April 14, 1925. 1,533,206

H. PFANNENSTIEHL

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Filed July 21, 1920 4 Sheets-Sheet 1

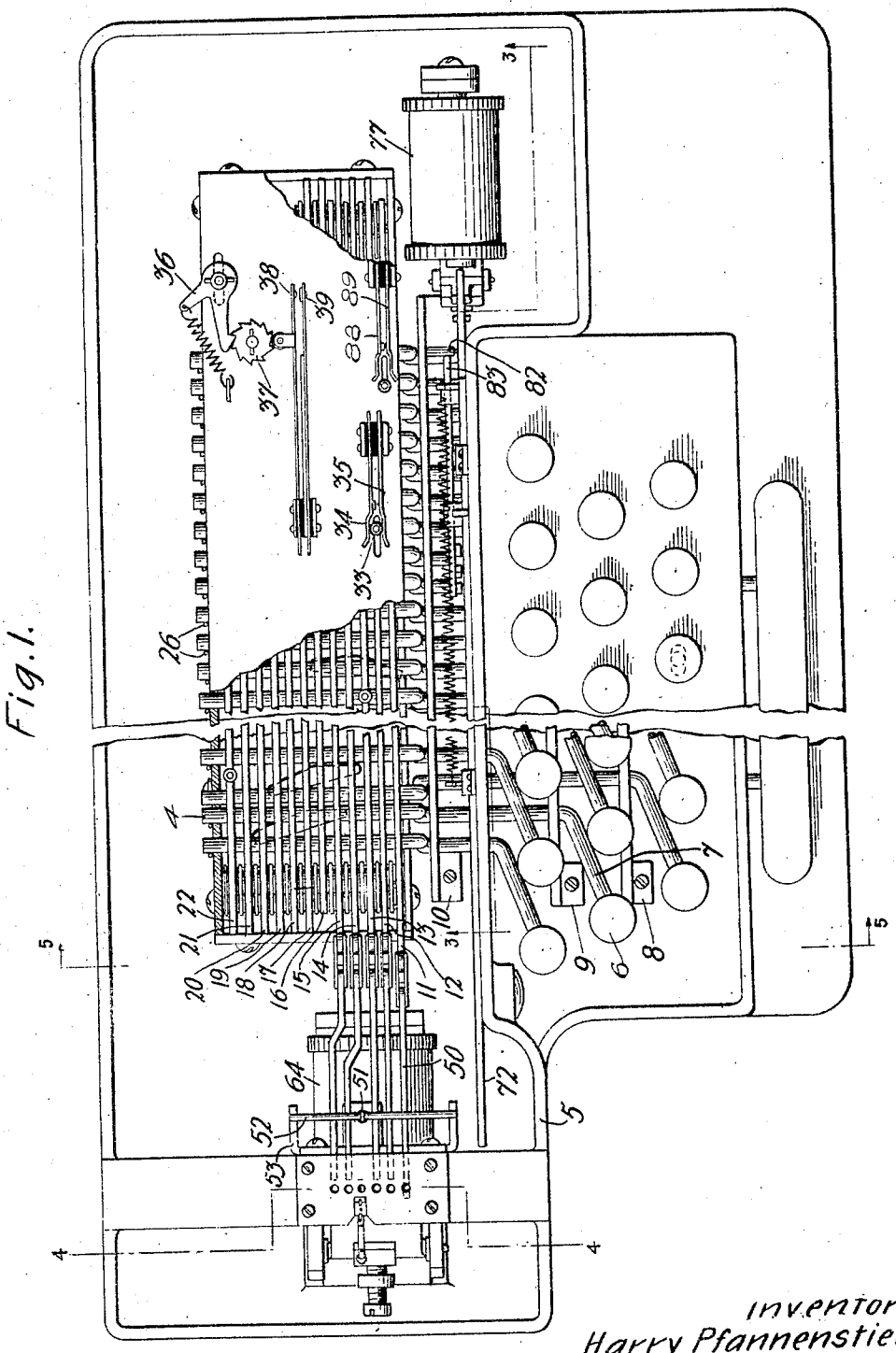


Fig. 1.

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Fig. 3.

