Apr. 24, 1923. 1,452,527

L. M. POTTS

TRANSMITTING APPARATUS FOR ELECTRIC TELEGRAPHS

Original Filed Dec. 14, 1915 4 Sheets-Sheet 1

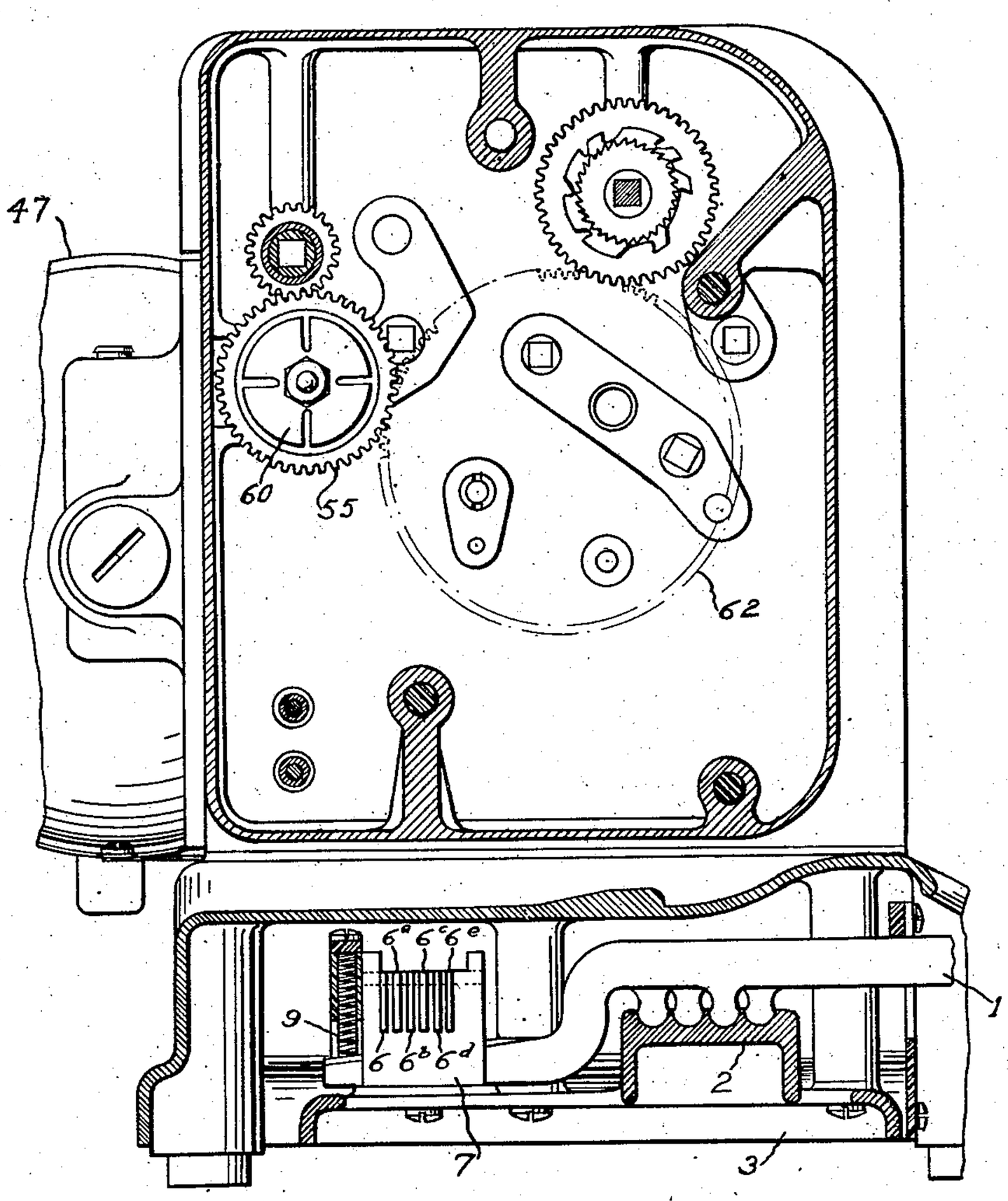


FIG. 1.

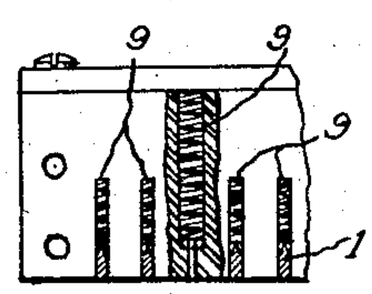


FIG. 2

INVENTOR.
Louis M. Potts
BY
Wm L. Symmons
ATTORNEY.

