

- [54] **CODE KEYBOARD FOR TYPEWRITERS AND SIMILAR OFFICE MACHINES**
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- [51] **Int. Cl.**..... B41j 23/02
- [58] **Field of Search**..... 197/16, 17, 19, 98, 18;
 235/145, 146; 178/17, 79; 340/365

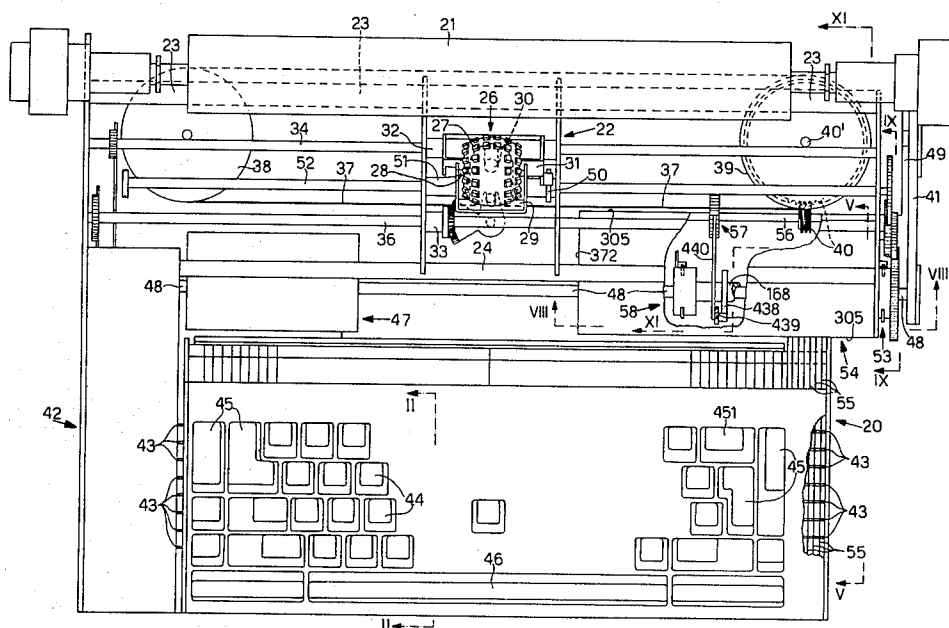
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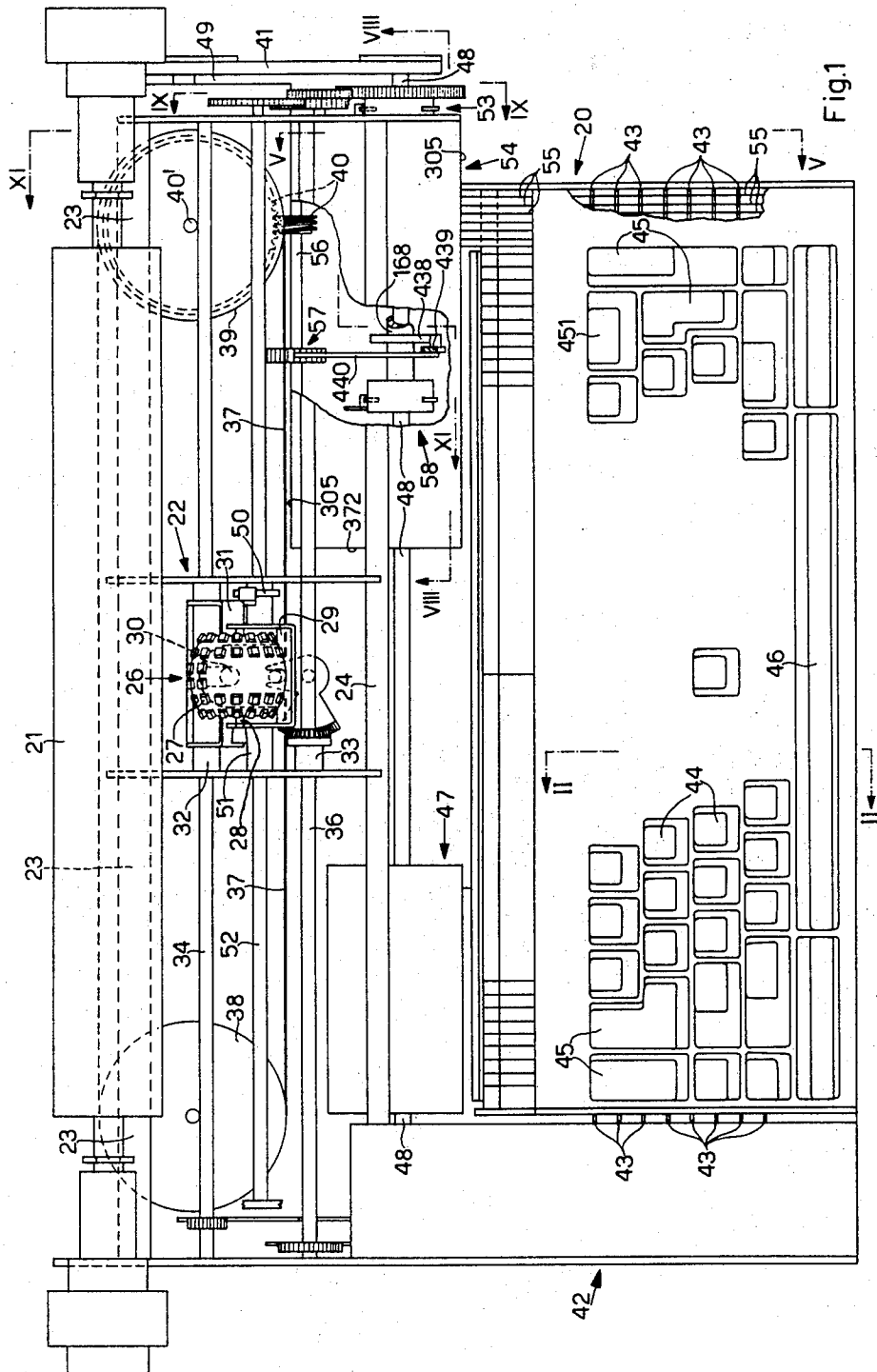
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[57] **ABSTRACT**

A code keyboard for typewriters has a plurality of keys, a series of code bars and a plurality of sliders. The setting sliders are urged back by corresponding springs and are normally latched by hooks controlled by the keys. The released slider engages a starting clutch and is successively shifted forward by a setting lug for setting the code bars. The lug is operated by a setting spring and is controlled by the clutch.

25 Claims, 18 Drawing Figures





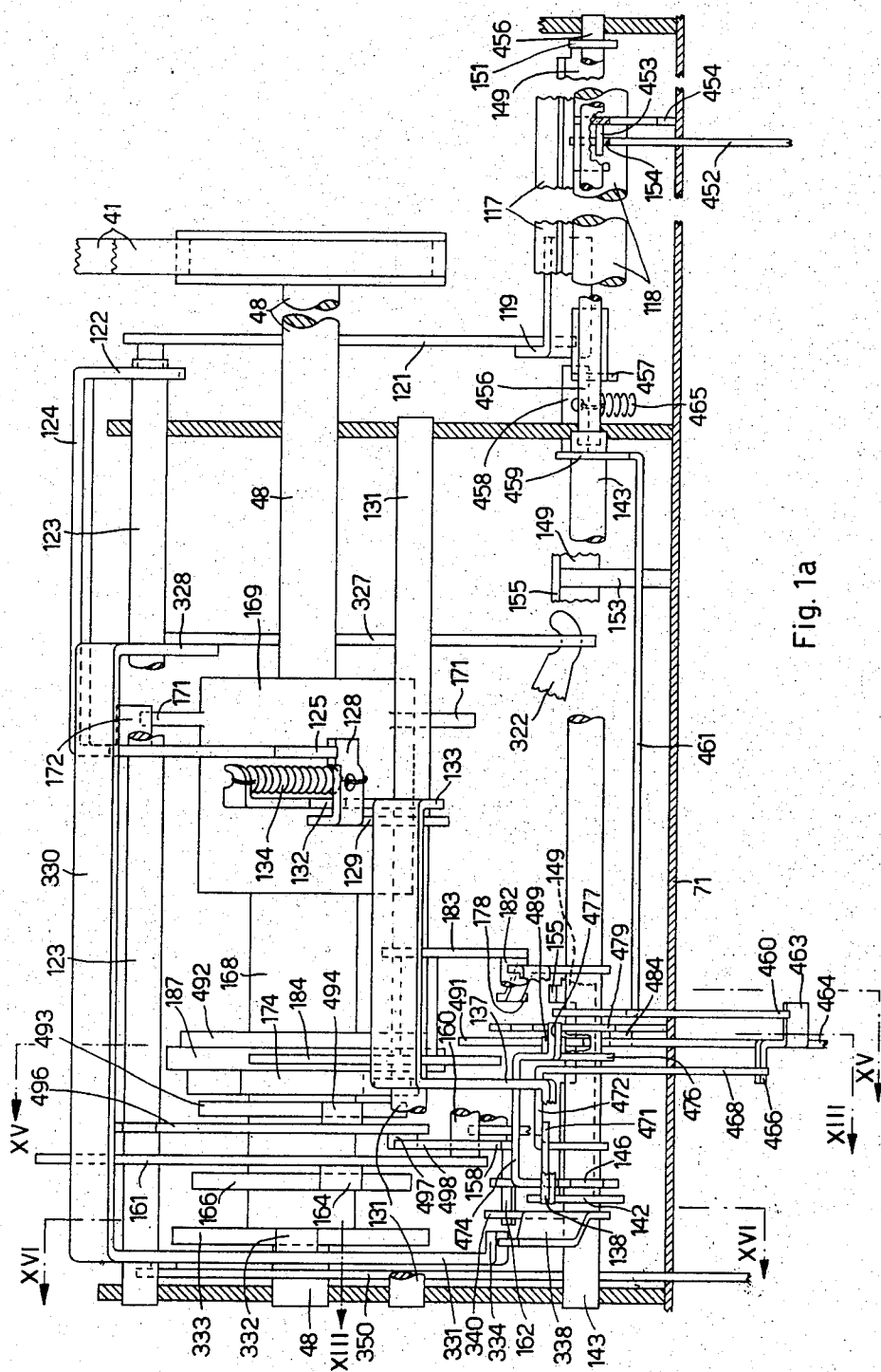


Fig. 1a

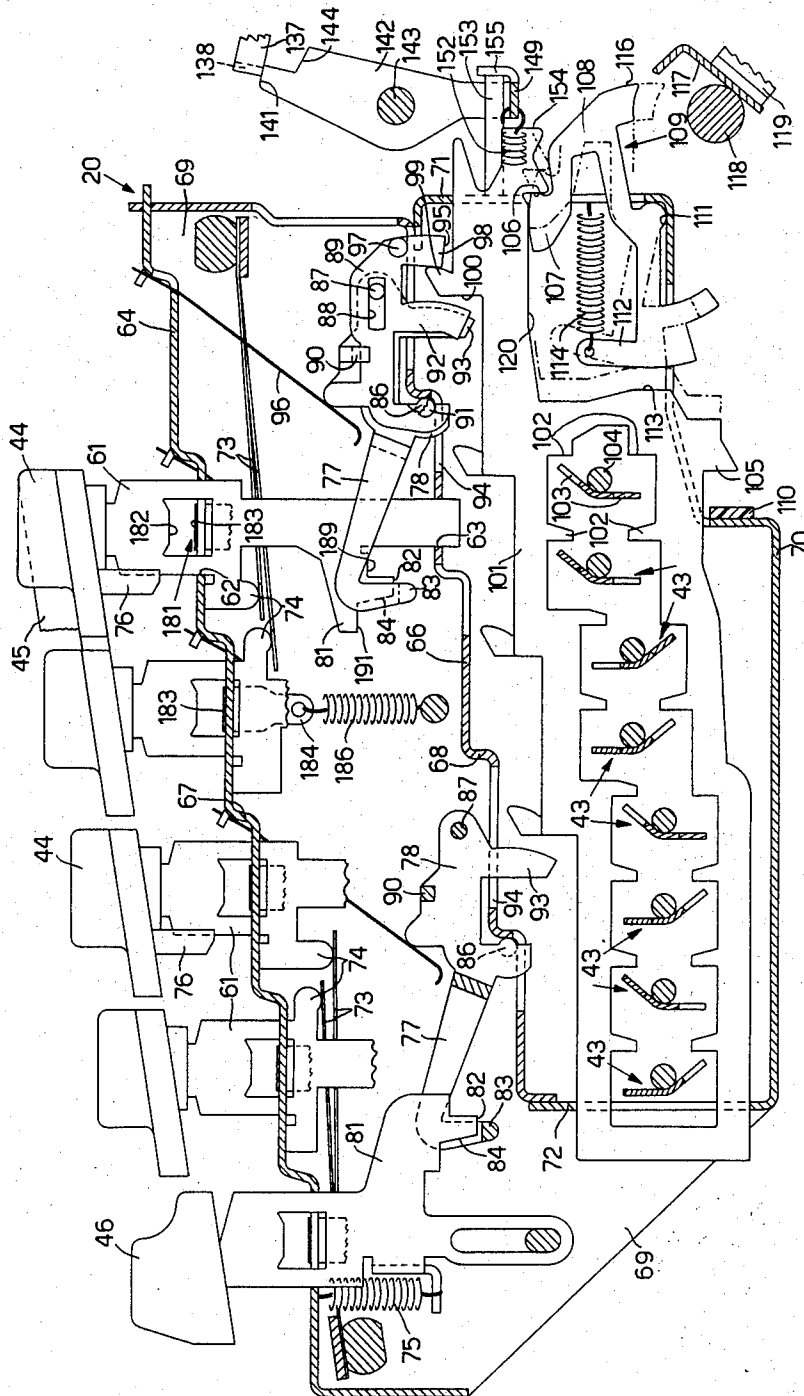
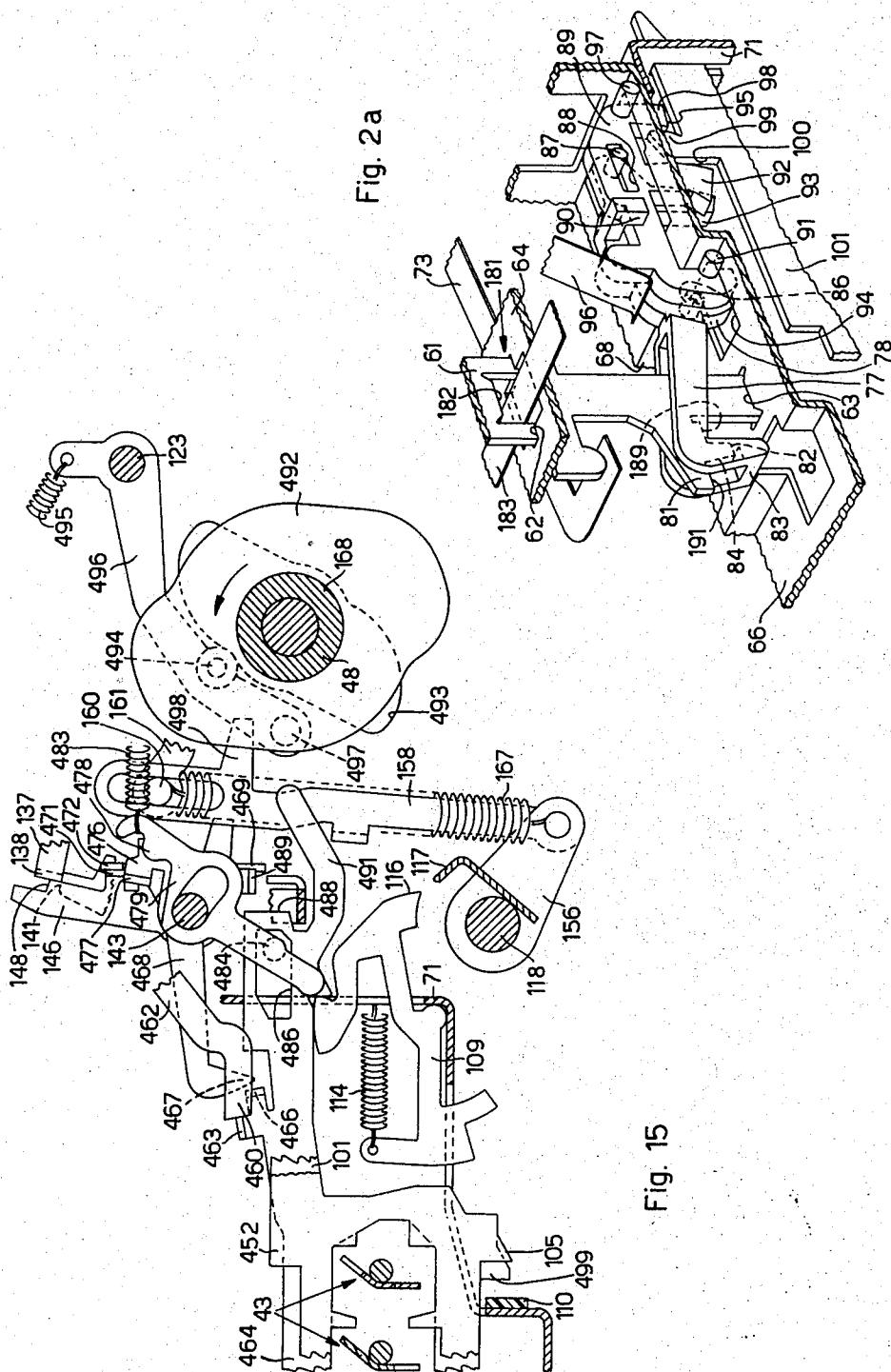