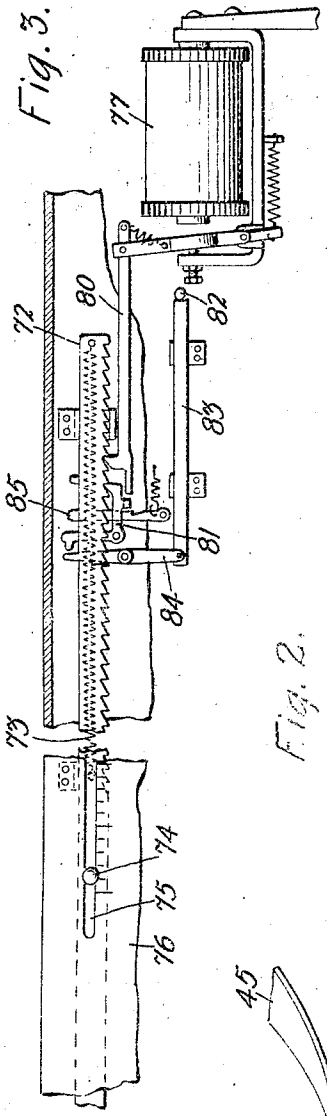
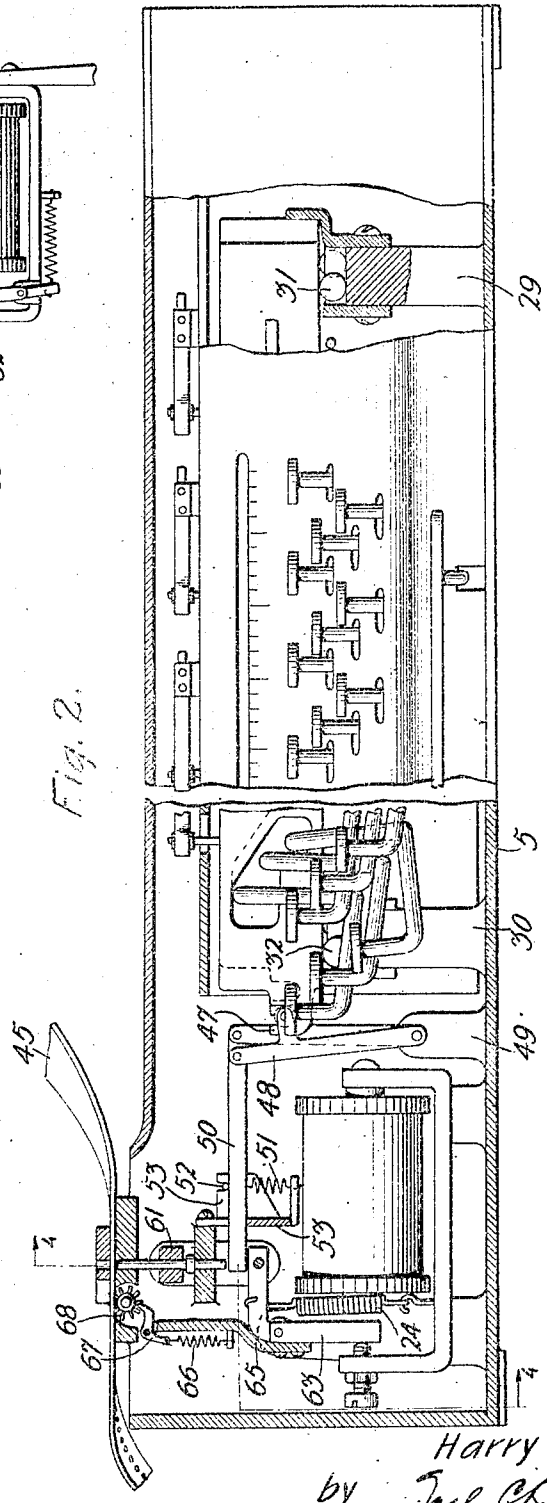


Fig. 2.



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Fig. 4.

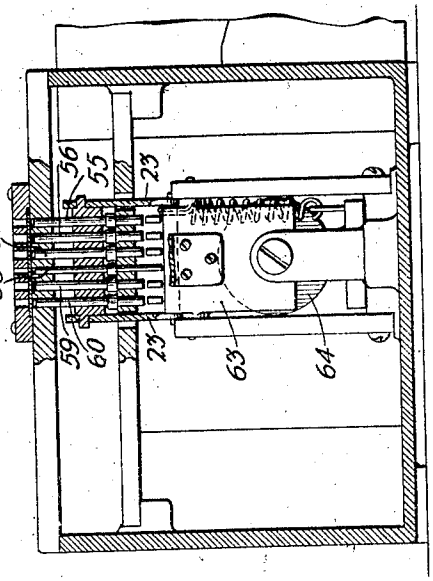


Fig. 6.

