

March 15, 1927.

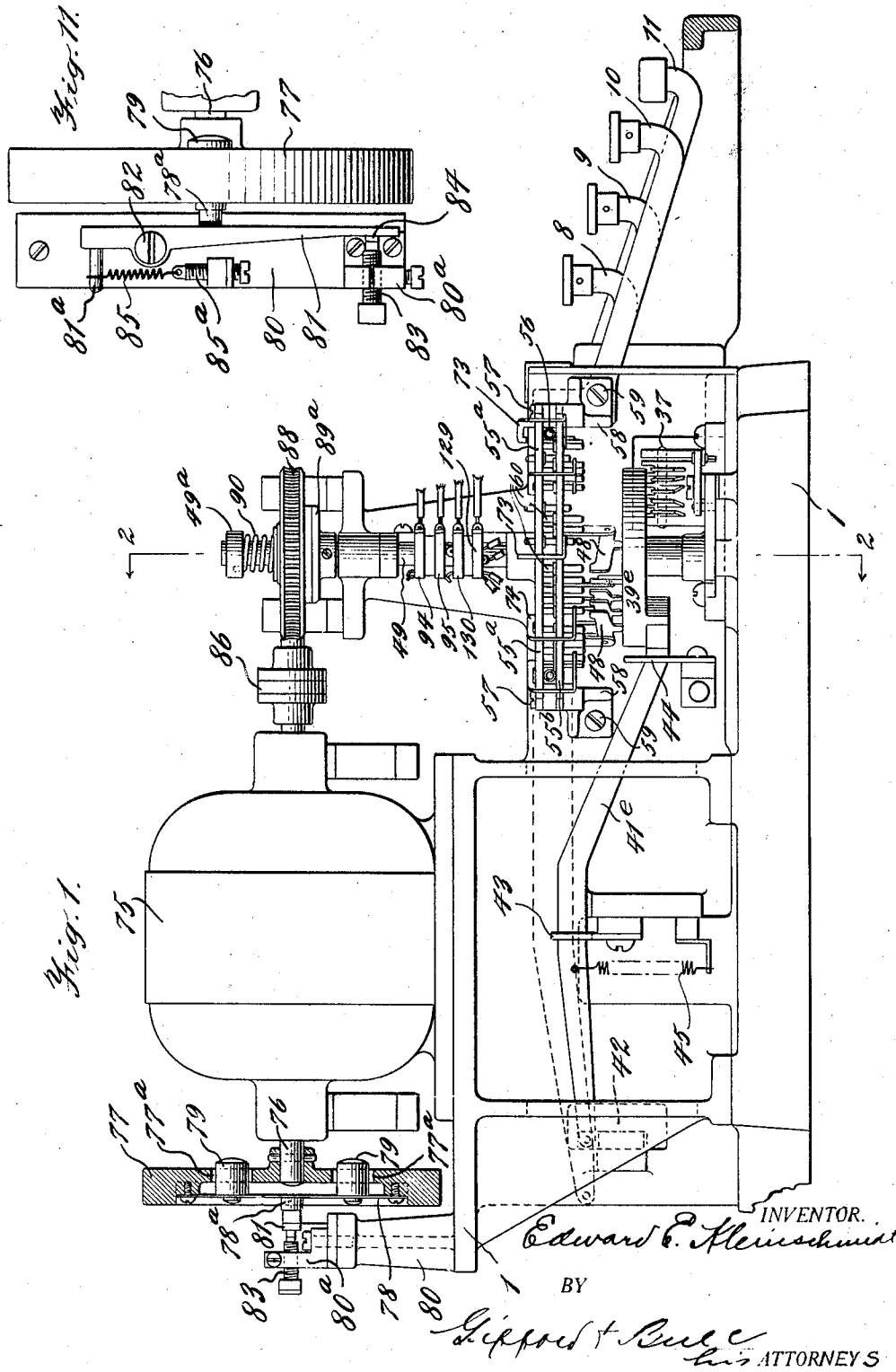
E. E. KLEINSCHMIDT

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PRINTING TELEGRAPHY

Filed Oct. 12, 1921

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E. E. KLEINSCHMIDT

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Filed Oct. 12, 1921

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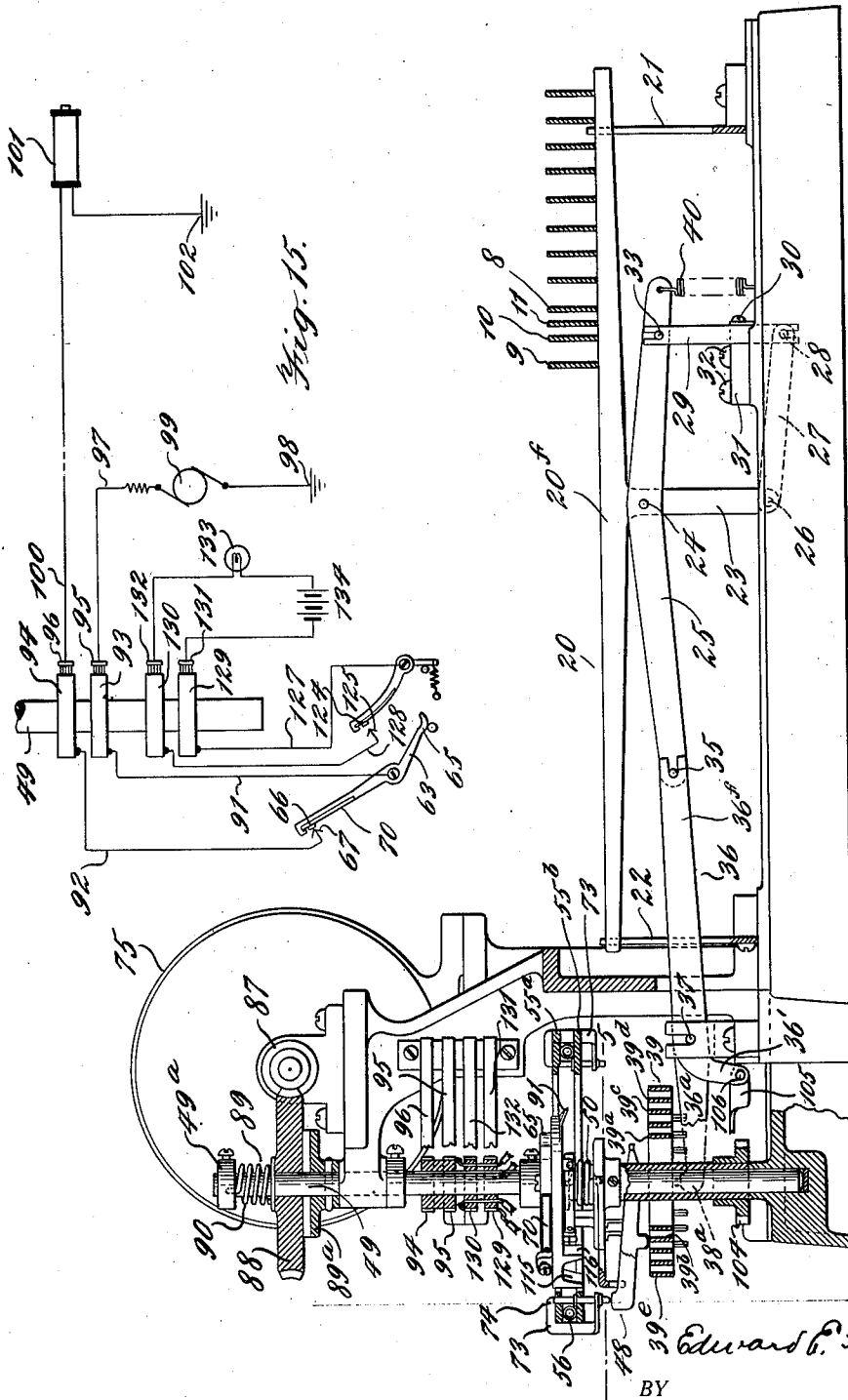


Fig. 2.