Apr. 24, 1923. 1,452,527

L. M. POTTS

TRANSMITTING APPARATUS FOR ELECTRIC TELEGRAPHS

Original Filed Dec. 14, 1915 4 Sheets-Sheet 2

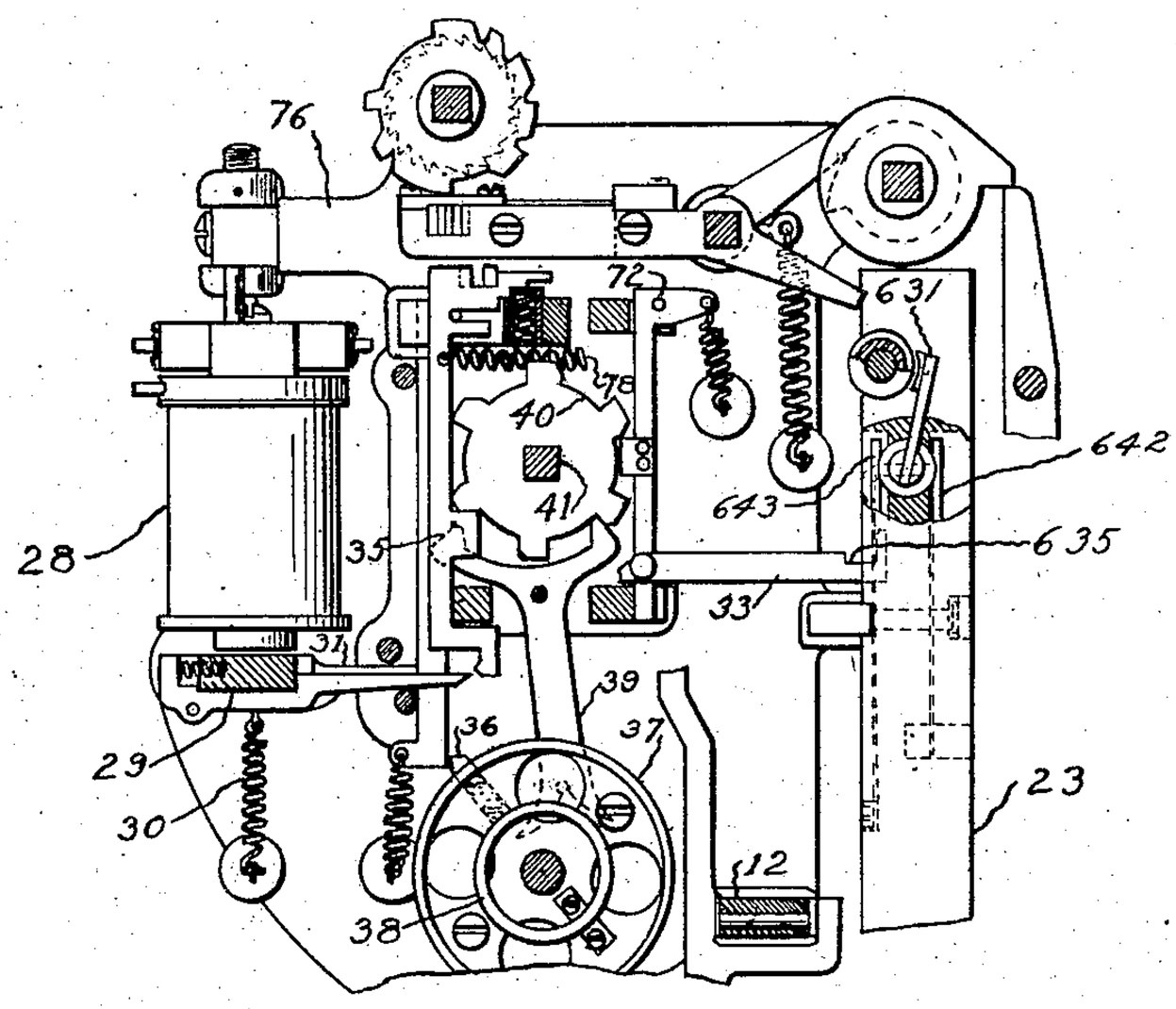


Fig. 3.

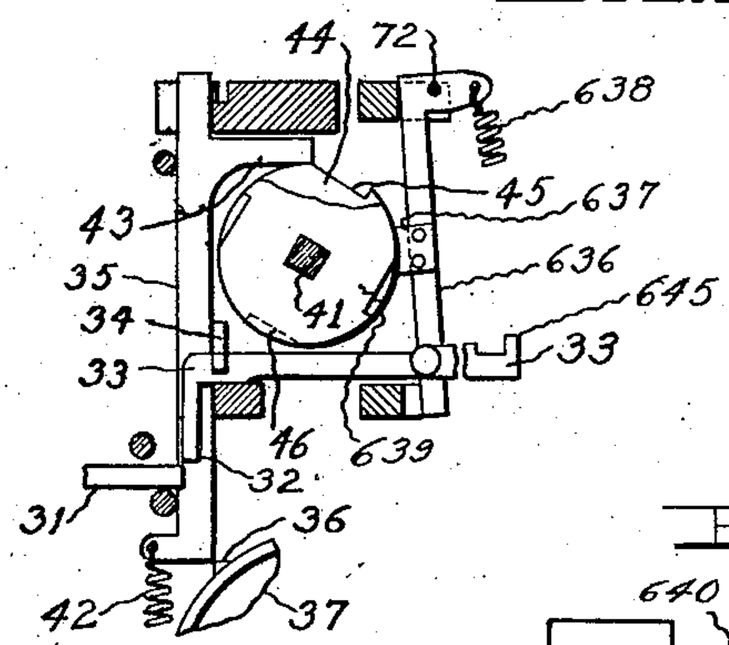


Fig. 4.

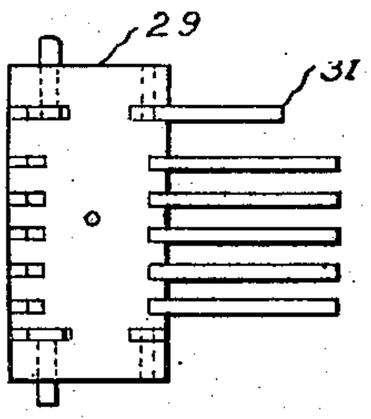
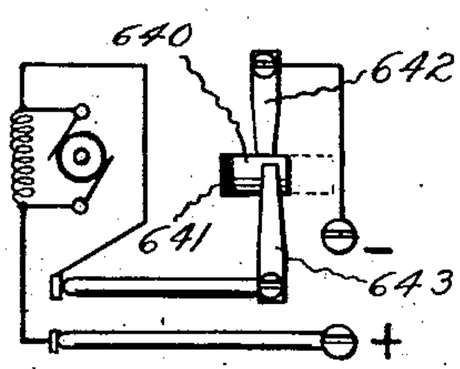


Fig. 5.



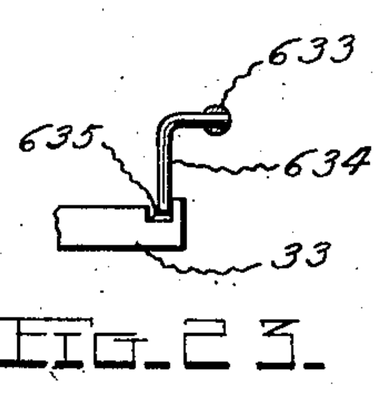


Fig. 2 a.

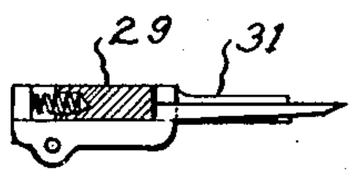


Fig. 6.

Fig. 24.

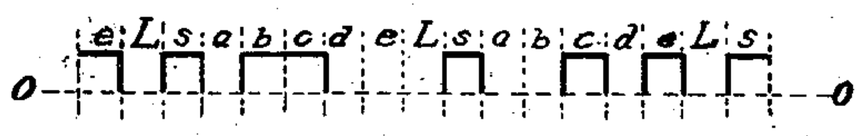


Fig. 8.

Fig. 7.

INVENTOR.
Louis M. Potts
BY
Wm. L. Symons
ATTORNEY.