Fig. 2



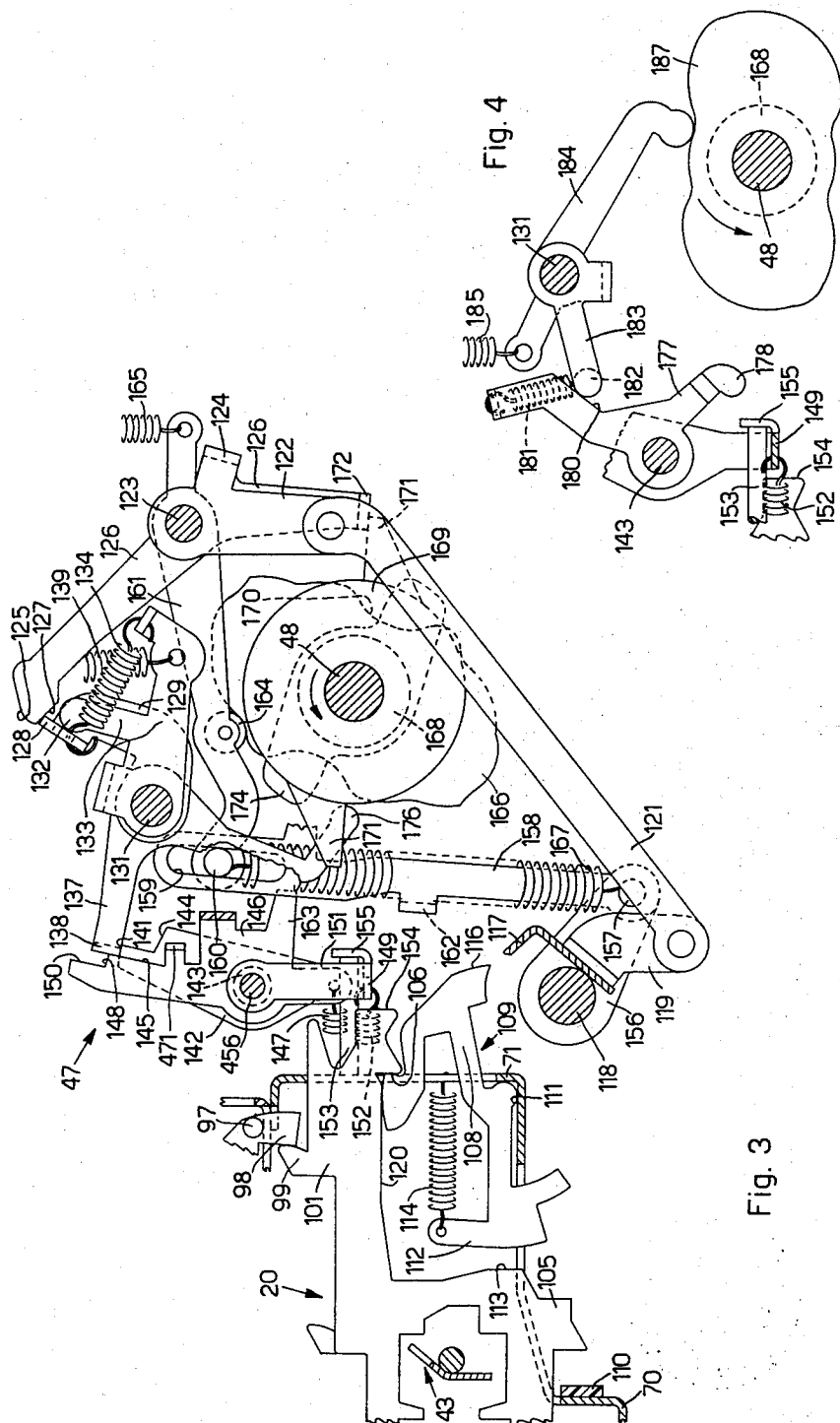


Fig. 3

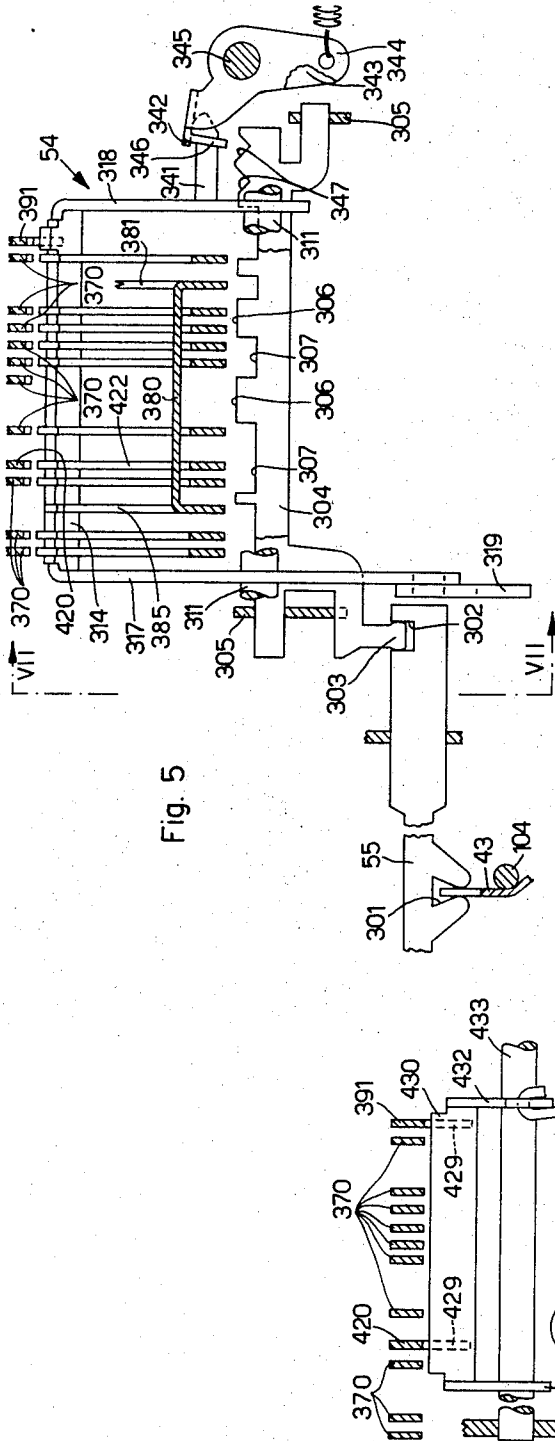


Fig. 5

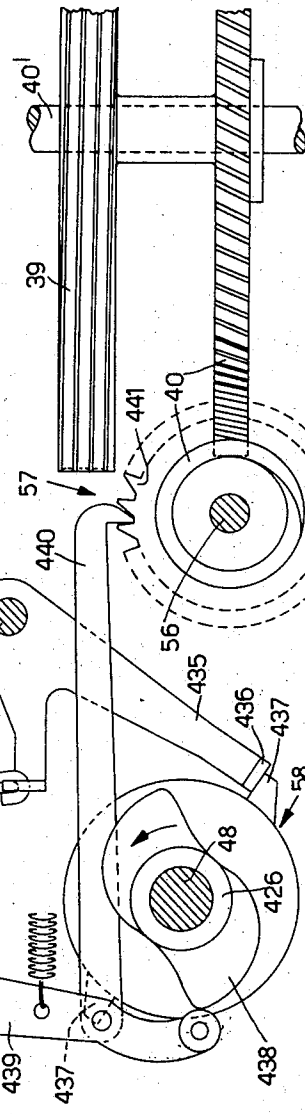
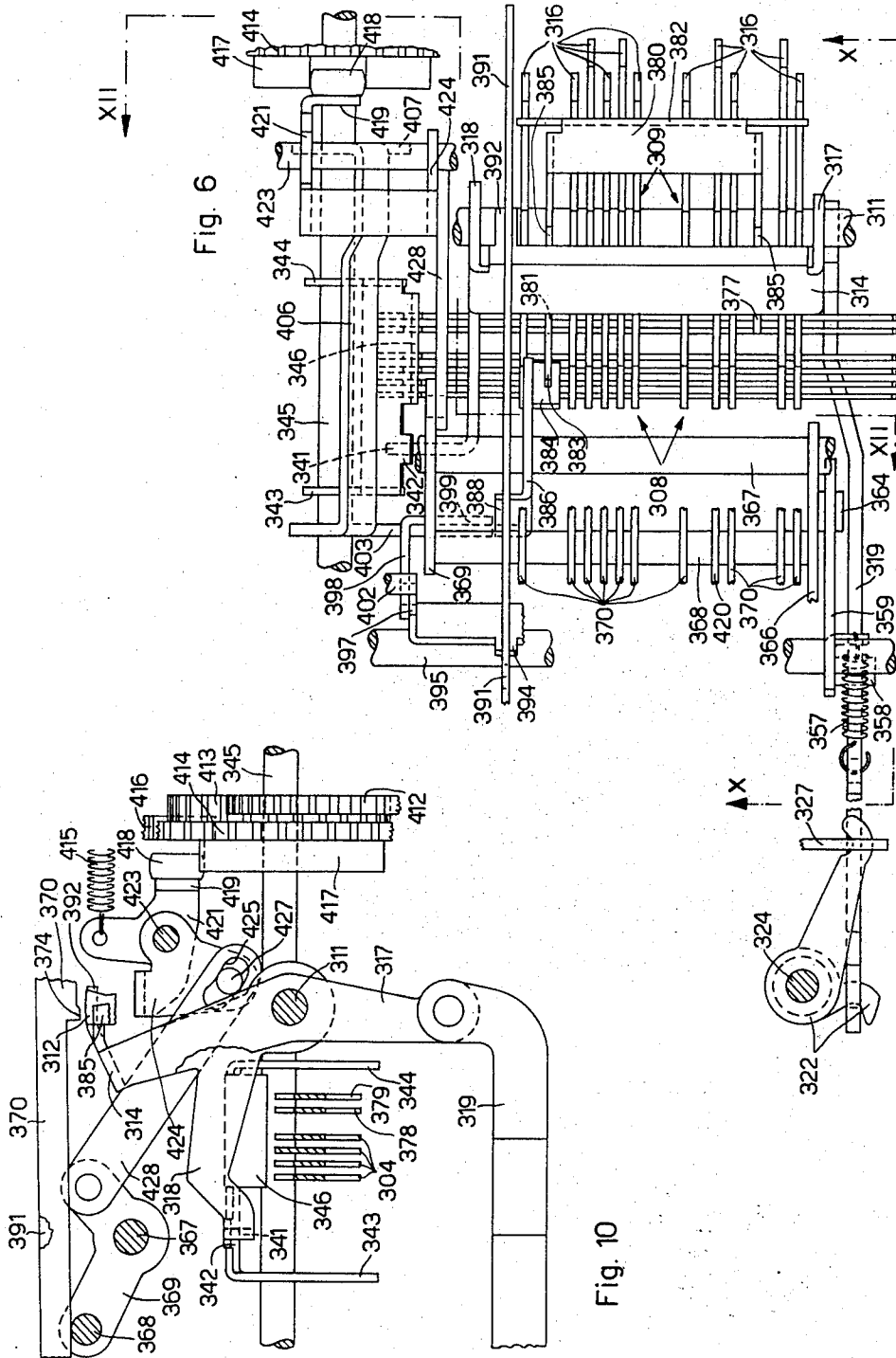
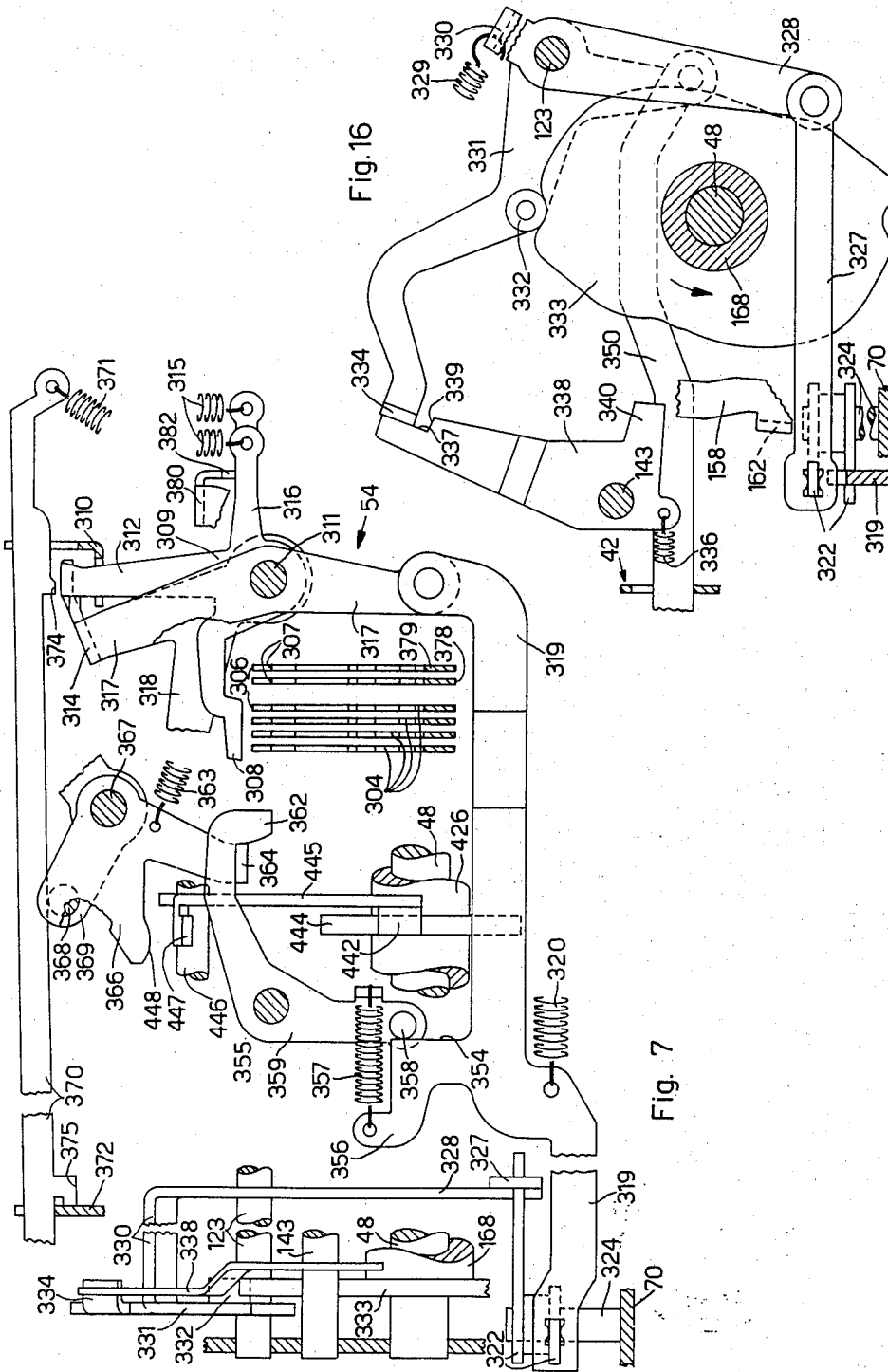