Fig. 15.

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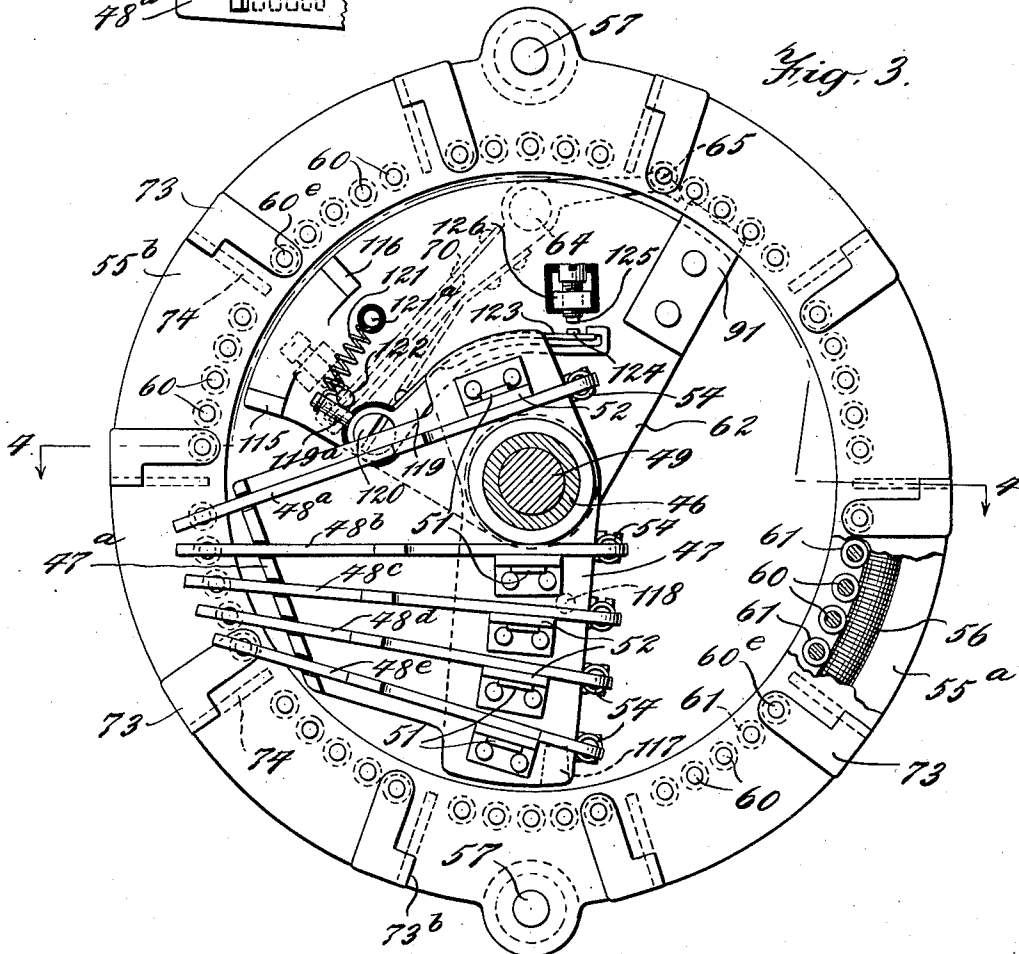
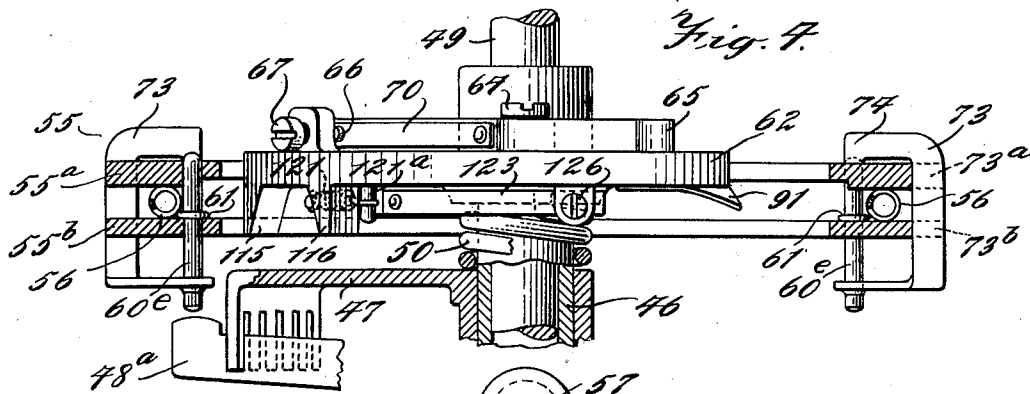
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6 Sheets-Sheet 3



