

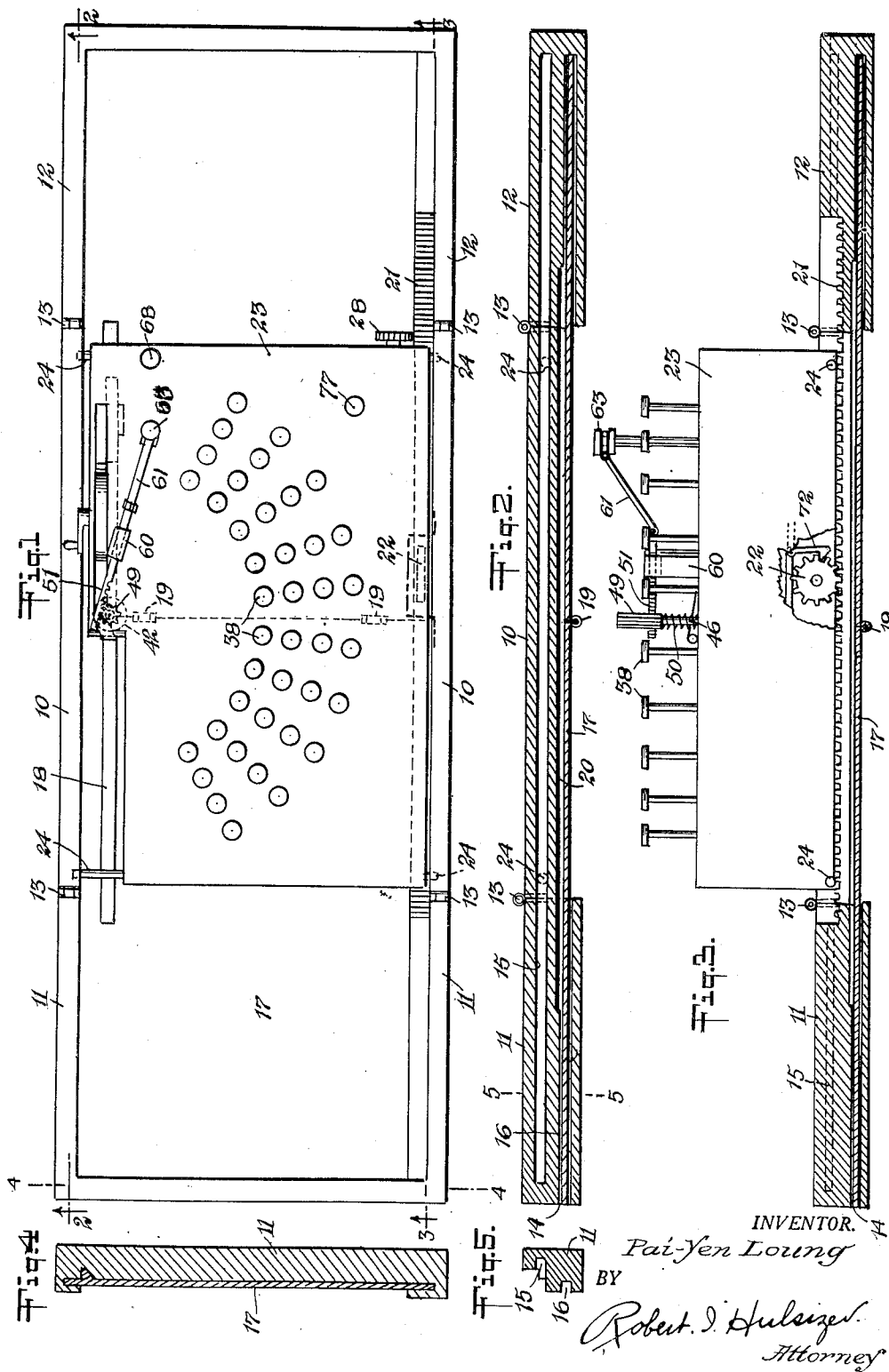
Oct. 24, 1950

P. Y. LOUNG
FLAT PLATEN TYPEWRITER WITH LONGITUDINALLY
PROJECTED TYPE STRIP ELEMENTS

2,527,016

Filed Nov. 24, 1948

5 Sheets-Sheet 1



INVENTOR.