Apr. 24, 1923. 1,452,527

L. M. POTTS

TRANSMITTING APPARATUS FOR ELECTRIC TELEGRAPHS

Original Filed Dec. 14, 1915 4 Sheets-Sheet 3

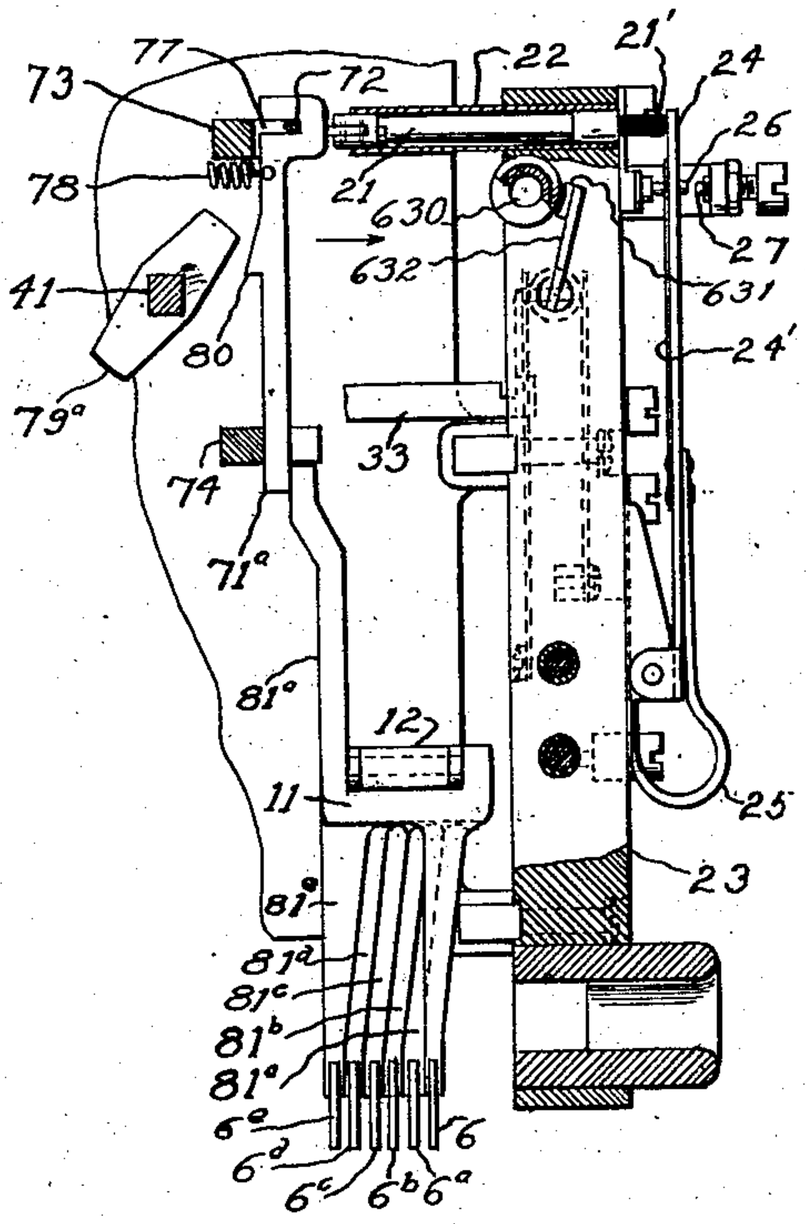


Fig. 9.

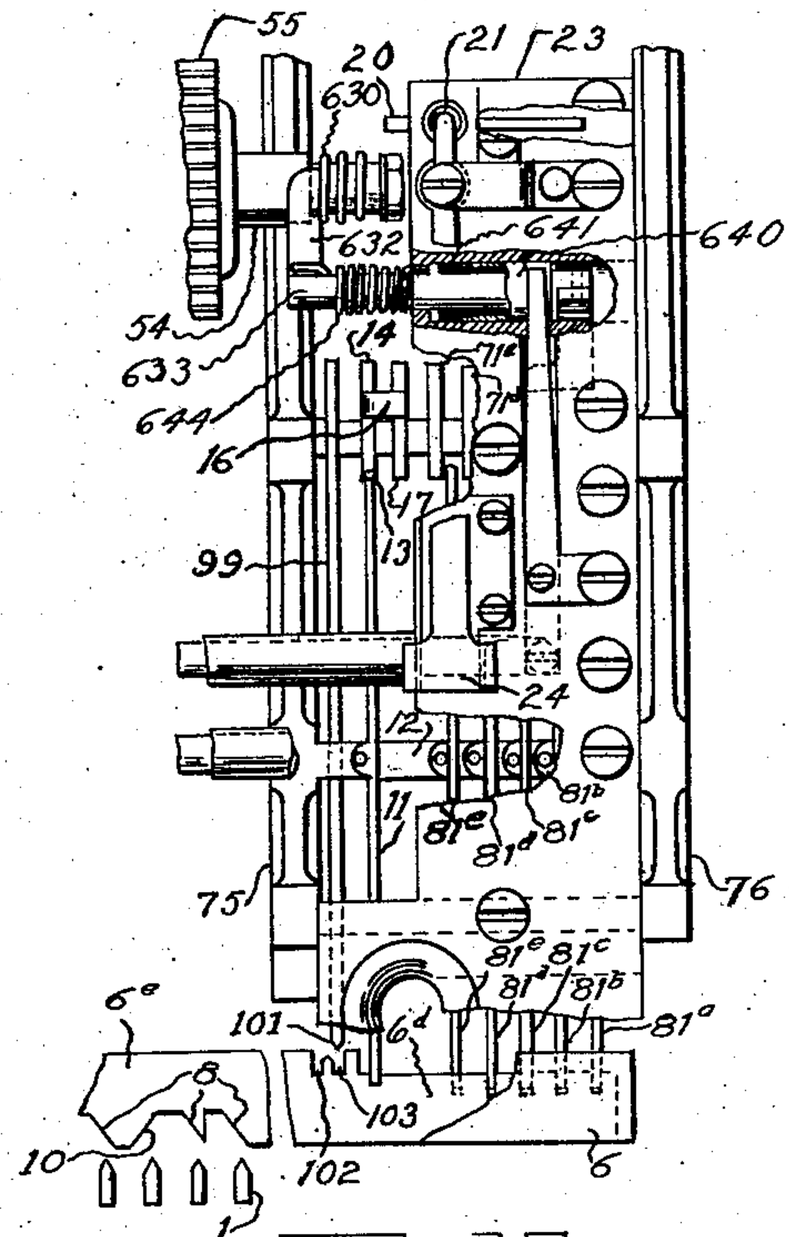


Fig. 10.