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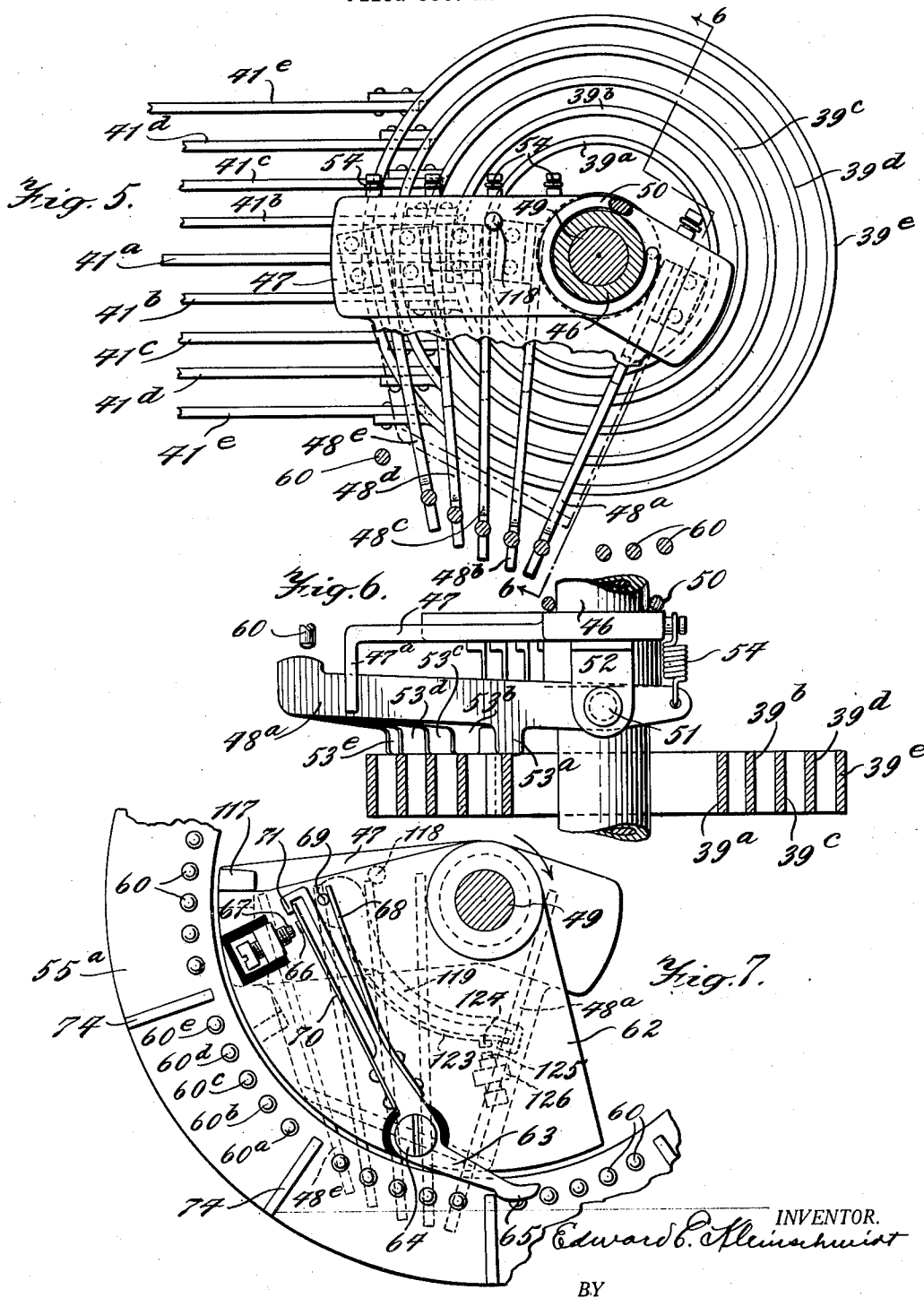
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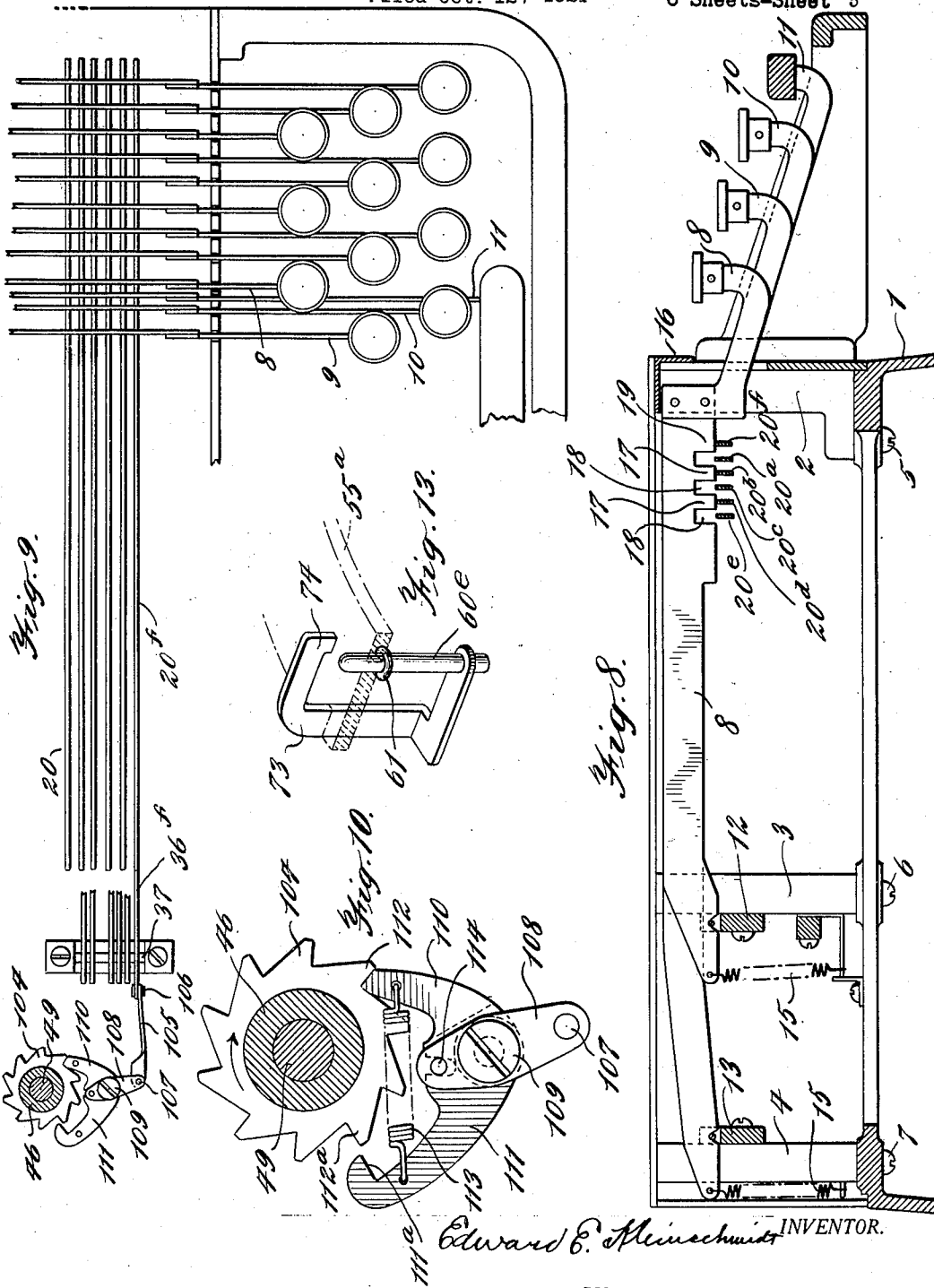
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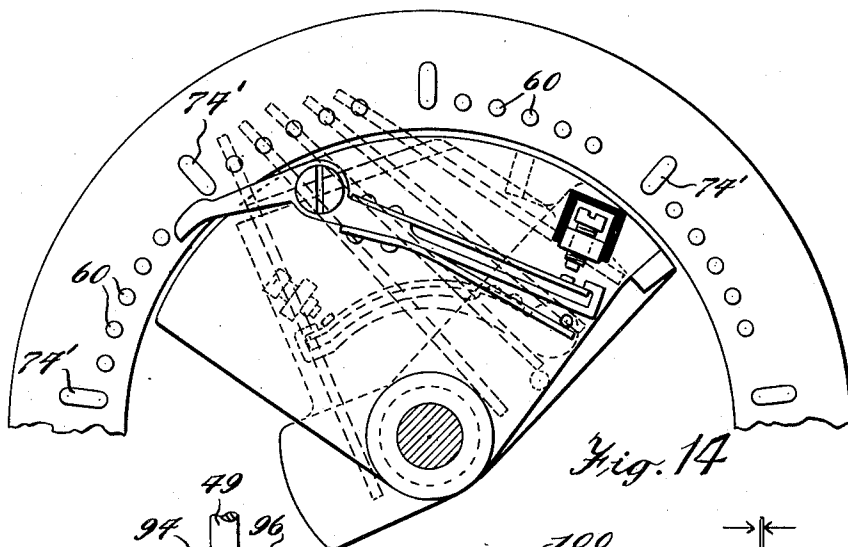