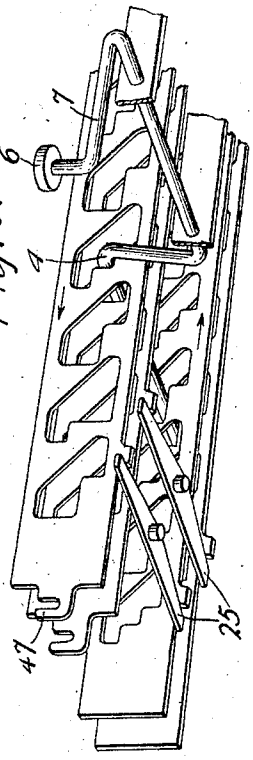
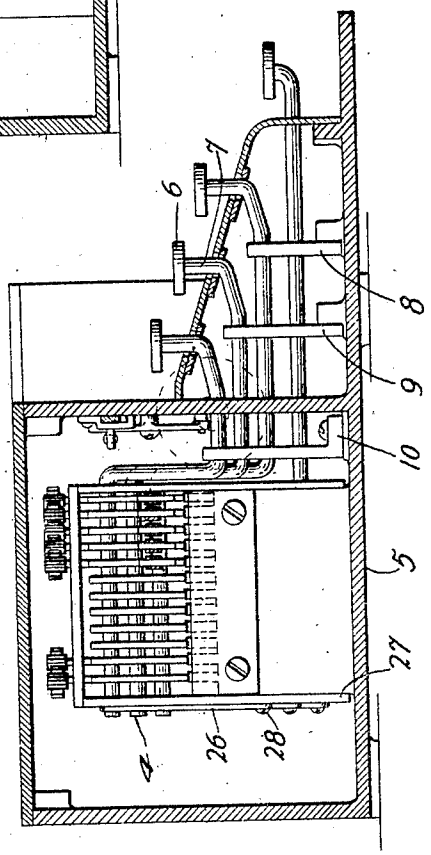


Fig. 5.



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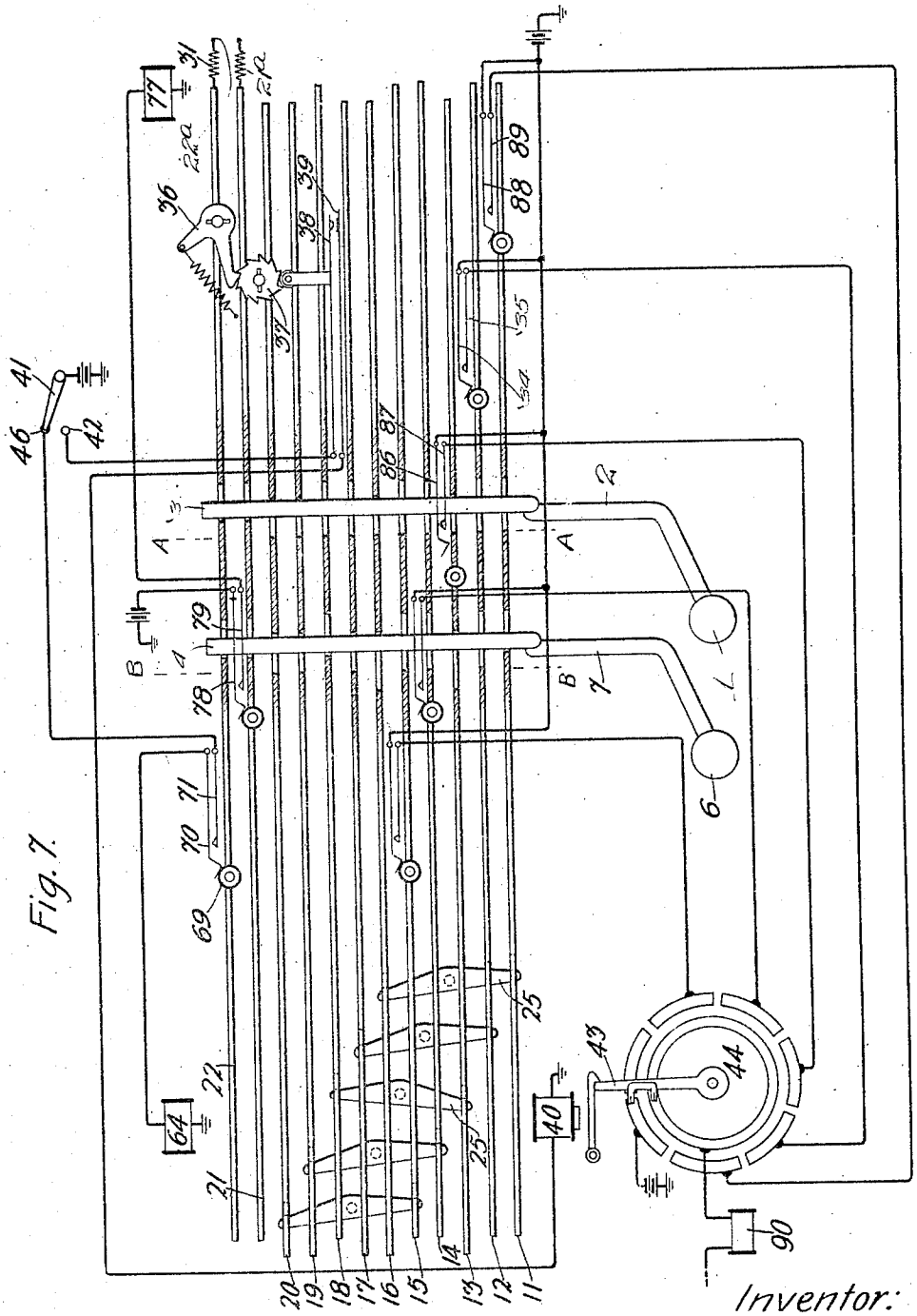


Fig. 1.

