

April 19, 1932.

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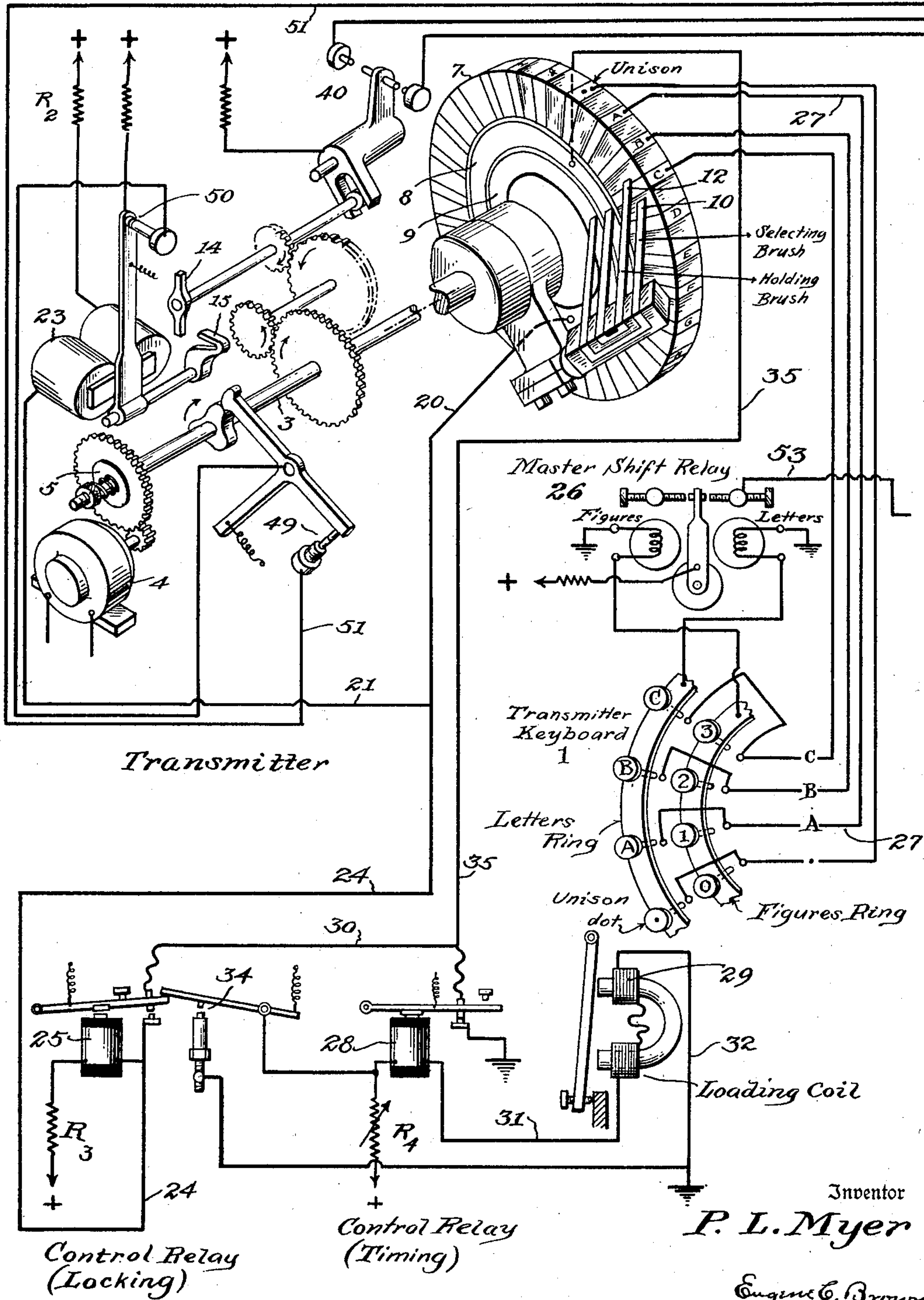
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AUTOMATIC TIMING CONTROL FOR MANUALLY OPERATED TRANSMITTERS
FOR TICKER OR STEP-BY-STEP TELEGRAPH SYSTEMS

Filed April 14, 1931

2 Sheets-Sheet 1

Fig. 1.