Fig. 14

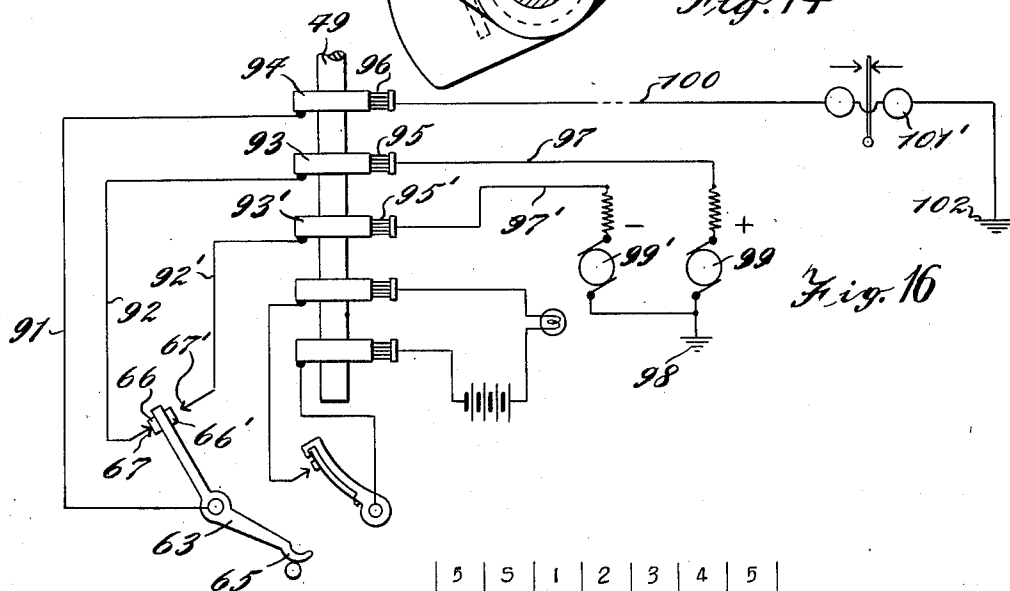
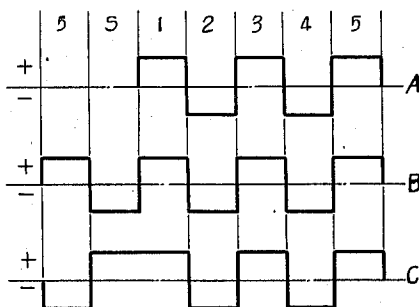


Fig. 16

Fig. 12



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UNITED STATES PATENT OFFICE.

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PRINTING TELEGRAPHY.

Application filed October 12, 1921. Serial No. 507,215.

This invention relates to keyboard transmitters for printing telegraphs of the general type shown in applicant's U. S. Patents Nos. 946,372 and 1,317,506, particularly adapted for storing signals in advance of transmission. This storing of signals was accomplished by setting up on a rotatable wheel, groups of pins representing characters to be transmitted and then advancing the wheel to co-operate with a transmitting head for transmitting a message represented by the groups of pins set in either transmitting or non-transmitting positions.

The present invention is characterized by the provision of a stationary storage element instead of the rotatable storage wheel shown in the above mentioned patents, upon which signals are stored and conveniently sent over the line by means of impulses caused by coaction between a rotatable transmitting head and the pins of the storage element representing signals.

One of the objects of the invention is the provision of a reliable and efficient transmitter in which the operation of the keyboard is independent of the transmission of the signals, whereby extreme care on the part of the operator to prevent striking keys too rapidly in succession is unnecessary.

Furthermore, by storing signals in advance of their transmission, the signals are transmitted at a constant, uniform speed, thereby permitting the operator to strike the keys fast or slow, or enabling him to pause for the purpose of changing or marking messages without effecting or stopping the transmission.

Another feature of the present invention consists in a new means for the transmission of a start impulse in advance of that of the signal impulses and of a characteristic different from that of the last signal impulse sent.

The invention will best be understood by reference to the accompanying drawings, in which one preferred form of the invention is shown, and in which Figure 1 is a side elevation, partly in section, of a telegraph transmitter embodying the invention; Fig. 2 is a sectional view taken along the line 2—2 in Fig. 1; Fig. 3 is a sectional bottom plan view of the storage member and the associated plunger-setting levers; Fig. 4—4 of Fig. 3, and showing certain parts in elevation; Fig. 5, is a sectional plan view taken along the line 5—5 of Fig. 2; Fig. 6 is a sectional elevation taken along the dotted line 6—6 of Fig. 5, looking in the direction of the arrows; Fig. 7 is a plan view of the make-and-break contact device actuated by the storage member and of the parts associated therewith; Fig. 8 is a sectional side elevation of the keyboard, illustrating the mountings for the key levers and the relations of the key levers to the combination bars; Fig. 9 is a fragmentary plan view of the key levers and the associated combination bars; Fig. 10 is a detail illustrating the escapement for actuating the setting levers; Fig. 11 is a plan view illustrating the governor for maintaining substantially constant motor speed; Fig. 12 is a diagrammatic representation of signal impulses; Fig. 13 is a perspective view illustrating a device for insuring the starting impulse having a characteristic different from that of the last group impulse; Fig. 14 is a plan view similar to Fig. 7, of a modification and Figs. 15 and 16 are diagrams of the electric connections.

Referring now to the drawings, any conventional form of key levers, such as employed on type bar typewriters, and of the character illustrated, may be used for selecting the plungers which control the impulses to be transmitted over the line wire.

In Figs. 1, 2, 8 and 9, in which one form of keyboard is shown, 1 is a frame, to which are secured standards 2, 3 and 4 by screws 5, 6, and 7, respectively. Key levers may conveniently be arranged in three banks, as illustrated, of which two of the banks of levers, 8 and 9, are pivoted on a bar 12, extending transversely of the machine, while the remaining bank 10 and the space-bar 11 are fulcrumed on a transverse bar 13, arranged at the rear of the bar 12. The key levers of the different banks are pivoted at different points longitudinally of the machine, in order to produce substantially the same vertical movement thereof where they engage the combination bars hereinafter described. The key levers are normally held in their elevated positions against a stop 16 at the front of the keyboard by individual springs 15, Fig. 8. Each key lever is provided with a plurality of lugs 17,

and intervening notches 18, Fig. 8, it being understood that the lugs and notches are differently arranged on the different key levers, thereby producing different combinations, corresponding to the code used. All of the key levers have a front lug or projecting portion, as indicated at 19, which engages and depresses the first or start selector-bar 20^f, every time when any of the key levers is depressed.

The transmitter is adapted for use with any system employing the Baudot code, and comprising various combinations of five-unit time-elements, in addition, using a special start impulse. The start impulse always precedes a group of code impulses, may be either a marking or a spacing impulse, and is always opposite in character to the last code impulse transmitted by the previous group.