Fig. 11





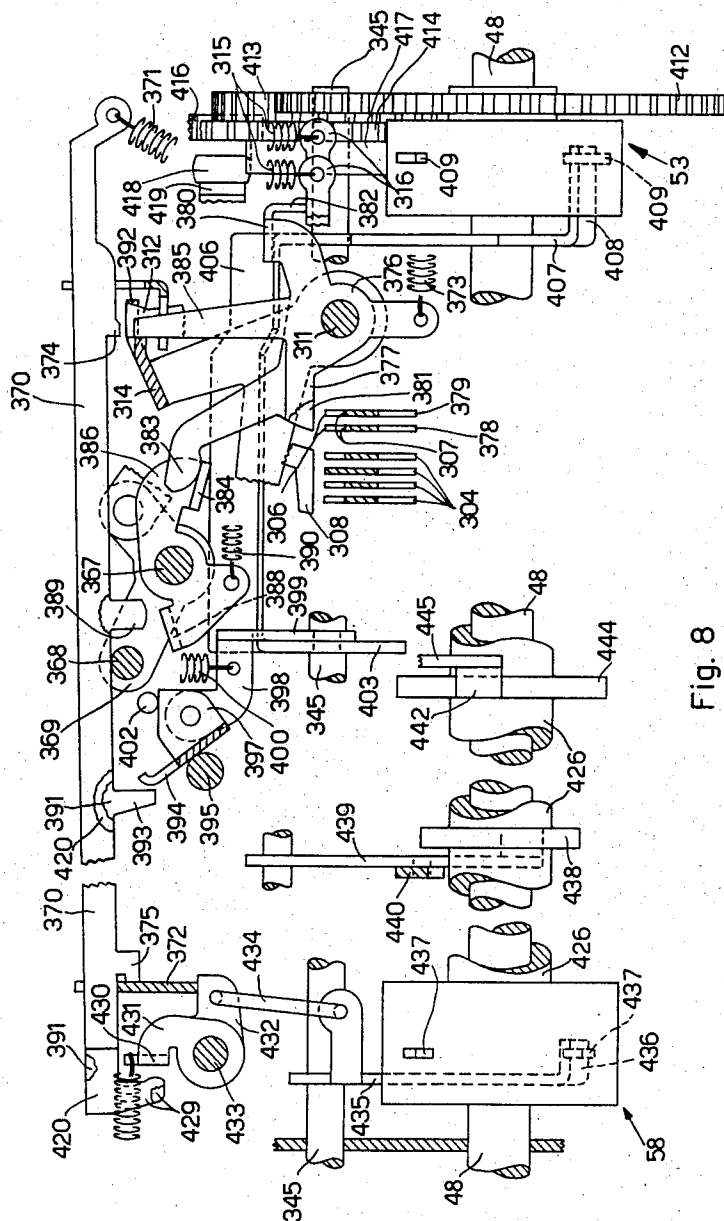


Fig. 8

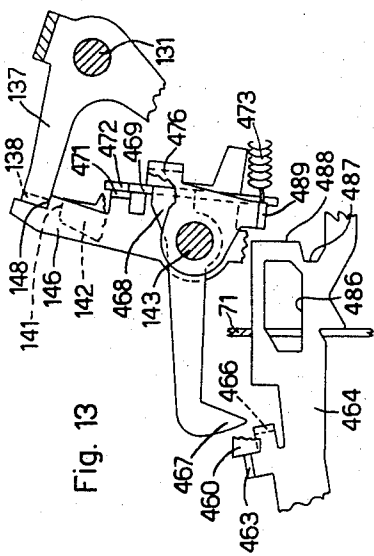


Fig. 13

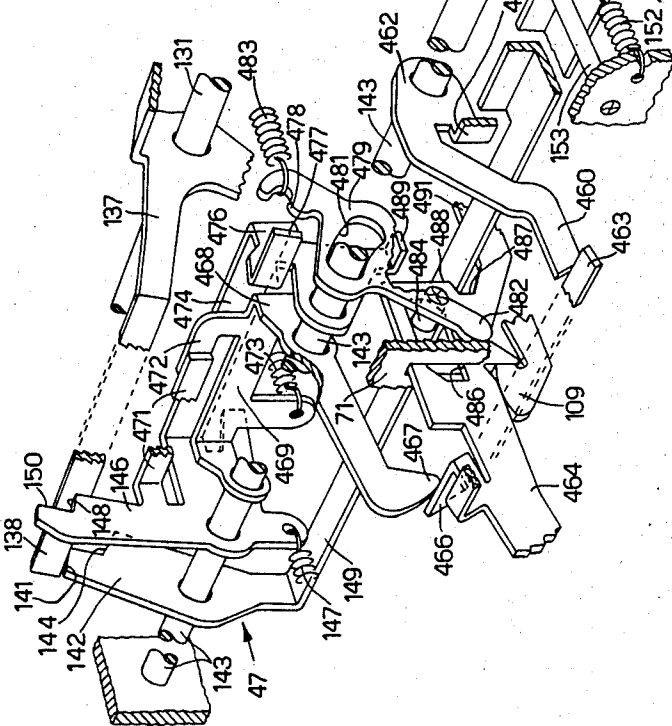


Fig. 14

CODE KEYBOARD FOR TYPEWRITERS AND SIMILAR OFFICE MACHINES

BACKGROUND OF THE INVENTION

The present invention relates to a code keyboard such as may be used in typewriters and other office machines with keyboard, comprising a plurality of keys, a series of code bars, a plurality of setting elements for said code bars associated with said keys and a starting clutch. A common setting member controlled by said starting clutch shifts the setting elements individually in a first direction for setting the code bars in accordance with the depressed key.

In a known keyboard of the type defined, the setting elements are urged into a rest position by springs bearing against a fixed stop of the frame. The depression of a key causes a lowering of the associated setting element and, through a common bar, the closing or engagement of the clutch and the starting of the main shaft. Through the medium of a splined shaft, the main shaft shift the lowered setting element in a second direction perpendicular to the lowering direction permitting the encoding of the code bars, which bears on the bottom edge of the setting element, keeping it lowered even on release of the respective key.

This keyboard requires a movement of the setting elements in accordance with two different coordinates. For correct functioning thereof, rather close machining tolerances are necessary so that the lowering stroke of the setting elements may cause at the same time the closing or engagement of the clutch and the release of the retaining spring. During the setting stroke, the retaining spring drags on the edge of the setting element under the action of the inclined spring, and moreover the setting element drags on the common bar, as a result of which the keyboard is sensitive in operation.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a code keyboard, which is reliable in operation and wherein the various kinematic elements can be produced with wide tolerances and are subject to very limited dragging.

According to the present invention, in a code keyboard of the above stated type, we now provide a plurality of springs operatively connected with said setting elements for urging individually said setting elements in a direction opposite to said first direction, hook means associated with said keys for normally holding at rest said setting elements in opposition to the action of said springs and for releasing said setting elements when said keys are depressed, whereby a released one of said setting elements is shifted in said opposite direction by the corresponding one of said springs, a starting member being disposed into the path of said setting element on said opposite direction to activate said starting clutch for a cycle, and intermediate means for permitting said common setting member to shift only said released setting element thus shifted in said opposite direction.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention is presented by way of non-limitative example in the following description and shown in the accompanying drawings, in which:

FIG. 1 is a general diagrammatic view of a typewriter incorporating a code keyboard embodying the invention;

FIG. 1a is a partial plan view of the setting and release mechanisms of the keyboard;

FIG. 2 is a partial section from the right on the line II—II of FIG. 1;

FIG. 2a is a perspective view of a detail of FIG. 2;

FIG. 3 is a partial section from the right of a detail of the setting mechanism of the keyboard;

FIG. 4 is a partial section from the right of another detail of the setting mechanism of the keyboard;

FIG. 5 is a partial section from the right of a detail of a functions recognition assembly of the keyboard on the line V—V of FIG. 1;

FIG. 6 is a partial section in plan of the keyboard;

FIG. 7 is a partial section on the line VII—VII of FIG. 5;

FIG. 8 is a partial cross-section of the keyboard on the line VIII—VIII of FIG. 1;

FIG. 9 is a partial section from the right on the line IX—IX of FIG. 1;

FIG. 10 is a partial section on the line X—X of FIG. 6;

FIG. 11 is a partial section of the keyboard on the line XI—XI of FIG. 1;

FIG. 12 is a partial section of the keyboard from the right on the line XII—XII of FIG. 6;

FIG. 13 is a partial section from the right on the line XIII—XIII of FIG. 1a of a keyboard reactivating mechanism in a working position;

FIG. 14 is an exploded perspective view showing a number of details of the keyboard reactivating mechanism;

FIG. 15 is a partial section from the right on the line XV—XV of FIG. 1a; and

FIG. 16 is a partial section from the right on the line XVI—XVI of FIG. 1a.

GENERAL DESCRIPTION

Referring to FIG. 1, the keyboard, indicated generally here by the reference 20, is fitted, by way of example, to a typewriter with a transversely fixed platen 21 and with a type carriage 22 movable transversely on two guides 23 and 24 which are parallel to the platen 21. Mounted on the carriage 22 is a barrel-shaped typing head 26 from which there projects a set of types 27 disposed in six vertical lines or files and 16 rows, substantially as described in the British Pat. specification No. 1,275,025.

The head 26 is rotatable with a substantially horizontal shaft 28 in a fork 29 to bring the row containing the character to be printed in front of the platen 21. The fork 29 is rotatable in turn with a sub-vertical shaft 30 in a bail 31 to orient the head 26 in front of the platen 21 and select the vertical line or file containing the character to be printed. For the two selection processes, the head 26 and the fork 29 are respectively rotated, in the manner described in the said patent specification, by a hollow shaft 32 and a sleeve 33 which are rotatable on the carriage 22. The shaft 32 and the sleeve 33 are angularly fast and axially slidable on a corresponding pair of prismatic shafts 34 and 36 which are rotatable with two cylindrical ends in the fixed frame of the machine.

The shafts 34 and 36, in turn, are rotated by a decoding unit indicated generally by the reference 42 and

substantially as described in the U.S. Pat. application Ser. No. 126,542 filed on Mar. 22, 1971 now U.S. Pat. No. 3,696,906, which converts the coded combinations of eight code bars 43 into selective rotations of the two shafts 34 and 36.

The setting of the bars 43 is effected from the keyboard 20 on the depression of one of the character keys 44, one of the function keys 45 or the space bar 46. This setting takes place through the medium of a setting assembly 47 which will be described hereinafter and which derives its motion from the driving shaft of the machine, indicated by the reference 48, which is continuously rotatable by an electric motor 49 through a belt 41.

For the printing of the selected character, the bail 31 is pivoted on the hollow shaft 32 to cause the head 26 to strike against the platen 21. To this end, the bail 31 is rotated by a cam 50 of a hollow shaft 51 turnable on the carriage 22, which is angularly fast and axially slidable on a prismatic shaft 52. The shaft 52 can rotate by means of two cylindrical ends in the fixed frame of the machine and is connected, for a cyclic rotation of 360°, to the main shaft 48 on the engagement of a one-cycle clutch 53 known per se. Control of this clutch, and therefore of the striking of the type, is effected by a functions recognition assembly 54 which will be described hereinafter and which is connected through a series of transmission bars 55 to the code bars 43 and recognizes whether their coded combinations correspond to a character to be printed or to a function to be performed. In the first case, the assembly 54 commands the engagement of the clutch 53, starting a printing cycle, while in the second case the clutch 53 remains open or disengaged and the head 26 remains in its inoperative position.

For the transverse movements of the carriage 22, the two ends of a cable 37 are fixed thereto, the cable being returned by the pulley 38 and being wound for several turns on the drum 39. This drum is actuated through a pair of elements consisting of a worm and worm wheel 40 by a transverse shaft 56 rotatable in the frame. More particularly, for the feed or advancing movements of the carriage 22, the shaft 56 is rotated step by step by an escapement 57 known per se, which is activated by a cyclic clutch 58 keyed on the driving shaft 48 and engaged under the control of the functions recognition assembly 54.

SETTING

Referring to FIG. 2, the keys 44 and 45 and the space bar 46 of the keyboard 20 are carried by a series of shanks 61 which are slidable in a corresponding series of slots 62 and 63 provided in two fixed plates 64 and 66. The character keys 44 and the function keys 45 are aligned in five rows, in correspondence with which the plates 64 and 66 have steps 67 and 68. The plates 64 and 66 are interconnected by a rear bent portion of the plate 66 and by two side pieces 69, only one of which can be seen in the drawing. To the plate 66 there is moreover fixed a base plate 70 which is provided with a rear bent portion 71 and a front bent portion 72 constituting together with the side pieces 69 the base structure of the keyboard 20.

The space bar 46 is normally kept raised by a spiral spring 75, while the keys 44 and 45 of the other rows are kept raised by leaf springs 74 acting on corresponding projections 74 of the shanks 61. The greater part of

the keys are moreover provided with a pin 76 which is adapted to be arrested against the plate 64, thus limiting the stroke of the respective key.

The shanks 61 are slidable in a slot presented by a front arm 77 of corresponding levers or release elements 78 made in a single piece in plastic. These levers 78 are substantially flat and are aligned in four transverse rows corresponding to the five rows of character and function keys. More particularly, the shank of the space bar 46 co-operates with the corresponding lever 78 by means of a projection 81 disposed at the rear, while the shanks of the keys 44 co-operate with the subjacent levers 78 by means of the corresponding projection 81 disposed at the front. These projections are provided with a first part constituted by a substantially horizontal bottom edge 82, which is disposed above one end 83 of the arm 77 and is adapted to co-operate therewith. The projection 81 is moreover provided with a second part constituted by a substantially vertical front edge 84 which is also adapted to co-operate with the end 83 of the arm 77.

The levers 78 (FIG. 2a) are provided on one face with an integral pin 86 bearing on the plate 66 and are provided on the opposite face with another pin 87 slidably engaged in its turn in a slotted hole 88 of a lever 89 which is also made of plastic. The two levers 78 and 89 are kept in contact by a lateral lug 90 of the lever 78, which permits mutual sliding movements. The lever 89 is also provided with an integral pin 91 which extends in the opposite direction with respect to the pin 86 and bears on the same plate 66. The two levers 78 and 89 are moreover respectively provided with two vertical and substantially similar projections 92 and 93 which are slidable in a series of longitudinal comb slots 94 in the plate 66, permitting a longitudinal movement of the two levers 78 and 89. These slots, together with the pins 86 and 91 and the shank 61, guide the levers 78 and 89 in a series of planes perpendicular to the plate 66.