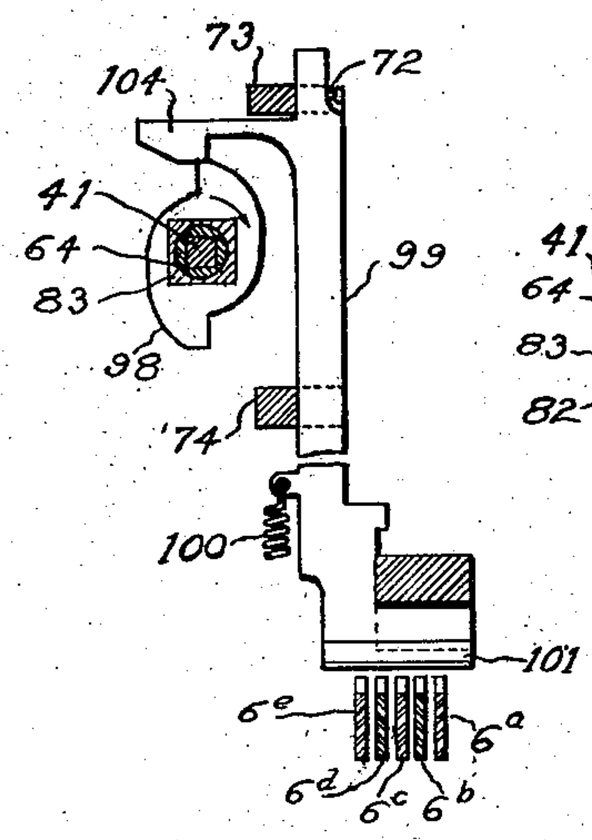


Fig. 11.

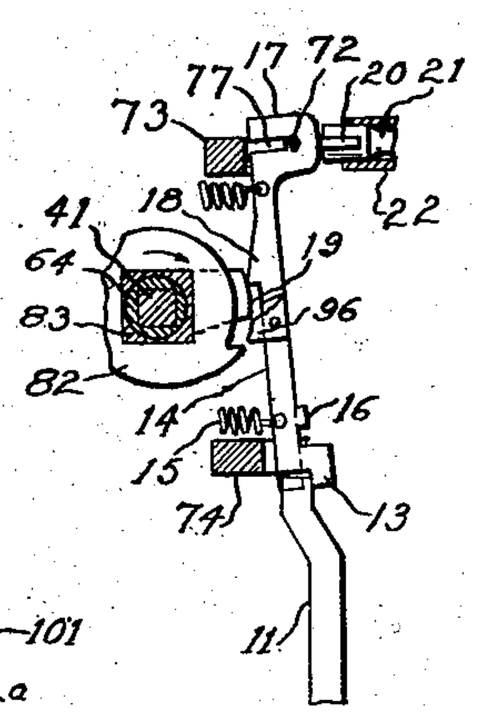


Fig. 12.

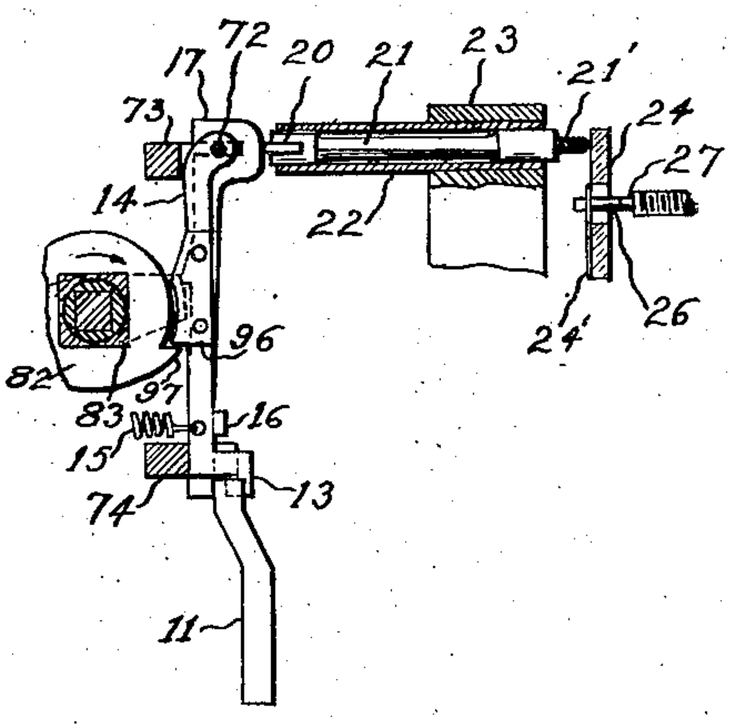


Fig. 13.

INVENTOR.
Louis M. Potts
BY
Wm. L. Symons
ATTORNEY.

Apr. 24, 1923. 1,452,527

L. M. POTTS

TRANSMITTING APPARATUS FOR ELECTRIC TELEGRAPHS

Original Filed Dec. 14, 1915 4 Sheets-Sheet 4

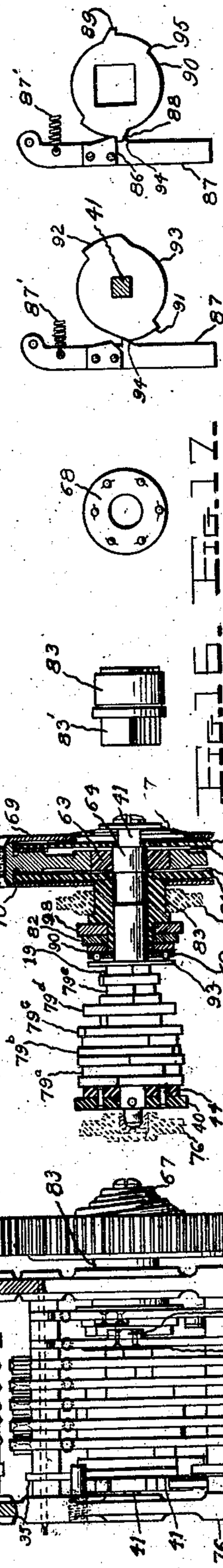


FIG. 17.

