

H. DREWELL.
TYPE WRITING AND PERFORATING DEVICE.
APPLICATION FILED JUNE 9, 1913.

1,163,986.

Patented Dec. 14, 1915.
3 SHEETS—SHEET 1.

Fig. 1.

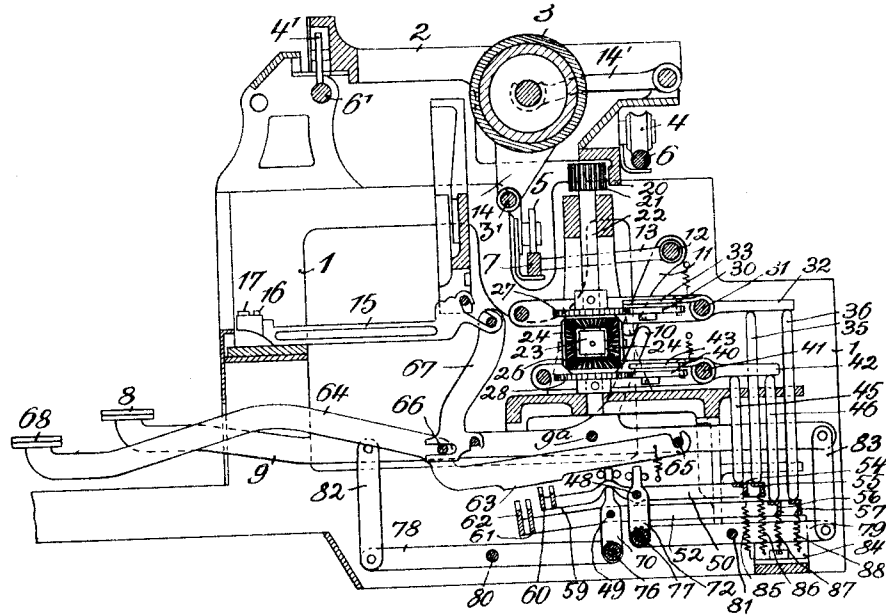


Fig. 2.

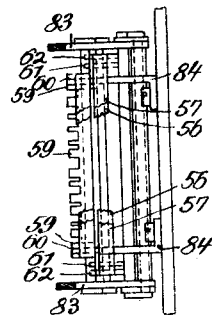
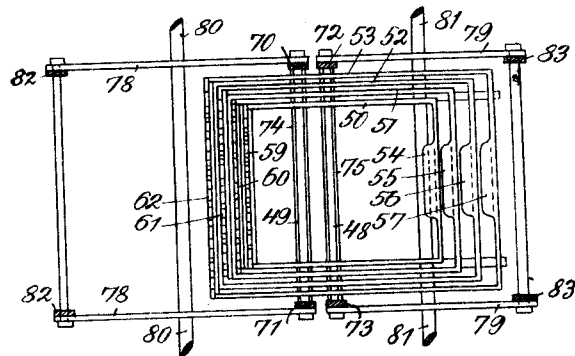


Fig. 3.