The levers 78 and 89, with respective pins 86 and 91, are normally urged against the vertical part of the respective steps 68 by the action of corresponding leaf springs 96 fixed to the plate 64 (FIG. 2). The springs 96 moreover tend to cause the levers 78 and 89 to turn clockwise in the drawing on the respective pins 86 and 91, being prevented therefrom by the arrest of a pin 97 of the lever 89 against the plate 66 and by the pin and slot link of the levers 78 and 89.

Each lever 89 is provided with a hook 98 which normally retains with its front edge a tooth 99 of a corresponding setting slider or setting element 101, which is therefore individually associated with the character and function keys. The sliders 101 are slidably guided by a series of comb slots formed in the rear bent portion 71 and in the front bent portion 72 of the base plate 70. Each tooth 99 is adapted to co-operate through the medium of a front edge 100 with the projection 92 of the corresponding lever 89 and can moreover co-operate with the bottom edge 95 of the hook 98.

Thus, with the four rows of levers there are associated four corresponding series of sliders 101 in which the tooth 99 is located in one of the four positions corresponding to the four rows of keys 44 and 45. The sliders 101 are provided with an elongated opening from which there project eight pairs of like teeth 102 aligned in vertical planes. The teeth 102 are disposed behind

the eight corresponding code bars 43. Each bar 43 is constituted by a transverse strip 103 which is bent at an obtuse angle and is fixed to a shaft 104 which can turn between the side pieces 69 of the keyboard 20. In correspondence with each pair of teeth 102 of the sliders 101, the strips 103 forming these bars are provided with a solid portion adapted to engage the tooth 102 and, on the opposite side with respect to the shaft 104, with a slotted portion permitting the passage of the tooth 102. The solid portions and spaces between the strips 103 of the bars 43 are disposed in such manner that with each slider 101 there is associated a corresponding combination of solid portions and spaces different from that for the other sliders. In this way, when each setting element 101 shifts in a first direction, that is towards the front part of the machine, it is adapted to dispose the bars 43 in accordance with the particular combination which is characteristic of that setting element. In correspondence with the rear part of the sliders 101 these sliders have a tooth 105 which is adapted to be arrested against a strip 110 of shock-absorbing or cushioning material, for example foam rubber, fixed to the rear bent portion 71 of the base plate 70.

Each slider 101 has in its rear portion a shoulder 106 which is in engagement with a tooth 107 arranged at the end of a U-shaped arm 108 of a corresponding plastics rocking lever 109. The rocking levers are disposed in the same plane as the respective sliders 101 and are guided by the corresponding sliders 101. The rocking levers 109 have in their median portion a circular profile 111 which bears on the angle of the rear bent portion 71 and constitutes the fulcrum of the rocking lever. In the proximity of the shoulder 106 the sliders 101 moreover have a bottom edge 120 adapted to co-operate with the upper part of the teeth 107 of the corresponding rocking levers 109. The rocking levers 109 are provided with an anchor-shaped arm 112 adapted to co-operate with a rear edge 113 of the corresponding slider 101. To the upper end of the anchor-shaped arm 112 there is fixed a spring 114 which holds the profile 111 against the angle of the bent portion 71 and tends to turn the rocking lever 109 clockwise about the said profile 111. Through the medium of the tooth 107 and the shoulder 106, the spring 114 urges the slider 101 to the rear, the slider remaining stationary owing to the arrest of the tooth 99 against the hook 98.

Moreover, in correspondence with the connecting zone between the arms of the U the arm 108 of each rocking lever 109 has a rear edge 116 shaped in the form of a circular arc concentric with the profile 111. The edge 116 is adapted to co-operate with an inverted L-shaped lug 117 which is fast with a shaft 118 rotatable in the sides of the machine. The upper end of the lug 117 is substantially at the same height as the profile 111. Fixed to the lug 117, which constitutes the common setting member of the keyboard, is a crank 119 (FIG. 3), which is pivoted to a connecting rod 121 connecting the keyboard 20 to an arm 122 of a bail 124 which can turn with another rocking lever arm 126 on a fixed shaft 123. A bottom edge 127 of the arm 126 normally bears on a bent portion 128 of a lever 129 turning on a fixed shaft 131. An upper profile 125 of the arm 126 is also adapted to co-operate with the bent portion 128 of the lever 129. Adjacent the lever 129 (see also FIG. 1a) there is also turnable on the shaft 131 an arm 133 which constitutes together with the lever 129 a means for arresting the setting member

117. The arm 133 has a projection 132 against which the bent portion 128 of the lever 129 normally bears owing to the action of a spring 134 stretched between the said bent portion 128 and a corresponding bent portion of the arm 133.

The arm 133 is connected in bail form to an arm 137 through a cross-piece fast with these arms. The arm 137 can also turn on the shaft 131 and is provided with a bent portion 138 normally held by the action of a spring 139 on the arm 133 against a substantially horizontal upper profile 141 of an arm 142. The arm 142 constitutes the starting element of the setting assembly 47 and can turn on a shaft 143 fixed between the side pieces of the machine. The arm 142 has a shoulder 144 in a lower position with respect to the profile 141 and on which the bent portion 138 of the arm 137 is also adapted to bear. The bent portion 138 moreover normally arrests a rear edge 145 of a lever 146 turning on the shaft 143 and on which a return spring 147 acts (see also FIG. 14). The lever 146, which constitutes a locking element for the setting assembly or arrangement 47, is provided with a horizontal shoulder 148 adapted to retain the bent portion 138 of the lever 137 and in a higher position with respect to the profile 141 of the lever 142. Above the shoulder 148, the lever 146 moreover has a rear edge 150 which is disposed more forward than the edge 145 and is also adapted to be arrested against the bent portion 138 of the lever 137.

The arm 142 is integral with a cross-piece or common bar 149 which is integral in turn with another arm 151 also turning on the shaft 143. The cross-piece 149 extends over the entire length of the keyboard 20 and is adapted to co-operate with the rear terminal profiles, indicated by the reference 154, of the setting sliders 101. The cross-piece 149 is moreover provided with a bent-up side or lug 155 which is normally arrested by the action of a return spring 152 against a pin 153 fixed to the bent portion 71 of the plate 70.

Fixed to the shaft 118 is a crank 156 to which there is pivoted by means of a pin 157 the lower part of a substantially vertical connecting rod 158. This connecting rod is provided with a lateral lug 162 adapted to engage a projection 163 of the lever 146. The connecting rod 158 is moreover provided at the top with a longitudinal slotted hole 159 which is slidably engaged in its central portion by a pin 160 fixed to a lever 161 which can turn on the shaft 123. Between the pin 160 and the pin 157 there is stretched a spring 167 which constitutes the setting spring of the keyboard. The spring 167 acting on the pin 157, tends to raise the connecting rod 158 and cause the shaft 118 and the lug 117 to rotate anti-clockwise, being normally prevented from doing so by the arrest action which the bent portion 128 of the lever 129 exerts on the edge 127 of the arm 126. The lever 161 is normally held at rest by means of a roller 164 which co-operates owing to the action of a return spring 165 with a two-lobed cam 166. This cam controls the setting of the code bars and reloads the setting spring 167.

The cam 166 is fixed on a hollow shaft 168 which represents the main shaft of the keyboard. The shaft 168 is rotatable on the main shaft 48 and to it there is fixed the driven part of a clutch 169 having a 180° cycle and which represents the starting clutch of the keyboard. The clutch 169 is provided with two control dogs 171 disposed at 180° one with respect to the other and, on the release of one of these, is adapted to con-

nect the hollow shaft 168 to the driving shaft 48 for an anticlockwise rotation. One of the two dogs 171 is normally retained by a bent portion 172 of the arm 126 so as to keep the clutch 169 open or disengaged and the shaft 168 stationary. On the shaft 168 there is moreover fixed a cam 174 which is adapted to co-operate with a projection 176 of the arm 137.

On the shaft 143 (FIG. 4) there can also turn a lever 177 provided with a projection 178 adapted to co-operate with the bent side or lug 155 of the cross-piece 149. An edge 180 of the lever 177 bears in turn on a pin 182 of an arm 183 owing to the action of a spring 181 stretched between the lever 177 and the said pin 182. The arm 183 can turn on the shaft 131 and is connected in the form of a bail through an integral cross-piece to another arm 184 which can also turn on the shaft 131. The end of the arm 184 co-operates in turn with a cam 187 fixed to the hollow shaft 168 owing to the action of a return spring 185 on the same arm 184.

The setting of the code bars 43 (FIG. 2) takes place in the following manner:

By depressing a character key 44 or a function key 45, the corresponding shank 61 pushes the end 83 of the arm 77 downwardly by means of the edge 82 of the projection 81. The corresponding levers 78 and 89 then turn anticlockwise in opposition to the action of the leaf springs 96, releasing the hook 98 of the lever 89 from the tooth 99 of the corresponding setting slider 101. Owing to the action of the spring 114, the rocking lever 109 then rotates clockwise and, by means of the tooth 107 and the shoulder 106 of the corresponding slider 101, shifts this slider to the rear (to the right in the drawing) until the rear edge 113 thereof is caused to stop against the anchor-shaped arm 112. Moreover, by this rotation, the rocking lever 109 brings the edge 116 of the arm 108 into the path of the lug 117, as indicated by a broken line.

If the key depressed is kept depressed, the levers 78 and 89 remain in a position which is rotated anticlockwise owing to the action of the edge 82 on the end 83 of the arm 77. This also happens in the case where the depressed key is released immediately after the freeing of the tooth 99. In this case, the edge 95 of the hook 98 is arrested against the top profile of the tooth 99 owing to the action of the spring 96, throughout the period in which the slider 101 is shifted to the right of the rest or inoperative position. The two levers 78 and 89 are thus kept raised and the sliders are prevented from being able to return to the rest or inoperative position.

By means of the profile 154 of the cross-piece 149, the slider 101 released in its following shifting towards the rear part of the machine causes an anticlockwise rotation of the arm 142, removing from the bent portion 138 of the arm 137 the support constituted by the top profile 141. The arm 137 (FIG. 3), as a result of the action of the spring 139 on the arm 133, then turns anticlockwise until it is arrested by the bent portion 138 on the shoulder 144 of the arm 142. Due to the rotation of the arm 137, the end of the projection 176 is moreover brought into the proximity of the cam 174. Finally, owing to the rotation of the arm 133, the projection 132 thereof causes, by means of the bent portion 128 of the lever 129, a corresponding anticlockwise rotation of the lever 129 and removes from the edge 127 of the arm 126 the stop constituted by the said bent

portion 128. The arm 126 then turns anticlockwise as a result of the action of the spring 167 on the crank 156 and by means of the kinematic chain constituted by the shaft 118, the crank 119, the connecting rod 121 and the other arm 122 of the bail 124. By means of the corresponding bent portion 172, the arm 126 releases the dog 171 of the clutch 169, which is thus closed or engaged, connecting the shaft 48 to the hollow shaft 168 for rotation. Therefore, the connecting rod 158 is drawn upwardly, moving the slot 159 upwards, and turns the shaft 118 and the lug 117 fixed thereto anticlockwise simultaneously with the release of the dog 171. After a brief rotation, the lug 117 encounters the edge 116 of the rotated rocking lever 109 and begins to push it to the left against the action of the spring 114 over which, however, the action of the spring 167 prevails. By means of the anchor-shaped arm 112 and the edge 113 of the released slider 101, the rocking lever 109 carries this slider along to the left in the drawing, causing it to pass through its inoperative position. Owing to the limited mass of moved parts, the spring 167 rapidly brings the lower end of the slot 159 into contact with the pin 160.

The rocking lever 109 is now locked between the shoulder 106 and the edges 113 and 120 of the slider 101, as shown in broken lines in FIG. 2, and is moreover guided at the bottom by the horizontal portion of the plate 70. The assembly constituted by the slider 101 and the rocking lever 109 is therefore shifted to the left without any relative movement occurring between the rocking lever 109 and the said slider 101.

If the depressed key has been released, on the passage of the slider 101 through its inoperative position the tooth 99 is released from the edge 95 of the hook 98 and the two levers 78 and 89 can return to their initial positions owing to the action of the spring 96. If, on the other hand, the key has remained depressed, the levers 78 and 89 remain rotated anticlockwise. Both in the first and in the second case, immediately after the slider 101 has passed through its inoperative position, it carries the lever 89 along with the edge 100 (FIG. 2a) and the projection 92, and, by means of the slot 88 and the pin 87, the said lever in turn carries the lever 78 along.

In the event of the key actuated having remained depressed, after a brief movement of the slider 101 to the left of the inoperative position, the end 83 of the arm 77 leaves the bottom edge 82 of the projection 81. Owing to the action of the spring 96, the two levers 78 and 89 therefore rotate clockwise about the respective pins 86 and 91 until the pin 97 is arrested against the plate 66, the levers returning so that they are oriented as in their respective initial positions.

On the engagement of the clutch 169 (FIG. 3), the cam 174 presents to the projection 176 of the arm 137 the part of smaller radius, in correspondence with a rapidly increasing profile. The rotation of the shaft 168 having been initiated, the cam 174 then causes the arm 137 to turn clockwise. After a rotation of the shaft 168 through about 18°, the cam 174 presents its higher profile and brings the bent portion 138 of the arm 137 above both the profile 141 of the lever 142 and the shoulder 148 of the lever 146. Owing to the action of the spring 147, the lever 146 released in this way by the bent portion 138 then turns clockwise until it is arrested by the other edge 150 against the same bent portion 138, therefore remaining turned clockwise with

respect to its inoperative position. Since, moreover, the released slider 101 has already been shifted to the left by the lug 117, the bar 149 can turn clockwise owing to the action of the spring 152 and returns to its initial position until it is arrested by the side or lug 155 against the pin 153 of the bent portion 71.

During the return to rest, the cross-piece 149 is assisted by the action of the projection 178 (FIG. 4) on the lug 155. Owing to the initial rotation of the shaft 168, the cam 187 in fact presents a rapidly increasing profile to the end of the arm 184, so that the arm 184 turns anticlockwise in opposition to the action of the return spring 185. Because of the action of the spring 181, the lever 177 follows the movement of the pin 182, turning anticlockwise in its turn, and accompanies the lug 155 with the projection 178 in the return of the lug to the inoperative position. After a rotation of the shaft 168 through about 22°, the lug 155 is already in contact with the pin 153. The further anticlockwise rotation of the lever 184 caused by the still increasing profile of the cam 187 is no longer followed by the lever 177, so that the spring 181 stretches further and the projection 178 forces the lug 155 against the pin 153, preventing possible rebounds of the lug with respect to the stop.

During this starting phase, the roller 164 (FIG. 3) follows the increasing profile of the cam 166, as a result of which the lever 161 is turned clockwise against the action of the spring 165, shifting the pin 160 upwardly. By means of the spring 167 which keeps the lower end of the slot 159 against the pin 160, the connecting rod 158 is also shifted upwardly by now under the control of the cam 166, continuing to shift the setting slider 101 to the left. In the course of this shifting of its rest point to the left, the released slider 101 encounters with the teeth 102 (FIG. 2) the solid parts of the strips 103, positioning the bars 43 positively according to the code combination appertaining to the depressed key. More particularly, if the solid portions of the strips or wings 103 are located below the respective shaft 104, the bars 43 are rotated into the position shown in the drawing for the first bar on the right, while if the solid portion is located above the shaft 104 the bars 43 are rotated into the position shown in the drawing for the third bar from the right.