Inventor:
Harry Pfannenstiehl.
by Joel C. Palmer Att'y

Patented Apr. 14, 1925. 1,533,206.

UNITED STATES PATENT OFFICE.

HARRY PFANNENSTIEHL, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PRINTING TELEGRAPHY.

Application filed July 21, 1920. Serial No. 397,902.

To all whom it may concern:

Be it known that I, HARRY PFANNENSTIEHL, a citizen of the United States, residing at Maplewood, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Printing Telegraphy, of which the following is a full, clear, concise, and exact description.

This invention relates to printing telegraph apparatus and particularly to keyboard actuating and controlling mechanism for use primarily in telegraph systems.

An object of the invention is the provision of a compact and unitary key controlled mechanism whereby in response to the actuation of keys, character representations may be transmitted to a distant station by means of current impulses or recorded or stored in the form of indentations or perforations in a suitable recording medium for future transmission.

Other objects of the invention are the provision of means whereby the simultaneous depression of two or more keys is rendered impossible; means whereby the key actuated selecting mechanism when once actuated remains in its operated position until withdrawn by the subsequent actuation of another key; and an improved means for restoring the punch pins of the perforating mechanism.

The invention contemplates the employment of mechanism selectively responsive to the actuation of keys and key levers for closing a plurality of current controlling contacts in various combinations according to the character to be transmitted and for actuating a corresponding number of perforation controlling members in various combinations for recording the characters by means of perforations in a tape. In addition, there is provided under control of each key a circuit closing member for controlling a suitable distributing mechanism for distributing the current impulses to line in proper sequential order when the mechanism is used as a direct keyboard transmitter and a corresponding circuit closing member under control of each key for controlling the operation of a suitable perforating mechanism when the mechanism is used as a keyboard perforator. Switching means is provided for placing either the current impulse distributor or perforator under control of the keyboard mechanism. The keyboard is so arranged that when the selecting elements are actuated due to the depression of a character key, they will be maintained in their actuated position until the subsequent depression of another character key. This is accomplished by grouping the elements of the selecting mechanism in two sets which, for the sake of clearness, will be referred to as positive and negative sets of selecting bars, they being interconnected with one another in such a manner that when one or the other is shifted due to the depression of a character key, the other will be moved in the opposite direction. This, as will be more clearly brought out in the description which is to follow, obviates the necessity of retractile springs and permits the segments of a distributor to be directly connected to the contact springs controlled by the selecting bars.

In order to prevent the interference of signals which would necessarily follow if two keys were depressed at the same time, the key levers are so arranged in conjunction with apertures cut in the selecting bars as to render it impossible to depress two keys at the same time.

When the keyboard mechanism is used in conjunction with a perforator for perforating a paper tape which is to be subsequently used in the transmission of a message, a member under the control of an electromagnet is actuated for positively restoring any of the punch pins which may have been previously driven through the tape due to the energization of the electromagnet.

A better understanding of the invention may be had from the following description and claims when considered in conjunction with the accompanying drawing wherein Fig. 1 is a plan view representing one embodiment of the invention; Fig. 2 is a front view with a portion of the casing cut away; Fig. 3 is a detail taken along the line 3—3, Fig. 1; Fig. 4 is an end view taken along the line 5—5, Fig. 1; Fig. 6 is a detail of a few of the selecting bars, while Fig. 7 shows in schematic form the circuit arrangement employed in connection with the keyboard mechanism.

Referring now to the drawings wherein like parts bear the same reference characters, there is provided a casing or housing 5 to which there is secured suitable sup-

ports for the various elements of both the keyboard mechanism and the perforator and which will be more clearly brought out in the description which is to follow. The arrangement of the character keys is substantially the same as that of any well-known typewriter and inasmuch as the keys form no part of the present invention, a detailed description thereof is unnecessary. The character keys are mounted on suitable key levers which are in the form of a crank so that when a key is depressed, a portion of the lever will be caused to move substantially in a horizontal plane. In order to permit movement of the key levers in this manner they are supported by means of extensions 8, 9 and 10. These extensions are secured to the housing by means of suitable screws, but any other means of securing the same may, of course, be employed.

