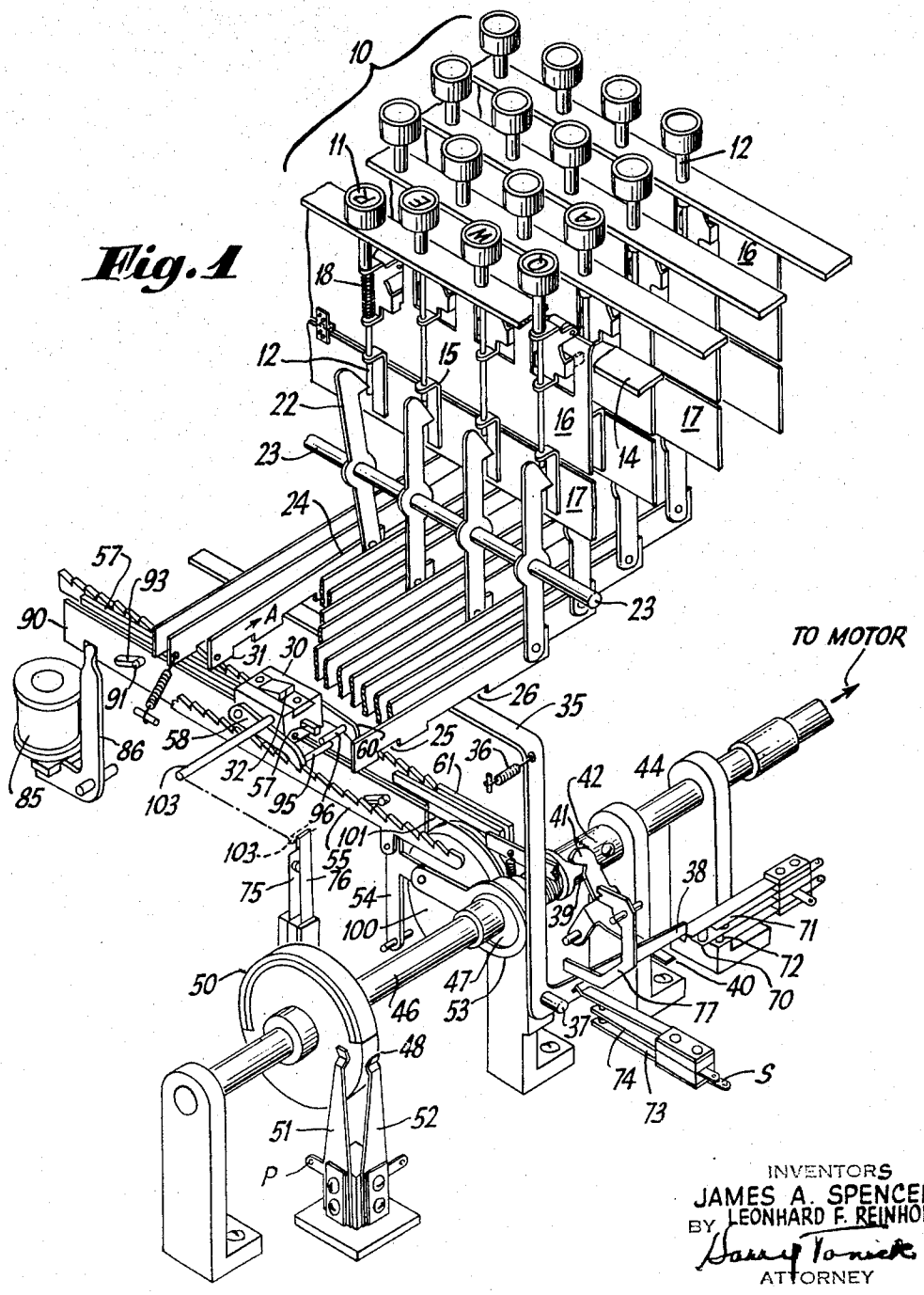
April 17, 1951 J. A. SPENCER ET AL 2,549,028