WITNESSES:
John C. Sanders
Albert F. Herman

INVENTOR:
Heinrich Drewell
BY *Mr. Wallace White*

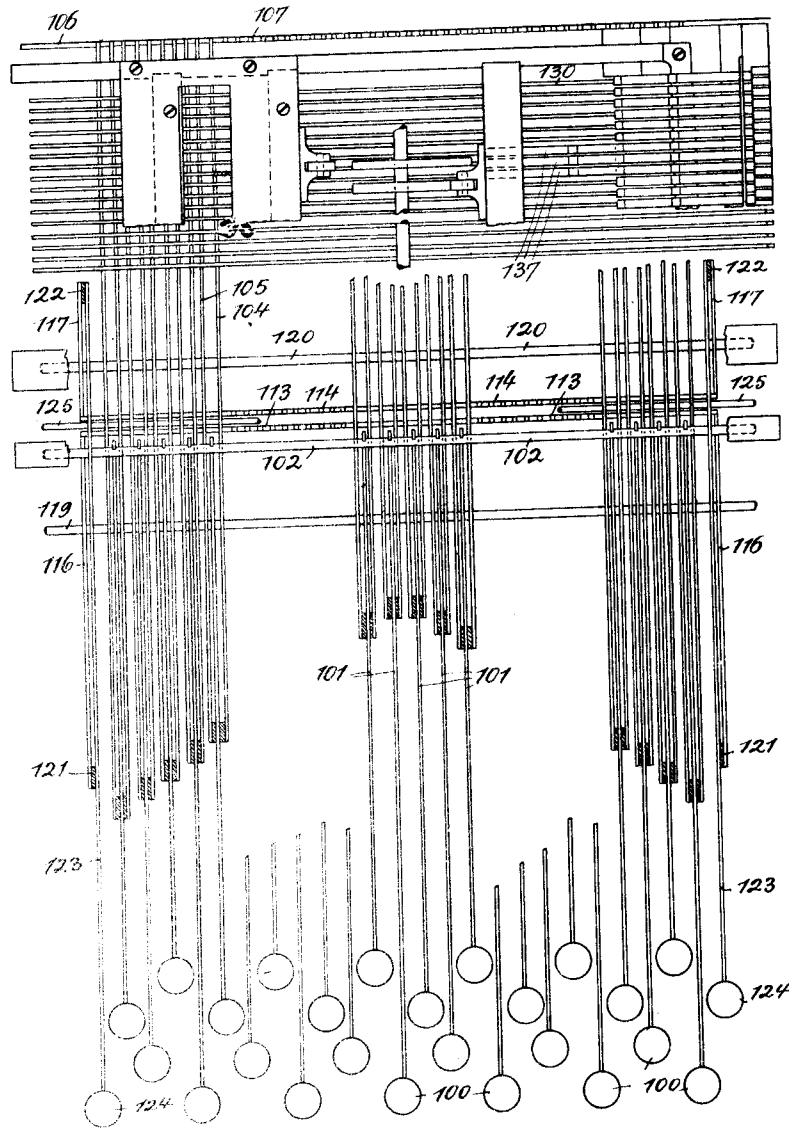
ATTY

H. DREWELL.
TYPE WRITING AND PERFORATING DEVICE.
APPLICATION FILED JUNE 6, 1913.

1,163,986.

Patented Dec. 14, 1915.
3 SHEETS—SHEET 2.

Fig. 4.



WITNESSES:
John C. Sanders
Albert D. H.

INVENTOR:
Heinrich Drewell
BY Mrs. Hallan A. Kite

ATTY

H. DREWELL.
TYPE WRITING AND PERFORATING DEVICE.
APPLICATION FILED JUNE 6, 1913.

1,163,986.

Patented Dec. 14, 1915.
3 SHEETS—SHEET 3.

Fig. 5.

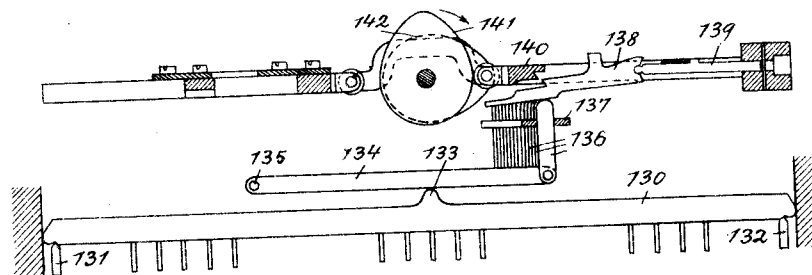


Fig. 6.

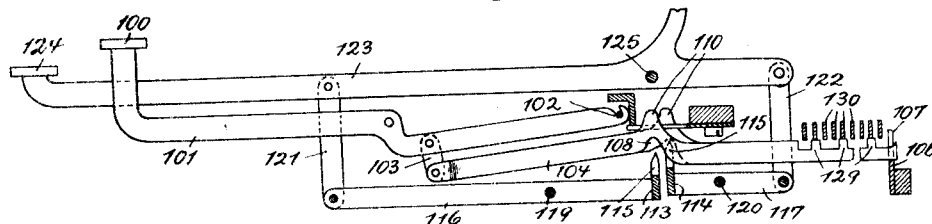


Fig. 7.