The key levers are all of similar construction and they differ only in their length which is necessitated in order to properly arrange the character keys. There is associated with each of the key levers, a flexible spring member 26 which is for the purpose of restoring the keys to normal upon their release. These springs, as clearly shown in Fig. 5, are attached to an upright member 27 by means of screws 28.

The key levers associated with the various keys pass through and cooperate with apertures cut in the several selecting bars which bear the numerals 11 to 20 inclusive, there also being provided what might be termed as two common selecting bars such as 21 and 22, the former being shifted upon the depression of certain ones of the character keys while the latter is shifted upon the depression of each of the keys. The function of these two last-mentioned selecting bars will be more clearly brought out in the description which is to follow. By a system of permutation, the apertures in the selecting bars are arranged such that 32 possible combinations may be set up through the operation of either set of selecting bars. Thus upon the depression of the character keys, the selecting bars will be set in different combinations to correspond with the Baudot or five-unit code. If more combinations are desired, it, of course, is necessary to increase the number of selecting bars, for with five positive and negative selecting bars, the number of combinations is limited to 32. Without additional selecting bars, the arrangement of the apertures would result in the movement of the selecting bars to the same position of two key levers which condition, of course, is not desired.

The first five of the selecting bars enumerated above are herein termed positive selecting bars, while the other five are termed negative selecting bars. All of the selecting bars with the exception of 21 and 22 are provided with lugs on their lower edge which are adapted to be engaged by a pivoted member 25 which is clearly shown in Fig. 6. Each pivoted member 25 extends from a positive selecting bar to a negative selecting bar and engages the lugs thereof. Thus, when a positive selecting bar is shifted due to a depression of the character key, a negative selecting bar associated therewith will be moved in the opposite direction or vice versa, due to the movement of the member 25. This thereby maintains the selecting bars in their actuated position until the subsequent depression of another character key for the setting up of a different combination. In order that these selecting bars may move with as small amount of friction as possible, there is provided a set of rollers such as 31 and 32 which are supported by means of brackets 29 and 30, these brackets being suitably screwed to the base portion of the casing.

To the upper edge of each of the positive selecting bars, there is attached a contact-controlling member 33. These contact-controlling members control the actuation of contact springs 34 and 35 suitably arranged therewith. Thus, when one of the selecting bars is shifted, the contact-making member 33 will likewise be shifted for effecting the actuation of the contact springs 34 and 35.

The selecting bar 22 which is common to all the character keys and is shifted due to the depression of any one thereof, has mounted on its upper edge, a stepping pawl 36 which is adapted to impart a stepping movement to a star wheel 37. This star wheel is associated with a contact spring 38 which is adapted to engage another contact spring 39. The closure of these contact springs through the stepping of the star wheel 37 by means of the stepping pawl 36 completes an energizing circuit for an electromagnet 40. This circuit may be traced from battery through the switch 41, contact 42, contact springs 38 and 39 and the winding of magnet 40 to ground. There is also mounted on the upper edge of the selecting bar 22 a contact control member 69 for controlling the actuation of contact springs 70 and 71. These contact springs control the energization of an electromagnet 64 when the switch 41 is thrown so as to engage contact 46. The selecting bar 21 also has a similar contact controlling member mounted thereon, which, when shifted, closes contacts 78 and 79, and causes the energization of an electromagnet 77, the purpose of which will be more clearly brought out in the description which is to follow.

Whenever it is desired to record the characters of a message by means of perforations in a tape, the switch 41 is thrown to engage

contact 46. The engagement of the switch 41 with contact 46 completes a circuit including the winding of the electromagnet 64, and the contact springs 70 and 71, which will be actuated each time the selecting bar 22 is moved forward. The movement of the switch 41 so as to engage contact 46, opens the energizing circuit of magnet 40 and prevents its operation upon the closure of contacts 38 and 39, which will be closed upon each movement of the selecting bar 22, as previously described.

The tape perforating mechanism consists of the following parts: an extension 54, which rests on lugs formed in the housing 5, and through which pass a number of character punch pins, 55, 56, 57, 59 and 60, and a similar feed punch pin 58. This extension, together with the upper cover plate of the casing through which the punch pins pass serve as a guide therefor. The character punch pins have an enlaged portion or shoulder which rests upon the extensions 54, the feed pin is also provided with an enlarged portion of the same nature as that of the character pins. The punch pins pass through holes or openings in a member 61, which is supported by means of uprights 23—23. Mounted on the base of the housing is an electromagnet 64, having an armature 63 pivoted to extensions also secured to the base of the housing. There is attached to the armature 63 a coiled spring 24, which serves to restore the armature 63 to normal upon the deenergization of the electromagnet 64. The armature 63 is L-shaped and has a portion thereof directly beneath the punch pins and serves as a means for driving the punch pins through the tape upon the energization of the electromagnet.