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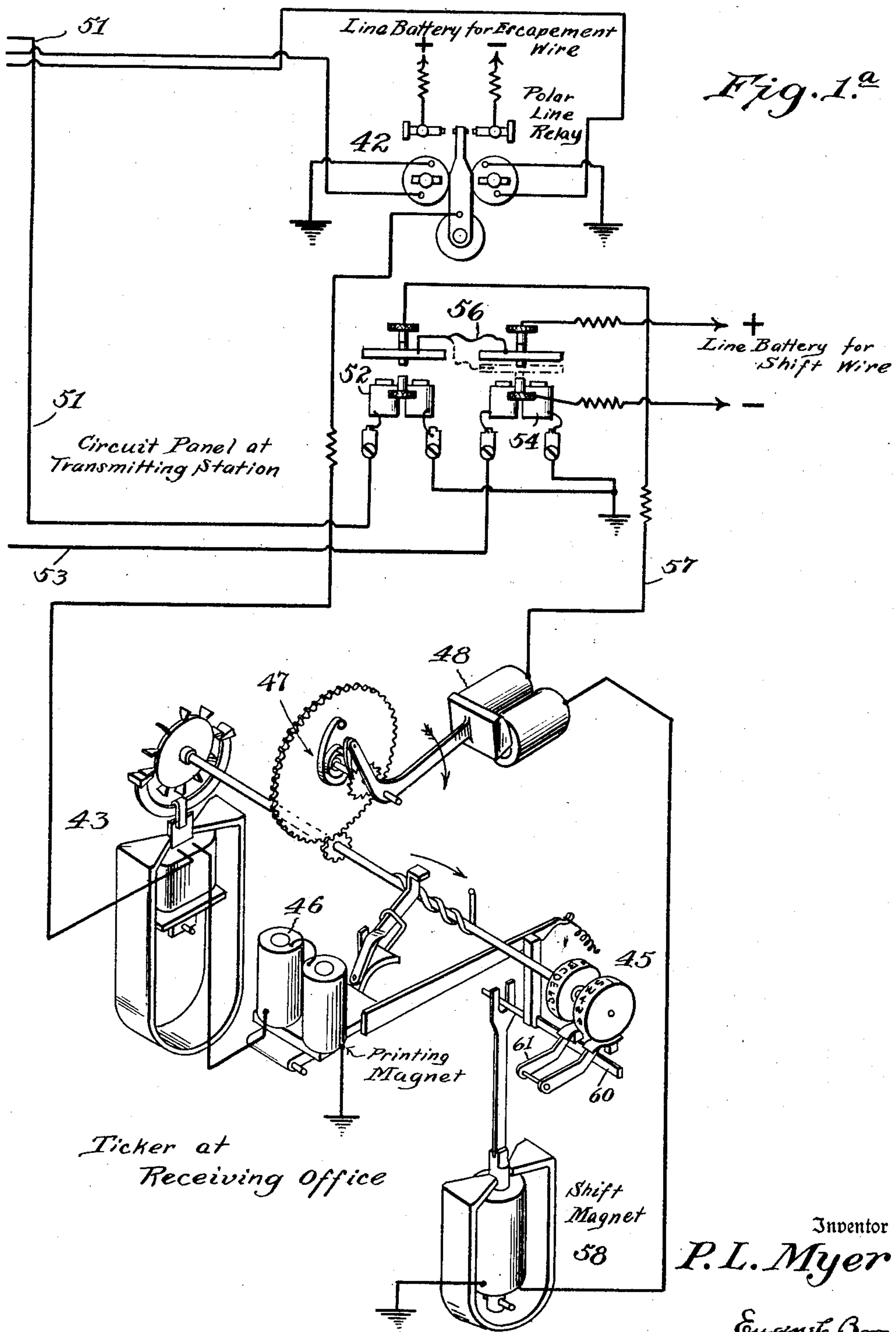
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FOR TICKER OR STEP-BY-STEP TELEGRAPH SYSTEMS**

FOR TICKER OR STEP-BY-STEP TELEGRAPH SYSTEMS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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AUTOMATIC TIMING CONTROL FOR MANUALLY OPERATED TRANSMITTERS FOR TICKER
OR STEP-BY-STEP TELEGRAPH SYSTEMS

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This invention relates to ticker systems and other step-by-step telegraph systems and particularly to means for automatically controlling the length or duration of the impulses transmitted from a manual keyboard.