In the course of the positioning of the bars 43, when the hollow shaft 168 (FIG. 3) has rotated through about 20°, the lug 162 of the connecting rod 158 encounters the projection 163 of the lever 146, carrying it upwardly. The lever 146 begins to turn anticlockwise, first leaving with the rear edge 150 the bent portion 138 of the arm 137 and then also moving away the other rear edge 145, while the lever 137 is still above the shoulder 148 owing to the action of the cam 174 on the projection 176. When the hollow shaft 168 has rotated through about 35°, the tooth 105 of the slider 101 strikes against the strip of rubber 110, arresting the movement of the slider 101 after a brief stroke and therefore completing the encoding of the bars 43. Starting from this phase, the decoding unit 42 (FIG. 1) positions the head 26 as described in the said U.S. Pat. application Ser. No. 126,542 now U.S. Pat. No. 3,696,906.

During the following rotation of the hollow shaft 168 (FIG. 3) from 35° to about 50°, the profile of the cam 166 is still increasing, as a result of which the lever 161 continues to turn clockwise as seen in FIG. 3. Since,

moreover, the slider 101 is arrested against the strip 110, the crank 156 remains stationary, preventing further lifting movements of the connecting rod 158. The pin 160 then leaves the lower part of the slot 159 and, sliding along the said slot 159, stretches the spring 167. In the course of this phase, the cam 174 presents to the projection 176 first a profile of maximum radius and then a sharply decreasing profile, which causes an anticlockwise rotation of the arm 137. Since the shoulder 148 of the lever 146 is beyond the path of the bent portion 138, the arm 137 can turn until it brings the said bent portion 138 below the shoulder 148. For a rotation of about 52°, the cam 174 causes the bent portion 138 to be stopped against the top profile 141 of the arm 142 which is already in the inoperative position, as a result of which the projection 176 leaves the profile of the cam 174.

During the rotation of the hollow shaft 168 between 50° and 65°, the cam 166 presents a decreasing profile to the roller 164. Owing to the action of the respective return spring 165 on the lever 161 and owing to the action of the spring 167, the pin 160 begins to lower itself along the slot 159, releasing the spring 167, while the freed slider 101 is still arrested against the strip 110. When the hollow shaft 168 has rotated through about 65°, the roller 164, following the decreasing profile of the cam 166, causes the pin 160 to reach the bottom end of the slot 159. Starting from this angle of rotation of the cam, the connecting rod 158 is shifted downwardly by the pin 160, causing a clockwise rotation of the lug 117 towards its inoperative position.

Owing to the clockwise rotation of the lug 117, the rocking lever 109 and the slider 101 (FIG. 2), pulled by the spring 114, begin to shift to the right and return to the inoperative position. If the key previously depressed has been released, the two levers 78 and 89, already in their rest or inoperative orientation, being pushed by the spring 96, follow the slider 101 and return to the inoperative position until they are arrested by the pins 86 and 91 against the vertical part of the corresponding step 68. If, on the other hand, the key is still depressed, since the levers 78 and 89 are in this stage already in their rest or inoperative orientation, the lever 78 is arrested with the end 83 of the arm 78 against the front edge 84 of the projection 81. The lever 89, on the other hand, continues to be carried along to the right by means of the hook 98 by the tooth 99 of the slider 101, sliding by means of the slot 88 on the pin 87 of the lever 78 until the pin 91 is arrested against the vertical part of the step 68. In both cases, for a rotation of about 90° of the hollow shaft 168, the slider 101 is arrested in its inoperative position. The rocking lever 109, still bearing against the lug 117, owing to the action of the spring 114, leaves with the anchor-shaped arm 112 the rear edge 113 of the slider 101 and turns anticlockwise fulcrumed on the by now stationary tooth 107. The profile 111 now slides on the horizontal portion of the plate 70 until it is arrested against the bent portion 71, bringing the rocking lever 109 into the initial inoperative position.

Before the reloading of the lug 117 has been completed, when the hollow shaft 168 (FIG. 3) has rotated through about 100°, the edge 125 of the arm 126 bears against the bent portion 128. In this phase, the arm 137 is still bearing on the profile 141 of the lever 142, while the lug 117 is in anticlockwise rotation because of the

decreasing profile that the cam 166 presents to the lever 161. Since the action of the return spring 165, which is exerted on the bail 124 through the chain 161, 158, 156, 119 and 121, prevails over the action of the spring 134 on the lever 129, the edge 125 of the lever 126 moves the bent portion 128 away from the projection 132 of the arm 133, stretching the corresponding spring 134.

When the shaft 168 has rotated through about 125°, the cam 166 present to the roller 164 a saddle 170 with a sharply decreasing profile which brings the edge 127 of the arm 126 above the bent portion 128. The bent portion 128 is then disengaged from the arm 126 and, owing to the action of the spring 134, strikes against the projection 132 of the arm 133, returning to the initial inoperative position. After a further brief rotation, the cam 166 presents to the roller 164 a profile of increasing radius. After the connecting rod 158 had adopted the lowest position, it begins to rise again, following the movement of the pin 160 with the lower part of the slot 159 owing to the action of the spring 167. The arm 126 reverses the direction of rotation in turn and the edge 127 begins to be lowered, being brought towards the bent portion 128 of the lever 129. When the shaft 168 has rotated through about 145°, the edge 127 of the arm 126 encounters the top profile of the bent portion 128 and is arrested thereagainst, stopping the connecting rod 121 and the lug 117 in their respective inoperative positions. The cam 166, on the other hand, still presents the increasing profile to the roller 164, as a result of which the lever 161 turns clockwise. The pin 160 is brought from the base of the slot 159 towards its initial position, while the connecting rod 158 stays down owing to the arrest of the arm 126, keeping the lug 117 at rest.

When the shaft 168 has rotated through 180°, the second tooth or dog of the pair of teeth or dogs 171 finally encounters the bent portion 172 of the arm 126, opening or disengaging the clutch 169 and therefore stopping the rotation of the hollow shaft 168.

If the depressed key has already been released, the keyboard 20 (FIG. 2) is disposed with all its parts in the initial inoperative conditions. In the event of the key not yet having been released, the slider 101 remains engaged by the hook 98 of the lever 89, by now at rest. The depressed key cannot exert any control over the said hook 98, because the end 83 of the lever 78 is raised and is beyond the influence of the edge 82, so that there is no repetition of the setting cycle. By releasing the depressed key in a second period, the raising of the shank 61 owing to the action of the spring 73 or 75 removes from the end of the lever 78 the stop constituted by the edge 84 of the projection 81. The spring 96 then shifts the lever 78 to the right until the pin 86 is cause to be arrested against the vertical part of the step 68, thus bringing the kinematic elements back into the initial inoperative position and making possible the commencement of another setting cycle.

If a second key is depressed before the setting cycle for the bars 43 which corresponds to the first key has been completed, another slider 101 is released in the manner described. If the first slider 101 is already shifted to the left, the top back portion of the lug 117, constituted by the smaller side of its L-shaped profile, is already located in the path of the arm 108 corresponding to the second rocking lever 109. This rocking lever shifts the corresponding slider 101 for a stroke

sufficient to release the respective tooth 99 from the hook 98, but cannot complete its anticlockwise rotation. The bottom profile of the arm 108 is arrested on the non-operative edge of the lug 117 and stores the setting command.

The shifting of the second slider 101 is insufficient to move the cross-piece 149 from its inoperative position, as a result of which the setting cycle appertaining to the first key is performed in the manner already described without any interference on the part of the second slider 101 to be released. During the phase of reloading of the lug 117, after the tooth 99 of the first slider 101 has been re-engaged by the corresponding hook 9 when the shaft 16 has rotated through about 120°, the lug 117 releases the arm 108 of the second rocking lever 109. This rocking lever can then turn clockwise and shifts the second slider 101 to the right and this slider, in turn, strikes against the cross-piece 149 by means of the edge 154. Moreover, in this phase, the cam 187 (FIG. 4) presents a sufficiently low and decreasing profile to the roller 186. The projection 178 of the lever 177 is then at such a distance from the lug 155 of the cross-piece 149 that this cross-piece 149 that this cross-piece can shift freely to the right owing to the action of the edge 154 of the slider 101. The arm 142 (FIG. 3) then turns anticlockwise and the arm 137 brings the bent portion 138 back on the shoulder 144, moving the bent portion 128 away from the path of the edge 125 presented by the arm 126.

When the shaft 168 has rotated through 145°, the connecting rod 158 brings the lug 117 into the inoperative position in the manner already described. Since, moreover, the arm 126 is not arrested by the bent portion 128, the spring 167 moves the connecting rod 158 upwardly following the pin 160, as a result of which the lug 117 shifts the second slider 101. Moreover, when the shaft 168 has rotated through 180°, the bent portion 172 of the arm 126 does not encounter the second lug or dog 171 of the clutch 169. The clutch remains engaged and the setting cycle of the second key depressed is initiated in a similar manner to that already described for the first key.

It is obvious that the setting elements 101 are urged by the springs 114 towards the rear part of the machine in a direction opposite to the direction of setting of the bars 43. The setting elements 101 are kept at rest in opposition to the action of the springs 114 by the character keys 44 or the function keys 45, which are adapted to release the corresponding setting elements 101 when they are depressed. The setting element released in this way is shifted in this opposite direction by the spring 114 to activate the starting clutch 169 by means of the rocking lever 126 through the common bar 149 and the stop means constituted by the lever 129 and the arm 133. The means constituted by the rocking levers 109 moreover allow the setting member 117 to engage only the setting element 101 shifted to the rear to shift it forward and set the bars 43.

REPEATED SETTING

The shanks 61 (FIG. 2) of the character keys 44 or function keys 45 have an opening 181 in the part projecting upwardly from the plate 64, this opening being adapted to co-operate by means of a top edge 182 with a thin flexible strip 183 of high elasticity material, for example spring steel. The strips 183 rest on the plate 64 and extend through the openings 181, each in corre-

spondence with each row of keys. One end of the strip or tape 183, which is not shown in the drawing, is fixed to the plate 64, while the other end, indicated by the reference 184, is fixed by means of a spring 186 to the left side 69 of the keyboard 20. The projections 81 of the shanks 61 are provided with a bottom edge 189 disposed at the rear and higher than the edge 82, which is adapted to be arrested against the plate 66. Moreover, the said projections 81 are provided with a third part constituted by a bottom edge 191 disposed at the front and higher than the shoulder 189, which is adapted to retain in turn the end 83 of the arm 77 of the corresponding lever 78. Some of the keys 44 and 45 associated with characters and functions requiring repetition are finally devoid of the pin 76.

By depressing one of the keys 44 provided with the pin 76, the setting of the bars takes place in the manner already described, since the edge 182 of the window or opening 181 does not touch the subjacent strip 183. In a similar manner, the edges 189 and 191 remain above the end 83 and do not interfere with the movements hereinbefore described.

By depressing one of the repeat keys 44 or 45 normally, the top edge 182 of the opening 181 is arrested against the strip 183 and the edge 82 of the projection 81 starts a setting cycle in the manner hereinbefore described. By exerting a greater pressure, the edge 182 carries along with it resiliently the strip 183, bending it in correspondence with the slot 62. An extra stroke depression of the shank 61 is then produced until the edge 189 of the projection 81 is arrested against the subjacent plate 66. The greater rotation of the levers 78 and 89 does not have any effect on the initial part of the setting cycle.

By keeping the repeat key depressed to its extra stroke during the setting of the bars 43, the two levers 78 and 79 are carried along to the left of their inoperative position, releasing the end 83 from the edge 82 of the projection 81. The two levers 78 and 89 are therefore rotated clockwise by the spring 96, but can now orient themselves in accordance with their inoperative position, since the end 83 of the arm 81 is arrested against the bottom edge 191 of the projection 81. The two levers 78 and 89 then remain turned anticlockwise, with the hook 98 of the lever 89 above the path of the tooth 99 of the corresponding slider 101. In its movement to the right, during the phase of reloading of the lug 117, the slider 101 therefore does not encounter any stop, so that the setting cycle having been completed it immediately initiates another. The release of the depressed key 44 or 45, at any stage whatsoever of the setting operation, causes the initiated cycle to be completed in the manner already described, so that at the end of the phase of reloading of the lug 117 and the slider 101, with the disengagement of the clutch 169, there takes place the stopping of the hollow shaft 168 and the return of all the kinematic elements of the keyboard to the inoperative position.

Thus, it is clear that the hook means 78 which retains the corresponding slider 101 is slidable in the frame and is shiftable by the first part 82 of the corresponding key 44 or 45 when it is depressed to release the corresponding setting element 101. When the released setting element is shifted forward, it carries along the corresponding hook means 78, freeing it from the part 82.

When the hook means 78 is not shifted, it is moreover arrested against the second, non-operative, part 84 of the corresponding key 44, 45, if the key is still in the depressed position after the setting of the bars 43, for which reason a repetition of the setting process is prevented. The third part 191 of the key 44, 45 is adapted to keep the hook means 78 turned during its shifting forward and in the case of extra stroke depression of the repeat keys devoid of the stop element 76, as a result of which by keeping one of these keys depressed to its extra stroke the setting of the bars 43 is repeated.

FUNCTIONS RECOGNITION ASSEMBLY

The transmission bars 55 (FIG. 5) of the functions recognition assembly 54 are slidable longitudinally of the keyboard and are connected individually by means of a notch 301 to four of the bars 43. By means of another notch 302, the bars are connected to a finger 303 of four sliders 304 slidable between two transverse sides 305 of the assembly 54. The upper edge of the sliders 304 is provided with a series of high profiles 306 and a series of low profiles 307. These profiles are adapted to be sensed by a horizontal arm 308 of a series of bell crank sensing levers 309 (FIG. 7) which can turn on a fixed longitudinal shaft 311. A second arm of the bell crank levers 309, which is indicated by the reference 312, is substantially vertical and is guided by a comb of a transverse bar 310 fixed to the assembly 54. The levers 309 are furnished with a horizontal extension 316 on which acts a corresponding series of return springs 315 which hold the arms 312 normally bearing against a bail 314 which can turn by means of two arms 317 and 318 on the shaft 311.

Pivoted to the arm 317 of the bail 314 is the end of a substantially horizontal connecting rod 319 pulled to the right by a spring 320 and pivoted on a bell crank lever 322 (FIG. 6). This lever can turn on a vertical pin 324 fixed to the plate 70 and connects the connecting rod 319 to a longitudinal connecting rod 327. This connecting rod is pivoted in turn to an arm 328 (FIG. 16) of a bail 330 which is turnable with another arm 331 on the transverse shaft 123 of the keyboard. Owing to the action of a return spring 329 on the bail 330, the arm 331 is adapted to co-operate by means of a roller 332 with a two-lobed cam 333 keyed on the hollow shaft 168. The arm 331 is moreover provided with a bent portion 334 against which there normally bears a rear edge 337 of a lever 338 due to the action of a spring 336. The lever 338, which represents a stop member of the functions recognition assembly, can turn on the shaft 143 and is provided with a horizontal shoulder 339 against which the bent portion 334 of the lever 331 is adapted to bear. The lever 338 is moreover provided with a projection 340 which is adapted to co-operate with the lateral lug 162 of the connecting rod 158.

The arm 318 of the bail 314 (FIG. 10) is provided with a bent portion 341 against which there is normally arrested a cross-piece 342 integral with two arms 343 and 344, due to the action of a weak return spring on the arm 344 (FIG. 5). The two arms 343 and 344 can turn on a shaft 345 fixed to the frame of the keyboard and the cross-piece 342 is provided with a bent portion 346 adapted to engage one of two notches 347 presented by the sliders 304.

The hollow shaft 168 (FIG. 1a) represents the driving shaft described in the mentioned U.S. Pat. No. 3,696,906 and indicated therein by the reference 123 in FIG. 9. The arm 331 (FIG. 16) corresponds to the rocking lever 117 and to this arm there is pivoted a connecting rod 350 indicated in that Patent by the reference 115, which represents the control element for rectifying the position of the code bars 43 indicated therein by the reference 101.