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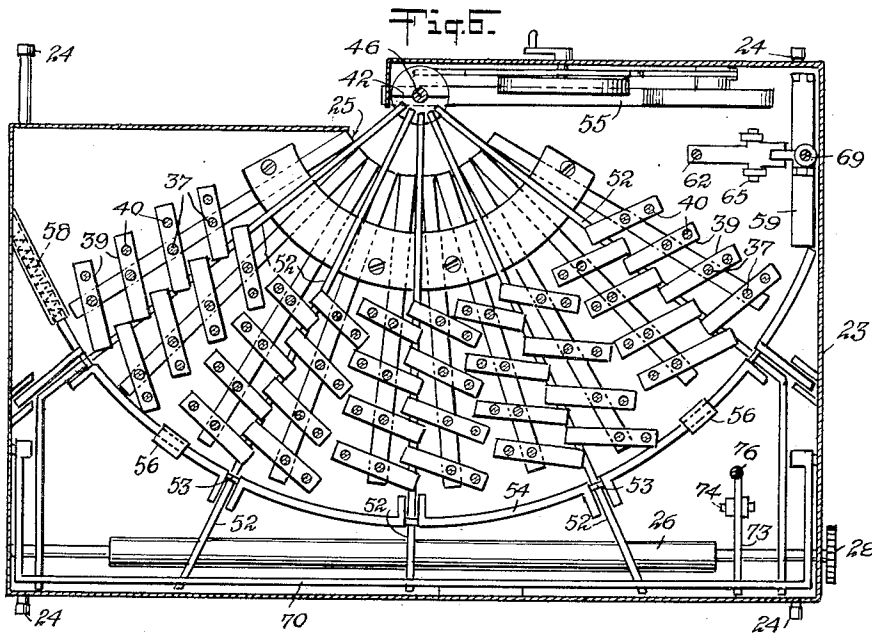
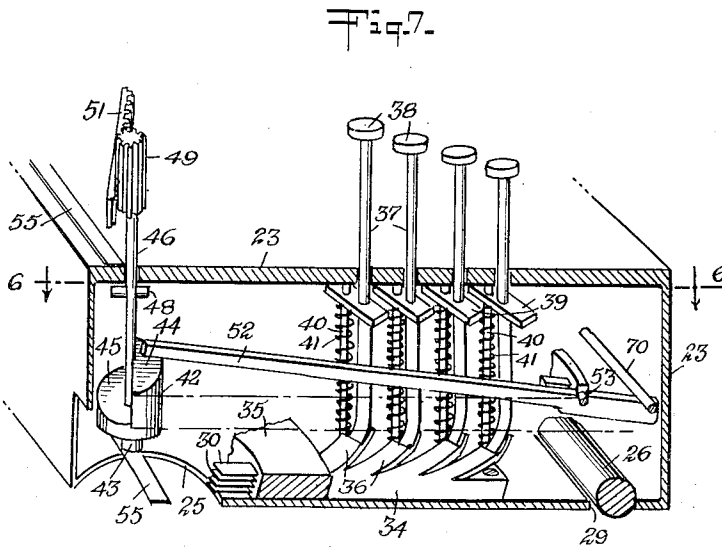
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5 Sheets-Sheet 3

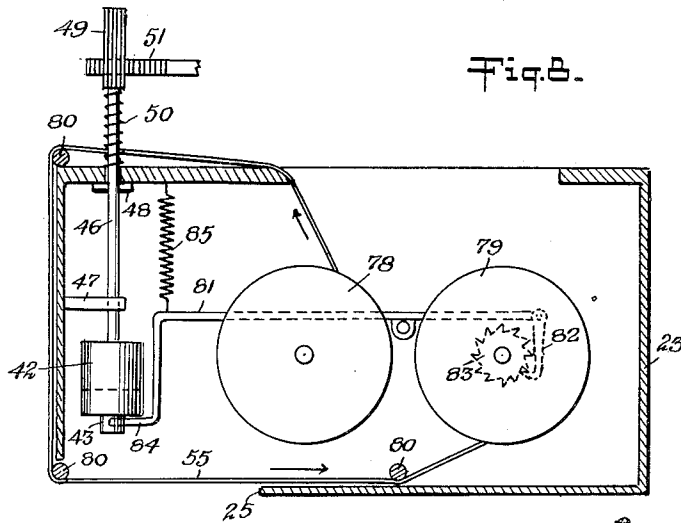


Fig. 8.

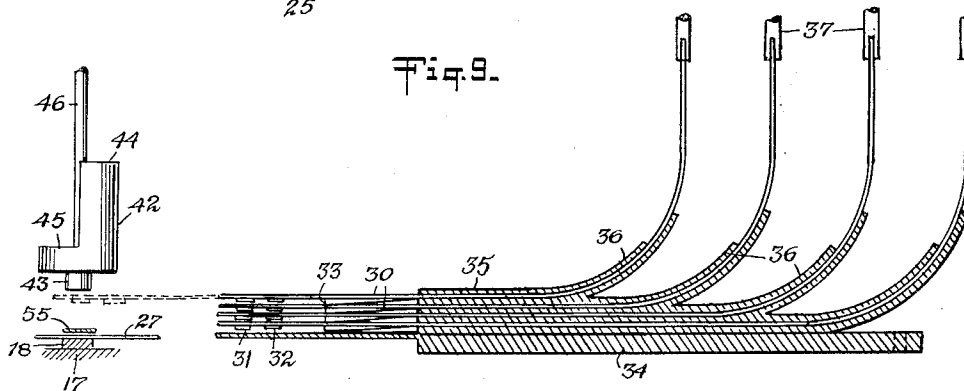


Fig. 9.

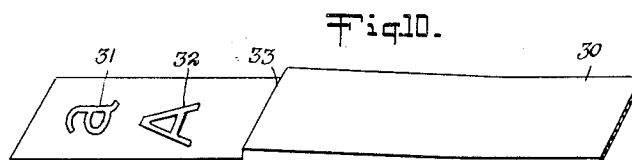


Fig. 10.

