witnesses.

LOUIS MAXWELL POTTS.

Witnesses:

H. G. BISHOP,
O'DONNELL LEE.