Each of the character pins has associated therewith a lever 50, the free end of which is adapted to be moved between the corresponding punch pin and the horizontal portion of the armature 63. Thus, whenever the electromagnet 64 is energized, the punch pins corresponding to the levers 50, which are moved underneath the punch pins, will be moved into engagement with the tape 54 for perforating the same. The feed punch pin will however be driven through the tape upon each energization of the electromagnet 64, as it normally rests on the horizontal portion of the armature 63.

The uprights 23—23 are also mounted on the horizontal portion of the armature 63, so that the member 61 will be moved in an upward direction upon the energization of the electromagnet 64. When the current is disconnected from the winding of electromagnet 64, and the armature thereof is restored to normal by means of the retractile spring, the member 61 will be caused to engage the enlarged portion of the punch pins and thereby withdraw them from engagement with the tape 45 and allow them to again rest on the extension 54. This eliminates the use of springs and provides a more positive action for restoring the punch pins to normal.

There is also attached to the armature 63, an upright member 65 which carries a stepping pawl 67 under the control of a retractile spring 66. This stepping pawl 67 is adapted to engage the teeth of a tape advancing wheel 68 for advancing the tape 45. The teeth of the wheel 68 engage the feed holes in the tape 45, which have been cut by the common punch pin 58. The pawl 67 is thus actuated upon the attraction of the armature 63 for moving the tape 45 to an unpunched area, for the perforating of the tape in accordance with the next succeeding character.

The free end of the levers 50 are prevented from getting out of place by means of a rod 52 suitably supported by a member 53 which is secured to the extension 54. The rod 52 has attached thereto a coiled spring 51 for maintaining the rod in contact with the levers 50. At the other end of the levers 50, there is connected a link 48. This link is pivoted to an upright 49, which is mounted on the base of the housing, and has an extension thereon which is adapted to be engaged by a hook 47 secured at one end of the positive selecting bars. Thus, when the selecting bars are actuated by the depression of a character key, the levers 50 will likewise be moved through the movement of the link 48.

In order that an operator, when using the keyboard mechanism either as a direct transmitter or for the purpose of perforating a tape, may know exactly how many characters have been either transmitted directly to line or stored in the recording medium, there is provided means whereby the number of characters which have been selected may be readily determined. This consists of a notched member 72 mounted in the front portion of the keyboard mechanism and which has attached thereto, a flexible spring 73 for restoring the same to normal upon its release. There is mounted to one end of the member 72, a knob 74 which projects out through a slot 75 cut in the member 76. The member 76 has suitably marked thereon, a scale which enables the operator to determine how many characters have been selected, since the knob 74 is adapted to be moved along this scale upon the selection of each character. The advancement of the member 72 is controlled by the electromagnet 77, the energizing circuit of which is completed through the contacts 78 and 79. These contacts are adapted to be closed upon the shifting of the selecting bar 21. To the armature of the electromagnet 77, there is attached a stepping

pawl 80 which engages the teeth on the lower edge of the member 72 and advances the same upon each energization of the magnet 77. The member 72 is adapted to be held in its actuated position by means of a holding pawl 81. It is thus seen that inasmuch as the electromagnet 77 is energized upon the depression of each of the character keys, with the exception of those which are for special functions, such as carriage return, line feed, etc., the member 72 will be advanced for indicating the number of characters which have been selected. When the operator, after having selected the number of characters desired to be printed on a particular line, actuates the carriage return key, the member 72 will thereupon be restored to normal under the control of the spring 73. This is accomplished by providing a pin 82 on the lever of the carriage return key, so that when this key is depressed, the pin engages one end of a lever 83 and causes the same to be moved to a horizontal plane. Attached to the other end of the lever 83 is a pivoted member 84, which is so arranged that when the lever 83 is moved, it engages a portion of the holding pawl 81 for effecting the disengagement thereof with the teeth of the member 72. The holding pawl 81, upon being withdrawn from engagement with the member 72, removes the stepping pawl 80 for preventing its interference with the return of the member 72. The holding pawl 81 is also held out of engagement with the teeth of the member 72 by means of a latch 85. This is for the purpose of maintaining both the holding pawl 81 and the stepping pawl 80 out of engagement with the member 72, until the subsequent energization of the magnet 77.