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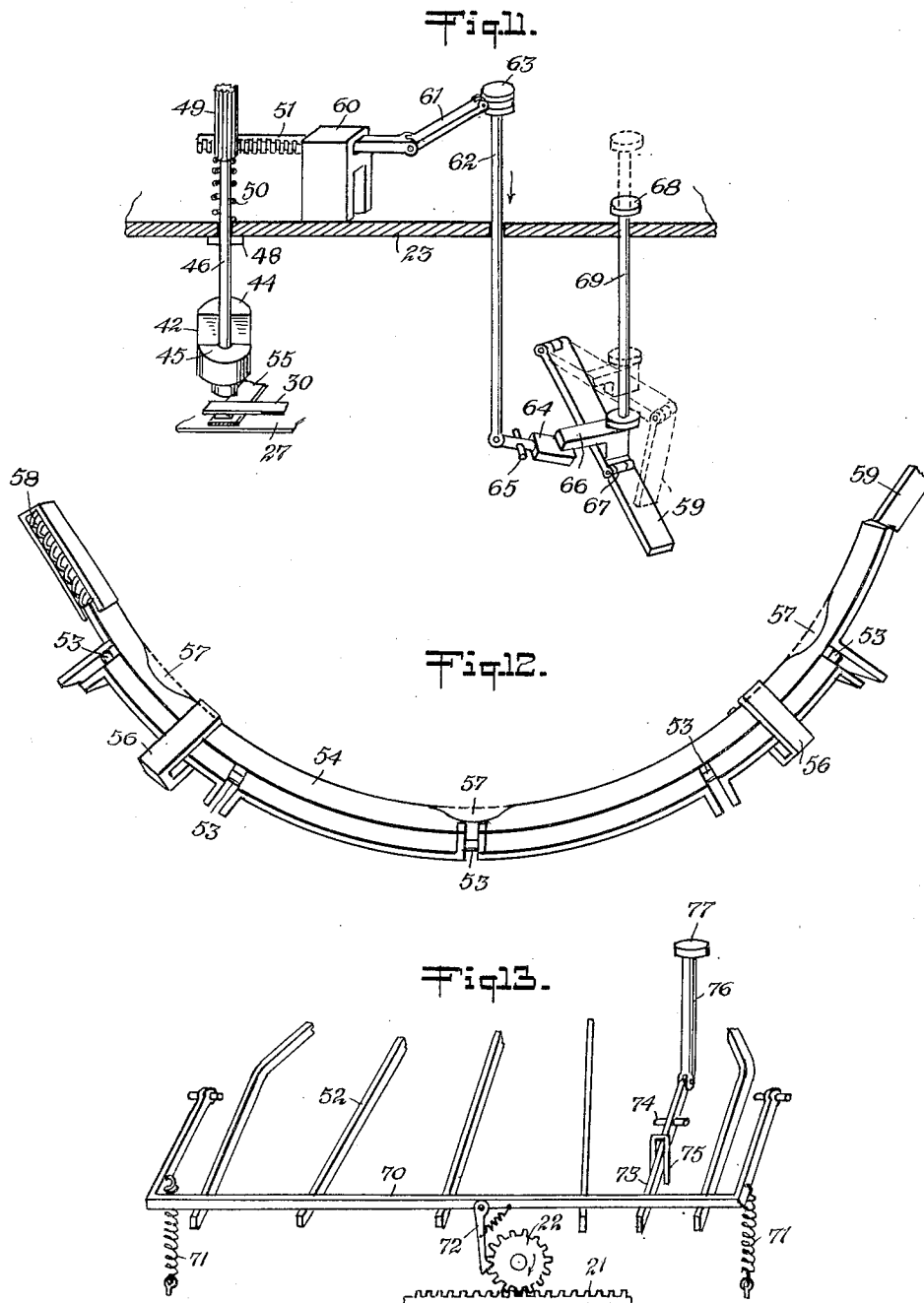
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5 Sheets-Sheet 4



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5 Sheets-Sheet 5

Fig. 14.

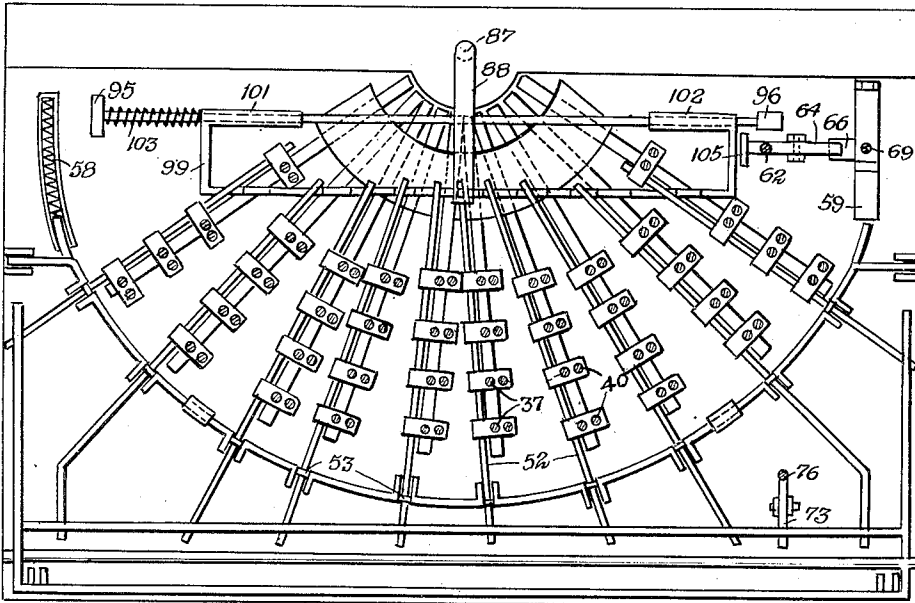


Fig. 15.