Integral with the connecting rod 319 (FIG. 7) is a projection 356 which is provided with a vertical profile 354 against which there normally bears, by the action of a spring 357, a pin 358 fixed to a vertical arm of a bell crank lever 359. This lever can turn on a fixed pin 355 of the assembly 54 and is provided on its horizontal arm with a tooth 362 which is adapted to retain a bent portion 364 of an arm 366 against the action of a spring 363. The arm 266 can turn on a fixed shaft 367 of the assembly 54. A shaft 368 is fixed to the arm 366 and to another arm 369 also turnable on the shaft 367, forming the bail 366, 368, 369.

On the shaft 368 there bears, by the action of a series of subvertical springs 371, a series of transverse function-command sliders 370 which are generally coplanar with the corresponding levers 309. The sliders 370 are adapted to command the performance of the functions associated with the function key that is depressed in the manner which will be seen hereinafter. These sliders are slidable horizontally and transversely of the keyboard between a series of vertical slots in the bar 310 and in a side piece 372 of the assembly 54. The sliders 370 are adapted to co-operate by means of a shoulder 374 with the upper end of the arms 312 of the corresponding bell crank levers 309 coplanar therewith. The sliders 370 are moreover provided at their left end with a tooth 375 by which they are normally arrested against the side piece 372 of the assembly 54 owing to the action of said spring 371.

Also rotatable on the shaft 311 (FIG. 8) is a cross-shaped lever 376 normally bearing on the bail 314 by the action of a return spring 373. The lever 376 is adapted to co-operate by means of a substantially horizontal arm 377 with two sliders 378 and 379 similar to the sliders 304 and connected to the sixth and seventh bars 43 starting from the right of FIG. 2. The cross-shaped lever 376 (FIG. 8) is integral with a cross-piece 380 which is connected in the form of a bail to a lever 381 which can turn on the shaft 311 and is also adapted to co-operate with the two sliders 378 and 379. The cross-piece 380 is provided with a vertical bent portion 382 which normally arrests the extensions 316 of the bell crank levers 309.

The lever 381 is provided with a tooth 383 which normally bears on a bent portion 384 of a lever 386 due to the action of a return spring 390, the force of which is substantially less than that of the spring 373. The lever 386 is rotatable on the shaft 367 and is provided with a second bent portion 388. This bent portion is disposed below, and at a certain distance from, a projection 389 of a slider 391 similar to the sliders 370 which is adapted to effect the engagement of the striking clutch 53.

None of the bell crank levers 309 corresponds to the slider 391, but the corresponding shoulder 374 is adapted to be engaged by a tooth 392 of the bail 314 when the slider 391 is depressed. The slider 391 is moreover provided with a projection 393 which is

adapted to co-operate with a lug 394 carried by a shaft 395 which can turn between the sides 305 of the assembly 54 (FIG. 5).

The lug 394 (FIG. 8) is provided with a lateral bent portion 397 to which a transmission lever 399 is pivoted by means of a bent portion 398. The bent portion 397 is moreover normally arrested against a fixed pin 402 owing to the action of a return spring 400 on the bent portion 398. The lever 399 (FIG. 9) is pivoted in turn to an arm 403 of a bail 406 (FIG. 8) which can turn by means of the said arm 403 and another arm 407 on the fixed shaft 345. The arm 407 (FIG. 9) is provided with a bent portion 408 which normally retains one tooth or dog of a pair of control dogs 409 of the clutch 53 disposed on the shaft 48.

On the driven part of the clutch 53 there is fixed a toothed wheel 412 which is in mesh with a toothed wheel 413 of half its diameter rotatable on the shaft 345 and integral with a toothed wheel 414. The toothed wheel 414 meshes in turn with a toothed wheel 416 of equal diameter which is keyed on the prismatic striking shaft 52.

The toothed wheels 413 and 414 are integral with a cam 417 which represents a first cam for reloading the sliders 370 and 391. The cam 417 (FIG. 10) co-operates with a roller 418 rotatable on a bent portion 419 of an arm 421 owing to the action of a return spring 415 on the said arm 421. This arm can turn on a fixed shaft 423 and is integral with a cross-piece connecting it in the form of a bail to another arm 424 which can also turn on the shaft 423. To the arm 424 there is fixed a pin 427 which is slidable in a slotted hole 425 in a connecting rod 428 pivoted in turn on the arm 369.

The slider 391 (FIG. 8) is moreover provided at its lefthand end with a projection 429 which is adapted to co-operate with a bail 430 turning by means of two arms 431 and 432 on a fixed shaft 433 in the proximity of the side piece 372. The arm 432 is connected through a connecting rod 434 to a bent portion of a rocking lever 435 turnable on the fixed shaft 345 (FIG. 11). By means of a bent portion 436, this rocking lever retains one dog of a pair of dogs 437 of the advancing clutch 58 carried by the shaft 48. Another slider 420 similar to the slider 391 is also adapted to co-operate by means of the corresponding projection 429 with the bail 430. This slider is in correspondence with a lever 422 (FIG. 5) of the series of bell crank levers 309. The lever 422 is adapted in turn to rotate until it touches the low profile 307 of the sliders 304 when these sliders are positioned in accordance with the code representing the "space" function, which is set, for example, on the depression of the space bar 46 (FIG. 2).

To the driven part 426 of the clutch 58 (FIG. 11) there is fixed a cam 438 with which the cam follower lever 439 co-operates. To this lever is pivoted the pawl 440 which engages the teeth of a ratchet wheel 441 of the escapement 57. The ratchet wheel 441 is fast in turn with the worm belonging to the pair of elements 40 and engaging the worm wheel fast with the carriage entraining drum 39.

On the part 426 (FIG. 12) there is fixed a cam 444 which represents a second cam for reloading the sliders 370, 391, 420. A roller 442 of a lever 445 which can turn on a transverse shaft 446 fixed to the assembly 54 co-operates with the cam 444 by the action of a return spring 450. The lever 445 (FIG. 7) is provided with a

bent portion 447 by means of which it is adapted to act on a bottom edge 448 presented by the arm 366.

The assembly 54 for control of the striking operates in the following manner:

By depressing a character key 44 of a function key 45 (FIG. 2) the hollow shaft 168 is started in the manner described, orienting the code bars 43 in accordance with the code of the key struck. The transmission bars 55 and the corresponding sliders 304 (FIG. 5) are then positioned correspondingly. The rotation of the shaft 168 (FIG. 16) brings the decreasing part of the profile of the cam 333 into correspondence with the roller 332. During the positioning of the code bars 43, when the shaft 168 has rotated through about 20°, the lug 162 of the connecting rod 158 encounters the projection 340 of the lever 338, carrying the latter along upwardly. The lever 338 begins to turn anticlockwise, removing the shoulder 339 from the path of the bent portion 334 of the arm 331. The roller 332 can then follow the decreasing profile of the cam 333 as far as the part of smaller radius, rotating the arms 328 and 331 anticlockwise. The connecting rod 350 rectifies the position of the code bars in the manner described in the mentioned U.S. Pat. No. 3,696,906, while the decoding unit 42 (FIG. 1) initiates the selection of the types or characters on the head 26. Through the medium of the connecting rod 327 and the lever 322 (FIG. 7), the arm 328 pushes the connecting rod 319 to the right, rotating the arm 317 of the bail 314 anticlockwise. The bent portion 341 of the arm 318 (FIG. 5) is then lowered and the bent portion 346 of the cross-piece 342 can be inserted in one of the two notches 347, locking the sliders 304 and rectifying or correcting the position thereof.

The anticlockwise rotation of the bail 314 (FIG. 7) continues until the shaft 168 has rotated through 90°. The arms 312 of the bell crank levers 309 follow the bail 314, as a result of which the said levers 309 turn anticlockwise under the action of the springs 315. If a character key 44 has been depressed, the positioning code of the code bars 43 is such that the slider 378 or the slider 379 or both brings or bring below the arm 377 and the lever 381 (FIG. 8) the high portion 306 of the respective upper profiles. The arm 377 and the lever 381 turn a little until they are arrested against the profiles 306 of the sliders 378 and 379. The lever 386 is rotated by the tooth 383 by a small angle insufficient to bring the corresponding bent portion 388 against the projection 389 of the slider 391. The bent portion 382 of the cross-piece 380 moreover keeps the extensions 316 substantially horizontal and the arms 312 of the bell crank levers 309 (FIG. 7) vertical. For the movement of the connecting rod 319 to the right, the profile 354 of the projection 356, pushing the pin 358, causes the lever 359 to turn anticlockwise, releasing the tooth 362 from the bent portion 364 of the arm 366. Owing to the simultaneous action of the sliders 370 on the shaft 368 and of the spring 363 on the arm 366, the bail 366, 368, 369 can then turn anticlockwise. The sliders 370 are thus released and owing to the action of the respective springs 371 rotate a little in their turn about the tooth 375, being lowered until the bottom edge of the shoulder is bearing on the top edge of the arms 312 which have remained vertical. The slider 391 (FIG. 8), to which no bell crank lever 309 corresponds and the projection 389 of which does not touch the bent portion 388, is on the other hand lowered more than the

other sliders following the rotation of the bail 366, 368, 369. This rotation comes to an end quickly, since the right-hand end of the slotted hole 425 (FIG. 10) is arrested against the pin 427 of the arm 424. In this position, the lowering of the slider 391 (FIG. 8) is sufficient to bring the shoulder 374 into the path of the tooth 392.

Continuing the rotation, from about 90° to 170° the shaft 168 (FIG. 16) causes the decoding unit to complete the selection of the characters, while the cam 333 presets to the roller 332 first the low and constant part of its profile and then the part of increasing radius, which causes a clockwise rotation of the arm 328. The connecting rod 319 (FIG. 7) is then drawn positively to the left, carrying along, by means of the spring 357, the vertical arm of the lever 359. This lever is then turned clockwise until the bottom edge of the tooth 362 is caused to be arrested against the top surface of the bent portion 364, as a result of which a further movement of the connecting rod 319 has the effect of stretching the spring 357 to a greater degree.

For the return stroke of the connecting rod 319, the bail 314 begins to turn clockwise and the bent portion 341 of the arm 318 (FIG. 5) brings the cross-piece 342 back upwardly, raising the bent portion 346 from the notches 347 of the sliders 304 and releasing them for the following setting of the code bars 43.

For the clockwise rotation of the bail 314 (FIG. 8), the corresponding tooth 392 encounters the left-hand edge of the shoulder 374 of the slider 391 and carries the latter along to the right in the drawing. By means of the projection 393, the lug 394 is thus turned clockwise against the action of the return spring 400. The lug 394, in turn, by means of the bent portion 397, the transmission lever 399 and the arm 403 of the bail 406, causes the other arm 407 of the bail 406 (FIG. 9) to turn anticlockwise, releasing the bent portion 408 from the corresponding dog or tooth 409. The clutch 53 is thus engaged and renders the toothed wheel 412 fast in rotation with the driving shaft 48, setting in rotation the square shaft 52 at an angular velocity which is twice that of the shaft 48. A cycle of striking of the head 26 (FIG. 2) against the platen 21 is thus started in the manner described in the said U.S. Pat. No. 3,696,906.

The shifting of the slider 391 (FIG. 8) to the right has the second effect of causing the clockwise rotation of the bail 430 through the medium of the projection 429. Through the connecting rod 434, this bail causes the rocking lever 435 (FIG. 11) to turn anticlockwise, producing the release of the tooth 437 and the engagement of the advancing clutch 58.

When the shaft 168 (FIG. 16) has rotated through about 180°, the cam 333 presents to the roller 332 a profile similar to the initial one, so that the connecting rod 319 and the bail 314 (FIG. 7) are again located in the respective initial positions. In this phase, with the selection of the character having taken place and with the keyboard reloaded, the clutch 169 (FIG. 3) is disengaged, stopping the rotation of the said hollow shaft 168.

The rotation of the toothed wheel 413 (FIG. 12) causes the simultaneous rotation of the cam 417, which gives rise to the phase of reloading of the sliders 370. At the beginning of the striking cycle, the cam 417 presents to the roller 418 a rest recess and then a profile of increasing radius. Until the toothed wheel 413

has rotated through about 180° (90° rotation of the wheel 412), the cam 417 presents to the roller 418 an increasing profile which causes the arm 421 (FIG. 10) to turn anticlockwise. Owing to the action of the pin 427 on the right-hand edge of the slot 425, the arm 424 carries the connecting rod 428 along to the right, turning the arm 369 clockwise. The shaft 368 is then lifted up, carrying along with it the sliders 370, 391 and 420. In this way, the shoulder 374 of the slider 391 (FIG. 8) is released by the tooth 392 of the cross-piece 314 and also the shoulders 374 of the sliders 370 and 420 leave the corresponding arms 312 (FIG. 7). Passing through its inoperative position, the arm 366 releases the tooth 362 of the lever 359 which had been left bearing on the bent portion 364, as a result of which the lever 359 returns to its inoperative position, being stopped by the pin 358 against the vertical profile 354 of the connecting rod 319. The slider 391 (FIG. 8), in turn, owing to the action of the return spring 371, shifts to the left, releasing the lug 394 from the projection 393, the lug turning anticlockwise through the action of the return spring 371, shifts to the left, releasing the lug 394 from the projection 393, the lug turning anticlockwise through the action of the return spring 400 on the bent portion 398. In consequence, the bail 406 (FIG. 9) turns clockwise, bringing the bent portion 408 of the arm 407 into the path of the arriving dog 409.

When the cam 438 (FIG. 11) has rotated through about 90°, with the striking having taken place, the said cam 438 causes a movement of the ratchet wheel 441 to be initiated, shifting the carriage in the printing direction.

During the following rotation of the toothed wheel 413 (FIG. 12) from 180° to about 200°, the cam 417 presents a decreasing profile to the roller 418, as a result of which the arm 421 (FIG. 10) turns clockwise towards the initial position owing to the action of the corresponding return spring 415. Since the bail 366, 368, 369 (FIG. 7) is henceforth locked by the action of the tooth 362 on the bent portion 364, the pin 427 (FIG. 10) slides in the slot 425 until it reaches the initial position shown in the drawing. From an angle of rotation extending from 200° to 360°, the cam 417 presents a constant low profile.

The toothed wheel 413 having attained a rotation of 360°, it is located in the initial state after completing a cycle. The driven part of the clutch 53 (FIG. 9), in turn, has rotated through 180° and the dog 409 strikes against the bent portion 408 of the arm 407, disengaging the said clutch 53, and leaves the kinematic elements of the assembly 54 in the initial inoperative state already described.

The depression of a key corresponding to a service or a function of the machine, such as, for example, spacing, return by one step, return to the beginning and the like, initiates a setting cycle of the code bars 43 (FIG. 2) similar to the cycle already described in connection with a character key 44. In contrast to this latter case, the arrangement of the bars 43 is such, however, that the sliders 378 and 379 (FIG. 8) now present the low profile 307 to the arm 377 and to the lever 381. When the bail 314 begins to turn anticlockwise, the arms 377 and the lever 381 can turn completely anticlockwise, as a result of which the bent portion 381 releases the extensions 316. The arms 312 of the bell crank levers 309 can follow the bail 314 and the arms 308 sense the upper profile of the other sliders 304, 378 and 379. In

this case likewise, the projection 356 (FIG. 7) of the connecting rod 319 releases the arm 366 through the lever 359, as a result of which anticlockwise rotation of the bail 366, 368, 369 is obtained under the action of the spring 363. The anticlockwise rotation of the arm 377 (FIG. 8) causes the tooth 383 to be lowered in turn and this tooth, acting on the bent portion 384 of the lever 386, causes this lever to turn clockwise until the bent portion 388 is caused to be arrested against the projection 389 of the slider 391.