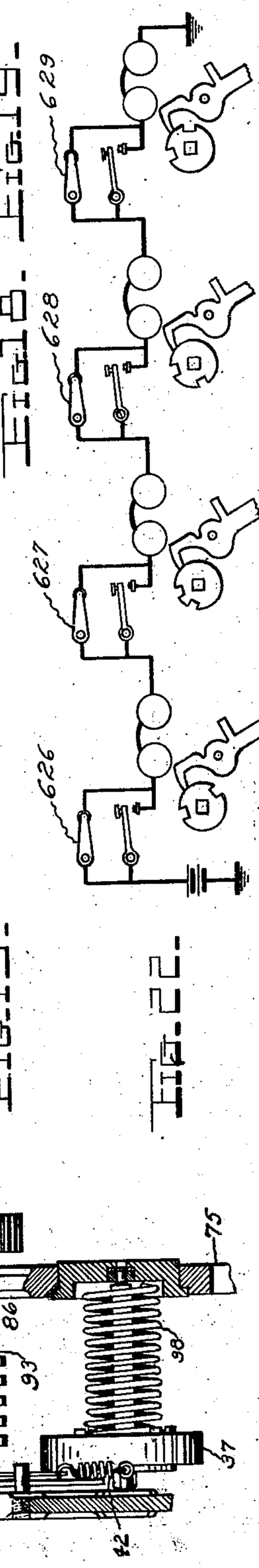


FIG. 22.

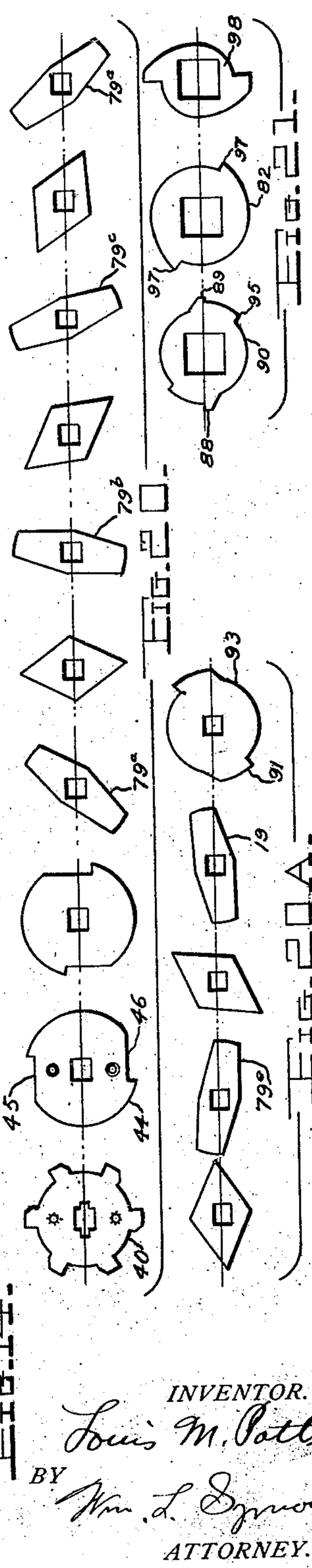


FIG. 21.

FIG. 20.

FIG. 20A.

FIG. 15.

FIG. 16.

FIG. 14.

INVENTOR.
Louis M. Potts
BY Wm. L. Symons
ATTORNEY.

Patented Apr. 24, 1923. 1,452,527

UNITED STATES PATENT OFFICE.

LOUIS M. POTTS, OF BALTIMORE, MARYLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TRANSMITTING APPARATUS FOR ELECTRIC TELEGRAPHS.

Original application filed December 14, 1915, Serial No. 66,830. Patent No. 1,370,669, dated March 8, 1921. Divided and this application filed February 6, 1920. Serial No. 356,615.

To all whom it may concern:

Be it known that I, LOUIS M. POTTS, a citizen of the United States of America, residing at Baltimore, State of Maryland, have invented certain new and useful Improvements in Transmitting Apparatus for Electric Telegraphs, of which the following is a specification.

This invention relates to transmitting apparatus in which the operation of the respective character keys is translated into electrical impulses through the action of a motor-driven mechanism.

An object of the invention is the provision of a positively-acting transmitting apparatus controlled by any one of a plurality of keys for initially setting such transmitting apparatus into operation.

Another object is the provision of automatic means whereby the transmitting apparatus may be controlled by an impulse of a particular character.

The present application is a division of the subject matter embodied in an application filed December 14, 1915, Serial No. 66,830, now Patent No. 1,370,669 of March 8, 1921.

The invention will be described with reference to the accompanying drawings wherein:—

Fig. 1 is a vertical section of the machine showing the gears and a section of the keyboard.

Fig. 2 shows how spring pressure is applied to the key levers.

Fig. 3 is a vertical section showing the timing mechanism and other parts.

Fig. 4 shows the starting mechanism.

Figs. 5, 6 and 7 show the magnet armature.

Fig. 8 is a current diagram indicating two of the signals.

Figs. 9 and 10 show the transmitting contact and associated parts.

Fig. 11 shows the locking device for the keys.

Figs. 12 and 13 show the mechanism for sending the start impulse.

Fig. 14 shows the timing mechanism, escapement, clutch and associated parts.

Fig. 15 is a detail of the escapement clutch and cams.

Fig. 16 is a detail of the slow start sleeve.

Fig. 17 is a detail of the thrust bearing between the slow start sleeve and cam shaft.

Figs. 18 and 19 are views of the slow start trigger.

Figs. 20 and 20ª show the relation of the cams on the escapement shaft.

Fig. 21 shows the relation of the cams on the escapement shaft.

Fig. 22 is an electrical diagram of the line.

Fig. 23 is a detail of part of the motor cut-off.

Fig. 24 is an electrical diagram of the motor cut-off.

The transmitting mechanism and signals.

The transmitting mechanism in the form shown in the accompanying drawings comprises, amongst other parts, a keyboard consisting of a plurality of key levers 1, pivotally mounted upon a cross support 2, forming a portion of the casting constituting the base 3, of the machine (see Fig. 1).

The key tips of levers 1 bear designations of the various characters and signals to be transmitted and are preferably arranged according to standard typewriter practice.

Extending transversely across the key levers adjacent their ends opposite the key tips, are a plurality of horizontal slide bars 6, 6ª, 6ᵇ, 6ᶜ, 6ᵈ, and 6ᵉ, mounted at opposite ends in individual slots in two upright supports 7. Slide bars 6ª—5ᵉ are adapted to be shifted longitudinally in various combinations by the engagement of the key levers with cams 8 on said bars. To shift elements in various combinations in this way is well known in the art, so need not be further described here.

The transmission here employed is based on the five unit or Baudot code, by which is meant that each signal interval is divided into five unit impulse periods which we call the *a*, *b*, *c*, *d* and *e* impulse periods, the signals being formed by combining impulses corresponding respectively to these periods as indicated, for example, in Fig. 8, where two complete signals are shown, one made up of a combination of the *b* and *c* impuses, and another of the *c* and *e* impulses. These are the code impulses. For each sig-

nal there is also a start impulse indicated by *s* in Fig. 8, and between the *e* impulse of each signal and the start impulse of the next succeeding signal there is inserted, in continuous transmission, a period of lag indicated by L, and which will be described in greater detail later. Where two impulse periods are adjacent, the current corresponding thereto merges and forms one elongated impulse as shown.