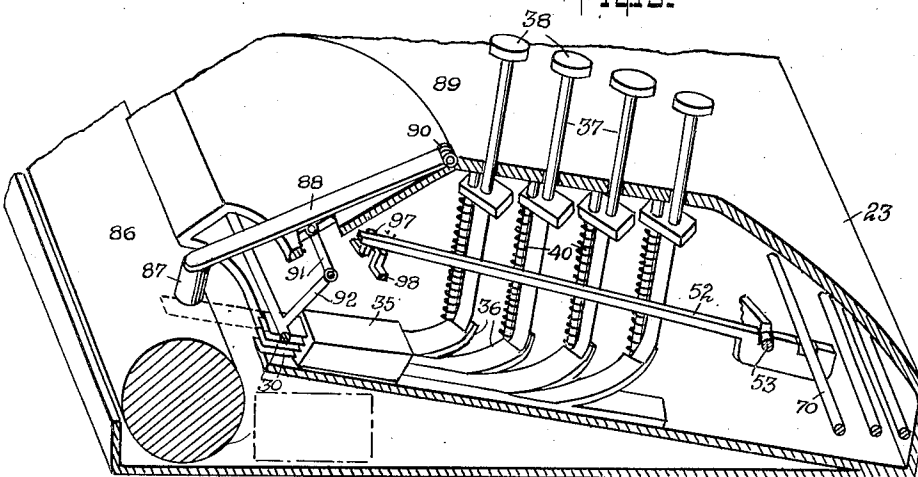
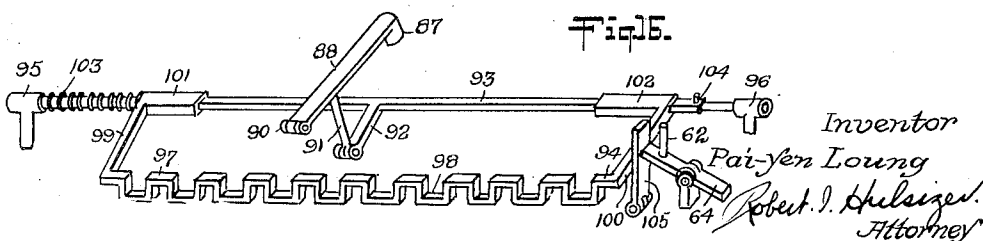


Fig. 16.



UNITED STATES PATENT OFFICE

2,527,016

FLAT PLATEN TYPEWRITER WITH LONGITUDINALLY PROJECTED TYPE STRIP ELEMENTS

Pai Yen Loung, Glen Cove, N. Y.

Application November 24, 1948, Serial No. 61,753

11 Claims. (Cl. 197—2)

1

This invention relates to new and useful improvements in a typewriter construction.

The main object of the invention is to provide a typewriter construction which is small, compact, capable of being assembled and disassembled readily and folded up into a small compass to enable it to be carried around readily. The smallest form thereof is intended to be carried around in the pocket.

A further object is to provide a construction in which the parts are relatively few, compact, economical to make and assemble, and capable of long continued use without the necessity of replacement.

Further and more specific objects, features, and advantages will more clearly appear from a consideration of the detailed specification hereinafter set forth especially when taken in connection with the accompanying drawings which illustrate a present preferred form which the invention may assume and which form part of the specification.

In brief and general terms, the invention relates to a typewriter in which there are provided a plurality of slidable strips of thin metal bearing the type characters instead of having the usual pivoted type bars. This makes for more compactness and less wear and tear on the parts. Preferably, each strip has a pair of characters thereon on one face adjacent its end and these strips are preferably arranged in groups in superposed relation and there are a plurality of groups of strips thus providing any desired number of characters. Of course, other arrangements of the strips may be made if desired.

The invention further includes manually operable means to advance each strip longitudinally as a key is pressed to position the desired character over an anvil or platen.

The invention further includes hammer operating elements adapted to be selectively operated upon a depression of the keys to move a hammer toward the anvil or platen as the type character on the strip is advanced so that the hammer will press the character against a sheet of paper which may be disposed beneath the strip and above the anvil or platen.

The invention further and in more particular, includes a series of pivoted hammer operating bars movable around their pivot points as the character keys are depressed. This is also combined with means manually operable to shift the pivot points of said bars from their normal position so that the movement of the type keys before contacting the pivoted elements may be

2

varied and thus enable the type strips to be advanced more or less, depending upon which of the characters thereon is to be disposed in position for printing.

5 The invention still further includes simple means automatically operated by the hammer, as it is advanced to print, to move the ribbon, which is normally disposed between the type strip and the sheet of paper.

10 Still further, the invention includes automatic means associated with the hammer operating bars to space the carriage as the bars are operated.