The sensing of the sliders 304 (FIG. 7) having been completed, the arms 308 of those bell crank levers 309 which are not concerned are arrested against the high portions 306 of the sliders 304. The corresponding vertical arms 312 therefore arrest the bottom edges of the shoulders 374, keeping the corresponding sliders 370 at rest. On the other hand, the rotation of the bail 314 is followed by the arm 312 corresponding to the lever 309 of the function to be performed. The slider 370 pertaining to this function turns, under the action of the respective spring 371, about the tooth 375 and is lowered until it touches with its bottom edge the top edge of the corresponding arm 312. The arm 369 (FIG. 10) rotates further anticlockwise in turn, shifting the connecting rod 428 to the left and in particular bringing the right end of the slot 425 against the pin 427. The slider 391, although released, cannot, on the other hand, be lowered because it is arrested by the projection 389 against the bent portion 388 (FIG. 8) of the arm 386, which is locked in turn by the tooth 383.

The subsequent return of the bail 314 (FIG. 7) to the inoperative position shifts the previously released slider 370 positively to the right by means of the arm 312 and the shoulder 374. This slider can thus start the cycle of performance of the machine function to be executed by, for example, engaging a clutch. If, for example, the space bar 46 (FIG. 2) has been depressed, the slider 420 (FIG. 8) is released and causes the bail 430 to turn, releasing the clutch 58 and producing the shifting of the carriage by one step in the manner already described. Simultaneously with the performance of the function, there is also selected by the unit 42 the character corresponding to the particular combination of the bars 43. Moreover, the printing slider 391 has remained with the shoulder 374 above the path of the tooth 392, as a result of which it cannot be shifted to the right and the clutch 53 remains disengaged, keeping the square shaft 52 stationary, so that the selected character is not printed.

During the movement of the carriage, when the part 426 (FIG. 12) has rotated for about 60°, the cam 444 presents an increasing profile to the roller 442 of the lever 445, so that the said lever 445 is turned clockwise, bringing the bent portion 447 against the tooth 448 (FIG. 7) of the arm 366. The bail 366, 368, 369 (FIG. 8) is then turned clockwise and the shaft 368 brings the sliders 370 upwards, releasing in particular the slider 420 corresponding to the spacing which is actuated by the respective arm 312. The spring 371 then provides for bringing the slider 420 back into its inoperative position. In the case of this rotation of the arm 366, the tooth 362 re-engages the bent portion 364 of the arm 366 and the connecting rod 428 returns to the position indicated in FIG. 10. For the return of the bail 430 (FIG. 11) to the inoperative position, the bent portion 436 of the arm 435 returns into the path of the arriving dog 437, as a result of which when the cam 438

has rotated through 180° the clutch 58 is disengaged again and the component parts of the keyboard are again in the initial inoperative conditions, ready for carrying out a new machine cycle.

DEACTIVATION OF THE KEYBOARD

In the event of simultaneous depression of two keys, the corresponding sliders 101 (FIG. 3) are released in the manner described and shift the cross-piece 149, rotating the starting element 142. The following rotation of the arm 137 causes the clutch 169 to engage and enables the lug 117 to turn under the action of the spring 167. The lug 117 therefore acts on the edges 116 of the rocking levers 109, which in turn shift the sliders 101 forward for setting the code bars 43 (FIG. 2). Since the codes of the depressed keys are different for the position of at least one bar, this bar presents to the teeth 102 of the sliders 101 the solid portion both above and below the shaft 104. This bar remains in an intermediate position, arresting the stroke of the sliders 101; the bars 43 which had to be permuted are disposed in this intermediate position and the lug 117 is locked. The connecting rod 158 moreover cannot complete its stroke and the lug 162 cannot engage the projection 163 of the lever 146 and the projection 340 of the lever 338 (FIG. 16), as a result of which these levers remain in the previous position. The shoulder 148 of the lever 146 (FIG. 3) is disposed in the path of the bent portion 138 of the arm 137 and the shoulder 339 of the lever 338 is disposed in the path of the bent portion 334 of the arm 331.

The simultaneous depression of two keys has the first consequence that the arm 331 of the bail 330 (FIG. 16) follows the descending profile of the cam 333 only until such time as the bent portion 334 is arrested on the shoulder 339 of the lever 338. The connecting rod 350 cannot correct the position of the code bars 43 (FIG. 1) and the decoding unit 42 leaves the head 26 in the last position that is reached. Owing to the arrest of the bail 330 (FIG. 16), the connecting rod 319 (FIG. 7) and the bail 314 remain stationary together with the bell crank levers 309 and the sliders 370, 391 and 420, as a result of which no command for carrying out striking or a function is given. The arrest of the lug 117 (FIG. 2) against the edges 116 of the shifted rocking levers 109 continues until the hollow shaft 168 has rotated through about 90°. After this rotation, the lug 117 leaves the rocking levers 109, allowing the sliders 101 to be re-engaged by the hooks 98. The lug 117, returning to its inoperative position, causes the lever 126 (FIG. 3) to be engaged with the bent portion 128 of the lever 129, bringing the lug 172 into the path of the dog 171 of the clutch 169, which is disengaged again for a 180° rotation of the hollow shaft 168.

At the end of the cycle described, the bent portion 138 of the arm 137 is bearing on the shoulder 148 of the lever 146, which is turned slightly clockwise, while the other kinematic elements are located in their respective inoperative positions. The lever 142 is no longer able to control the arm 137, so that it is not possible to start a new printing or function cycle and the keyboard 20 is deactivated. If another key is depressed, the corresponding slider 101 is released and the clockwise slider 101 is released and the clockwise rotation of the corresponding rocking lever 109 is caused until the arm 112 makes contact with the edge 113 of the slider 101. The rotation of the lever 142 has no effect

for the starting of a fresh setting cycle and the sole consequence is to shift the edge 116 of the rocking lever 109 to the rear and bring it into the path of the lug 117.

REACTIVATION OF THE KEYBOARD

The keyboard is provided with reactivation means which comprise a reactivation key 451 (FIG. 1) which holds a slider 452 (FIG. 14) identical to the sliders 101 engaged or hooked by means of a corresponding hook 98. The key 451 may be one of the function keys, which, if it is depressed with the keyboard free, therefore commands the corresponding function through the medium of the slider 452, while if it is depressed with the keyboard deactivated commands the reactivation of the keyboard in the manner which will be seen hereinafter.

The rear edge 154 of the slider 452, in addition to acting on the cross-piece 149, is adapted to engage a bent portion 453 of a lever 454. This lever is fixed on a shaft 456 which can turn in the frame of the keyboard. The shaft 456 is coaxial with the shaft 143 and is fast with another lever 457. On the lever 457 there acts, through the medium of a lug 458 of an arm 459, a return spring 465 which keeps the lever 454 normally bearing against the rear plate 71. The arm 459 can turn on the shaft 143 and is connected in the form of a bail to an integral cross-piece 461 integral in turn with another arm 462, which can also turn on the shaft 143 and is provided with a projection 460 with a substantially horizontal top edge. The front edge of the arm 462 normally retains a lateral lug 463 of a reactivation slider 464 slidable longitudinally of the keyboard and drawn to the rear by one of the usual rocking levers 109 and the corresponding spring 114.

On the opposite side with respect to the lug 463, the slider 464 is provided with a second lateral lug 466 which is adapted to be arrested against a tooth 467 of an arm 468 which can turn on the shaft 143. The arm 468 is integral with a cross-piece 469 provided with a lug 472 normally arrested against a lateral lug 471 of the lever 146 owing to the action of a return spring 473. The lever 146 (see also FIG. 1a) is moreover integral with a cross-piece 474 integral in turn with an arm 476, which can also turn on the shaft 143 and is provided with a lateral lug 477 adapted to co-operate with a convex profile 478 of a release lever 479. The lever 479 engages the shaft 143 through the medium of a slotted hole 481 and is normally arrested by means of a rounded end 482 against the plate 71 owing to the action of a return spring 483. Fixed laterally to the lever 479 is a pin 484 which is adapted to co-operate with the rear edge of an opening 486 presented by the slider 464. With a pair of rear edges 487 and 488, this slider is adapted to co-operate with the cross-piece 149 and with a lug 489 of the arm 476, respectively.

The slider 464 moreover has a rear projection 491 which is adapted to co-operate with a cam 492 (FIG. 15) also keyed on the hollow shaft 168. On this shaft there is moreover keyed a cam 492 which normally co-operates, by the action of a return spring 495, with a roller 494 of a cam follower lever 496, rotatable in turn on the shaft 123. To the lever 496 there is fixed a pin 497 which is adapted to co-operate with a lateral projection 498 presented by the connecting rod 158. Finally, the slider 464 is provided with a bottom tooth 499 which is adapted to co-operate with the strip 110

and is disposed more forward with respect to the similar teeth 105 of the other setting elements. The simultaneous depression of two keys and the following deactivation of the keyboard brings the reactivation means into the position indicated in FIG. 13. More particularly, the lever 146 which is disposed in the position shown in FIG. 13, retains the bent portion 138 of the arm 137 by means of the shoulder 148 and keeps the cross-piece 469 turned clockwise through the lug 471, as a result of which the tooth 467 of the arm 468 is located beyond the path of the lug 466.

In the event of no other key having been depressed after the deactivation of the keyboard, the setting sliders 101 (FIG. 2) with their teeth 99 are engaged with the respective hooks 98 of the lever 89. The reactivation of the keyboard 20 is then effected in the following manner.

On depressing the reactivation key 451 (FIG. 1), the slider 452 (FIG. 14) is released and, owing to the rear carrying along with its rear edge the bent portion 453 of the lever 454, turning the latter anticlockwise. By means of the other lever 457 and the lug 458 of the arm 459, the other arm 462 is turned anticlockwise, bringing the edge 460 below the lug 463. The slider 464 is thus released and, being no longer retained by the tooth 467, shifts to the rear as a result of the action of the respective rocking lever 109.

In its movement towards the rear part of the machine, the slider 464 shifts the cross-piece 149 by means of the edge 487, turning the lever 142 (FIG. 13) anticlockwise and removing the edge 141 from the path of the bent portion 138 of the arm 137. The edge 488 (FIG. 14) moreover shifts the lug 489 of the arm 476, causing it to turn anticlockwise together with the lever 146. The lever 146, which had kept the keyboard 20 deactivated, is thus turned anticlockwise, returning to the inoperative position and releasing bent portion 138 of the lever 137 from the shoulder 148. The lever 146, in turn, through the medium of the lug 471 and owing to the action of the spring 473, is followed by the cross-piece 469 (FIG. 13), bringing the tooth 467 back into the path of the lug 466. The arm 137 (FIG. 3) can now release the arm 126 of the bail 124, as a result of which the rotation of the lug 117 and the engagement of the clutch 169 commence, with the consequent starting of a cycle for setting the code bars 43. Moreover, the rocking levers 109 associated with the sliders 452 and 464 (FIG. 14) shift into the path of the lug 117 (FIG. 15), as a result of which the sliders 452 and 464 are shifted forward in the manner hereinbefore described in connection with the sliders 101.

Passing through the inoperative position, the lug 466 of the slider 464 strike against the rear edge of the tooth 467, turning the arm 468 clockwise in opposition to the action of the spring 473. After the passage of the lug 466 (FIG. 13), the same spring 473 enables the tooth 467 to be caused to return its inoperative position. Moreover, the lug 463 leaves the projection 460 of the arm 462, which can now return to its inoperative position owing to the action of the corresponding return spring 465 together with the lever 457 (FIG. 14), the shaft 456 and the other lever 454. While the slider 452 sets the code bars 43, the slider 464, in its forward movement, strikes against the pin 484 with the rear edge of the opening 486, carrying the pin along with it. There is then produced an anticlockwise rotation of the arm 479 about the bearing point between

the end 482 of the lever 479 and the rear plate 71, in opposition to the action of the spring 483. The arm 479, guided by the slotted hole 481 on the shaft 143, strikes by means of the convex profile 478 against the lug 477 of the arm 476, turning this arm anticlockwise against the action of the spring 147 together with the lever 146 fast therewith. Owing to the rotation of the lever 146, the shoulder 148 is again removed from the path of the bent portion 138 of the arm 137, as a result of which this arm can be brought towards the shoulder 141 of the lever 142. When the code bars 43 (FIG. 15) are located in an intermediate position, the tooth 499 of the slider 464 is arrested against the strip 110. The lug 117 is thus arrested and does not cause the slider 452 to complete the setting of the code bars owing to the inadequate stroke of the slider 464.

When the hollow shaft 168 has rotated through about 52°, the cam 174 (FIG. 3) allows the bent portion 138 of the lever 137 to lower itself until the edge 141 of the lever 142 is reached, in a similar manner to what occurs during the normal setting of the bars. Since the connecting rod 158 has not been able to complete its upward stroke, the lug 162 does not encounter the projection 340 (FIG. 16) of the lever 338. The bent portion 334 of the lever 331 then bears on the shoulder 339 of the lever 338 and the said lever 331 cannot follow the profile of the cam 333. This cam does not supply any command to the functions recognition assembly 54 (FIG. 1), nor can it correct the position of the bars of the decoding unit 42, as a result of which both the selection of characters and a command or carrying out functions are prevented.

In the following rotation of the hollow shaft 168, up to about 90° (FIG. 15) the lug 117 remains locked and there is not other shifting of the setting elements 101, 452 and 464. The following phase of reloading of the lug 117, on the other hand, takes place duly in the manner already described and brings the sliders 452 and 464 (FIG. 14) towards their inoperative positions. More particularly, the slider 452 is arrested against the hook 98 of the corresponding lever, while the slider 464 is arrested with the lug 463 against the front edge of the projection 460 of the arm 462. In the following rotation of the hollow shaft 168 (FIG. 3), the edge 127 of the lever 126 is again arrested on the bent portion 128, while the tooth or dog 172 re-disengages the clutch 169, bringing the kinematic elements back into their inoperative positions.

The reactivation cycle of the keyboard therefore develops in a manner rather similar to a normal setting cycle. The differences consist in the fact that the code bars are not set and that the bent portion 334 (FIG. 16) does not release itself from the shoulder 339 of the lever 338. The arm 137 (FIG. 3), on the other hand, is returned under the control of the lever 142, owing to the already described action of the profile 478 on the lug 477. Contrary to the normal setting cycle, the bell crank levers 304 of the function unit have not been released and therefore neither the printing of characters nor advance of the printing unit has taken place and, as the sole consequence, there has been obtained the reactivation of the keyboard 20.

In the event of one or more keys having been depressed after the deactivation of the keyboard, the released sliders 101 are shifted to the rear by their full stroke by the respective rocking levers 109, with the edges 113 (FIG. 2) in contact with the respective arms

112. The rocking levers 109 are turned clockwise and are in the path of the lug 117 with their edges 116.

The reactivation of the keyboard is now effected in the following manner:

By depressing the reactivation key 451 (FIG. 1), the slider 452 (FIG. 14) is released and causes the arm 462 to turn in the manner already described and releases the slider 464. The latter slider is then shifted to the rear and, with the edge 488, carries the lug 489 along, causing the arm 476 and the lever 146 fast therewith to turn anticlockwise. The arm 137 is then released by the shoulder 148 and releases the lever 126, as a result of which the clutch 169 is engaged and rotation of the lug 117 is permitted.