There are at present in use several types of ticker transmitting apparatus in which the duration of the impulses transmitted over the line to the tickers is directly dependent upon the touch of the keyboard operator. In order that the number of impulses corresponding to the selected character shall be transmitted, the operator must depress the corresponding key until the trailer brush rotates over the segments of the selector head of the transmitter to the segment connected to the depressed key, whereupon a circuit is established to energize the "stop" magnet, thereby stopping the brushes and causing a printing signal to be transmitted over the ticker circuit. The duration of this printing signal may be short or long depending upon the length of time the key remains depressed after the trailer brush reaches the circuit closing segment.

When the tickers are operated locally it is possible to adjust them so that they respond properly to the direct control of the keyboard operator at the transmitter. However, when the ticker circuits extend over long distances, the service has not been altogether satisfactory. The principal difficulty has been due to occasional or frequent short printing signals which an operator is liable to transmit unconsciously. These short signals may be of sufficient duration to cause the local pilot tickers near the operator to properly print the transmitted characters and yet they may not be of sufficient duration to cause all of the tickers to respond properly.

In addition to the difficulty above referred to it occasionally happens that the keyboard operator depresses a key at the instant the trailer brush is about half way across the segment to which the key is connected. In this case, the "stop" magnet responds but instead of transmitting the desired long impulse for printing the selected character, a short printing impulse is transmitted for the next succeeding character.

The object of my invention is to provide means for invariably transmitting a signal of a predetermined minimum duration; and also to render impossible the accidental transmission of a printing impulse for a character following the one for which the key is depressed.

In the following detailed description I shall refer to the diagrammatic illustration in Figs. 1 and 1^a showing a ticker system having a transmitting apparatus embodying my improvements and a standard ticker at the receiving station of the usual type.

While the ticker shown in the diagram prints on a tape or ribbon of paper the scope of this invention is not limited thereto. There are other step-by-step operated printing instruments which print on a page to which this principle will also apply. This method of control applies broadly to any step-by-step printing telegraph instrument which requires for its operation a succession of impulses to step a typewheel to a selected position and followed by a longer impulse to effect printing of the character thus selected.

The accompanying diagrams show the keyboard as a separate unit apart from the transmitter. The scope of this invention is not limited, however, to this arrangement as both keyboard and transmitter may be combined in one unit employing the means of control herewith disclosed.

The keyboard 1 of the transmitter, the actuating mechanism for operating the transmitter to send out the proper signal impulses over the ticker circuit together with the master shift relay and polarity controlling relays on the circuit panel of the transmitting station are all well known and their operation is well known by engineers familiar with stock ticker apparatus. The features embodied in my invention comprise a special selector head, trailer brushes arranged to cooperate therewith in association with timing and locking relays for determining the duration of the printing signals.

The shaft 3 carrying the brushes which move over the selector head is driven as usual

by an electric motor 4 through a friction clutch 5.

The selector head is constructed with a peripheral segmented ring 7 consisting of narrow metal segments separated by comparatively wide insulating segments. Within the segmented ring are two continuous inner rings 8 and 9 which serve as a means of making electrical connection with the brushes 10 and 12 that bear on the segmented ring. The outer shorter brush 10 may be designated as the selecting brush and the inner longer one 12 as the holding brush. The mechanical relationship between the brushes setting, the selector head segments and the stop clip 14 should be substantially as shown in the diagram. As indicated in Fig. 1, the selecting brush 10 has just passed off of the conducting segment C and the stop clip 14 is in a vertical position, having about 90 degrees to travel before it engages the stop arm 15. The holding brush 12 is just about to make contact with the C segment. When the stop clip 14 engages with the stop arm 15, the holding brush 12 will be in contact with the segment C and the selecting brush 10 will be about two-thirds of the distance across the insulating segment. It will thus be evident that an impulse received through the selecting brush is of very short duration but that this impulse which is received by the stop magnet is in ample time to move the stop arm 15 into position to be engaged by the stop clip.