The invention still further includes a simple construction of folded base to support the type carriage thereon when in expanded, unfolded condition, capable of being folded and unfolded in the matter of a few seconds and permitting the ready and quick disposition of the carriage thereon and the equally rapid removal of the carriage therefrom when desired.

The invention still further includes a simple construction of type strip and a simple, compact supporting unit for a group of strips whereby they are always maintained in alignment for ready operation by the depression of a key and whereby they do not rub or interfere with each other as one or the other of the group of strips is advanced or retracted.

30 The invention further includes other features of advantage and utility, which will be more apparent as the following description of the construction and operation is considered, and which patentable features are set forth in the claims hereto attached.

35 The present preferred embodiment of the invention is illustrated in the drawings, of which:

Fig. 1 is a plan view of the device showing the supporting base in extended position with the carriage mounted thereon;

40 Fig. 2 is a vertical longitudinal cross section taken on the line 2—2 of Figure 1;

Fig. 3 is a similar section taken on the line 3—3 of Figure 1;

45 Fig. 4 is a vertical transverse section taken on the line 4—4 of Figure 1;

Fig. 5 is a vertical transverse section taken on the line 5—5 of Figure 2;

Fig. 6 is an enlarged plan view of the carriage with the top wall removed;

Fig. 7 is a vertical transverse section through the carriage and represents a detail view of the operation of the type strip and the type hammer;

Fig. 8 is a vertical detail section of the ribbon operating mechanism;

55

Fig. 9 is an enlarged partial vertical section of the type strips and their supporting member;

Fig. 10 is a perspective of the end of a typical type strip in reversed position;

Fig. 11 is a detail section showing part of the mechanism for shifting from capitals to ordinary type;

Fig. 12 is a perspective view of another portion of the same mechanism;

Fig. 13 is a detail perspective of the mechanism for spacing the carriage;

Fig. 14 is a view somewhat similar to Figure 6 and shows a modified embodiment of the invention;

Fig. 15 is a view somewhat similar to Figure 7 of this modified embodiment; and

Fig. 16 is a detail of the shift mechanism for this modified embodiment.

Referring now merely to the specific embodiment of the invention which has been selected to illustrate one form of the invention in the drawings of this application, I shall first refer to the foldable base plate.

This unit comprises an open rectangular frame formed of a central main section 10 and end sections 11 and 12 pivotally hinged to the central section at 13. These end sections are therefore adapted to be folded up and over to lie flat on top of the central section when the base is not in use so as to occupy a small compass. The end wall of the section 11 is provided with a slot 14 extending therethrough as shown in Figure 2, and the side walls of the sections 10, 11 and 12 are provided with upper and lower grooves 15 and 16 extending the length of these members and aligned when these members are laid out flat as shown in Figure 2. In the lower groove 16 there is adapted to be disposed a sectional plate 17 which when in position fills the opening of the open base as shown. On the top of this plate 17 is disposed an elongated anvil 18 in the form of a raised bar. This anvil supporting plate 17 is hinged in two at 19 and the plate in folding hinges in the opposite direction from that of the base section in which it is operatively disposed. Thus the base and the plate when in the position shown in the drawings tend to hold each other in the extended position. The end slot 14 permits the left end of plate 17 to be moved considerably to the left in order to insert its right portion in the lower groove in the right hand section 12 when assembling the base with the plate 17. It is to be seen in Figure 2, that the lower groove 16 in the base plate along its mid portion has a raised portion 20 to permit a sheet of paper to be inserted above the anvil plate 17 and to extend forwardly to lie on top of the anvil 18 in order to receive impressions as later described. The front wall of the base plate is also provided with a rack 21 along its upper edge, along its mid portion to engage with a spacing gear 22 on the movable carriage disposed above and on the base plate as to be described.

Movable type carriage

This comprises a rectangular casing 23 which has forwardly and rearwardly extending supporting pins 24 at its corners which extend into the upper groove 15 of the base frame and on which the carriage may slide back and forth in the frame and above the anvil or platen plate 17. The bottom plate of the carriage casing 23 is cut away at its mid forward edge as shown at 25 in Figure 7, to permit the printing elements

therein to move down into contact with the sheet of paper below the carriage as later described.

On and within the casing 23 and with particular reference to Figures 1 to 13 inclusive, there is shown a present preferred form of printing elements and related mechanisms now to be described.

Sheet operating mechanism

The sheet of paper disposed below the casing 23 and resting on the anvil 18 along the line being printed may be fed forward or backward by means of a roller 26 shown rotatably mounted near the bottom of the casing along its rear edge in Figure 7 and extending slightly below the lower face of the casing to bear against the paper lying on the upper face of the anvil plate 17. This sheet of paper is indicated at 27 in Figure 9. The roller 26 is operated by a knob 28 at the right of the casing 23 as shown in Figure 6. The roller can extend below the bottom of the casing 23 by reason of an elongated slot 29 in the bottom of the casing 23 in which it lies as shown.