Slide bar 6 is for the transmission of the start impulse and is therefore operated by each of the key levers. This bar therefore has a cam corresponding to cams 8 on its lower edge for each key lever.

The key levers are returned to normal under the action of individual compression springs 9, and the slide bars 6—6^e are returned by the key levers engaging cam faces 10 slanting in an opposite direction from the cam faces which send the slides forward.

On the operation of any key, or the space bar, start slide 6 will be shifted to the right (Fig. 10). This imparts angular movement to a start lever 11, fulcrumed on a stationary supporting bracket 12, and engaging at its lower end a slot in the upper edge of start slide 6. The upper end of lever 11 normally lies behind a toe 13 on the lower end of a lever 14, as in Fig. 12, so as to cock the lower end of the latter lever outwards, or to the right, against the tension of a spring 15. When start lever 11 is rocked by slide 6 on the depression of a key, its upper end will be thrown from behind toe 13, thus permitting spring 15 to pull the lower end of lever 14 to the left, as in Fig. 13. When this occurs, an offset or lip 16 on lever 14 will engage and carry to the left the lower end of a lever 17. This latter lever has a cam or shoulder 18, which, in the normal position of the parts, rests, as shown in Fig. 12, against the end of a cam 19, so that when the lower end of said lever is thrust to the left (Fig. 10), it will turn on said cam as a fulcrum, its upper end being thrust to the right. The upper end of lever 17 is in constant engagement with a horizontal bar 20 fast to a plunger 21 slidably mounted in a tube 22 rigidly mounted in a block 23 of insulating material rigidly secured to the selector frame. The outer end of this plunger is provided with an insulating tip 21′ against which is held a contact lever 24 under constant tension of a spring 25. Fast to one face of lever 24 is a spring 24′ to which is rigidly secured a contact 26 which passes through an opening in lever 24 and is adapted to make and break contact with an adjustable stationary contact 27. The reason for mounting contact 26 on spring 24′ is to permit the lever 24 to move towards contact 27 after contact 26 has engaged contact 27, to prevent jamming. The movement of lever 17 to the right (Fig. 13) as described, acts through bar 20 to send contact 26 into engagement with contact 27, and to thus transmit the start impulse. It will not be necessary here to describe the electric circuit of this impulse further than to say that the contacts 26 and 27 may be considered in a circuit which includes an electromagnet 28 (see Fig. 3). Magnet 28, on being energized by the start impulse, will pull up its armature 29, against tension of spring 30, whereupon an extension 31 (Figs. 5–7) fast on said armature and normally lying beneath a downwardly extending toe 32 (see Fig. 4) of a lever 33, will cause said lever, acting against an offset 34 on a vertically movable stop slide 35, to remove the lower end of the latter from engagement with a stop member 36 fast to a balance 37, and release the latter, whereupon it will oscillate under the control of balance spring 38. The oscillation of this balance controls, through the medium of an anchor 39 and escape wheel 40, the step-by-step movement of a shaft 41. This shaft carries, fast thereon, a starting cam 19 and others to be presently described.

The balance and escapement timing mechanism in substantially the form herein shown and described, is described and claimed in Patent No. 1,229,201, issued June 5, 1917, so need not here be gone into in greater detail.

Lever 35 is operated by armature extension 31 against the tension of a spring 42 and is held up, out of the path of stop 36, until shaft 41 has made six steps or a half revolution, by an offset or arm 43 on said lever resting upon the periphery of a cam 44, the high part of which holds said lever up as described, while two diametrically opposite drops 45 and 46 allow said stop slide to return under the action of a spring 42 to the path of stop 36 in order to stop the oscillation of the balance at the end of a signal interval which, in this machine, corresponds to the time of a half revolution of shaft 41, said shaft making six equal steps for each such period, one for the start impulse and five for the code impulses. Cam 44 is mounted fast on shaft 41.

Shaft 41 is power driven in the following way: Mounted on the back of the frame of the machine is a continuously operating electric motor 47, driven from any desired local source of current (see Fig. 1). Through a reduction gear, motor 47 continuously drives gear 55.

Gear 55 is in constant mesh with a gear 62 (see Fig. 1) which imparts power to escapement shaft 41 through a friction drive shown most clearly in Fig. 15. Gear 62 is fast on a bushing 63 adapted to rotate on a collar 64 having a circular periphery, but a square bore, the latter adapted to fit square shaft 41 and turn therewith. Near the outer face

of gear 62 is a steel disc 65 having a square central opening through which shaft 41 passes so as to form a positive driving connection. Between this disc 65 and the web of gear 62 is a floating fiber disc 66 which may rotate either with gear 62 or with disc 65. Disc 65 is slidable longitudinally of shaft 41 and is forced towards gear 62 under tension of a spring 67. The thrust of gear 62 to the left (Fig. 15) is taken up through ball thrust bearing 68 and parts to be later described. Plates 69 and 70 are for retaining in the clutch a supply of graphite grease or other lubricant. For the present we are not concerned with the other parts of this clutch, shown on the left of gear 62 in Fig. 15.

From the description which has preceded, it will be recalled that shaft 41 is normally held against rotation. Notwithstanding this, gear 62 rotates continuously, but when slide 35 is released from stop 36, shaft 41 will rotate from the friction created between gear 62, and discs 65 and 66.

The code impulses to form the signals are transmitted by closing contacts 26—27 at times corresponding to the unit impulse periods of a signal interval, and this is effected by causing a series of five transmitting levers 71^a, 71^b, 71^c, 71^d and 71^e, to act upon universal bar 20 in combinations corresponding to the signals to be transmitted. These transmitting levers, as well as levers 14 and 17 all swing upon a common fulcrum 72 and move in individual guide slots in two cross bars 73 and 74 rigidly secured between two side members 75 and 76 of the selector frame.