Particular note should here be made that the selecting brush 10 rests on insulation when the stop clip 14 engages with the stop arm 15. This detail is a distinct departure from the general practice. In the usual arrangement of selector head and trailing brush the conducting segments are wide and the insulation between segments narrow. When a key is depressed by the operator and the trailing brush reaches the energized segment, a circuit is established and maintained from battery through the selecting brush and stop magnet to ground as long as the key is depressed. With this arrangement it is obvious that a key may be depressed while the selecting brush is on the last part of the conducting segment in which case the stop arm 15 would respond to its impulse after the stop clip 14 had rotated beyond the proper point of engagement. In this case the stop clip 14 makes another half revolution and engages for an instant for the next impulse thereby transmitting a short clippy printing impulse to the line for the character following the one for which the key was depressed. In the means herewith described the selecting brush 10 makes contact with the conducting segment for only such time as will permit the actuation of the stop magnet 23 sufficiently early to allow ample time after the selecting impulse had been received, for the stop arm 15 to be drawn into its position of en-

gagement. The establishment of a selecting circuit at any other time is made impossible by having the selecting brush pass on to the insulation while the stop clip 14 is rotating the 90 degrees previous to its engagement with the stop arm 15.

The method of maintaining a circuit through the stop magnet after it receives an impulse through the selecting brush will now be described. The inner solid ring 9 is connected through a circuit including conductors 20, 21, winding of stop magnet 23, and resistance R_2 to positive battery. A circuit connection is also made from said ring 9 through conductor 24, winding of locking control relay 25 and resistance R_3 to positive battery. Suppose now that the A key is depressed, then as the selecting brush 10 passes over the A segment, a circuit is established from ground, through the letters coil of the master shift relay, through the letters ring, the A contact, conductor 27, the A segment, selecting brush 10, solid inner ring 9, conductor 20, conductor 21 and stop magnet 23 to positive battery; and also through conductor 24 and control locking relay 25 to positive battery. Thus the control relay 25 receives the selecting impulse simultaneously with the stop magnet and moves its armature to its front contact.

It will be noted that the armature of locking relay 25 is electrically connected by conductor 30 with the armature of timing control relay 28, and that said relay 28 normally holds its armature against its front contact, being normally energized by a circuit from positive battery, through resistance R_4 , through the winding of relay 28, conductor 31, through adjustable loading coil 29, and conductor 32 to ground. The front contact of relay 25 is connected through conductors 24 and 20 to the inner ring 9 of the selector head.

When the armature of the locking control relay 25 is moved to its front contact, as above described, a circuit is established from ground at the front contact of timing control relay 28, through conductor 30, armature and front contact of relay 25, and from this point over two channels to positive battery. Over one channel through the coils of relay 25, and resistance R_3 to positive battery and over the other channel through conductors 24 and 21, stop magnet 23 and resistance R_2 , to positive battery. Thus both relay 25 and stop magnet 23 are energized and remains so until released in the manner now to be described.

The armature of relay 25 controls the operation of a set of contacts 34, which close each time the armature of relay 25 moves against its front contact. These contacts 34 establish a short-circuit about the relay 28 and the loading coil 29 which causes them to discharge their magnetism. This discharge action requires a fixed interval of time depending upon the current flowing in

the circuit and the reactance of the relay and the loading coil. The latter may be varied by adjusting the air-gap between the armature and core of the coil. The interval between the short-circuiting of the relay 28 and the release of its armature may thus be accurately determined. Therefore, after a certain fixed interval the timing control relay 28 becomes deenergized and its armature is drawn to its back contact by the retractile spring. This breaks the circuit to ground through the front contact of relay 28, thereby releasing the stop magnet 23 and the locking control relay 25, unless the operator is still depressing the A key of the keyboard. If the operator is still holding this key depressed, the ground through the letters coil of the master shift relay 26 is applied through the conductor 27, the A segment and the holding brush 12, which is resting on the A segment, to the outer solid ring 8, thence through conductors 35 and 30 to the armature of relay 25 and through the front contact to both the relay 25 and the stop magnet 23, thus keeping both relay and stop magnet energized as long as said key is depressed.

As soon as the operator releases said key, the circuit through the relay 25 and the stop magnet is broken. When the armature of relay 25 moves to its back contact, the auxiliary contacts 34 open, breaking the short circuit and permitting the relay 28 to again become energized, thus applying ground from its front contact through conductor 30 to the armature of relay 25, and preparing the latter to function when the next character is depressed by the operator.

From the above description it is manifest that the duration of the printing signal impulse of each transmitted character is under the control of the operator so long as he holds the key depressed for the minimum predetermined interval. When however the operator releases a key in less than said minimum fixed interval, the timing relay 28 will maintain a circuit through the locking relay 25 and the stop magnet 23 for the predetermined minimum period determined by the time required for the discharge of magnetism in the timing relay 28. The length of the minimum impulse is readily controlled by adjusting the resistance R_4 which determines the value of the current flowing through the coil of control relay 28 and by adjusting the position of the armature of the loading coil 29 to regulate the reactance of the circuit. Under certain conditions the use of a loading coil could be dispensed with but its use makes possible a wide range of adjustment.