Underneath the key levers, and arranged transversely thereof, are arranged the selector-bars 20^a, 20^b, 20^c, 20^d and 20^e, and the start-bar 20^f. The displacement of the selector-bars in various combinations characterizes the groups of line impulses employed in transmitting the desired signals. When, for example, the key bar 8, Fig. 8, representing letter R, is depressed, the lugs 19 and 17 thereon engage and depress the start bar 20^f and the selector bars 20^b and 20^d, while the bars 20^a, 20^c and 20^e are received in the notches 18 and are not depressed. The depression of the bars 20^b and 20^d sets up a combination of plungers in the storage member, as will be more fully hereinafter explained, by means of which the desired combination of impulses is transmitted over the line.

Referring, now, particularly to Fig. 2, the combination bars are constructed and arranged to be moved downwardly by the key levers in a parallel path. These bars are preferably guided by combs 21 and 22 located at the right and left ends of the bars, respectively, as indicated. Each of the bars is provided with a downwardly extending arm, which is pivoted at 24 to a lever 25. The lower end of the arm 23 is pivoted at 26 to one end of a link 27, the other end of which is pivoted at 28 to a standard 29, secured by a screw 30 to a bracket 31, which may, in turn, be secured to the frame 1, by screws 32. The lever arm 25 is pivoted at 33 to the standard 29, a spring 40 normally pulling down the right end of the lever 25 and tilting the same so as to elevate the bars 20. It will be apparent that, since the parts connecting the pivotal points, 24, 26, 28 and 33 form a parallelogram, the bars 20 will always be displaced parallel to themselves so that they are always depressed the same amount, regardless of the location of the point or points of the key lever by which they are engaged. While only one of each

of the parts co-operating with the six bars 20 for producing parallel movement of the bars, is shown in Fig. 8, it will be understood that corresponding parts are associated with each of the bars 20.

The rear ends of the levers 25 are pivoted, as at 35, to levers 36^f, 36^a, 36^b, 36^c, and 36^d and 36^e, indicated, in general, at 36 and only two of which, 36^f and 36^a, are shown, and which are pivoted at 37 in the frame of the machine. The rear ends 38^a, 38^b, 38^c, 38^d and 38^e of the levers 36^a, 36^b, 36^c, 36^d and 36^e engage rings 39^a, 39^b, 39^c, 39^d and 39^e, indicated, in general, by the reference character 39, which are preferably concentrically arranged, as shown, and bodily movable upwardly, and when the front ends of the levers 36 are depressed, their rear ends 38 are raised, and thereby the corresponding rings 39. The rings 39 are preferably rigidly secured to levers 41^a, 41^b, 41^c, 41^d and 41^e, one of which is illustrated in Fig. 1. The innermost setting-ring 39^a is secured to a single lever 41^a, which is secured to a center line of the ring, each of the remaining four setting-rings preferably being secured to two levers, 41^b, etc., one on each side of the center in order to prevent tilting of the rings. The levers 41^a to 41^e are pivoted in a bracket 42, and are guided near their centers by a comb 43, and at the right-hand end by a comb 44. A spring 45 is attached to each of the levers 41, to return the rings 39 to normal when the key levers are released and themselves returned by the springs 15.

An operating shaft 49 passing centrally through the rings 39, is surrounded by a loose sleeve 46, which is actuated by the shaft through helical spring 50, one end of which is secured to the sleeve and the other end of which is secured to and rotated by the shaft 49, the spring being wound before being placed in position. A plurality of fingers, 48^a, 48^b, 48^c, 48^d and 48^e, indicated, in general at 48, are pivoted at 51 to brackets 52, Fig. 6, preferably secured to the under side of a carrier-arm 47. The carrier-arm may be bent downwardly at one end, as at 47^a, to form a comb, which guides the movements of the fingers 48. The fingers 48 may be provided with downwardly extending lugs or projections 53^a, 53^b, 53^c, 53^d and 53^e so that they are moved upwardly by the upward movement of the corresponding rings, regardless of the angular positions occupied by the fingers. A light coil spring 54, Figs. 3 and 6 is attached to each of the fingers 48, to bring the lugs 53 normally into engagement with the rings 39.

The storage member, indicated, in general, by the reference character 55, comprises an upper and a lower ring 55^a and 55^b. These rings are separated by a circular coil spring 56. The rings 55^a and 55^b are secured by screws 57 to brackets 58, Fig. 1, which are,

in turn, fastened by screws 59 to upright members of the frame 1. The rings 55^a and 55^b are provided with openings in which are received plungers 60^a to 60^e, which are movable therein in a direction parallel to the axis of the shaft 49. These plungers are arranged, in the form here shown, in groups of five, corresponding to the code and while ten such groups are shown in Fig. 3, it will, of course, be understood that a greater or lesser number of groups may be employed, as desired. Each of the plungers 60 is provided with a peripheral rib 61, Fig. 4, which is located beneath the coil spring 56 when the plungers are depressed, as indicated in Fig. 4. Whenever a plunger 60 is forced upwardly, as previously described, the rib 61 moves upwardly past the diameter of the coil spring, expanding the latter as it passes the same, and when the spring again contracts, it engages the plunger beneath the rib 61 and holds the same in an elevated position.

Referring to Fig. 7, to show how the transmission is effected by the raised plungers, a carrier 62 is secured to and rotatable with the shaft 49. An arm 63 is pivoted at 64 preferably to the upper side of the carrier 62. The arm 63 is provided at one end with a shoe 65; which is arranged to engage the plungers 60 when in their elevated positions, but does not engage the plungers in their depressed positions, so that the rotation of the carrier 62, in the direction indicated by the arrow, causes the shoe 65 to engage such plungers of a given group as have been elevated, and oscillates the arm 63 once for each engaged plunger. The end of the arm 63 opposite to the shoe 65 is provided with a contact 66 which co-operates with a stationary contact 67. The contact 66 is normally held away from the contact 67 by a spring 68, secured at its inner end to the lever 63, the outer end of the spring 68 engaging a fixed stop 69. The contact 66 is preferably carried by a blade spring 70, also secured to the arm 63, the outer end of the spring 70 preferably engaging a stop 71, which may be formed at the outer end of the arm 63. It will be seen, therefore, that when the shoe 65 on the arm 63 engages one of the plungers 60, the arm 63 will bring the contact 66 into engagement with the contact 67 and thereby transmit a signal impulse, over the line, as will be more fully hereinafter explained. Jamming of shoe 65 against a selected plunger 60 is prevented and perfect contact between 66 and 67 assured by the resiliency of spring 70 and the clearance between it and its carrying arm 63.

This arrangement is particularly adapted for sending make-and-break current, its circuit connections are shown in Fig. 15. When it should be desirable to send positive and negative impulses, as for use in long

distance transmission, the circuit connection shown in Fig. 16, may be employed.

Each group of signal impulses is preceded by a single starting impulse, so that when the Baudot code is used, there will be six impulses for each group. The provision of means for transmitting signals by the use of six impulses when using Baudot code, instead of seven impulses, as usually employed, including a start and a stop impulse, increases the speed of transmission correspondingly. When only six impulses are used, however, special mechanism is required for receiving the impulses, such, for example, as illustrated in the copending application, Serial No. 432,564, filed Dec. 22, 1920. Such mechanism requires that the starting impulse should have a characteristic different from that of the last signal impulse.