While levers 71^a—71^e may turn on fulcrum 72 as a pivot, their upper ends may, by means of a slot 77 in each, travel longitudinally on said fulcrum. Each lever, however, is at all times under tension of an individual spring 78 which normally holds it in the position shown in Fig. 9 with the fulcrum rod 72 against the closed end of slot 77. Now, if pressure be applied to any one or more of these levers at a point about on a level with and in the direction of the straight arrow, Fig. 9, such lever being restrained at its upper end by spring 78 will turn on rod 72, and its lower end will swing to the right, assuming that its lower end is not restrained from this movement. If, however, the lower end of such lever is positively locked against such movement, the upper end of the lever will swing to the right against the tension of spring 78, and, acting through bar 20, will send contact 26 into engagement with contact 27. The selective operation of levers 71^a—71^e consists in restraining the lower ends of combinations of these levers against movement to the right Fig. 9 when power is applied to them as stated. The mechanism for applying said power comprises five cams 79^a, 79^b, 79^c, 79^d and 79^e mounted fast on shaft 41 and angularly displaced around the axis of said shaft one twelfth of a circumference (see Figs. 20 and 20^a), and each located in the same vertical plane with its corresponding lever of the series 71^a—71^e, and in such relation thereto that as shaft 41 rotates, the ends of these cams will engage with cam projections 80 on the respective levers in such manner as to exert force on the levers in the direction of the straight arrow Fig. 9. As shaft 41 rotates step-by-step, these cams will therefore act on levers 71^a—71^e successively, and these cams are of such length that any one of them will close contacts 26, 27 for an interval corresponding to a unit impulse period.

Cam 19 is identical in shape to cams 79^a—79^e and is staggered one twelfth of a circumference from cam 79^e on shaft 41, and occupies the angular position intermediate of cams 79a and 79^e.

The mechanism for locking the lower ends of levers 71^a—71^e against movement, to cause them to kick to the right at their upper ends as described, comprises a series of five levers 81^a, 81^b, 81^c, 81^d and 81^e, similar to start lever 11, and fulcrumed individually upon bracket 12 to turn in a plane at right angles to the movement of levers 71^a—71^e. The upper end of each lever of the series 81^a—81^e normally lies forward of and just to one side of a corresponding lever of the series 71^a—71^e, so that by shifting the upper ends of any of the levers 81^a—81^e the proper distance to the left, Fig. 10, will be brought in front of the lower end of its corresponding lever of the series 71^a—71^e, thereby acting as a stop to positively lock the movement of said levers as described. Levers 81^a—81^e are thus operated in the desired combinations, by their lower ends engaging with individual slots each in a corresponding slide bar of the series 6^a—6^e, so that by shifting these bars in combinations, corresponding levers 81^a—81^e will operate.

The slow start or lag producing mechanism.

The purpose of inserting the interval of lag, hereinbefore referred to, is to prevent the last impulse of a signal from blending with the start impulse of the next succeeding signal in order to allow time for the balance to be locked at the end of each signal and started again in the same phase position. When the machine is not operated at its maximum speed, a natural lag will be produced between successive signals due to the pauses of the operator. When the machine is operated at its maximum speed, a period of lag is automatically produced by causing a cam 82 to rotate a certain amount after the escapement shaft 41 has come to rest at the end of a signal interval, thereby causing the bottom of start control lever 14

to remain cocked to the right (Fig. 12) notwithstanding the upper end of lever 11 has been moved from behind it.

Cam 82 is fast upon a square hub portion 83′ of a sleeve 83 (Figs. 15 and 16) rotatably mounted on sleeve 64. Also fast on sleeve 83 is a steel disc 84, the inner face of which lies against a floating fibre friction disc 85 inserted between disc 84 and a face of gear 62. This arrangement is such that unless sleeve 83 is restrained, it will rotate with gear 62 by power transmitted through friction discs 84 and 85, and may thus continue to rotate after shaft 41 is stopped. Normally, however, sleeve 83, and therefore cam 82, are prevented from rotating by a projection 86 on a holding pawl 87 (Figs. 19 and 14) engaging with either shoulder 88 or 89 of a cam 90 also fast on said sleeve. The release of this holding pawl is effected by either one of two elevated portions 91, 92 on a cam 93, fast on shaft 41 (Fig. 18) operating upon a lip 94 on the said holding pawl.

At the end of a given signal, cams 90 and 93 occupy the positions shown in Figs. 18 and 19. Then on the first step of shaft 41 to transmit the next succeeding signal, high portion 91 of cam 93 acting on lip 94 will cause pawl 87 to release its holding projection 86 from shoulder 88 of cam 90, whereupon said cam and its sleeve 83 will be released and rotate from power derived from the friction clutch shown in Fig. 15. When the drop of portion 91 of cam 93 passes lip 94 of pawl 87, stop 86, under the action of spring 87′, will be placed in position to be engaged by a shoulder 95 of cam 90, and by doing so will stop the rotation of sleeve 83. Sleeve 83, therefore, will have rotated the angular distance from shoulder 88 to shoulder 95 of cam 90 (see Fig. 19), before shaft 41 completes a half revolution. Then, by the time that the escapement shaft has completed its half rotation, elevated part 92 of cam 93 will occupy the same position relative to lip 94 of the holding pawl 87 as does the elevated portion 91 in Fig. 18, thereby releasing stop 86 from shoulder 95. This will allow sleeve 83 to again take up its rotation. Stop 86, however, is at this time shifted only far enough to clear shoulder 95, but not far enough to clear shoulder 89 of cam 90, which latter shoulder engages stop 86 and arrests the rotation of sleeve 83 and consequently the rotation of cam 82. In rotating the angular distance from shoulder 95 to 89, however, which, it will be noted, takes place after shaft 41 has stopped its rotation, one of the high parts 97 of cam 82 passes extension 96 on lever 14, whereupon if a key is depressed at that time, lever 14 will drop from said high part under the action of spring 15, and extension 16 on said lever acting on start lever 17, will cause the latter to turn on cam 19 as a fulcrum and send the start impulse as described, but delayed for an interval equivalent to the time of rotation of slow start sleeve 83 after the escapement shaft has come to rest at the end of a signal interval.

Start cam 19 is the same in shape as the code cam 79^a—79^e. The angular setting of all these cams may be readily seen from Figs. 20 and 20^a.

When any key is operated, all of the keys become locked against operation until after the last impulse period of the signal interval, and this is effected by mechanism shown most clearly in Figs. 10 and 11. Directly after the slow start sleeve 83 commences to rotate, a cam 98 fast thereon starts into rotation from the position shown in Fig. 11, and allows a vertically movable slide 99 to drop under the pull of a spring 100. In doing so, a knife edge 101, carried by said slide and extending transversely across the upper edge of all the slide bars 6^a—6^e, is sent into engagement with either of two notches 102 or 103 of said bars and locks them against operation until after the end of the last impulse period of a signal. The keys are unlocked at the end of a signal by one of the high parts of cam 98 again lifting slide 99. This slide is mounted in slots in guides 73 and 74 and is provided with an extension or arm 104 upon which cam 98 operates.