The operation of the ticker at the receiving office and the operating circuits therefor are so well known that a detailed description is unnecessary. The number of impulses sent out by the pole changer contacts 40 over the conductors to the coils of the polar line relay

42 is of course determined by the distance the brushes travel before engaging the segment on the selector head corresponding to the selected character. The polar line relay transmits alternate positive and negative impulses to the coil of the escapement magnet 43, thereby causing the corresponding letter on the type wheel 45 to be positioned. When the transmitter is stopped by the action of the stop magnet causing the stop clip 14 to engage the stop arm 15, the prolonged impulse causes the printing magnet 46 to lift the platen and tape against the selected character on the type wheel.

The actuating spring 47 of the ticker is wound by the winding magnet 48 which receives an impulse three times during each revolution of the transmitter shaft 3 as the cam closes the contacts 49.

The circuit through the winding magnet is also utilized to control the shift magnet which determines whether a letter or a figure shall be printed. When the stop magnet is energized the contacts 50 are opened, thus breaking the circuit through the conductor 51 which normally transmits impulses to the winding relay 52. The armature of the latter therefore remains on its back contact. If a key in the letters ring of the keyboard was depressed, the armature of the master shift relay 26 moves to its right hand contact, thereby connecting positive battery over conductor 53 to the shift relay 54 which attracts its armature and connects minus battery over conductors 56 and 57 to the coil of shift magnet 58. The latter positions the shift arm 60 under the heel of the letters platen 61 just prior to the operation of the printing magnet. If a key on the figures ring was depressed the armature of master shift relay moved to the left and no current is transmitted over conductor 53. The armature of shift relay 54 is therefore against its back contact, thereby connecting positive battery over conductors 56 and 57 to the shift magnet 58. The latter thereupon shifts the platen under the figures characters of the type wheel prior to the operation of the printing magnet.

It is obvious that the positioning of the brushes relative to each other is important in securing the proper operation of the automatic stop magnet control. The forward selecting brush 10 should be about two-thirds of the distance across an insulating segment and the rearward holding brush 12 should have just come upon the selected segment when the brushes were arrested by the engagement of the stop clip 14 with the stop arm 15. This arrangement ensures the separation of the brushes so that both cannot engage the same segment at the same time.

While I have described in detail the particular arrangement shown for automatically ensuring the transmission of a printing

impulse for a minimum predetermined interval to all of the stock tickers connected in a circuit, it will be evident to engineers that various changes and modifications may be made without departing from my invention.

I claim:

1. In a step-by-step operated printing telegraph system, a manually operated keyboard, an impulse generator controlled from said keyboard for generating signals to operate the receivers and means for determining the minimum length of each printing impulse transmitted to said receivers.

2. In a telegraph system, a step-by-step printing receivers responsive to a printing impulse of certain minimum duration, a manual keyboard transmitter for generating both step-by-step and printing impulses, and control means for limiting the minimum duration of each printing impulse, said control means being independent of the touch of the keyboard operator.

3. In a telegraph system, a manual keyboard transmitter, a step-by-step receivers responsive to step-by-step impulses and printing impulses from said transmitter, the maximum duration of such printing impulses being controlled directly by the actuation of the keyboard by the operator and auxiliary control means independent of the operator for limiting the minimum duration of the printing impulses.

4. In a telegraph system, a manual keyboard transmitter, the maximum duration of printing impulse transmitted directly controlled by the operator and auxiliary control means for automatically lengthening all printing impulses to a predetermined fixed minimum provided said impulses would otherwise be less than said fixed minimum.

5. In a step-by-step operated printing telegraph system, a manually operated keyboard, an impulse generator controlled from said keyboard for generating step-by-step and printing signals to operate the receivers and means for the prevention of accidental transmission of a printing impulse for a character following the one associated with the key actuated by the operator.

6. In a step-by-step operated printing telegraph system, a manually operated keyboard, an impulse generator controlled from said keyboard for generating step-by-step and printing signals to operate the receivers and means whereby the printing impulse which is transmitted will always correspond only to the key actuated by the operator.