The present invention is described and shown in connection with a system utilizing marking and spacing impulses, that is to say, when the plungers are in their raised positions, a marking impulse is sent over the line and when they are in their depressed positions, no impulse whatever, but for convenience, termed a "spacing impulse", is sent over the line. The special receiving mechanism above indicated requires that the starting impulse should be the opposite in character to that of the last signal impulse and, when using marking and spacing impulses, should the last signal impulse be a marking impulse, then the starting impulse must be a spacing impulse, and vice versa.

Referring, now, particularly to Figs. 3, 4 and 13, a member 73, approximately C-shaped, is rigidly secured to the last plunger 60^e of each group of plungers, and is movable up and down with these plungers, preferably guided in slots 73^a and 73^b, formed in the periphery of the rings 55^a and 55^b, respectively, of the storage member 55. The member 73 is provided with an inwardly extending radial lug or arm 74, the end of which is so arranged that when the member 73 has been raised by the raising of the associated plunger 60^e, then the arm 74 will be raised above the path of movement of the shoe 65 on the lever 63, and when the plunger and the member 73 are in their depressed position, the arm 74 will be located in the path of movement of the shoe. When the plunger 60^e, therefore, is raised for transmitting a marking impulse as the last signal impulse, the arm 74 is in its raised position and when the shoe 65 passes the arm 74, a spacing impulse or no impulse, will be sent over the line. On the other hand, when the last group plunger 60^e is in its depressed position, a spacing impulse will be sent over the line, as the shoe 65 moves over the plunger 60^e. The shoe 65 imme-

diately thereafter engages the arm 74, which is now in its depressed position, and transmits a marking impulse. It will be seen, therefore, that the starting impulse is always of a different characteristic from that of the last signal impulse.

An alternative arrangement may be employed in systems using extra impulses for stopping and starting the receiving apparatus, that is, when seven impulses are transmitted for each character, one for starting the receiving apparatus, five code impulses and one for stopping the apparatus. In such an arrangement, the member 73 connected to and movable with plunger 60° is omitted, and the plunger 60° is of the same form and performs the same functions as the other plungers. To send the stopping and starting impulses in a seven unit system, according to the arrangement shown in Fig. 14, the seventh or last plunger is entirely left off and the group of code plungers 60, is preceded by a stop 74¹, corresponding to a permanently raised plunger, whereby every group of code impulses is always preceded by a starting impulse of marking polarity.

Fig. 12 discloses in diagram A the characteristic code impulses of the letter R, as now generally used in printing telegraphy. Diagram B shows the same letter following a letter in which the last or fifth code impulse was a positive or marking impulse, and the starting impulse, according to the present invention is, therefore, a negative or spacing impulse. Diagram C shows the same letter following a letter in which the last or fifth code impulse was a negative or spacing impulse, the starting impulse for the letter "R", therefore, is a positive or marking impulse.

In accordance with this invention, power means are provided for operating the transmitting mechanism. The setting-up mechanism for the plungers may be actuated at a greater speed than the transmitting mechanism, and the transmitting mechanism may thus operate at a uniform rate and is not subject to disturbance by any momentary interruption of the setting-up mechanism.

Referring, now, particularly to Figs. 1 and 11, the speed of the transmitting mechanism is preferably maintained at a substantially constant rate by an electric motor 75, which may be controlled by a centrifugal governor, opening and closing a shunt around a resistance in series with the motor armature (the details of which are not illustrated in the drawings). Secured to the armature shaft 76 of the motor is a flywheel 77 on one side of which is mounted a flat spring 78 secured at its ends, as indicated in Fig. 1, and on which are secured two weights 79, projecting through opening 77^a in the flywheel. A bracket 80 is mounted on an upright member 65 of the frame 1 and supports a contact arm

81, pivoted at 82. A contact-screw 83 is mounted on a bracket 80^a, and co-operates with a movable contact 84, carried on the contact-arm 81, while a spring 85 attached to a pin 81^a on the arm 81 and to an adjustable screw 85^a, Fig. 11, tends to keep the contacts 83 and 84 open. A lug or button 78^a is secured to the central portion of the spring 78 and is located opposite the contact-arm 81 and controls the opening and closing of the contacts 83 and 84, and thereby the speed of the motor, through the action of the movable weights 79.

The shaft 76 of the motor 75 is connected by a coupling 86 to a worm 87 which meshes with a worm-wheel 88, loosely mounted on the shaft 49. A friction-clutch, indicated, in general, at 89, is interposed between the worm-wheel 88 and the shaft 49, and preferably comprises a spring 90, interposed between the friction-plate or clutch member, engaging the worm and a collar 49^a, on the shaft 49, Fig. 2. The friction-clutch may also comprise a second friction-plate 89^a secured to the shaft, and located beneath the worm-wheel 88. The amount of friction between the clutch and the worm-wheel 88 may be adjusted by means of the collar 49^a. When the carrier 62 is free to rotate, it is rotated by the shaft 49, and thereby the shoe 65 of the arm 63 passes over a given group of plungers and transmits marking or spacing impulses, in accordance with the positions of the plungers.

After a given signal has been transmitted, it is necessary to return to normal position the plungers of the given group, in order that they may be in the proper position to be selected for another combination. The return of the plungers is brought about by a cam plate 91 secured to the under side of the plate 62 and located immediately behind the shoe 65 of the arm 63. The leading edge of the cam-plate 91 extends above the ribs 61 on the plungers 60, and engages the ribs of such plungers as are in an elevated position and depresses them, bringing the ribs below the coil spring 56.

The transmitting contacts 66 and 67 are connected by conductors 92 to slip-rings 93 and 94, respectively, mounted upon the shaft 49, Fig. 15. Connection is preferably made from the slip-ring 93 by a sliding brush 95 to a conductor 97, which may be grounded at 98 and in which is included a suitable source of electric energy 99. The slip-ring 94 is connected to the line conductor 100 by means of a brush 96, and at the receiving end the line is connected to ground 102 through relay 101.

Referring, now, particularly to Figs. 9 and 10, 104 is an escapement wheel secured on the loose sleeve 46 surrounding shaft 49, as heretofore described. The escapement-wheel 104 is controlled by the start-bar 20^c,

through the levers 25 and 36, the latter preferably being bent down at its outer end, as at 36', Fig. 2. A link 105 is pivoted at one end to the bent end 36' and the other end is connected as at 107, to an arm 108, which is, in turn, pivoted to the frame, as at 109. The arm 108 co-operates with two pallets 110 and 111, Fig. 10, the pallet 110 being shown in Fig. 10 in engagement with a tooth 112 of the escapement wheel 104. The two pallets 110 and 111 are resiliently connected together by a coil spring 113. The end of the arm 108 is provided with a pin 114, which is received between the pallets 110 and 111, Fig. 10. When the start-bar 20' is depressed, therefore, the movement of the lever 25 turns the lever 36' clockwise, Fig. 2, thereby moving the bent end 36' to the left and rocking the lever 108 clockwise, Fig. 10, so as to move the pallet 110 to the right to disengage it from the tooth 112. At the same time, the spring 113 will pull the pallet 111 to the right, thereby bringing the detent 111^a into engagement with the tooth 112^a, to prevent substantial rotation of the escapement-wheel 104 in the direction of the arrow. When the selector-bar 20' is released and elevated to its normal position, the link 105 is moved to the right and the lever 108 rotated in the reverse direction. The pin 114 on the lever 108 will then move the detent 111^a on the pallet 111 out of engagement with the tooth 112^a and permit the escapement-wheel to rotate until the pallet 110 engages the next succeeding tooth. The teeth on the escapement-wheel correspond in number to the groups of plungers, so that each time the escapement-wheel is released, the member 47 and the setting-up fingers carried thereby, are rotated through the angular distance corresponding to one of the groups of plungers, it being understood, of course, that the escapement wheel and associated parts are so designed that when one of the teeth of the escapement-wheel is in engagement with the pallet 110, the ends of the fingers 48 will register with the pins of the given group.