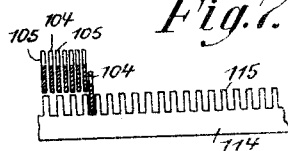
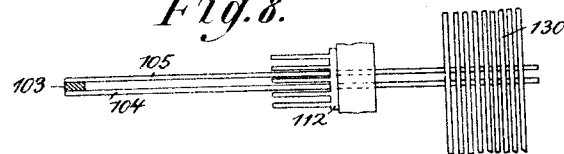


Fig. 8.



WITNESSES:

John C. Sanders
M. F. Humm

INVENTOR:

Heinrich Drewell
BY Mrs Wallace K. Kite

ATTY

UNITED STATES PATENT OFFICE.

HEINRICH DREWELL, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO SCHNELLSETZ-MASCHINENGESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF CHARLOTTENBURG, GERMANY.

TYPE-WRITING AND PERFORATING DEVICE.

1,163,986.

Specification of Letters Patent.

Patented Dec. 14, 1915.

Application filed June 6, 1913. Serial No. 772,044.

To all whom it may concern:

Be it known that I, HEINRICH DREWELL, a subject of the German Emperor, residing at Charlottenburg, Germany, have invented
5 new and useful Improvements in Type-Writing and Perforating Devices, of which the following is a specification.

My invention relates to means for operating type-writing machines or band perforating machines or similar devices the operation of which is controlled by means of a key board and one or more "shift-keys," the depression of the latter causing the other keys when struck to produce an effect different
15 from the one they may produce without this depression.

The invention is particularly applicable to those type-writing machines in which each type-bar carries two or more types and in
20 which the feeding of the paper-carriage is adapted to the particular width of each character that is being printed, *e. g.* the feed of the carriage is smaller when an "i" than when an "m" is being printed. Type-writing machines of this kind comprise generally a plurality of key-levers and a plurality of cross-bars or so-called universal-bars which are arranged underneath said key-levers and extend at right angles to the latter.
30 The key-levers are each provided with one or more suitable projections adapted to select one or more of said universal-bars to be depressed by said key-levers. Each of the universal-bars is operatively connected to a suitable member of the feed-controlling device serving to control the movement of the paper-carriage, and when depressed causes a pre-determined step of the carriage. Thus the depression of a type-key-lever which im-
40 parts its movement to one or more of said universal-bars causes a certain feed of the paper-carriage, the amount of this feed corresponding with the width of the character printed simultaneously. But if, as here
45 supposed, a shift-key is provided in the type-writing machine, the depression of the shift-key causes the characters printed by means of the type-key-levers to be changed. If for example a key-lever normally serves
50 to print the character "a" it will—when struck while the shift-key is depressed—cause the printing of the character "A." As the width of the character normally printed by depressing a certain key is not in all

cases the same as the width of the character printed during the depression of the shift-key, this key has to control the feeding of the paper-carriage in a suitable manner. Means hitherto known for this purpose provide operatively connecting means between
60 the shift-key and the universal-bars before mentioned for moving the latter along the key-levers and presenting them to another group of projections on the latter. Means of this kind are for example shown and described in the drawings and specification of my U. S. Letters Patent 953,988 dated April 5, 1910. Referring for example to Figure 1 of the drawings of said Letters Patent the universal bars 65 and 66 are normally placed
70 opposite to the projections 67 and 68, and by depressing the shift-key may be moved along the type levers and placed opposite to the projections 87 and 88. But when using devices of this kind the operator of the ma-
75 chine must take care not to depress any key-lever before the shift-key has been perfectly depressed, or, when released, has not perfectly returned to its rest position. Otherwise the projections of the key-levers will
80 come into the way of the shifting movement of the universal bar and the latter will be prevented and not completed. In common type writers, however, in which the steps of the carriage are of equal width, the shift-
85 key may be depressed nearly simultaneously with the depression of any other key and the shifting effect will be correct if the shifted member, for example the platen roll of the paper carriage, comes into its shifted posi-
90 tion only a very short time before the printing of a character takes place. Thus those type-writing machines the paper carriage of which is fed in steps of equal width allow a greater speed of working than those type-
95 writing machines in which the step-wise movement of the carriage has been adapted to the different widths of the characters printed and it is a principal purpose of my invention to do away with this difference in
100 the speed of working. The application of my invention, however, is not confined to type-writing machines, it may be employed also in band perforating devices which for example serve to produce the perforated
105 bands for operating type-setting machines, telegraphic apparatus and similar devices. In such devices as well as in the type-writ-

ing machines before mentioned a number of key-levers having projections cooperate with a number of cross or universal-bars causing one or more holes to be punched into a suitable band. A device of this kind is for example shown and described in the drawings and specification of my U. S. Letters Patent 851,504 dated April 23, 1907.

If a device of this kind is to be provided with a shift key in order to change the combination of holes which are caused to be punched when one of the common keys is depressed, my present invention may be employed, and it will be of greater importance than in a type-writing machine, because the incomplete shifting of a perforating device may produce on the band incorrect holes which can not be removed or canceled like incorrect characters written on a type-writing machine. If, in a type-writing machine of the kind in question, the feed of the paper-carriage, or, in a perforating device, the combination of holes is to be changed by depressing a shift-key the cooperation of the key-levers and the universal-bars must be modified somehow. The common way to do this is to move the universal-bars along the key-levers and to present them to another group of projections on the latter. When employing my invention the movement which serves for modifying the cooperation of the key-levers and the universal bars takes place in a direction to or from the projection or in the direction or parallel to the direction in which the projections operate, *e. g.* the two movements produced by the two keys will not hinder each other. Either two series of universal bars or two series of projections are provided and arranged in such manner that they may operate alternatively only.

Several embodiments of my invention are diagrammatically illustrated by way of example in the accompanying drawings, wherein:—

Fig. 1 is a sectional side elevation showing my improved apparatus in a typewriter whose carriage is shifted proportionally to the width of the letters. Figs. 2 and 3 are detail elevation and plan views, respectively, of my apparatus as shown in Fig. 1; Fig. 4 is a plan view, showing my improved apparatus applied to a band-perforating machine which may be combined with a typewriter if desired, Figs. 5 and 6 are front and side elevations, partly in section, respectively, showing the apparatus illustrated in Fig. 4, and Figs. 7 and 8 are detail views.

Referring first to Fig. 1, the numeral 1 designates the main frame of the typewriter, and 2 the paper-carriage which carries the platen-roll 3, and has rollers 4, 4 running on the rails 6, 6. The platen-roll 3 is journaled in a rocking frame 14 whose lower cross-bar 5 carries in the middle a

roller 5 which runs on a rail 7. This rail can be lifted by means of the shift key 8. For this purpose the lever 9 carrying the shift key 8 has an arm 10, which bears against an arm 11 fast on an axle 12 which carries the rail 7 by means of two additional arms 13, only one of these being visible in Fig. 1. When the key 8 is depressed the axle 12 is rotated by the lever-arms 10 and 11, and the rail 7 is thus lifted. The roller 5 which runs on the rail 7 is therefore lifted, and with it both the frame carrying the platen-roll 3 and the platen-roll itself. On both sides of the latter are side arms 14' of the roll-frame which cause the platen-roll to be raised equally at both ends. When the shift key is depressed the type 17 carried by the type lever 15 is printed instead of the type 16 whenever the appertaining key is depressed. This shifting device is known *per se*.

The paper-carriage 2 influenced by the carriage spring, not shown, has a toothed rack 20 meshing with a pinion 21 fast on a vertical axle 22. This axle carries a collar 23 carrying the pivots of two planet wheels 24. Meshing with the latter are two sun-wheels 25, 26 freely rotatable on the axle 22, and each rigidly connected with a ratchet wheel 27 and 28, respectively. Adjustable collars on the axle 22 prevent axial displacement of the ratchet-wheels 27, 28 and of the sun-wheels 25, 26, and consequently keep them in gear with the planet wheels. Engaging in the ratchet-wheels are special feed members, each of which consists of a fast detent and a loose pawl. The loose or feed pawl 30 of the one feed member 30, 33 normally engages the ratchet-wheel 27 and prevents its being rotated under the influence of the carriage-spring. This feed pawl 30 is mounted on an axle 31 carrying a rearwardly-directed arm 32. When this arm 32 is raised, the pawl 30 leaves the wheel 27 and the detent 33 rigidly connected with the pawl 30 enters into the ratchet-wheel 27. When the arm 32 returns into its normal position, the feed pawl 30 again enters between the teeth of the ratchet-wheel 27 and permits the same to rotate one tooth. The loose or feed pawl 40 of the other feed member 40, 43 which engages with the ratchet-wheel 28, is fast on the axle 41 and connected with an arm 42. With this pawl 40 the fast detent 43 is connected in such manner that the latter engages in the ratchet-wheel 28 alternately with the pawl 40 and consequently permits this wheel to rotate one tooth.

Pairs of vertical rods 35, 36 and 45, 46 actuate the arms 32 and 42, respectively. These rods are actuated by rocking frames 50, 51, 52, 53 (Fig. 3), of which the two former rock about the axle 48, and the two latter about the axle 49. Each of the rocking

frames 50, 51, 52, 53 comprises at one end a plate 54, 55, 56, 57 respectively, the plates 55, 57 supporting the rods 35, 36 and the plates 54, 56 supporting the rods 45, 46, respectively. At the other end of these rocking frames are the universal bars 59, 60, 61 and 62. Above these bars are located the lugs 63 on the key-levers 64. The latter rock about the axle 65 and each has a lateral pin 66 which enters into a slot in an angle-lever 67 and consequently causes the type-lever 15 to be driven by the key 68 at the free end of the key-lever 64. In the normal position of the apparatus and key-lever 64 can influence by means of its lug 63 one of the two universal bars 59 and 60, or both simultaneously. The universal bars have suitable notches (Fig. 2) into which the lugs 63 of the key-levers can enter when the latter are not to influence the particular bars. Otherwise the lugs abut against the unnotched portions of the universal bars and depress them downward as soon as the keys are depressed.

In the normal position of the shift key 8 and of the universal bars 59, 60, 61, 62, the first two bars are so close below the lugs 63 that they can be reached and depressed by the key-lever when a key is depressed. The other pair of universal bars 61, 62 is so far distant from the lugs 63 of the key-levers that when a key is depressed these bars are not influenced.

When the shift key 8 is depressed, the pairs of universal bars change their positions below the lugs 63. This is brought about by the following devices:--The axes 49, 48 of the frames 50, 51, 52, 53 are journaled in short lever-arms 70, 71 and 72, 73, respectively. The arms 70, 71 are fastened to the ends of a sleeve 74, and the arms 72, 73 are fastened to the ends of a sleeve 75. The two sleeves 74, 75 are free to rotate about the axes 76, 77, which constitute portions of rocking-frames 78, 79, respectively, those respective axes 80, 81 are mounted in the main frame 1 of the typewriter. The frames 78, 79 are connected by vertical links 82, 83 with the shift key lever 9, which rocks about the axle 98. When the shift key 8 is depressed, the axle 49 and, consequently, the frames 52 and 53 are raised, and the axle 48 together with the frames 50 and 51 are lowered. The universal bars 61, 62 are therefore brought closer to the lugs 63, whereas the universal bars 59, 60 are removed farther therefrom. When a key is depressed it can now influence only the bars 61 and 62. Since the notched and unnotched portions of the pairs of universal bars can be distributed as desired, the desired change in the feed of the paper-carriage can therefore be brought about by depressing the shift key 8. These ends of the frames 50, 51, 52, 53 which carry

the plates 54, 55, 56, 57, respectively, normally rest on correspondingly stepped supports 84. Springs 85, 86, 87, 88 are connected to the frames 50, 51, 52, 53, respectively, and normally hold them down in contact with their supports 84. Consequently, raising and lowering the axes 48, 49 correspondingly raises and lowers only the pairs of universal bars 59, 60 and 61, 62, respectively, one of the plates 54, 55, 56, 57 being raised only when a type key is depressed.

Figs. 1 to 8 illustrate an embodiment of my invention which is particularly applicable when a large number of universal bars are employed. This embodiment can be used both in typewriting and in band-perforating machines, and also when both these machines are combined. The drawings illustrate only the key-levers, shift levers and the operative parts of a perforating device directly coacting with them. The remainder of the machine is not shown, as it is not comprised in my invention. The apparatus illustrated is shown applied to perforating mechanism operatively connected with a typewriter. The levers 101 carrying the keys 100 are mounted to rock about a common axle 102. Pivotaly connected with each key-lever 101 by a link 103 is a pair of auxiliary levers 104 and 105. All the free ends of the auxiliary levers are located in slots 107 of a comb-like guide 106 and in their normal position rest on the bottoms of these slots. Each of the auxiliary levers 104 and 105 has a recess 108 and over that a projection 110. The latter slides in a comb-like guide plate 112 which prevents the auxiliary levers 104 and 105 from being displaced laterally. Below the recesses 108 in these levers are located movable bars or combs 113 and 114 having teeth 115 tapered off like knife-edges. A portion of one of these combs is illustrated in Fig. 7. The combs 113 and 114 form parts of frames 116 and 117, respectively, which respectively rock about axes 119, 120 and are connected by links 121, 122, respectively, with the levers 123 of the shift or shift keys 124; these levers 123 are mounted to rock about the axle 125. The teeth 115 of the comb 114 project into the recesses of the auxiliary levers 105, and those of the bar 113 into the recesses 108 of the auxiliary lever 104, the slotted portions of the comb 114 being located directly below the levers 105 (Fig. 7).

In the normal position of the shift key-levers 123, the teeth on the bar 114 are located just below the auxiliary levers 105. Hence when a key 100 is depressed and the appertaining levers 104 and 105 move downward, the recess 108 in the latter auxiliary lever abuts against a tooth of the comb 114, whereby the downward movement of the

lever 105 is checked. A further depression of that end of the lever 105 connected with the key-lever 101 now has the effect of raising the other end of the lever 105. This upward movement does not, however, occur in the case of the auxiliary lever 104 connected to the same key-lever 101, because this auxiliary lever descends into a gap between the teeth 115 of the bar 114, and therefore only rocks about its fulcrum in the guide-piece 106. When one of the shift keys 124 is depressed, the bar 113 is raised and the bar 114 lowered. In this position, when a type-key 100 is depressed the appertaining lever 104 rocks about the point of the corresponding tooth 115 of the comb 113, whereas the corresponding auxiliary lever 105 descends into one of the gaps in the comb 113, but does not reach the corresponding tooth 115 of the other comb 114, and therefore rocks only about its normal fulcrum at its rear end.

The auxiliary levers 104 and 105 have near their rear ends a number of lugs 129, over which cross-bars 130 are located. The latter rest at both ends on knife-edge-like fulcrums 131, 132 (Fig. 5) and consequently rock about the right-hand fulcrum 132 or the left-hand fulcrum 131 according as their left or their right end is raised. These bars each have on their top edges a lug 133, whereon a small lever 134 rests. All the levers 134 are mounted to rock about a common axle 135 and at their free ends are each pivotally connected to a rod or push-bar 136. The push-bars 136 slide in slots in a guide-plate 137 and normally support the driving levers 138 of punches 139. When the driving levers 138 are raised they can be brought into engagement with a punching-bar 140. The latter is driven in known manner by suitable cams 141, 142 when holes are to be punched. The raising of the rear end of one of the auxiliary levers 104 and 105 causes not only those cross-bars which are at the moment located above its lugs 129 to be raised, but also the corresponding lever 134, push-bar 136 and driving lever 138. When the punching-bar 140 is subsequently driven, it causes a corresponding group of holes to be punched in the band. The combinations of punches are therefore determined by the variously arranged lugs 129 on the auxiliary levers 104 and 105.

The stroke of the lug 133 on one of the cross-bars 130 is independent of the position of the auxiliary levers 104 and 105 which raises the particular cross-bar. The length of the front arm of the auxiliary levers 104 and 105 is such that the rear arm has a greater stroke, the more remote the particular auxiliary lever is from the middle of the machine, the stroke of the auxiliary levers 104 and 105 located in the middle being indeed about half that of those nearest the sides of the machine. In this manner com-

pensation is made for the difference in the effect of the auxiliary levers 104 and 105 on the cross-bars 130 owing to the latter all rocking about one point. The stroke of a given lug 133 on one of these bars is therefore always the same, but the strokes of the various lugs differ one from another owing to the lugs 129 for raising certain cross-bars 130 being at different distances from those fulcrums of the auxiliary levers 104 and 105 which are furnished by the combs. This difference of stroke of the lugs 133 is compensated for by the different lengths of the levers 134 and by the different distances of the upper points of application of the push-bars 136 from the pivots of the driving levers 138. These lengths and distances are so chosen that all the driving levers 138 have the same stroke at the radius at which the driving lever is brought into engagement with the punching-bar 140, independently of the positions both of the depressed key and of the driving lever which is raised. This compensation of differences in the stroke by varying the lengths of the lever-arms is essential for obtaining not only easy and uniform operation of the keys, but also certainty that the latter will make the correct selection of perforating punches. Easy and uniform operation of the keys is obtained because the full stroke of the key or a predetermined fraction thereof which is equal for all keys can always be used for raising the driving levers 138. It is not necessary to interpolate in the stroke of the various keys an idle movement varying in amount in different keys. Moreover, without appreciably increasing the work of depressing the keys, powerful springs or weights can be arranged to influence the driving-lever 138, because the stroke of this lever is small as compared with that of the keys. On the other hand, owing to their form and mode of support the cross-bars 130 are better secured against bending than the otherwise usual frame-like universal bars.

When combining a perforating machine with a typewriter whose carriage is shifted proportionally to the width of the letters, the lugs 129 on the auxiliary levers 104 and 105 can serve both for selecting the punches and for selecting and determining the distance through which the carriage is shifted.

Owing to the levers 104 and 105 being fulcrumed at their rear ends only the pair of bars 113, 114 need be moved when shifting, only when a type key is depressed almost simultaneously with the shift movement does the auxiliary lever 104 corresponding to this type key influence the tooth on a comb connected to the shift key. The latter is therefore always very easy to operate, because large masses of moving parts and considerable friction are obviated.

I claim:--

1. The combination with key-board mechanism comprising shift means of a plurality of key-levers, a plurality of series of fulcrumed universal-bars arranged transversally to said key-levers and adapted to be actuated thereby, a plurality of movable members each carrying the fulcrums of one of said series of universal-bars and when actuated displacing said fulcrums in a direction parallel to the actuating direction of said universal bars thereby making said series of universal bars alternatively operative and inoperative, a shift-key, and connecting means between said shift-key and said movable members for actuating the latter by means of said shift-key.

2. The combination with key-board mechanism comprising shift means of a plurality of key-levers, a plurality of series of fulcrumed intermediate members, operative connecting means for connecting to each one of said key-levers one member of each of said series of intermediate members, a plurality of movable fulcrums adapted to be alternatively approached to and withdrawn from said intermediate members and when approached serving as a fulcrum for one of said series intermediate members thereby making said series of intermediate members alternatively operative and inoperative, a shift-key and operative connecting means between said shift-key and said fulcrums for operating the latter by means of said shift-key.

3. In a type-writing machine, the combination of a plurality of key-levers, a plurality of series of fulcrumed universal-bars arranged transversally to said key-levers and adapted to be actuated thereby, a plurality of movable members each carrying the fulcrums of one of said series of universal-bars

and when actuated displacing said fulcrums in a direction parallel to the actuating direction of said universal-bars thereby making said series of universal-bars alternatively operative and inoperative, a shift-key, connecting means between said shift-key and said movable members for actuating the latter by means of said shift-key, a paper-carriage, means for controlling the feed of said paper-carriage, and operative connecting means connecting said universal-bars to said feed controlling means for operating the latter by means of said universal-bars.

4. The combination with key-board mechanism comprising shift means, of a plurality of key levers, a plurality of series of fulcrumed intermediate members, operative connecting means for connecting to each one of said key-levers one member of each of said series of intermediate members, a plurality of movable fulcrums adapted to be alternatively approached to and withdrawn from said intermediate members and when approached serving as a fulcrum for one of said series of intermediate members thereby making said series of intermediate members alternatively operative and inoperative, a shift-key, operative connecting means between said shift-key and said fulcrums for operating the latter by means of said shift-key, and a plurality of universal bars adapted to be selected and operated by said intermediate members.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEINRICH DREWELL.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.