IMPULSE TRANSMITTER FOR ELECTRIC SIGNALING DEVICES

Filed Jan. 28, 1948 2 Sheets-Sheet 1

Fig. 1



INVENTORS
JAMES A. SPENCER
BY LEONHARD F. REINHOLD
Harry Tonick
ATTORNEY

April 17, 1951 J. A. SPENCER ET AL 2,549,028

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Fig. 2

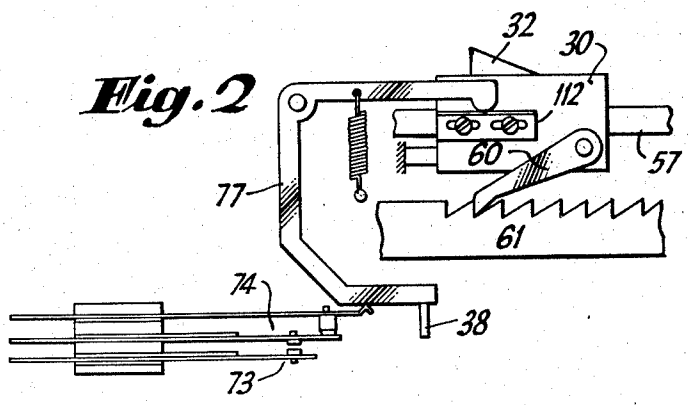


Fig. 3

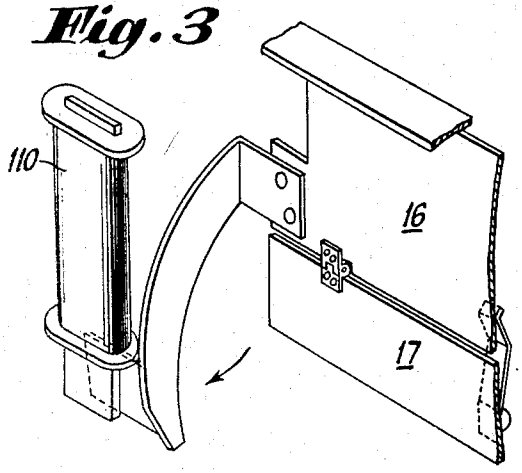


Fig. 4

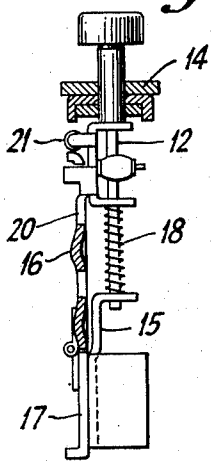


Fig. 5

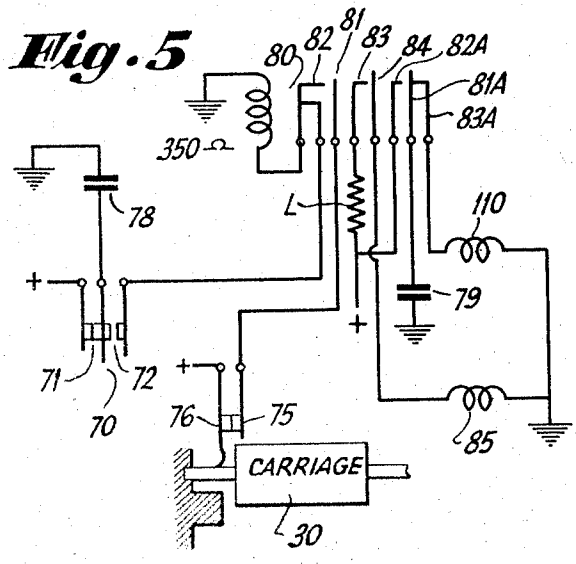
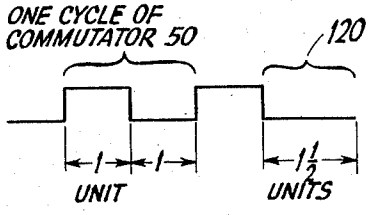


Fig. 6



INVENTORS
JAMES A. SPENCER
BY LEONHARD F. REINHOLD
ATTORNEY

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IMPULSE TRANSMITTER FOR ELECTRIC SIGNALING DEVICES

James A. Spencer, Teaneck, N. J., and Leonhard F. Reinhold, Great Kills, N. Y., assignors to Radio Corporation of America, a corporation of Delaware

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8 Claims. (Cl. 178—79)

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The present invention relates to transmitter arrangements for telegraph systems utilizing step by step records, wherein a distinctive number of equal length marking and spacing impulses are required to select a character, and a spacing signal of greater time duration than those in the character selecting train initiates a recording operation and provides time in which the recording device may be conditioned to receive a new signal train.

An object of the present invention is the generation of variable length signal trains of uniform marking and spacing signal elements for controlling step by step recorders.

Another object of the present invention is the provision of a keyboard transmitter for operation with step by step printing telegraph systems.

An example of the present invention includes a keying arrangement for generating variable length trains of signal impulses in the form of current reversals. Said signal trains are intended for controlling step by step printers. The keying arrangement includes a keyboard having one key for each character. The keys are mounted on mechanically interlocking push rods operating in a framework which also carries a series of bell cranks and levers, one each for each character key. A counting mechanism and control bail are mounted transversely beneath the lever assembly for controlling the rotation of a single cycle commutator. The single cycle commutator is adapted to be connected to the armature shaft of a continuously rotating electric motor through a toothed clutch cooperating with the transverse bail. The operation of any of the keys on the keyboard initiates the rotation of the commutator for sending out a train of signal elements. The number of elements in the train is characteristic of the character on the key. A mechanism is provided for counting the number of signal elements generated and when the correct number is reached for the particular character selected, the commutator is disconnected from the source of power, a spacing impulse of extraordinary length is transmitted, and the keyboard and counting mechanism are returned to its normal position for the selection of another character.

The present invention will be more fully understood by reference to the following detailed description which is accompanied by a drawing, in which:

Fig. 1 illustrates in fragmentary perspective the essential parts of a transmitter employing an embodiment of the present invention;

Fig. 2 illustrates in enlarged detail a portion of the structure of Fig. 1;

Fig. 3 illustrates a portion of the locking mechanism for the keyboard of Fig. 1;

Fig. 4 is a cross-section of the key locking mechanism of the keyboard of Fig. 1;

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Fig. 5 is a circuit diagram of the relays and contactors of Fig. 1; and

Fig. 6 illustrates the form of the signal trains transmitted by the transmitter of Fig. 1.

Fig. 1 shows a keyboard 10 including a plurality of key strips 14 each having a number of keys 11 arranged thereon, one key for each character to be represented by transmitted signal trains. The general arrangement of the keys on the keyboard preferably follows that of the keys on a conventional typewriter. Each key 11 is mounted on a push rod 12 passing through key strip 14 and guide member 15. Each bank of keys has associated therewith a locking vane 16 pivoted along its lower edge to frame member 17 and urged toward the push rods 12 of that bank of keys by return springs 18 (see also Fig. 4). If any selected key 11 is pressed, its push rod 12 is moved downwardly. The associated hinged locking vane 16 is forced outwardly by roller 21 carried on push rod 12, thus releasing any previously operated keys. When the selected key 11 reaches the bottom of its travel, roller 21 (shown in Fig. 4) enters a locking aperture or notch 20 in vane 16 and is mechanically locked in its selected position. Associated with each push rod 12 is the return spring 18 acting to return the key to its unoperated position upon release of the locking mechanism. As each key is operated, the lower end of its associated push rod 12 moves downwardly against the sloped nose of an associated bell crank 22 pivoted on shaft 23. The pressure of the push rod 12 against the sloped nose of the bell crank 22 causes the bell crank to rotate in a counterclockwise direction. Thus the selector lever 24, pivoted to the lower end of bell crank 22, is moved in the direction indicated by arrow A. The selector levers 24 are each provided on their lower edges with notches 25 and 26. These notches, when no keys are depressed, are in alignment with one another in all of the selector levers 24. All of the notches 25 are (whenever the levers 24 occupy an unselected position) in direct alignment with the path along which inclined plane 32 on carriage 30 is adapted to move. When one of the levers 24 is selected, edge 31 on lever 24 is moved into the path of the carriage 30 so that as the carriage 30 is moved in a direction from right to left the inclined plane 32 therein tends to urge the selected lever 24 upwardly.

Notches 26, in all of the selector levers 24, are in alignment when no selector lever 24 is actuated. An operating bail 35 occupies the aligned notches. The bail 35 is urged toward the left hand edge of notches 26 by a spring 36. It will be noted that whenever any one of the selector levers 24 is moved in the direction of arrow A, bail 35 is rotated in a clockwise direction about pivots 37 causing the extension arm 38 to depress the clutch lever 40. The cam surface 39

on clutch member 41 is thereby released freeing clutch member 41 and allowing it to shift axially to engage with clutch member 42. Clutch member 42 is carried on a continuously rotating shaft 44 driven by an electric motor. Clutch member 41 is carried on shaft 46 coaxially arranged with respect to shaft 44. Shaft 46 also carries an eccentric 47 and a commutator 48 fixedly coupled thereto. Commutator 48 is of the single cycle type having a conducting rim 50 over half of its circumference insulatingly secured thereto. Brushes 51 and 52 are so placed as to engage the side of the commutator and the conducting rim 50 as they rotate. It will be seen that as commutator 48 is rotated brushes 51 and 52 are connected together through rim 50 for half of the period of revolution of shaft 46 thus generating one square wave cycle for each revolution of shaft 46, as shown in Fig. 6. Furthermore, as shaft 46 rotates, eccentric 47 imparts a reciprocating motion through shoe 53 and lever 54 to a ratchet rack 55. Ratchet rack 55 runs parallel to a guide bar 57 carrying carriage 30. Carriage 30 carries a pawl 58 which is adapted to engage the teeth on rack 55. Carriage 30 is further provided with a holding pawl 60 engaging in the teeth of a stationary rack 61. Thus as shaft 47 completes one revolution, ecentric 47 completes one reciprocation of rack 55, advancing carriage 30 one step on the stationary rack 61.

Now since the slots 25 on unactuated selector levers 24 are all in alignment with the nose on carriage 30, the carriage 30 passes them freely without affecting them. As it reaches the first actuated selector lever 24, the inclined ramp 32 engages the edge 31 on selector lever 5 causing that lever to move upwardly and disengage bail 35 from notch 26. The spring 36 is thus permitted to rotate the bail 35 in a counter-clockwise direction. Clutch lever 40 re-engages the cam face 39 on clutch member 41 moving it axially away from the driving member 42, thus stopping shaft 46 from rotating. Since the commutator 48 and the rack 55 each complete one cyclic operation with each rotation of shaft 46, the movement of carriage 30 provides a means for counting the number of marking and spacing impulses transmitted by commutator 50.

The functioning of the electrical control circuits will now be described with reference to Figs. 1, 2, 3 and 5. Prior to initiating transmission, contacts 70 and 71 are closed and contacts 70 and 72 are open. Contacts 73 and 74 are open, as are contacts 75 and 76. Relay 80 is unoperated. When clutch 41 is released by bail 35, contacts 70 and 72 are closed by member 38, thus connecting a source of potential to charge a condenser 78 and contacts 70 and 72 are opened. Immediately when the carriage 30 begins to advance, contacts 75 and 76 are permitted to close. This connects a source of potential to the holding leaf contact spring 81 of relay 80 and also charges another condenser 79 through leaf contacts 81A and 82A. When bail 35 is released by the movement of carriage 30, the contacts 70 and 71 open and 70 and 72 close. Condenser 78 then discharges through the winding of relay 80 which operates and electrically locks up by current coming to the winding through holding contacts 81 and 82. The operation of relay 80 connects a source of power through a voltage limit resistor L and through its contacts 83 and 84 to magnet 85. Magnet 85 operates armature 86 thereby moving a release bar 90 to the right. Release bar 90 is supported in position on pins 91 and 92, in inclined apertures 93. Thus as the bar 90 is moved to the right, it is also caused to rise, forcing pins 95 and 96 upwardly and disengaging pawls 58 and 60 from the racks 55 and 61. A spring (not shown) within spring drum 100 winds up carriage return cord 101, thus pulling the carriage 30 back to its rest position. As the carriage 30 reaches its extreme right hand position, the contacts 75 and 76 are separated by the action of pin 103 against contact 76, thus releasing relay 80. As relay 80 opens, condenser 79 discharges through contacts 81A, 83A and the winding of magnet 110 causing vane 16 to rock backward and release the selected key 11 in group 10.

The release slide 112 which cooperates with lever 77 is adjustably mounted on carriage 30. Thus the moment of opening of contacts 73 and 74 may be adjusted. These contacts are connected in series in the signaling line S and a source of power P, as are also contacts 51 and 52 coacting with commutator 48.

What is claimed is:

1. A transmitter including means for generating equal length signaling impulses, a number of keys, one individual to each of a number of characters to be represented by different length trains of signaling impulses, means responsive to the selection of any one of said keys for initiating transmission of said impulses, means automatically disabling said generating means when the number of impulses transmitted is representative of the character represented by the selected key, and means responsive to the operation of said disabling means for restoring said disabling means to a position of rest.

2. A transmitter including means for generating equal length signaling impulses, a number of keys one individual to each of a number of characters to be represented by different length trains of signaling impulses, means responsive to the selection of any one of said keys for initiating transmission of said impulses, means automatically disabling said generating means when the number of impulses transmitted is representative of the character represented by the selected key, means responsive to the operation of said disabling means for releasing said disabling means for return to a position of rest, and further means for restoring the selected one of said keys.

3. A telegraph transmitter including a number of keys, one individual to each of a number of characters, means for locking a selected key in an operated position, a commutator adapted to generate equal length signal impulses, a continuously rotating shaft, means responsive to the operation of any one of said keys for clutching said commutator to said shaft, means responsive to the operation of said one of said keys for disengaging said clutch upon generation of the number of impulses representative of the character associated with said operated key, means for restoring said disengaging means to a position of rest, and means responsive to said last mentioned means for releasing said locking means.

4. A telegraph transmitter including a number of keys, one individual to each of a number of characters, means for locking a selected key in an operated position, a commutator adapted to generate equal length signal impulses, a continuously rotating shaft, means responsive to the operation of any one of said keys for clutching said commutator to said shaft, an eccentric adapted to revolve with said commutator, a ratchet rack arranged to be reciprocated by said eccentric, a

carriage mounted to move along said rack, one step in said rack for each reciprocation thereof, a number of key levers each having a notch therein, normally all in alignment over the path of said carriage, the selection of any one of said keys acting to displace the notch in one of said key levers into the path of said carriage, said carriage carrying a cam surface adapted to lift said key lever, and means responsive to the lift of any of said key levers for disabling said clutching means.

5. A telegraph transmitter including a number of keys one individual to each of a number of characters, means for locking a selected key in an operated position, a commutator adapted to generate equal length signal impulses, a continuously rotating shaft, means responsive to the operation of any one of said keys for clutching said commutator to said shaft, an eccentric adapted to revolve with said commutator a ratchet rack arranged to be reciprocated by said eccentric, a carriage mounted to move along said rack one step in said rack for each reciprocation thereof, a number of key levers each having a notch therein, normally all in alignment over the path of said carriage, the selector of any one of said keys acting to displace the notch in one of said key levers into the path of said carriage, said carriage carrying a cam surface adapted to lift said key lever, means responsive to the lift of any of said key levers for disabling said clutching means, and means for returning said carriage to a position of rest.

6. A telegraph transmitter including a number of keys one individual to each of a number of characters, means for locking a selected key in an operated position, a commutator adapted to generate equal length signal impulses, a continuously rotating shaft, means responsive to the operation of any one of said keys for clutching said commutator to said shaft, an eccentric adapted to revolve with said commutator a ratchet rack arranged to be reciprocated by said eccentric, a carriage mounted to move along said rack one step in said rack for each reciprocation thereof, a number of key levers each having a notch therein, normally all in alignment over the path of said carriage, the selector of any one of said keys acting to displace the notch in one of said key levers into the path of said carriage, said carriage carrying a cam surface adapted to lift said key lever, means responsive to the lift of any of said key levers for disabling said clutching means, means for returning said carriage to a position of rest, and a pair of contacts adapted to be connected in series in a signaling line and adapted to be opened by the return of said carriage to said position of rest.

7. A telegraph transmitter including means for generating equal length signaling impulses, a number of keys, one individual to each of a number of characters to be represented by different length trains of signaling impulses, means responsive to the selection of any one of said keys for initiating transmission of said impulses, a continuously rotating shaft, a commutator adapted to generate said different length trains of signaling impulses, means responsive to the operation of any one of said keys for clutching said commutator to said shaft, an eccentric adapted to revolve with said commutator, means for counting the number of impulses transmitted including a ratchet rack arranged to be reciprocated by said eccentric, a carriage mounted to move along said rack, one step in said rack for each reciprocation thereof, means for disabling said generating means when the number of impulses transmitted is representative of the character represented by the selected keys, means responsive to the operation of said disabling means including a spring to return said carriage to a position of rest upon completion of the counting of said impulses.

8. A device for transmitting intelligence expressing the individual characters thereof in terms of varying numbers of equal length signal elements including an output circuit, a generator arranged to produce a continuous train of signal elements to be applied to said output circuit, a member arranged to be moved step by step in synchronism with the production of signal elements by said generator, a number of stops, one individual to each of a number of characters to be represented by different length trains of said signal elements, means responsive to the operation of any one of said stops to initiate movement of said member and to connect said generator to said output circuit, and further means responsive to cooperation between said member and said one stop to disconnect said generator from said output circuit and restore said member to its initial position.

JAMES A. SPENCER.
LEONHARD F. REINHOLD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
374,390	Bixley	Dec. 6, 1887
1,142,684	Etienne	June 8, 1915
1,585,441	Vaughan	May 18, 1926
2,412,625	Mallina	Dec. 17, 1946