It is thought that a more concise understanding of the invention may be had from a description of the selection of a particular combination when considered with particular reference to Figure 7. Let us assume that it is desired to employ the keyboard mechanism as a direct transmitter, and with the selection of the preceding character, the selecting bar 13 had been moved in a positive direction for effecting the closure of contact springs 86 and 87, and is thus retained in its actuated position. The negative selecting bar 18, which is connected with the positive selecting bar 13, will be moved in the opposite direction by the pivoted member 25, common to both these selecting bars. Upon the depression of another character key such as, for instance, the key 6, the positive selecting bar 11 will be moved in a positive direction and at the same time cause the negative selecting bar 16 to be shifted in the opposite or negative direction by means of the pivoted member 25. The aperture in the negative selecting bar 18 is so arranged with respect to key lever 7, that when the key 6 is depressed, it will be caused to move forward due to the engagement of operating lever 4 with the side of the aperture in this selecting bar. Accordingly, selecting bar 13 will be moved in the opposite direction by means of the member 25 associated with both of these selecting bars. The remainder of these selecting bars will remain unaffected, due to the actuation of this particular character key, as the key lever 7 does not engage the apertures cut therein. It is thus seen that the shifting of the selecting bar 11 in a positive direction effects the closure of the contact springs 88 and 89, the contact springs controlled by the contact-making member of the other selecting bars being open for this particular selection. It is, however, to be noted that contact springs 86 and 87, which had previously been closed due to the actuation of selecting bar 13, are at this time open, due to the depression of the character key 6 and the movement of the negative selecting bar 18, which causes the positive selecting bar 13 to be moved in a negative direction. The selecting bar 22 will also be shifted upon the depression of the character key 6, for causing the stepping pawl 36 to advance the star wheel 37 for closing contacts 38 and 39. A circuit is thus completed for the release magnet 40 in the same manner as previously described. The energization of the release magnet 40 thereby attracts its armature and releases the arm 43 of the distributor 44, which connects with the line 90 the various contact springs controlled by the selecting bars in the order in which they are connected with the segments of the distributor. The selecting bar 21 will also be shifted, upon the depression of this character key, for effecting the energization of magnet 77, upon the closure of contact springs 78 and 79. This, as before noted, advances the member 72 one step. Following the movement of selecting bar 21 to the left and the restoration of the actuated character key to normal this bar will be restored by spring 21^A. Likewise, when the selecting bar 22 is moved from its normal position and the actuated character key is restored to normal this bar will be returned by the action of retractile spring 22^A.

When any one of the key levers is depressed for the selection of particular ones of the selecting bars in accordance with the desired character to be transmitted, the full depression of a second key is prevented due to a mechanical connection established by the operating levers of the character keys engaging the sides of the apertures in the selecting bars and the connecting link 25 between the two sets of selecting bars. As shown in Fig. 7, when the character key 1 is depressed, the corresponding operating le-

.ver 3 is moved to the left thereby moving the selecting bars of the respective groups so that the sides of the apertures cut therein are aligned along the broken line A—A. Upon the restoration of the key 1 to normal, the selecting bars, with the exception of bars 21 and 22, remain in the position set. The latter mentioned bars are restored to their normal position by means of retractile springs 21A and 22A. Now, should an attempt be made to depress key 6 during the period that key 1 is depressed, no mutilation of signals will result owing to the mechanical locking arrangement established between the respective bars through the operating levers of the depressed character key and the connecting link 25. When an attempt is made to depress key 6, with key 1 already depressed, no movement of the selecting bars will result even though the operating lever 4 of key 6 engages the sides of the apertures in selecting bars 11 and 18. These selecting bars with their corresponding selecting bars 16 and 13 are prevented from operating on account of the depression of key 1 which already has its operating lever 3 in engagement with the sides of the apertures in the respective selecting bars arranged along the broken line A—A of Fig. 7. When this condition exists, selecting bar 11 is prevented from moving for, as shown in Fig. 6 a projection on the under surface of this bar engages the pivoted connecting link 25 which extends to selecting bar 16 of the second set and which transmits the movement of the selecting bar 11 to selecting bar 16, and vice versa. Accordingly, with the selecting bars in the position shown in Fig. 7, selecting bar 11, upon the depression of key 6, is moved to the left while selecting bar 16 is moved to the right through the connecting link 25. However, when the key 1 is depressed, the apertures of the selecting bars are aligned along the broken line A—A of Fig. 7, selecting bar 16 cannot be moved due to the engagement of the side of its aperture by the operating lever 3 of key 1. Likewise, selecting bar 18 is prevented from being shifted upon an attempted depression of key 6. By the system of permutation in accordance with the Baudot or five-unit code, the apertures in the selecting bars are all cut so that no two keys have the same cuttings. Consequently there will be at least one set of selecting bars which will have the edge of its aperture projecting beyond the line B—B at any other key during the period any key is depressed thereby preventing the depression of any of the other character keys. However, the instant the character key 1 is restored to normal, any of the selecting bars such as those brought about due to the depression of the character key 6 may be shifted to their selecting position. When the character key 6 is depressed, the apertures cut in the selecting bars will be aligned along the broken line B—B in a manner similar to the alignment of the apertures in the selecting bars along the broken line A—A of Fig. 7.