If the number of sliders 101 (FIG. 3) released after the deactivation of the keyboard is greater than two, the spring 167 does not succeed in overcoming the force of the corresponding springs 114. Moreover, owing to the engagement of the clutch 169, the cam 493 (FIG. 15) has also been set in rotation and initially presents to the roller 494 a rapidly increasing profile which causes the lever 496 to turn clockwise. The pin 497 fixed thereto is thus raised and, encountering the projection 498 of the connecting rod 158, shifts this rod positively in the upward direction, causing an anticlockwise rotation of the lug 117. The action of the pin 497 in the setting cycles has no effect, because the spring 167 shifts more quickly. The lug 117 then shifts forward positively the turned rocking levers 109 and the sliders 101, 452, 464. This shifting is completed after a rotation of the shaft 168 through about 75° and is sufficient to cause the sliders 101 to re-engage the hooks 98 of the corresponding levers 89. The following phase of reloading of the lug 117 then takes place in the manner hereinbefore described for the reactivation of the keyboard without any key having been depressed, as a result of which at the end of the reactivation cycle all the kinematic elements return to the inoperative state.

In the event of the key 451 (FIG. 1) being depressed with the keyboard non-deactivated, the slider 452 (FIG. 14) is released, starting a normal setting cycle and bringing the edge 460 of the arm 462 below the lug 463 of the slider 464, releasing it in the manner hereinbefore described. Since the lever 146 is now in the inoperative position, the tooth 467 is in the path of the lug 466. After a slight movement to the rear, the slider 464 is arrested with the lug 466 against the tooth 467 of the arm 468, before the edge 116 (FIG. 2) of the corresponding rocking lever 109 is brought into the path of the lug 117. Therefore, there is rotated only the rocking lever 109 of the slider 452, which can thus initiate the setting of the bars 43 in accordance with the function associated with the key 451.

In the case of the setting of the bars 43 by the slider 452, after a 15° rotation of the hollow shaft 168, the arm 137 is reloaded by the cam 174, as a result of which the lever 146 turns clockwise in the manner already described. Through the medium of the lug 471 (FIG. 14), the arm 468 is then also caused to turn clockwise and its tooth 467 is raised, releasing the lug 466. The slider 464 thus shifts back to the right and, since the setting of the bars 43 (FIG. 15) is already in progress, the corresponding rocking lever 109 can only bear on the top profile of the lug 117. During the following rotation of the shaft 168 there takes place the carrying out of the function corresponding to the par-

ticular combination of the bars 43 as set by the depressed key 451. This operation may be the selection and printing of the character or the development of a function of the machine.

After a rotation of the shaft 168 for about 40°, the cam 492 (FIG. 15) encounters with the increasing part of its profile the projection 491 of the slider 464, shifting this slider a little more forward of its inoperative position. When the shaft 168 has rotated through about 90°, the cam 492 causes the slider 464 to move back towards its inoperative position by means of its decreasing profile. Since the arm 462 is now in the inoperative position, the lug 463 is now in the inoperative position, the lug 463 is arrested against the projection 460. The functions connected with the code set having been completed, the various kinematic elements can return to the inoperative positions.

During the settling and reactivation cycles, the cam 492 shifts the slider 464 forward for a small stroke, which has no effect on the operation described since the kinematic elements are all in the stage of return to rest.

It is therefore clear that the reactivation means of the keyboard comprise a reactivation slider 464 similar to the setting element 101 and adapted to be shifted to the rear by spring means on the depression of the reactivation key 451 to bring the locking element 146 back to rest. The reactivation slider 464 moreover reactivates the starting clutch 169 and the stop 499 is adapted to arrest the setting member 117 in such manner as to shift the reactivation slider 464 forward for a reactivation stroke sufficient to bring it back under the control of the reactivation key 451, but insufficient to set the bars 43 in accordance with the respective code combinations. The release means 478 are moreover controlled by the reactivation slider 464 when it shifts forward and bring the locking element 146 back to rest.

It is understood that modifications, improvements and replacements of parts may be made in the code keyboard hereinbefore described without departing from the scope of the invention.

We claim:

1. Code keyboard for typewriters and other office machines with keyboards, comprising a plurality of keys, a series of code bars, a plurality of setting elements for said code bars individually associated with said keys, a starting clutch, a starting member to actuate said starting clutch for a cycle, and a common setting member controlled by said starting clutch to shift said setting elements individually in a first direction for setting said code bars in accordance with the depressed one of said keys, wherein the improvement comprises:

- a. a plurality of springs operatively connected with said setting elements for urging individually said setting elements in a direction opposite to said first direction,
- b. hook means associated with said keys for normally holding at rest said setting elements in opposition to the action of said springs and for releasing said setting elements when said keys are depressed, whereby a released one of said setting elements is shifted in said opposite direction by the corresponding one of said springs, said starting member being disposed into the path of said setting element

on said opposite direction to activate said starting clutch for said cycle,

- c. and intermediate means operatively connected to said setting elements for causing said common setting member to shift in said first direction only said released one of said setting elements.

2. Keyboard according to claim 1, wherein said intermediate means comprise a series of rocking levers individually connected to said setting elements to shift them in the said opposite direction with the aid of the said corresponding springs, the rocking lever corresponding to said released setting element being brought into the path of said setting member to cause said setting member to shift said released setting element in the said first direction by means of said rocking lever connected thereto.

3. Keyboard according to claim 2, wherein said springs are individually connected to said rocking levers, said rocking levers being fulcrumed and slidable on a fixed frame of the keyboard, a first part of said rocking levers urging said corresponding setting elements in the said opposite direction and a second part of each one of said rocking levers being arrestable in the course of rotation by a portion of the corresponding setting element.

4. Keyboard according to claim 1, wherein said hook means is slidable in the frame and cooperates with a first part of said key when depressed to release said setting elements, said setting elements having trailing means for carrying said corresponding hook means along in said first direction whereby said hook means release said first part of said keys, said keys having moreover a second non-operative part adapted to arrest said hook means in an unshifted position, if the key is still in the depressed position after the setting process, as a result of which a repetition of the setting process is prevented.

5. Keyboard as in claim 4, wherein said hook means comprises a hook for each one of said setting elements and a release element connected to said hook as to rotate therewith and to slide in the frame independently thereof, spring means being provided for bringing said release element back to an unrotated position and for urging it in the said opposite direction towards a non operative position, said spring means bringing said hook back into the normal inoperative position independently of said release element.

6. Keyboard according to claim 5, wherein said hook can turn in the frame to release said corresponding setting element, and is normally arrested against the frame, said hook being connected to said release element to carry it along in the said first direction, and said trailing means comprising a shoulder of the corresponding setting element and a projection of said hook adapted to co-operate with said shoulder.

7. Keyboard according to claim 6, wherein said hook and said release element are substantially flat and are connected by a pin and slot, said spring means being constituted by leaf springs acting on substantially like cam parts of said hook and of said release element, the said first part of the corresponding key being adapted to act on one end of said release element against the action of said leaf spring.

8. Keyboard according to claim 4, wherein at least one key can be depressed for an extra stroke greater than a predetermined stroke, a third part of said one key keeping said hook means turned during the move-

ment of said hook means in the said first direction in the case of depression for the said extra stroke for a repeated operation.

9. Keyboard according to claim 8, wherein said keys are upwardly biased by corresponding restoring springs and are distributed in a plurality of parallel rows, further comprising a strip fixed to the frame and deformable elastically, said one key cooperating with said strip during the said extra stroke as a result of which said one key is subject to the supplementary restoring action of said strip.

10. Keyboard according to claim 9, wherein said keys are carried by shanks slidable vertically and individually in corresponding slots in the frame, said strip being constituted by an elastic material anchored to the frame by means of a return spring, said keys in the same row having in their shanks openings through which extends said strip, and a top edge of said keys bending the strip into the said slots during the said extra stroke.

11. Keyboard according to claim 1, wherein said common setting member is shiftable by a setting spring to shift said released setting elements in the said first direction, said starting member being constituted by a universal bar adapted to be shifted by said released setting elements during the shifting in the said opposite direction to activate the starting clutch, and comprising an arrest means for said common setting member, said arrest means being releasable by said universal bar simultaneously with the activation of said clutch, so that the shifting of the released setting element in the said first direction commences before the beginning of the said cycle.

12. Keyboard for typewriters and other office machines comprising a plurality of keys, a plurality of setting elements individually associated with said keys, each of said setting elements being selectable by the corresponding one of said keys when depressed, a common setting member for setting said selected setting element, a starting clutch operable when engaged for a cycle to control said common setting member through an intermediate member positioned by a driven shaft of said clutch, a starting element acting on said clutch for holding it disengaged, yieldable means yieldingly acting on said starting element for moving it to a predetermined position to engage said clutch, a latch normally holding said starting element against the action of said yieldable means, and a common bar operated by said selected setting element to release said latch, wherein the improvement comprises:

first linkage means connecting said starting element with said setting member so that said yieldable means cause said common setting means to initiate the setting of said selected setting element before the engagement of said clutch, and

second linkage means connecting said intermediate member with said common setting member through a lost motion connection, for causing said common setting member to complete the setting of said selected setting element during said cycle.

13. Keyboard according to claim 12, wherein said first linkage means comprise a rod connecting said setting member to a rocking lever which is normally kept under the control of said latch and in turn retains a control tooth of said clutch to keep said clutch disengaged.

14. Keyboard according to claim 12, wherein said intermediate member is constituted by a reloading cam

follower lever which co-operates with a corresponding cam carried by a driven part of said clutch, said second linkage means comprising a crank connecting said setting member with a reloading connecting rod, and said lost motion connection is constituted by a pin and slot connection connecting said reloading rod with said cam follower lever.

15. Code keyboard for typewriters and other office machines with keyboard having a plurality of keys, a series of code bars, a plurality of setting element each of said setting element being selectable by the corresponding one of said keys when depressed, a starting clutch actuatable for a cycle on depression of each of said keys, a common setting member adapted to shift said selected setting element in a setting direction for setting said code bars in accordance with said depressed key, driving means controlled by said clutch for driving said setting member, said driving means being yieldable to permit said setting member to be arrested before the end of its stroke in the case of simultaneous selection of a plurality of selected setting elements and to prevent the setting of said code bars, and a locking element shiftable at the beginning of said cycle to temporarily prevent any further starting of said clutch, said setting member deactivating said locking element at the end of its stroke, wherein the improvement comprises:

- a. a reactivation slider similar to said setting elements and adapted, when released, by a corresponding reactivation key to bring said locking element back to an inoperative position, said reactivation slider moreover reactivating said starting clutch,
- b. stop means for said reactivation slider adapted to arrest said setting member so as to shift said reactivation slider in said setting direction for a reactivation stroke sufficient to bring said reactivation slider back under the control of said reactivation key, but insufficient to set said code bars,
- c. and release means controlled by said reactivation element when said reactivation slider is shifted in said setting direction to bring said locking element back to said inoperative position independently of said setting member.

16. Keyboard according to claim 15, wherein said setting elements are normally held in an inoperative position by said plurality of keys against the action of corresponding springs, said springs urging said setting elements toward a released position on depression of said plurality of keys, and wherein said common setting member is shifted by a setting spring, said setting member being connected by means of a connecting rod to a reloading cam rotated by said starting clutch, when actuated, said connecting rod being adapted to be shifted positively by means of a reactivation cam also rotated by said clutch to actuate said setting member so as to shift in the said setting direction said plurality of released setting elements when released owing to the depression of said keys after the deactivation of said starting clutch, said reactivation cam shifting said released setting elements for a stroke smaller than or equal to the said reactivation stroke, but sufficient to bring said plurality of released setting elements back to said inoperative position under the control of said keys.

17. Keyboard according to claim 15, wherein said release means comprise a release lever adapted to be ro-

tated by said reactivation slider during the said reactivation stroke.

18. Keyboard according to claim 15, comprising a plurality of springs operatively connected with said setting elements for urging individually said setting elements in a direction opposite to said setting direction, hook means associated to said keys for normally holding at rest said setting elements in opposition to the action of the said springs and for releasing said setting elements when said keys are depressed, whereby a released one of said setting elements is shifted in the said opposite direction by the corresponding one of said springs, a starting element being disposed on the path of said setting element on said opposite direction as to be shifted by said released one of said setting elements to activate said starting clutch for said cycle, and means for permitting said common setting member to shift only said released one of said setting elements thus shifted in the said opposite direction, and wherein said reactivation key retains a further setting element of said plurality, said further setting element being adapted to activate said starting clutch and to set said code bars in accordance with a combination representing a character or a function, first retaining means operatively connected with said further setting element normally retaining said reactivation slider, said retaining means releasing said reactivation slider when said further element is released in consequence of the depression of said reactivation key, second retaining means operatively connected with said locking element being normally adapted to arrest said reaction slider in the said opposite direction and releasing said reactivation slider when said locking element is shifted for preventing the starting of said clutch.

19. Keyboard according to claim 18, wherein a regeneration cam carried by a driven part of said clutch is adapted to control the position of said reactivation slider temporarily during the setting cycle started by said reactivation key independently from said common setting member.

20. Keyboard according to claim 1, comprising a series of code sliders, said code sliders being settable by said code bars in combinations representing characters to be printed and/or functions to be performed, a plurality of sensing elements for sensing said code sliders, a plurality of command sliders associated with said sensing elements, one of said command sliders being adapted to carry out a command for printing the respective character on recognition by said setting elements of character combinations of said code sliders, while the others of said command sliders being adapted for command the respective functions on recognition by said setting elements of function combinations of said code sliders, a cyclically actuated command bail adapted to control said sensing elements, said command sliders being prearrangeable by springs in a selection under the control of said sensing elements and being then shifted in a command direction by means of the said command bail, and wherein said command bail is actuated by said starting clutch to shift said command sliders during said cycle.

21. Keyboard according to claim 20, wherein said command sliders carry out the commands through the medium of at least one cyclic command clutch, and wherein said command sliders are adapted to follow said sensing elements by means of said springs, and comprising a reloading bail for retaining said sensing

elements, in a rest position against the action of further springs a retaining tooth normally engaging said reloading bail in an inoperative position, and means connecting said common bail with said tooth for releasing said reloading bail from said retaining tooth and cam means positioned by a driven part of the same command clutch to cause said reloading bail to bring said command sliders back to rest and said retaining tooth to re-engage said reloading bail.

22. Keyboard according to claim 21, wherein the sensing element associated with said one of said command sliders, on recognition of the said character combinations, is adapted to keep the other sensing elements in an inoperative position to prevent said other respective command sliders from carrying out the said function commands.

23. Keyboard according to claim 20, wherein said command bail controls a spring-loaded positioning element adapted to correct the position of said code sliders and to keep said code sliders in position during the sensing operation by the said sensing elements.

24. Keyboard according to claim 20, comprising driving means for said common setting member, said driving means allowing said setting member to be arrested

on said first direction for a stroke insufficient to set said code bars in the case of simultaneous release of a plurality of said setting elements, a function cam carried by a driven part of said starting clutch, a function lever co-operating negatively with said function cam for driving said command bail, a stop member and reloading means connected with said setting member to shift said stop member, said function lever being adapted to leave said function cam and to be arrested temporarily against said stop member during the said setting process, said reloading means shifting said stop member to release said function lever for the setting stroke of said setting member, whereby said function lever remains arrested against said stop member in the event of said insufficient stroke of said setting member to prevent said printing and function commands.

25. Keyboard according to claim 1, wherein a decoding apparatus carries out on a type-carrying element of the machine the selection of the type corresponding to said combinations, said decoder being activated by the driven part of said starting clutch to select the said type during said cycle.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,828,909 Dated August 13, 1974

Inventor(s) Domenico Roano et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the first page:

After "Assignee:" delete "Ing. C. Olivetti & Co., S.p.A." and insert -- Ing. C. Olivetti & C., S.p.A.--; After "Attorney" delete "Ira McMahon" and insert --Ira J. Schaefer--; In the abstract, line 4, delete "lathed" and insert --latched--.

Column 15, line 2, delete "sahft" and insert --shaft--.

Column 26, line 18, delete "settling" and insert --setting--.

Signed and sealed this 11th day of February 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks