Jan. 23, 1923. 1,443,108

T. WALTON.

APPARATUS FOR PRINTING AND COPYING MUSIC AND THE LIKE.

FILED MAR. 8, 1922. 4 SHEETS-SHEET 1

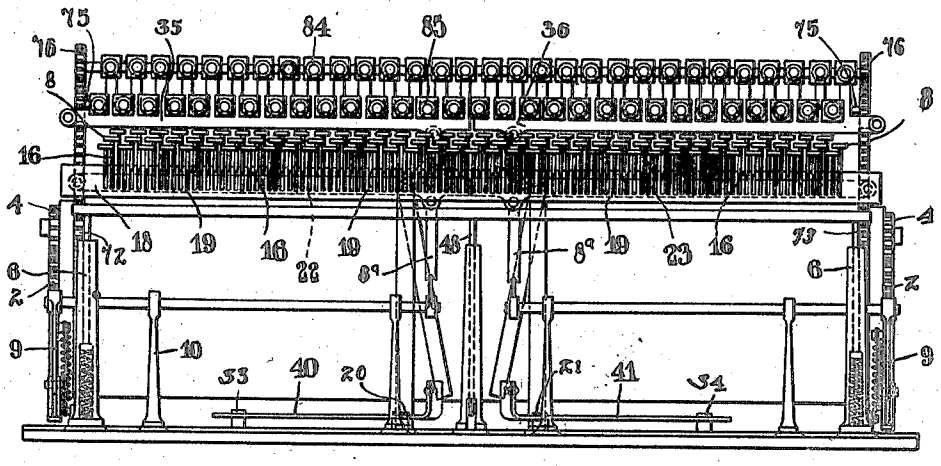


Fig. 1.

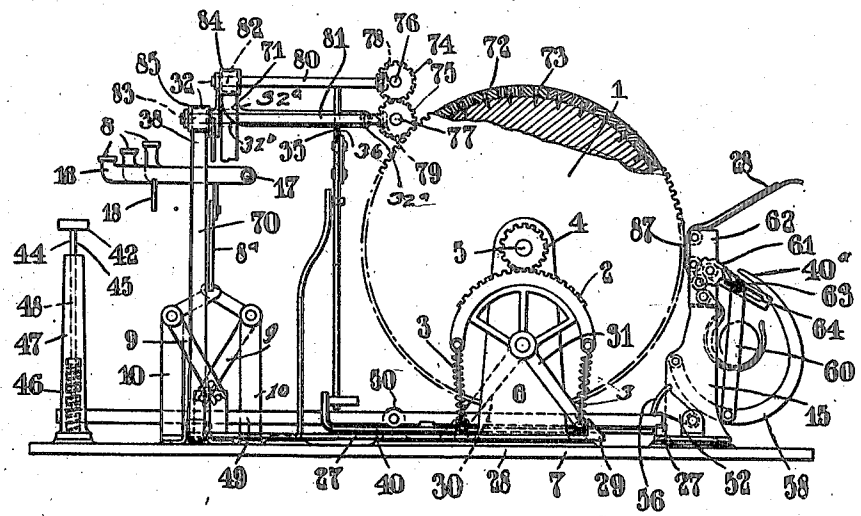


Fig. 2.

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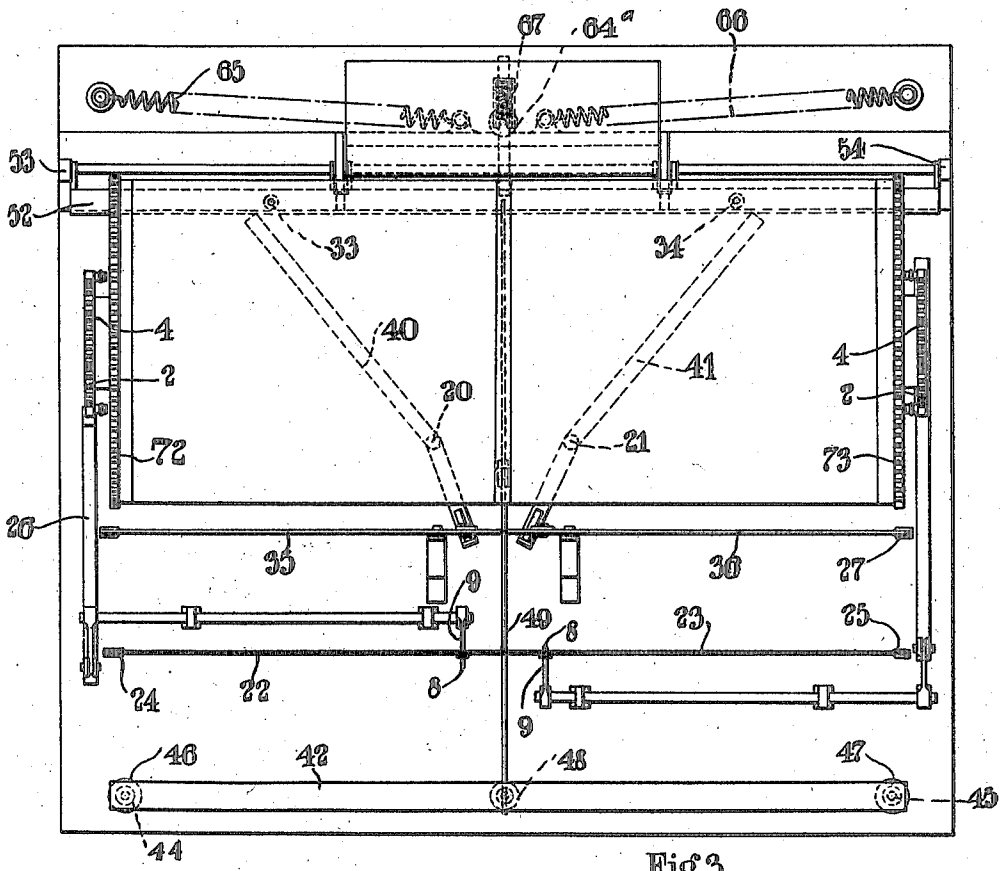


Fig. 3.

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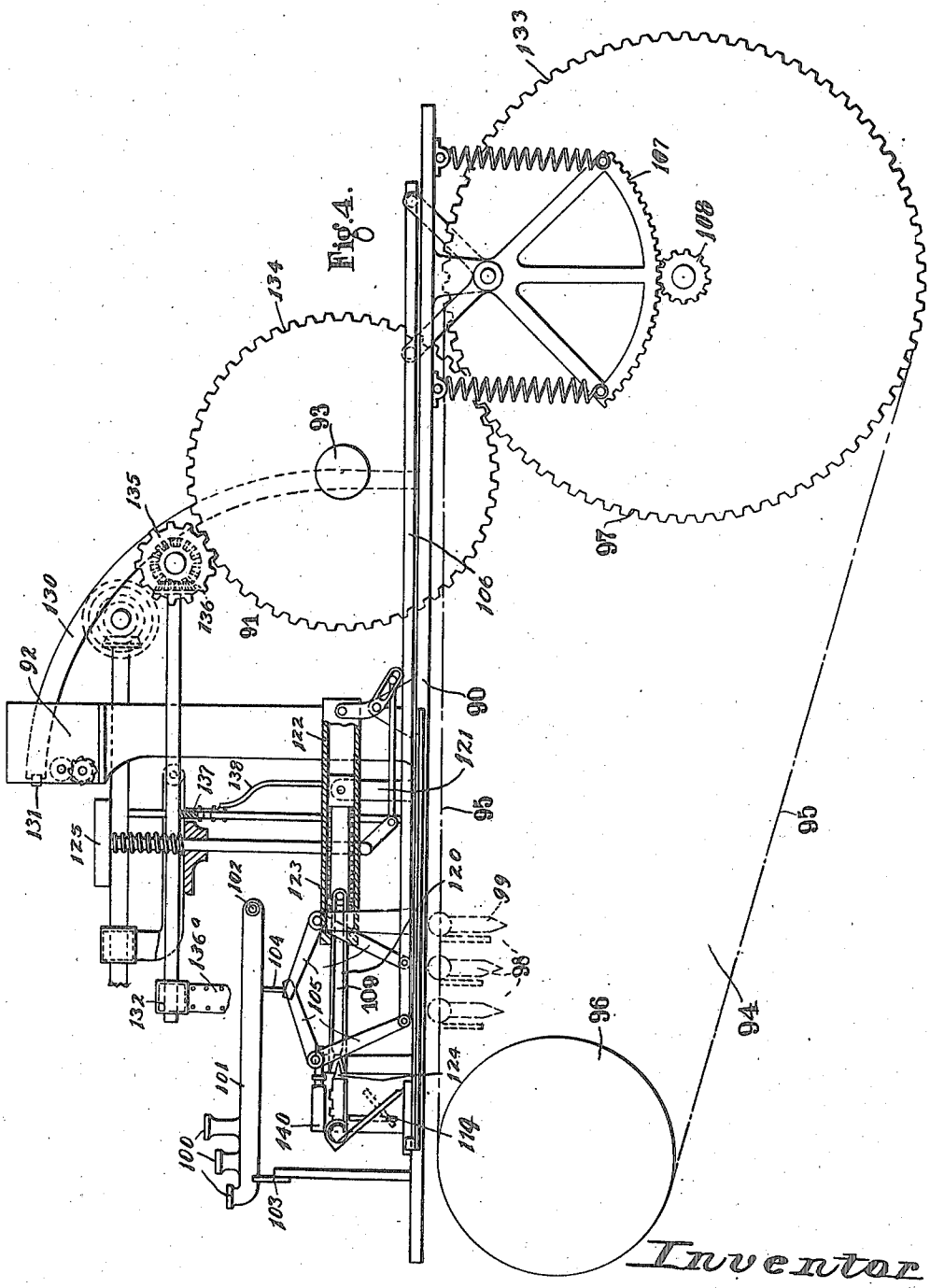
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Fig. 4.



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APPARATUS FOR PRINTING AND COPYING MUSIC AND THE LIKE.

FILED MAR. 8, 1922. 4 SHEETS-SHEET 4



Fig.6.

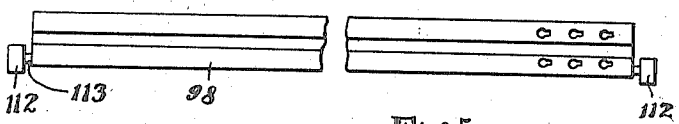


Fig.5

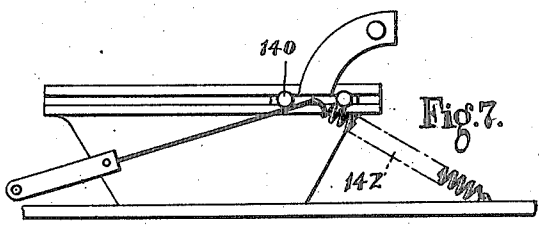


Fig.7.

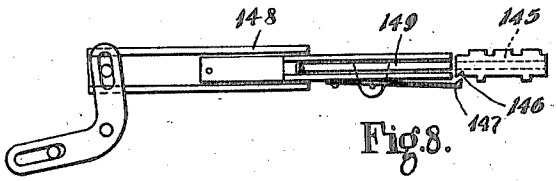


Fig.8.

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Patented Jan. 23, 1923. 1,443,108

UNITED STATES PATENT OFFICE.

THOMAS WALTON, OF LONDON, ENGLAND.

APPARATUS FOR PRINTING AND COPYING MUSIC AND THE LIKE.

Application filed March 8, 1922. Serial No. 542,036.

To all whom it may concern:

Be it known that I, THOMAS WALTON, a subject of the King of Great Britain and Ireland, and residing at St. Andrew's Vicarage, Short Street, New Cut, Lambeth, London, S. E. 1, England, have invented a certain new and useful Improved Apparatus for Printing and Copying Music and the like, of which the following is a specification.

This invention relates to typewriting machines and has for its object to provide a simple and compact form of machine capable of reproducing a relatively large number of characters such as is required, for example, in the case of music or a number of oriental languages, it being obvious, however, that the invention may be applied with equal effect and like advantage in any case where it may be desired to utilize a large number of characters without unduly increasing the size and complexity of the machine.

The invention consists in a typewriter comprising a type magazine or carrier having a plurality of supporting holders or rows of type, each of which contains a separate set of type carriers, means comprising two sets of keys, one set of keys for positioning the holders or rows and a second set of keys for positioning any particular type in the selected holder or row in the printing position in relation to the paper or other material upon which the printing is to be effected.

The invention also consists in a typewriter as set out in the preceding paragraph having in combination therewith means for holding the paper or other sheet to be printed upon, key-operated means for selecting any particular type row from the magazine or carrier and secondary key-operated means for bringing the selected type or the selected row into printing relationship with the paper or other material on which printing is to be effected.

The invention further consists in a typewriter as set out in the penultimate paragraph, having in combination therewith means for holding the paper or other sheet to be printed upon, primary key-operated means for selecting any particular holder or row and secondary key-operated means for bringing the selected type or the selected holder or row into printing relationship with the paper or other material on which printing is to be effected.

The invention still further consists in apparatus as set out in the penultimate paragraph in which the type magazine or carrier, holder or row is movable relatively to the selecting device to enable any particular type to be selected for conveyance to the printing position.

My invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows a front view of one form of construction;

Figure 2 shows a side elevation of Figure 1;

Figure 3 shows a plan, a part of the upper mechanism being removed for clearness;

Figure 4 shows somewhat diagrammatically another form which my invention may take;

Figure 5 shows the type bar tray;

Figure 6 shows a carrier for same;

Figure 7 shows an end view of the inking device as shown in Figure 4; and

Figure 8 shows an alternative method of type gripping device.

Referring now to Figures 1, 2 and 3, I form my improved machine with a cylindrical type bar holder 1 of sufficient dimensions to accommodate the maximum number of type characters; and such type characters may either be formed upon the cylindrical surface or they may be separate therefrom and arranged in slots, guides or other devices provided upon the surface of the cylinder, the arrangement being such that the cylinder 1 comprises a plurality of rows parallel with the axis of the cylinder, each row comprising a plurality of types. The cylinder 1 is adapted to be rotated by a toothed quadrant 2 controlled by springs 3, 3, the said quadrant engaging a spur wheel 4 on the spindle 5 upon which the cylinder 1 is mounted, said spindle and cylinder being carried in suitable bearings 6 provided upon the base 7 of the machine. In conjunction with the said spring controlled quadrant 2 I provide a number of keys 8 corresponding in number to the number of rows of types upon the cylinder 1, keys 8 being connected with the cylinder operating mechanism by means of links 8^a adapted to operate bell crank levers 9 mounted upon suitable bearings 10, the construction being such that on

a particular key being depressed the cylinder 1 is rotated to bring the corresponding type into printing relationship with the paper or other material to be printed on provided upon the carriage 15.

The keys 8 are mounted upon levers 16 having a common pivot 17 and are each adapted to be depressed through a definite predetermined distance, a fixed comb member 18 being provided for this purpose, having slots 19 through which the key levers 16 are each adapted to move when operated.

The key levers 16 are arranged to rest transversely upon pivoted levers or tracker bars 22, 23, said bars being fulcrumed at their outer extremities 24, 25 respectively, the arrangement being such that the extremity of one or the other of the pivoted levers or tracker bars 22 or 23 will be depressed through a definite distance, depending upon the distance of the key lever from the fulcrum of the tracker bar of any one of the keys being operated.

This movement of the extremity of one or the other of the pivoted tracker bars 22 or 23 resulting from the operation of a particular key will be communicated through member 8^a to either one or the other of the bell cranks 9 which in turn will cause the type cylinder 1 to be rotated in one direction or the other dependent upon the particular tracker bar operating, the necessary rotary movement being obtained through link 26 or 27 operating either the member 28 or 29 which in turn rotates the cylinder 1 through arm 30 or 31, segment 2 and spur-wheel 4, so that the particular row of types corresponding to the particular key depressed or operated will be moved into the printing position in relation to the paper 28 or other material provided upon the carriage 15, and upon which the printing is to be effected.

For the purpose of bringing any particular type in the selected row into the printing position in relation to the printing hammer or striker or other device I provide a second series of keys 32 also provided with tracker bars 35 and 36 and comb member 38, the object of this supplementary set of keys being to cause the carriage 15 to be moved laterally in relation to the cylindrical type holder 1 by means of one or the other of the bent bars 40 or 41 pivoted to the base of the machine at 20 and 21 and adapted to operate by engaging one or the other of the rollers 33 or 34 mounted upon the base of the carriage 15, whereby the latter is adapted to be moved laterally, the amount of such movement being dependent upon the particular key actuated to operate either one of the tracker bars and consequently either of the bent levers 40 or 41; the printing hammer or striker 40^a being brought into position for striking against the particular type selected, and being preferably actuated by a separate key 42 provided for this purpose and operating in the following manner:

Attached to the outer extremities of the key 42 are two rods 44 and 45 slidably mounted on pillars 46 and 47 provided on the base of the machine, the rods 44 and 45 being adapted to be depressed by the act of operating the key 42 against the springs provided in the said pillars, whereby the key 42 tends to return to its normal position after being operated.

The key 42 is further provided with a centrally located rod 48 adapted to actuate a lever 49 pivoted at 50 in such a manner that its end remote from the rod 48 will function to rotate the member 52 pivoted at each of its extremities 53 and 54 to the base of the machine. The face 56 of the member 52 thereupon engages with the hammer arm 58 to operate the hammer or striker 40^a attached to the carriage 15, the member 52 being of such a length that it will engage the hammer arm 58 when the carriage is in any position relatively to the type carrying cylinder.

The act of operating the hammer arm 58 also gives relative vertical movement to the paper or other material to be printed upon which is carried upon the carriage 15, by raising the link 60 and roller 63 to operate the pawl 61 and ratchet wheel 62, variable spacing being effected by varying the position of the roller 63 in the slot 64, further manually operated spacing means being provided at the extremity of the paper carrying roller if found desirable, the spacing being in the vertical direction when the machine is required for Chinese in which the lines are vertical and not horizontal.

After each printing operation the carriage 15 is adapted to be returned to its central and normal position by means of springs 65 and 66, the carriage being further provided for this purpose with a positioning pin 64′ working against the action of a spring 67 to engage a recess in a fixed part of the machine whereby such position may be more readily maintained. If found desirable the helical springs 65 and 66 may be replaced by volute springs or other similar means.

If desirable the machine may be provided with a number of indicating strips 70 and 71 as shown, having type characters thereon corresponding with the type characters upon the cylindrical holder 1, such indicators being actuated by rotation of the type selecting keys and effected by means of racks and pinions, worm and worm wheels, or other devices operated by the rotation of the cylinder for the selection of any particular type row.

In the construction shown, movement of the strips is effected by means of annular toothed wheels 72 and 73 provided upon the outer surface of the type carrying cylinder 1, said annular wheels driving with pinions 74 and 75, provided with bevel wheels 76 and 77, engaging with bevel pinions 78 and 79 upon the spindles 80 and 81, the spindles 80 and 81 having mounted upon their extremities remote from the bevel gears, small pulleys 82 and 83, provided if necessary with bands upon their surfaces adapted to engage holes provided in the sides of the indicating tapes 70 and 71 whereby the latter are adapted to pass over the said pulleys, the arrangement being such that the operation of depressing any particular key to rotate the cylinder to bring the selected row of type into operative position causes the particular symbols in that row to be indicated on the tape beneath its corresponding key upon the series of keys 32.

The key bars 32^a and 32^b are connected with the stationary shaft 32^c on which they are pivoted and are provided with box shaped members 84 and 85 enclosing the pulleys 82 and 83.

Where an ink ribbon or similar inking device is employed (not shown) the paper may be protected if necessary by a sheet of celluloid 87 or similar material provided on the face of the carriage as shown, the celluloid or other strip having a suitable aperture through which the hammer 40^a may operate.

If necessary the types may be fastened to the cylinder by means of screws or similar means, in such a manner as to be readily removable therefrom.

Assuming, for example, that the type holder has 108 rows of types with 72 types in each key it will be seen that the machine is capable of printing 7,776 characters with the use of only 180 keys, and the over-all dimensions of the machine may be made relatively small having regard to the large number of characters which may be obtained.

In the form of the invention illustrated in Figs. 4 to 8 the improved apparatus includes a base plate 90 upon which is movable laterally a carriage 92 while operatively associated with the carriage and the base plate is a roller 93 which carries the paper or material to be impressed the paper being thus enabled to be trained from the roller to the upepr part of the carriage 92 for a purpose that will hereinafter appear.

A type carrier 94 is arranged to operate beneath the base late 90 and comprises endless bands 95 which rotate over pulleys 96 and 97 such pulleys being provided at each end of the machine and are connected together by common shafts, the endless bands 95 having suspended thereon by rollers 112. 113 in a manner so as to be readily movable any desired number of holders 98 for accommodating rows of type bars 99 the latter being adapted to be removed from the holders and in turn may have three or other number of characters formed thereon. A locking plate is also provided in conjunction with each holder or tray, the arrangement being such that a slight lateral movement of the locking plate will be sufficient to release the type bars from their locked position on the holder when the latter is in its functional position.

In general it will be convenient to arrange in each a holder or tray those types or characters which would be ordinarily employed together in order that the machine may be manipulated for any specific purpose with the minimum amount of movement or manipulation of the machine. Keys 100 are mounted upon the outer extremities of key levers 101 the latter being pivoted at their inner extremities 102 and are adapted to be depressed vertically through slots in a comb plate 103 so that each of said levers is adapted to be depressed through a definite predetermined and uniform distance. A tracker bar 104 is also provided and is suitably located beneath the member 101 such tracker bar being capable of a varying vertical movement depending upon the particular key and its lever which may be operated. The varying movement imparted to the tracker bar is communicated by means of bell cranks 105 to pitmans 106 located on the upper part of the base at the opposite sides thereof, the outer extremities of the pitmans 106 being pivotally connected to the arms of spring controlled segments 107. It is to be appreciated that when the tracker bar 104 is depressed and the bell cranks swung about their pivots a rectilinear movement will be imparted to the pitmans 106 to rock the segments 107 and as the segments are in engagement with pinions 108 on the shaft which supports the pulley 97 this movement will act to actuate the type carrier and thereby bring a particular type holder or tray into a predetermined position so that it may be removed therefrom by hand. It is to be noted that the carriage 92 is formed at its forward end with a receiving portion for accommodating the selected type holder or tray.

In order that the particular type may be selected from the selected type holder a second set of keys is employed, the same being of a substantially similar construction and operating in a substantially similar manner as in the preferred form, the numerals corresponding being indicated by hundreds. At this point it may be mentioned however that the synchronous movement to ensure of the operation of the indi-

cating tapes 136 is effected by the provision of an additional gear wheel 134 on the axis of the roller 93 said gear being in mesh with the teeth 133 on the pulley wheel 97 and they are also in mesh with the pinions 135. A spring chuck 120 is mounted in a casing and is positioned so as to receive the particular type bar 99 from the selected holder or tray 98. The casing rests in a horizontal position on a stud 121. The opposite end of a casing 122 is swingably connected by a suitable bell crank lever to a bracket on the supporting base. A manually operable spring controlled plunger is slidably mounted for vertical movement through the stationary portion of the machine and is operably connected through a suitable link arrangement with a bell crank lever in the casing 122 in a manner that when depressed the casing together with the chuck carrying the particular selected type bar will be swung upwardly so as to effect a character impression on the paper or other material not shown which is adapted to be arranged in advance of a platen 131. Subsequent to this action the spring controlling the plunger 125 causes the casing to be returned to its original position and the type bar removed therefrom.

In conjunction with the type tray receiving portion 114 at the front part of the carriage 92 suitable inking mechanism such as indicated by the numerals 140 and 142 in Fig. 7 may be employed and in the present instance comprises generally an inking roller 140 which is connected to an adjacent bell crank 105 and is adapted to distribute ink over the types in the selected holder or tray.

In Fig. 8 there is illustrated a slightly modified form of chucks 147, 148 and 149 for engaging the selected type bars 145 and 146.

It will be seen that with such an apparatus as herein described that it is possible to produce a very compact and comparatively simple form of machine capable of employing a large number of characters without making the machine unduly complex, as for example assuming that the machine has 60 keys and 24 holders or trays in the type carrier each holder will contain 60 type bars and if each type bar has three characters thereon the total number of characters which can be reproduced with the 60 keys on the machine is $60 \times 3 \times 24 = 4320$. It will be understood however that these figures are given merely by way of example since other ratios of the number of characters reproducible to the number of keys adopted may be obtained by suitable variations in the design of the machine.

It is believed in view of the foregoing that a further detailed description of the operation of the invention is unnecessary. Likewise it is believed that the advantages of the invention will be readily apparent.

Having thus fully described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A typewriter comprising a type carrier, a plurality of rows of types thereon and each of which contains a separate set of type characters and actuating means comprising two sets of keys, one set of keys acting to position the rows and the other set of keys acting to select any particular type in the selected rows for character impression.

2. A typewriter comprising in combination a type carrier, a plurality of rows of types thereon, means for holding the material upon which characters are to be impressed, actuating means comprising two sets of keys, one set of keys acting to position the rows and the other set of keys acting to select any particular type in the selected row for character impression and the type carrier being movable relatively to the selecting keys to enable any particular type to be selected for conveyance to the character impression position.

3. A typewriter comprising a movable type carrier, a plurality of rows of type removably mounted thereon and each of which contains a separate set of type characters, actuating means comprising two sets of keys, one set of keys acting to position the rows and the other set of keys acting to select any particular type of the selected rows for character impression, and the carrier being movable for the purpose of bringing any particular type into a position appropriate for removal, substantially as described.

4. A typewriter comprising a type carrier, a plurality of rows of type removably mounted thereon and each of which contains separate sets of type characters, actuating means comprising two sets of keys, one set of keys acting to position the rows and the other set of keys acting to select any particular type in the selected rows for character impression and indicating means movable synchronously with the carrier whereby the characters are visible any time upon the indicating means and correspond with the types in the particular row selected from the carrier substantially as described.

5. A type writer as claimed in claim 1 wherein means is provided whereby the vertical spacing of the material to be impressed may be adjusted to a predetermined amount.

6. A typewriter as claimed in claim 1 wherein means is employed for holding the material to be impressed, and a manually operable member for effecting an impression of the selected type.

7. A typewriter as claimed in claim 1 wherein means is employed for holding the material to be impressed, a manually operable member for effecting an impression of the selected type and means whereby the actuation of the impression member auto-

matically operates to space the material to be impressed.

8. A typewriter as claimed in claim 1 wherein indicating tapes are associated with the second set of keys and provided with various characters thereon adapted to bring into view the character corresponding with the particular key controlling the particular type operating, substantially as described.

In testimony whereof I have signed my name to this specification.

THOMAS WALTON.