The operation of the mechanism when employed for the purpose of perforating a paper tape is substantially the same, with the exception of disconnecting the release magnet 40 and connecting the winding of the magnet 64 with battery through to the contacts of the switch 41 upon the closure of contact springs 70 and 71, and a further description thereof is considered unnecessary.

What is claimed is:

1. In a transmitter, the combination of a keyboard mechanism, character keys, operating levers therefor, a plurality of selecting bars arranged transversely of said operating levers, and means comprising mechanism connected with certain ones of said bars effective for preventing the simultaneous depression of two of said character keys.

2. In a device for setting up character representations in code form, a key-controlled mechanism, comprising operating levers, a plurality of sets of selecting elements, and a member connecting an element in one set with an element in the other set and actuated upon the movement of either of the elements due to the operation of an operating lever for shifting the other element in the opposite direction.

3. In a transmitter, the combination of keyboard mechanism, a plurality of selecting elements having irregularly shaped apertures, operating levers passing through the apertures in said selecting elements and by the lateral movement of the operating levers engaging the walls of such apertures for moving the selecting elements in substantially the same plane.

4. A keyboard mechanism comprising a plurality of character keys, a plurality of selecting elements having apertures therein and an operating lever individual to each of said keys extending through such apertures, and by their lateral movement cause the movement of said selecting elements in various combinations, said elements being arranged to remain in the set position until subsequently moved due to the actuation of another operating lever.

5. A keyboard mechanism comprising a plurality of character keys, a plurality of selecting elements having irregularly shaped apertures therein, and an operating lever individual to each of said keys extending through such apertures, and by their lateral movement causing the movement of said selecting elements in various combinations, said elements being arranged to remain in the set position until subsequently moved

due to the actuation of another operating lever.

6. In a device for setting up character representations in code form, a key controlled mechanism comprising a plurality of selecting elements having apertures therein and operating levers passing therethrough and by their lateral movement engaging the walls of such apertures for effecting the movement of said elements in various combinations.

7. In a transmitter the combination of a plurality of character keys, a plurality of banks of laterally shiftable levers operated by said keys, said levers of each bank being in the same plane, a plurality of selecting bars arranged transversely of said levers, and abutments on said bars for selective engagement with said levers.

8. A keyboard mechanism comprising a plurality of character keys operating levers therefor, a plurality of sets of selecting elements, all of said selecting elements being moved directly by said operating levers, and means for rendering an element of one group responsive to the movement of an element in the other group.

9. A keyboard mechanism comprising a plurality of character keys, operating levers therefor, a plurality of sets of selecting elements, all of said selecting elements being moved directly by said operating levers, and a member associated with an element of each set and responsive to the movements of an element in either one of said groups for effecting the movement of the corresponding element in the other group.

10. A keyboard mechanism comprising a plurality of character keys, operating levers therefor, a set of positive and a set of negative selecting bars in operative relation with said operating levers and operated directly thereby in variable combinations upon the depression of the corresponding character key.

11. A keyboard mechanism comprising a plurality of character keys, operating levers therefor, a set of positive and a set of negative selecting bars arranged to be shifted directly by said operating levers and a member individual to a selecting bar of each set and actuated due to the movement of either one thereof for causing the movement of the other of said selecting bars.

12. A keyboard mechanism comprising a plurality of character keys, operating levers therefor, a set of positive and a set of negative selecting bars in operative relation with said operating levers and operated directly thereby, and a member individual to a selecting bar of each set and actuated due to the movement of either one thereof for causing the movement of the other of said pair of selecting bars in an opposite direction.

13. A transmitter comprising keys, a plurality of sets of selecting elements, contacts associated with one of said sets thereof, means for shifting an element of one set upon the movement of the corresponding element in the other set and means moved laterally upon the depression of a key for effecting the movement of the selecting elements in variable combinations for actuating said contacts.

14. A transmitter comprising keys, a plurality of sets of selecting elements, contacts associated with one of said sets thereof, a member cooperating with a selecting element in each of said sets and actuated due to the movement of either one or the other thereof for effecting the movement of the corresponding one in the other set in an opposite direction, and means responsive due to the depression of a key for moving said selecting elements in variable combinations for actuating said contacts.

15. In a transmitter, the combination of a keyboard mechanism, keys, operating levers therefor, a plurality of selecting elements arranged transversely of said operating levers, selecting elements having apertures through which said operating levers pass, said elements being arranged to be moved in substantially the same plane as said operating levers, contacts controlled by said selecting elements, a line, a distributor having certain of said contacts connected to the segment thereof, and means operated due to the depression of a key for causing said distributor to connect said contacts with said line.

In witness whereof, I hereunto subscribe my name this 14th day of July A. D., 1920.

HARRY PFANNENSTIEHL.