In descending, knife edge 101 engages slots 102 of the operated bars, and slots 103 of the unoperated bars, as will be readily seen. The advantage of operating cam 98 from the slow start instead of from shaft 41 is that it prevents the possibility of the operator pressing a key too soon and clipping the tail off the last or *e* impulse of a signal. By the present arrangement, the keys are completely locked until after the *e* impulse is completed.

Motor cut-off.

The automatic cut off, for use on way wires whereby when the line is not in use all the motors 47 are automatically stopped and automatically started when the line is opened at any point, is shown most clearly in Figs. 3, 4, 9, 10, 23 and 24, and comprises, amongst other parts, a worm 630 near one end of shaft 54, which is constantly driven by the motor of the machine. This worm is adapted to at times engage with a tip 631 formed on an arm 632 fast to a shaft 633 adapted to rotate and slide longitudinally in the contact block 23. Fast to the other end of this shaft is an arm 634, one end of which extends into a slot 635 of lever 33, which is pivotally connected to a swinging arm 636 having an extension 637 which is held, under tension of spring 638, against the periphery of cam 639 fast on the escapement shaft 41 (see Fig. 4.) Shaft 633 carries

a metal contact sleeve 640 insulated therefrom by bushing 641 which extends at one end beyond said sleeve to form a circuit breaker. The circuit which supplies power to the motor, includes, in series therewith, a pair of spring contacts or brushes 642 and 643, which close the circuit to the motor by engaging contact sleeve 640 (see Fig. 24.).

When escapement shaft 41 rotates on the transmission or reception of a signal, the high part of cam 639 will operate upon extension 637 to shift arm 33 to the right (Fig. 4). This permits shaft 633 to rotate under the action of torsional spring 644 in such direction as to bring tip 631 of arm 632 into engagement with worm 630 whereupon shaft 633 will be shifted to the right as worm 630 continues its rotation. When the end of a signal is reached, extension 637 on arm 33 will drop into one of the depressions in cam 639, thus acting through arm 33, and arm 634 to remove tip 631 from engagement with worm 630, thus stopping the movement of shaft 633 to the right. This shifting of shaft 633 is not sufficient, however, to remove contact sleeve 640 from engagement with brushes 642 and 643. When the tip 631 has been withdrawn from worm 630 as described, shaft 633 is pushed to the left (Fig. 10) under the extensional tension of spring 644 to its starting point. However, if the circuit of magnet 28 is continuously closed, as for example, by the closing of one of the line switches 626—629 (Fig. 22), the armature arm 31 of said magnet (see Fig. 4), will continuously back up extension 32 on arm 33, thereby preventing the movement of said arm to the left when a depression of cam 639 reaches extension 637. This shifts shoulder 645 of arm 33 in such direction as to permit spring 644 to continuously hold the tip of arm 632 in engagement with worm 630. Shaft 633 will thereby be shifted so far to the right (Fig. 24) that the brushes 642 and 643 will be brought into engagement with insulating bushing 641 and thereby break the motor circuit. If then the circuit, including magnet 28 is opened, as, for example, by opening any one of the line switches 626—629 (Fig. 22), arm 31 will drop, thus permitting lever 33 to be drawn to the left and thereby acting through shoulder 645 and arm 634 to rotate shaft 633 in such direction as to remove tip 631 of arm 632 from worm 630, whereupon shaft 633 will be shifted to the left (Fig. 10) by spring 644 and contact sleeve 640 again brought into engagement with brushes 642 and 643, thus again completing the motor circuit.

By the mechanism just described whenever signals are sent over the line by closure of the contacts 26—27 the motor circuit remains closed, but when the line is closed for a greater length of time than when any signal is sent by contacts 26—27 e. g. by the closing of switch 626 the motor is stopped, but is again started as soon as the line is opened.

What I claim is:

1. In a telegraph transmitter, means for transmitting an invariable starting impulse, means to transmit thereafter a series of varying impulses, a shaft adapted to operate the means for transmitting the varying impulses, timing means to control the motion of said shaft, and a second shaft whose rate of motion is independent of said timing means to control the means for transmitting the invariable starting impulse.

2. In a transmitter, a keyboard, a pair of contacts, means to cause said contacts to transmit a series of electrical impulses, varying according to the signal to be transmitted, means to cause said contacts to transmit an impulse invariably preceding the varying impulses for each signal, said second mentioned means including means tending to close said contacts and two devices to prevent said closure, one of said devices acting to prevent the operation of said contact closing means until a certain interval after the completion of the preceding signal, and the second of said devices acting to prevent the operation of said contact closing means except when a key of said keyboard is operated.

3. In a telegraph transmitter, an electric motor to drive the same, a switch to control the motor, a magnet, means operated by said magnet to start the transmitter into operation at the beginning of each signal, automatic means to stop the transmitter at the end of each signal, and means also controlled by said magnet to operate the switch.

4. A telegraph transmitter comprising a plurality of selectable members, means for moving said members in predetermined combinations, a member common to said means and movable upon the operation thereof, a contact spring, and a pivoted lever operable upon the movement of said common member for controlling the actuation of said contact spring.

5. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a contact spring, and a pivoted lever operable upon the movement of said common member for controlling the actuation of said contact spring.

6. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a contact spring, a lever operable upon the movement of said common member for controlling the actuation of said contact spring, and means operated subse-

quently to effect the restoration of said contact spring.

7. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a contact spring, a lever operable upon the movement of said common member for controlling the actuation of said contact spring, and mechanically operable means for subsequently effecting the restoration of said contact spring.

8. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a contact spring, a lever operable upon the movement of said common member for controlling the actuation of said contact spring, and a cam effective subsequent to the movement of said common member for permitting the restoration of said contact spring.

9. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a single contact spring, a plunger operatively associated with said contact springs, and a pivoted lever operated upon the movement of said common member for controlling the actuation of said plunger to operate the contact spring.

10. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a single contact spring, a cam, and a lever operatively associated with said contact spring and said common member and fulcrumed on said cam upon the movement of said common member for controlling the actuation of said contact spring.

11. A telegraph transmitter comprising a plurality of selectable members, keys for moving said members in predetermined combinations, a member common to said keys and movable upon the operation of any one thereof, a single contact spring, a cam, a lever operatively associated with said contact spring and said common member and fulcrumed on said cam upon the movement of said common member for controlling the actuation of said contact spring, and mechanical means arranged to subsequently effect the movement of said lever whereby said contact spring is restored to normal.

In testimony whereof I affix my signature.

LOUIS M. POTTS.