Type-strip operation

A main feature of this invention is the fact that there are no pivoted type bars but a series of longitudinally movable type strips having type characters on a face thereof adjacent one end. These strips are indicated at 30 as shown in Figure 9. They are in the form of flat strips of spring metal preferably thin and having normal characters 31 disposed on one face near the outer end of the strip and capital forms 32 of the same characters inwardly adjacent thereto. To the rear of the character space on the strip, the strip is thickened as at 33 so as to keep the character portions spaced enough to keep the character surfaces from rubbing. In the form shown in this embodiment, the strips are arranged in groups of four superposed. Each group of strips is mounted slidably in a guide block 34 bolted to the bottom of the casing 23 which block is provided with narrow channels 35 to receive each strip and these channels have rear upwardly curved portions 36 so as to change the line of movement of the strip from a horizontal direction at its forward end to a vertical direction at its rearward portion. In the form now being described, there are ten groups each with four strips and each strip has two characters thereon thus providing for the printing of eighty characters.

Preferably the guide blocks are so disposed as to direct the strips toward a central printing point as seen in Figure 1, from which center the strips radiate. In the inoperative positions of the strips as shown in Figure 7, they are disposed about at the edge of the opening 25 previously mentioned in the bottom of the casing 23. Each strip is advanced longitudinally to the dotted position shown in Figure 9 in a manner later to be set forth. At their rear upwardly directed ends the strips 30 are connected to the lower ends of stems or rods 37 which extend upwardly through the top wall of the casing 23 and have on their upper ends finger caps 38. Below the top wall of the casing 23 and fixed to the stems 37 are cross bars 39 which move with the stems 37 when the fingers of the operator press down on the caps 38 and they are guided by guide rods 40 extending between the top and bottom walls of the casing 23 and passing through the bars 39. Springs 41 surround the rods 40 and tend to press upwardly on the bars 39 to hold the strips

in their retracted position when the fingers of the operator are released from the caps 38.

Printing hammer

As shown in Figures 7, 8 and 9, there is slidably disposed within the casing 23 a hammer block 42 having a striker surface 43 and having two upper surfaces 44 and 45 disposed at different levels thereon. This hammer is supported on a slidable stem 46 which is journaled in a bracket 47 fastened to the wall of the casing 23 and in a hole in the upper wall of said casing and through which the stem 46 passes. A cross key 48 on the stem 46 within the casing 23 prevents too much upward movement of the stem. At its upper end the stem 46 is provided with an elongated pinion 49 beneath which is a spring 50 which tends to hold the stem 46 in upward position. The pinion engages with a rack bar 51 which is moved in a manner later described and which turns the hammer to present one or the other of the surfaces 44 and 45 to be engaged by pivoted hammer actuating levers 52 now to be described.

Hammer actuation

It is seen from Figures 7 and 9, that the hammer 42 is disposed for vertical movement in a line passing through the anvil plate 17. The downward movement of the hammer is effected by means of the pivoted actuator levers 52. These levers in the form shown in Figure 6, are five in number and are pivoted as at 53 on a curved plate 54 disposed just above the bottom of the casing 23. The actuator levers 52 are directed in lines radiating from the center axis of the hammer stem 46. In Figure 7, the levers are shown disposed above the upper surface 44 of said hammer. It is clear that when a type stem 37 is depressed, the cross bar on it will move down and at a predetermined interval will contact the top of a lever 52 to move it down against the top of the hammer, to move the hammer down against the advanced type strip 38, the ribbon 55, and the sheet of paper 27 moving them against the anvil plate 17 and thereby causing the character to be printed on the sheet. With the surface 44 of the hammer presented beneath the lever 52, it is clear that the type may be moved a definite distance before the lever is actuated but it is also clear that if the hammer is turned around to present the lower surface 45 beneath the end of the lever 52 then the type strip may be moved a greater distance before the lever is actuated and this permits the strip to be advanced further for the presentation of the other character thereon before printing takes place. As the other surface of the hammer is thus presented the curved plate 54 is moved in an arc and held in this movement by fixed brackets 56 disposed on the floor of the casing 23. In this movement, the plate 54 rides up or down on cam surfaces or elements 57 fastened to the floor of the casing 23 and thus the pivot points of the levers 52 are raised or lowered. When they are lowered, the ends of the levers will be brought down adjacent the lower surface 45 and consequently, further away from the cross bars 39 on the type stems 37 thus permitting further movement of the strips before printing takes place. A spring 58 presses against one end of the curved plate 54 tending to move it to ride up on top of the cam elements 57 but a movable actuator shift bar 59 engages the other end of the curved plate 54 and may move

it against the resistance of the spring 58 in the manner and for the reasons now to be set forth:

Shift mechanism

The rack bar 51 shown in Figure 8 is slidable in a support block 60 mounted on top of the casing 23 and has pivoted to its end a link 61, the other end of which is pivotally connected in any suitable manner to a shift rod 62 having a finger cap 63 as shown in Figure 11, and pivotally connected at its lower end to a trip lever 64 pivoted at 65 to the bottom of the casing. The end of this trip lever lies beneath a lateral arm 66 connected to the split shift bar 59 which at one end is hinged in any suitable manner to the casing 23 and at the other end bears against the curved shift plate 54 as previously stated. This split shift bar 59 is hinged in the middle at 67. When the stem 62 is depressed to set the parts for the printing of small characters, the split bar is broken as shown in dotted lines in Figure 11 and this permits the spring 58 at the other end of the curved shift plate 54 to shift it to ride it up on the cam elements 57 and this will move the actuating levers 52 to their upward position. As the stem 62 is depressed, it will, through link 61, slide rack bar 51 causing the pinion 49 to rotate to present the higher surface 44 of the hammer to lie under the ends of the levers 52. In order to shift to the position of the parts for the printing of capitals, a finger cap 63 on top of rod 62 is depressed. This moves rod 62 down against the split bar and causes it to move to extended position shown in full lines in Figure 11. This will cause the end of the bar 59 to push against the curved shift plate 54 and against the resistance of spring 58 and allow the plate 54 to assume the position shown in Figure 11 in full lines, and this is the position of the parts when capitals are to be printed. As seen in Figure 6, the cross bars 39 on the stems 37 are so extended that for each two groups of type strips a common lever 52 is actuated so that for ten groups of strips only five levers 52 are needed as seen in Figure 6.

Spacing mechanism

Referring particularly to Figure 13, it will be seen that as the forward ends of the levers 52 are moved down, the rear ends are lifted and will raise a spacer bar 70 pivoted to the sides of the casing 23 and the upward movement of which is opposed by means of springs 71. A spring-biased pawl 72 is pivoted to the bar 70 and engages the spacer pinion or gear 22 journaled in a wall of the casing 23 and this gear engages the rack 21 on the frame 10 previously mentioned to thus effect the sliding or spacing of the carriage along the anvil and with respect to the sheet of paper 27. A separate spacer bar 73 is provided pivoted to the casing 23, at 74 and limited by the bracket 75 and provided with an operating stem 76 at one end having a finger cap 77 thereon. This stem projects up through the top of the casing 23 so that the finger of the operator may space the carriage at will since the other end of the bar 73 lies beneath the bar 70 carrying the pawl 72 cooperating with the spacer gear 22.

Ribbon Feed

Referring especially to Figure 8, the details of the ribbon feed are more clearly shown and include two ribbon reels 78 and 79, between which the ribbon 55 travels and over certain guide rods 80. The ribbon as seen, travels across the opening 25 in the bottom of the casing 23 and just

7

above the paper 27 and below the type strips 30. A pivoted lever 81 mounted in the casing, has a pawl 82 at one end engaging a ratchet pinion 83 on the shaft of reel 79. The other end of this lever is bent down and extends beneath the lower face of the hammer in the form of a fork end 84 to embrace the striker surface of the hammer. Every time the hammer descends the lever is pivoted to move the ribbon before the hammer reaches its lowest point and causes the character to be printed on the paper. A spring 85 connected to the lever 81 will restore it to its normal position.

Operation of preferred form

It is clear that when any one of the finger caps 33 is depressed, the strip connected to it will be advanced and, after the stem 37 moves a definite distance the cross bar thereon encounters the lever 52 related thereto and moves it to the hammer which is thus moved down to press the type strip against the ribbon and the paper to print. When a capital letter is to be printed, the finger cap 68 is depressed thus extending split bar 59 and pushing the shift plate 54 to the left against the resistance of spring 58 to restore it to the position shown in Figure 12. This lowers the levers 52 and at the same time, turns the hammer around to present the lower surface 45 beneath the ends of the levers 52. Thus the type strips may be advanced further before the hammer is operated and thus the capital characters are positioned. To restore the shift for normal printing of small regular characters, the finger cap 63 is depressed thus breaking the joint of the split shift bar 59 as above described and causing the shift plate 54 to move to the right under the action of the spring 58 and ride up on the cam surfaces 57 and thus raise the pivot points of the levers 52 and elevate the levers 52. The spacing takes place automatically and the paper can be spaced for line position by means of the handle or knob 28.

Modified form (general description)

In Figures 14, 15 and 16, is illustrated in a general way a form suitable for a portable type of machine. In this form of the machine, the operation of the type strips is substantially the same as in the other form except that in this form, there is shown ten groups of type strips and a hammer operating lever for each group making ten hammer operating levers in all. The spacing mechanism and the ribbon operating mechanism are substantially the same as before and are therefore not shown. In this form there is employed a platen 86 instead of the anvil 18.

The main features of invention resident in this form over the preferred form just described, consist in the type of hammer used and in a different shift mechanism. In this form, the hammer 87 is disposed on the end of a pivoted arm 88 hinged to the outside of the casing 89 at point 90. To the middle of this hammer arm is pivoted a link 91 which extends through a hole in the casing and this in turn is pivotally connected to an arm 92. This arm is connected at its other end to one portion of a rectangular frame comprising front and rear bars 93 and 94. The front bar 93 at its ends is round in cross section and is supported by turning movement between upright journal members 95 and 96, but throughout the rest of its length it is rectangular in cross section. The rear bar 94 is in the form of a rectangular sectioned bar pursuing a verti-

8

cal zigzag path thus forming a series of alternate high points 97 and low points 98. This rear bar at its ends is connected by arms 99 and 100 to sleeves 101 and 102 embracing and slidable along the front bar 93. A spring 103 is coiled around bar 93 between the journal member 95 and the sleeve 101 and tends to push the sleeve 101 and the rear bar 94 to the right. A stop member 104 fixed to the front bar 93, limits the right hand movement of the sleeve 102. The hammer operating levers 52 have their front ends disposed over the rear bar 94 and whether a high point thereon or a low point is positioned beneath, the respective levers will determine the amount of movement of them which will occur before they encounter the rear bar 94 and therefore the time when this bar will be pivoted to operate the hammer 86. Consequently, the printing of small characters and capital characters is in this manner provided for. In order to shift the rear bar 94 in order to present a high or low portion beneath the levers 52, I have provided as before, the arcuate shift plate 54 and associated parts as well as the depressible stems 62 and 69 and the split bar 59 and associated parts. However in this case, when the stem 62 is depressed, one end of lever 64 presses against the connecting arm 100 to move the frame formed by arms 93 and 94 to the left against the resistance of spring 103. This will cause the high points to be disposed below the hammer levers 52 and at the same time, as before mentioned, will permit spring 58 to move the shift plate 54 to the right and raise the pivot points of the levers 52.

While the features of invention hereinafter claimed have been set forth in detail and clearly, parts of a typewriter not necessarily involved in the invention, have been omitted naturally, for the sake of simplicity and brevity. The particular forms of the inventive features herein shown are merely indicative of one embodiment of the idea involved and applicant does not desire to limit himself to the particular forms shown.

What I claim as my invention, is:

1. In a typewriter, a type bar in the form of a strip of material, manual means to advance said strip to printing position, a hammer to engage said strip and press it against a sheet of paper, means operated by said manual means as the strip is advanced to advance the hammer to print, a support for said hammer and strip, and means operated by the hammer advancing means to space the support with respect to the sheet of paper each time the hammer is advanced.

2. In a typewriter, the combination of a longitudinally movable type strip with characters on a lateral face thereof, a manually operable means to advance said strip longitudinally to printing position, a hammer to be advanced to printing position, a pivoted lever to engage and advance the hammer, means on the manual means to engage the lever when the manual means is operated, and a second manual means to shift the pivot point of said lever to alter the position of the lever with respect to the hammer.

3. In a typewriter, the combination of a longitudinally movable type strip with characters on a lateral face thereof, a manually operable means to advance said strip longitudinally to printing position, a hammer having a plurality of upper surfaces at different levels and adapted to be advanced at right angles to the strip to printing position, a pivoted lever to engage one of

9

the surfaces of the hammer and advance it, means on the manual means to engage the lever when the manual means is operated, and a second manual means to shift the pivot point of the lever to alter the position of the lever with respect to the hammer and to turn said hammer to present one or the other surface level beneath an end of the lever.

4. In a typewriter, the combination of a longitudinally movable type strip with characters on a lateral face thereof, a manually operable means to advance said strip longitudinally to printing position, a hammer having a plurality of upper surfaces at different levels and adapted to be advanced at right angles to the strip to printing position, a pivoted lever with one end disposed over the hammer and with an intermediate pivot point, means on the manual means to engage the lever when the manual means is operated, a second manual means to shift the pivot point of the lever to alter the position of the end of the lever with respect to the hammer and to turn said hammer to present one or the other surface level beneath this end of the lever, and a spacing device associated with and operated by the other end of said lever.

5. In a typewriter, a plurality of superposed type carrying strips having characters adjacent the end on one lateral face thereof, the thickness of each strip adjacent the characters being increased to keep the characters on one strip from rubbing those on an adjacent strip.

6. In a typewriter, a plurality of superposed type carrying strips having characters adjacent the end on one lateral face thereof, each strip on the face bearing the characters having an elevated shoulder adjacent the area bearing the characters to prevent rubbing of characters on adjacent strips.

7. In a typewriter, a plurality of superposed type carrying strips having characters on one lateral face thereof, a block having horizontal passages to guide the respective strips, said block having guide channels at the rear of each passage curving smoothly in a vertical direction to guide the rear of the strips into a vertical position, and manually operable means on the upper rear ends of said strips.

8. In a typewriter, an arcuate plate having a series of pivot points thereon, radially disposed levers pivoted on said points, cam surfaces disposed below said plate, manual means to move said plate in one direction, and spring means

10

engaging said plate and tending to move it in the opposite direction.

9. In a typewriter, an arcuate plate having a series of pivot points thereon, radially disposed levers pivoted on said points, cam surfaces disposed below said plate, manual means to move said plate in one direction with respect to said cam surfaces, spring means engaging said plate and tending to move it in the opposite direction, a hammer disposed beneath the ends of said levers, said hammer having a plurality of upper surfaces at different levels and means associated with the hammer and with said manual means to turn the hammer one way or the other as the plate is moved in one direction or the other.

10. In a typewriter, a pivoted hammer to be advanced to printing position, a pivoted frame having a bar with high and low surfaces thereon alternately disposed, a linkage between said frame and the hammer whereby the hammer is pivoted as the frame is moved, a pivoted lever disposed over said bar, and manual means to advance said lever toward said bar to pivot the frame and advance the hammer.

11. In a typewriter, a pivoted hammer to be advanced to printing position, a pivoted frame having a bar with high and low surfaces thereon alternately disposed, a linkage between said frame and the hammer whereby the hammer is pivoted as the frame is moved, a pivoted lever disposed over said bar, manual means to advance said lever toward said bar to pivot the frame and advance the hammer, and a second manual means to laterally adjust said frame to present a high or a low surface thereof beneath the lever.

PAI YEN LOUNG.

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