In order to prevent the transmission from coming into the same group of plungers as the setting fingers, or vice versa, which would cause mutilation of a signal that has been set-up but not as yet transmitted, means are provided, associated with the plate 62 and carrier 47, which will now be described. Referring more particularly to Figs. 3, 4 and 7, on the under side of the plate 62 are two stop-lugs 115 and 116, while on the top side of the carrier 47 is an upwardly projecting stop-lug 117. In operation, when the carrier 47 is stopped, the carrier 62 will continue to rotate until the stop-lug 117 is brought into engagement with the lug 115, when the transmission will be stopped until the carrier 47 is again started. After

the setting-up fingers 48 have been stepped along until they have caught up with the transmission, they will be stopped by the lug 117 on the carrier 47 coming into engagement with lug 116 on the plate 62.

In accordance with this invention, a signal is preferably provided for giving an indication to the operator when the setting-up mechanism has nearly overtaken the transmitting mechanism. For this purpose, a pin 118 is preferably secured to the carrier 47, and on the bottom of the plate 62 is provided an arm 119, pivoted at 120. The arm 119 may be provided with a laterally extending stud or pin 119^a, to which is connected a spring 121, the other end of the spring being secured to a pin 121^a on the carrier 62. The spring 121 normally holds the stud 119^a in engagement with a stop 122. On the arm 119 is a flat spring 123 provided at its free end with a contact 124, which co-operates with a fixed contact 125 adjustably mounted in a stud or bracket 126. When the lever 119 is held by the spring 121 in the position indicated in Fig. 3, the contacts 124 and 125 are open. The contacts 124 and 125 are connected by conductors 127 and 128 to slip-rings 129 and 130, respectively, mounted on the shaft 49. The slip-rings are connected by brushes 131 and 132 to a circuit, including an indicator, which is here illustrated as an electric lamp 133, a suitable source of energy, such as a battery 134, being included in the circuit. When the setting-up mechanism has nearly caught up to the transmission mechanism so that, for example, only three groups of plungers intervene between the two mechanisms the pin 118 will ride behind the contact-lever 119, thereby pressing the contact 124 into engagement with the contact 125 to close the signal circuit.

The operation of the device is as follows:

The depression of any one of the key levers 8, 9 or 10 displaces certain of the bars 20 in a combination corresponding to the particular key depressed. For example, if the key bar R is depressed, then the combination bars 20^b, 20^a, will be depressed, and also the bar 20, since the latter is depressed by every key bar, while the bars 20^a, 20^c, 20^e will remain in their elevated positions. The depression of the bars 20^b and 20^a will rock the levers 36^b and 36^a in the manner described, thereby elevating the rings 39^b and 39^a, which will, in turn, raise the fingers 48^b and 48^a, thereby raising the plungers 60^b and 60^a of the particular group beneath which the fingers happen to rest. At the same time, the depression of the bar 20 causes the release of the setting-up mechanism by releasing the escapement-wheel 104 through the described action of the pallet 110 and 11, thereby permitting the member carrying the setting-up fingers to be carried

to the next group. Now, when the rotation of the transmitting mechanism brings the shoe 65 of the lever 63 opposite the group that has been set up, the shoe 65, in passing the plunger 60^a, will not be actuated, since this plunger is in a depressed position, and a spacing impulse is sent over the line. To be exact, no impulse is sent over the line at this time, the receiving mechanism being arranged, in a known manner, to respond to marking impulses and spacing impulses; the expression "spacing impulses" being used as a convenient way of stating that at this time no impulse is sent. The shoe then engages the plunger 60^b, which was raised, thereby actuating the arm 63 and closing the contacts 66 and 67 to send a marking impulse over the line. Similarly, as the shoe 65 passes the plunger 60^c, a spacing impulse will be sent, in passing the plunger 60^d a marking impulse will be sent and in passing the plunger 60^e a spacing impulse will be sent. Since the last group plunger 60^e is in a depressed position to send a spacing impulse, the member 73 is depressed and the arm 74 is brought into the path of movement of the shoe 65, thereby closing the contacts 66 and 67 to send a marking impulse as the start impulse, which impulse is the opposite in characteristic from the last group impulse.

In the event of sending positive and negative impulses, an additional contact 66' must be provided on lever 63, Fig. 16. In this case contacts 66 and 66' of lever 63 are connected over conductor 91 to ring 94 on shaft 49, and by means of brush 96 over line 100 to the receiving station and through a polarized relay 101' to ground 102. At the sending station contacts 67 and 67' are connected to poles of opposite polarity of the sources of electrical energy 99 and 99' and to ground 98.

It is obvious that with this arrangement impulses of opposite polarity can be sent over the line to the receiving station, depending upon the position of lever 63 according to the raised or depressed plungers 60.

During normal operation, the transmitting mechanism is operated at a continuous rate, while the setting-up mechanism may be operated at a rate greater than that of the transmission. Whenever the setting-up mechanism nearly catches up with the transmitting mechanism, so that only three groups of plungers intervene between the two mechanisms then the pin 118 rocks the arm 119 in the described manner, thereby closing the contacts 124 and 125, of the circuit of the signal 133, to give the operator notice that the setting-up mechanism has nearly overtaken the transmitting mechanism.

What is claimed, is:—

1. A transmitter comprising a stationary

storage member provided with a plurality of groups of circuit controllers, movable means for setting up combinations of said circuit controllers, and movable means for transmitting code impulses in accordance with the positions of said controllers.

2. A transmitter comprising a stationary storage member provided with a plurality of groups of circuit controllers, means movable at varying speeds for setting up combinations of said circuit controllers, and means movable at a substantially constant rate for transmitting code impulses in accordance with the positions of said controllers.

3. A transmitter comprising a stationary storage member provided with a plurality of groups of movable circuit controllers, rotary means comprising a plurality of movable members for engaging and setting up controllers of the groups in code combinations, and means for transmitting code impulses in accordance with the positions of said controllers.

4. A transmitter comprising a stationary storage member provided with a plurality of groups of control members, a stationary keyboard mechanism, movable means controlled by said keyboard mechanism for setting up controllers of the groups in code combinations, and means coacting with said controllers for transmitting line impulses.

5. In a printing telegraph, a stationary storage member provided with a plurality of groups of plungers, rotary means comprising a plurality of members for setting-up plungers of the groups in code combinations, means for actuating said members comprising a plurality of selecting rings, means for moving said rings in desired combinations, and means for transmitting line impulses in accordance with the positions of said plungers.