7. In a manually controlled transmitting apparatus for telegraph ticker systems, the combination with a manually operated keyboard and a motor-actuated circuit selector having relatively movable contact brushes and segments, a magnet operating to stop the transmitter at positions controlled by the keys of said keyboard, and auxiliary electro-

magnetic means actuated under control of said keys and operating to determine the minimum actuation of said magnet.

8. In a telegraph ticker system as set forth in claim 7, said auxiliary means embodying a timing relay operating to close a circuit through said stop magnet, a locking relay actuated simultaneously with said stop magnet to short-circuit said timing relay and means to delay the deenergization of said timing relay for a predetermined interval.

9. In a telegraph ticker system as set forth in claim 7, said auxiliary means embodying a timing relay operating to maintain the circuit through said stop magnet, a locking relay actuated simultaneously with said stop magnet to short-circuit said timing relay and adjustable means to delay the deenergization of said timing relay for a predetermined interval.

10. In a manually controlled transmitting apparatus for telegraph ticker systems, the combination of a manually operated keyboard, a selector head having segments electrically connected to contacts cooperating with the respective keys of said keyboard, motor-actuated brushes movable over said segments, a stop magnet adapted to arrest said brushes when energized, said brushes being arranged to close a circuit through said magnet when engaging a segment corresponding to a depressed key, and auxiliary means operating to maintain the energization of said magnet for a predetermined minimum interval.

11. In a manually controlled transmitting apparatus for telegraph ticker systems, the combination of a manually operated keyboard, a selector head having segments electrically connected to contacts cooperating with the respective keys of said keyboard, motor-actuated brushes movable over said segments, a stop magnet adapted to arrest said brushes when energized, said brushes being arranged to close a circuit through said magnet when engaging a segment corresponding to a depressed key, a normally energized relay controlling an auxiliary circuit through said magnet, means actuated simultaneously with said magnet to short circuit said relay, and means for delaying the deenergization of said relay for a predetermined interval.

12. In a manually controlled transmitting apparatus for telegraph ticker systems, the combination of a manually operated keyboard, a selector head having segments electrically connected to contacts cooperating with the respective keys of said keyboard, motor-actuated brushes movable over said segments, a stop magnet adapted to arrest said brushes when energized, said brushes being arranged to close a circuit through said magnet when engaging a segment corresponding to a depressed key, auxiliary means

operating to maintain the energization of said magnet for a predetermined minimum interval, a normally energized relay having an armature controlling a circuit through
5 said magnet, an electromagnetic device actuated simultaneously with said stop magnet to short circuit said relay and means to delay the release of said armature for a predetermined interval.

10 13. In a manually controlled transmitting apparatus for telegraph ticker systems, the combination of a manually operated keyboard, a selector head having segments electrically connected to contacts cooperating
15 with the respective keys of said keyboard, a motor actuated brush movable over said segments, a stop magnet adapted to arrest said brushes when energized, said brush being arranged to close a circuit through said
20 stop magnet as it passes over a segment corresponding to a depressed key, a locking relay arranged to be energized simultaneously with said stop magnet, a normally energized timing relay having its armature electrically
25 connected to the armature of said locking relay and closing a path at its front contact for a locking circuit through said locking relay and said stop magnet, said locking magnet when energized operating to short circuit
30 said timing relay and means to delay the deenergization of said timing relay for a predetermined interval.

14. In a manually controlled transmitting apparatus for telegraph ticker systems, the
35 combination of a manually operated keyboard, a selector head having segments electrically connected to contacts cooperating with the respective keys of said keyboard, a pair of motor-actuated brushes movable over
40 said segments, one brush being in advance of the other, a stop magnet adapted to arrest said brushes when energized, said forward brush being arranged to close a circuit through said stop magnet as it passes over a
45 segment corresponding to a depressed key, a locking relay arranged to be energized simultaneously with said stop magnet, said rearward brush operating to close a holding circuit through the depressed key, said segment,
50 said stop magnet and said locking relay, a normally energized timing relay having its armature electrically connected to the armature of said locking relay and closing a path at its front contact for locking circuits
55 through said locking relay and said stop magnet, said locking magnet when energized operating to short circuit said timing relay and means to delay the deenergization of said timing relay for a predetermined interval.
60

In testimony whereof, I affix my signature.

PERCY L. MYER.