6. In a printing telegraph, a stationary storage member provided with a plurality of groups of plungers, rotary means comprising a plurality of members for setting-up plungers of the groups in code combinations, means for actuating said members comprising a plurality of concentrically-arranged selecting rings, means for moving said rings in desired combinations, and means for transmitting line impulses in accordance with the positions of said plungers.

7. In a printing telegraph, an operating shaft, a stationary storage member provided with a plurality of groups of movable plungers, rotary means actuated by said shaft and comprising a plurality of members for setting-up code combinations of said plungers, a plurality of selecting rings surrounding said shaft and engaging the respective fingers, means for moving said rings in desired combinations, and means for transmitting line impulses in accordance with the positions of said plungers.

8. In a printing telegraph, an operating shaft, a stationary storage member surrounding said shaft and provided with a plurality of groups of movable plungers, rotary means comprising a plurality of members for setting-up code combinations of said plungers, means for actuating said members comprising a plurality of rings concentrically arranged around said shaft and movable longitudinally thereof and engaging the respective members, means for actuating desired combinations of said rings and thereby setting-up desired combinations of said plungers, and means for transmitting line impulses in accordance with the positions of said plungers.

9. In a printing telegraph, a storage member comprising a plurality of groups of movable plungers, means for setting-up the plungers of said groups in code combinations, means for transmitting line impulses of different characteristics depending upon the positions of said plungers, and means for transmitting a start impulse having a characteristic different from that of the last group impulse.

10. In a printing telegraph, a storage member comprising a plurality of groups of movable plungers, means for setting-up the plungers of said groups in code combinations, means for transmitting line impulses of different characteristics depending upon the positions of said plungers, and means associated with the last plunger of a group for transmitting a start impulse having a characteristic different from that of the last group impulse.

11. In a printing telegraph, a storage member comprising a plurality of groups of movable plungers, means for setting-up the plungers of said groups in code combinations, means for transmitting line impulses of different characteristics depending upon the positions of said plungers, and means comprising a member secured to and movable with the last plunger of each group for transmitting a start impulse having a characteristic different from that of the last group impulse.

12. In a printing telegraph, a stationary storage member comprising a plurality of groups of movable plungers, means for setting-up the plungers of said groups in code combinations, means for transmitting line impulses of different characteristics depending upon the positions of said plungers, and means for transmitting a start impulse having a characteristic different from that of the last group impulse.

13. In a printing telegraph, a rotary member, contacts thereon for transmitting line impulses, a fixed storage member located adjacent to said rotary member and provided with a plurality of groups of movable plungers, means for setting-up the plungers of

said groups in predetermined combinations, a member associated with the last group plunger and movable therewith, and means coacting with said plungers and the member associated with the last group plunger for transmitting line impulses.

14. In a printing telegraph, a shaft constantly tending to rotate a fixed storage member comprising a ring surrounding said shaft and provided with a plurality of groups of movable plungers, a keyboard mechanism, means rotatable by said shaft and provided with a plurality of movable members operable by the keyboard mechanism in any position of said members for setting-up the plungers of said groups in code combinations, and means rotatable by said shaft for transmitting line impulses in accordance with the positions of said plungers.

15. In a printing telegraph, a stationary storage member provided with a plurality of groups of circuit controllers, movable mechanism for setting-up combinations of said circuit controllers, mechanism movable relatively to said setting-up mechanism for transmitting code impulses in accordance with the positions of said controllers, and means for preventing interference between said setting-up mechanism and said transmitting mechanism.

16. In a printing telegraph, a stationary storage member provided with a plurality of groups of movable circuit controllers, rotary means for setting-up combinations of said circuit controllers, and means rotating at a slower speed than the setting-up means for transmitting line impulses in accordance with the combinations of controllers set-up.

17. A transmitter for transmitting code combinations of electrical conditions comprising a single movable contact carrying member, a keyboard mechanism, means actuated by said keyboard mechanism for controlling said contact carrying member in accordance with the code combinations to be transmitted, and means for actuating said contact carrying member to precede each code combination with a condition differing from the last condition of the immediately preceding code combination.

18. A transmitter for transmitting code combinations of electrical conditions comprising contact carrying means, a keyboard mechanism, solely mechanical means actuated by said keyboard mechanism for controlling said contact carrying means in accordance with the code combinations to be transmitted, and means for preceding each code combination with a condition differing from the last condition of the immediately preceding code combination.

19. The combination as set forth in claim 18 in which said solely mechanical means comprises a plurality of groups of members

controlled by said keyboard mechanism to store a plurality of succeeding code combinations.

20. The combination as set forth in claim 18 in which said solely mechanical means comprises a plurality of groups of members controlled by said keyboard mechanism to store a plurality of succeeding code combinations, together with means for operating said contact carrying means at a uniform rate of speed to transmit successive code combinations independently of the rate of operation of said keyboard mechanism.

21. The combination as set forth in claim 18 in which said contact carrying means comprises a single contact carrying member.

22. Apparatus for transmitting code combinations of marking and spacing conditions comprising a keyboard mechanism, a storage mechanism upon which a plurality of code combinations may be simultaneously set up by said keyboard mechanism, transmitting contact mechanism actuated by said storage mechanism in accordance with the code combinations set up thereon, and means for preceding each transmitted code combination with a condition the nature of which is determined by the last condition of the preceding code combination.

23. The combination as set forth in claim 22 in which said transmitting contact mechanism comprises only one movable contact carrying member.

24. The combination as set forth in claim 23 in which said transmitting contact mechanism comprises only one movable contact carrying member, and in which said keyboard and said storage mechanisms comprise solely mechanical means.

25. In a telegraph system, a signal storing transmitter comprising stationary means, a series of groups of permutation elements slidably supported in apertures in said stationary means, a rotary carrier, a set of selectable setting up members mounted on said carrier for successive engagement with said groups of permutation elements, a rotatable transmitting carrier, and circuit closing means positioned on said transmitting carrier for engagement successively

with the set groups of permutation elements.

26. The combination as set forth in claim 25, together with yieldable means for holding the permutation elements in any set position.

27. The combination as set forth in claim 25, together with means for rotating said carriers independently of each other.

28. A transmitter comprising a plurality of groups of permutation elements, a plurality of setting up members for said permutation elements, a universal member individual to each setting up member, and means for shifting said universal members to actuate said setting up members to set said permutation elements in combinations.

29. A storing transmitter comprising stationary means, a plurality of groups of permutation elements mounted in said stationary means, a rotatable carrier, a plurality of setting up members mounted on said rotatable carrier, setting up members for said permutation elements carried by said rotatable carrier, stationary actuating members individual to said setting up members, and means for operating said stationary actuating members to shift said setting up members in combinations, to set said permutation elements in accordance with signals to be transmitted.

30. The combination as set forth in claim 29 in which said stationary actuating members comprise rings engaging said setting up members.

31. A storing transmitter comprising storing means embodying a plurality of permutation elements, means for setting up said permutation elements in accordance with the signals to be transmitted, means actuated by said permutation elements to transmit code combinations of electrical conditions, and means to give an indication when said setting up means approaches said transmitting means.

Signed at Brooklyn, in the county of Kings and State of New York, this first day of October, 1921.

EDWARD E. KLEINSCHMIDT.