

Nov. 17, 1964

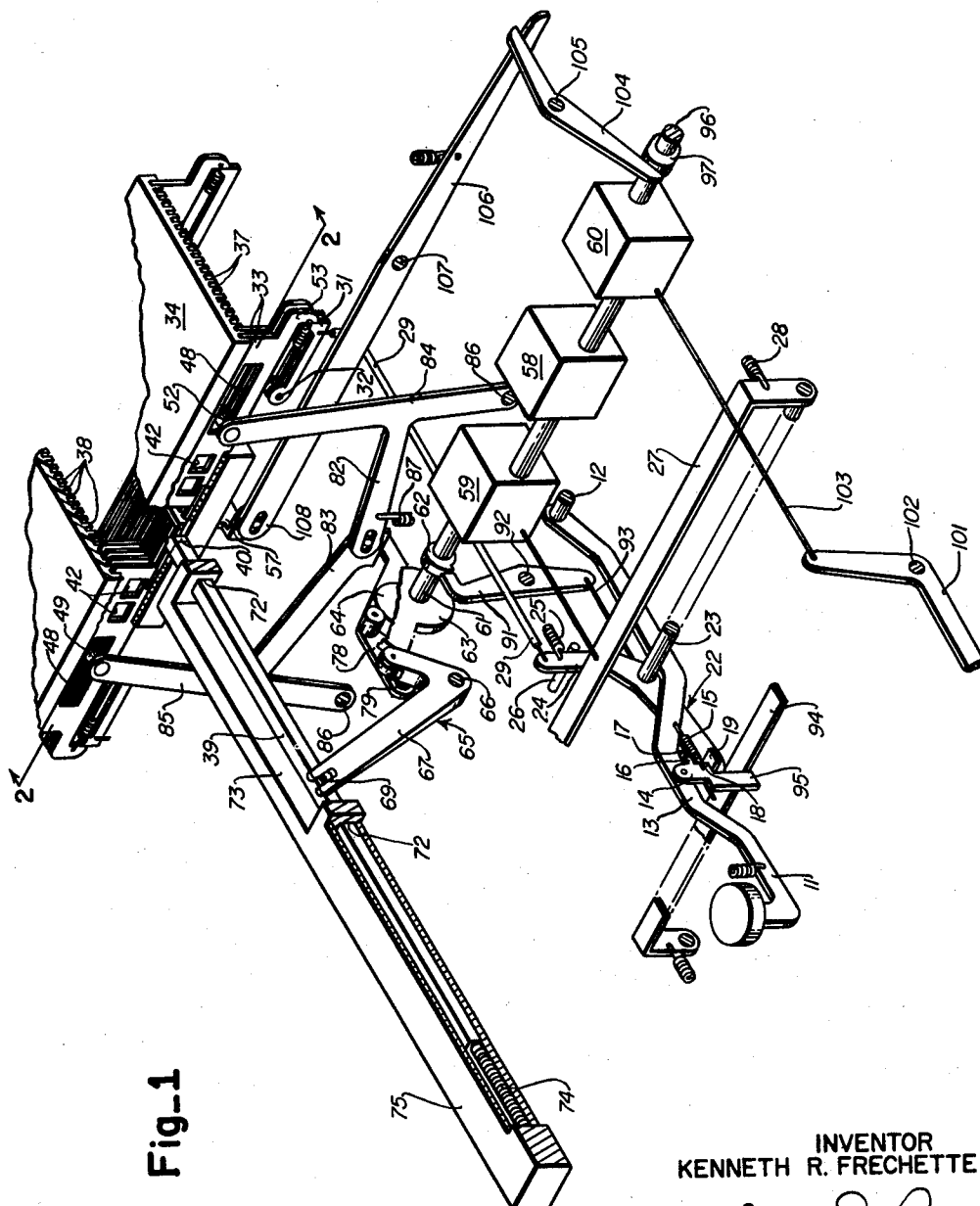
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3,157,264

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TYPEWRITER EMPLOYING SLIDES TO REMOVABLY AND
MAGNETICALLY HOLD INDIVIDUAL TYPE ELEMENTS.

Filed Jan. 12, 1962

2 Sheets-Sheet 1.



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2 Sheets-Sheet 2

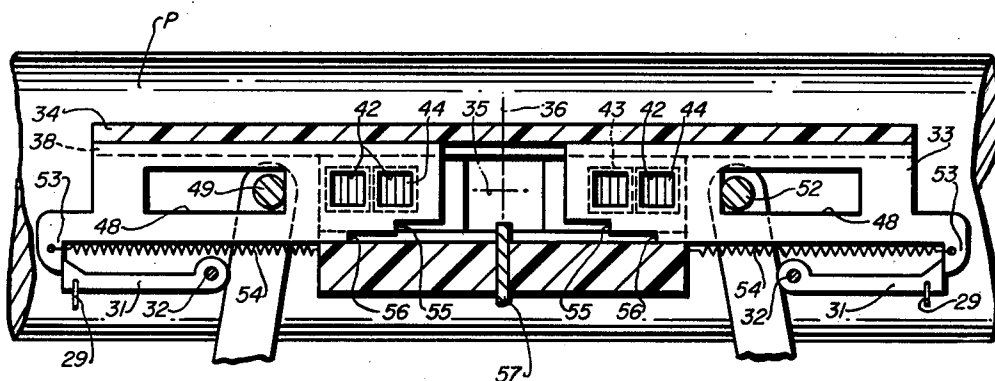


Fig. 2

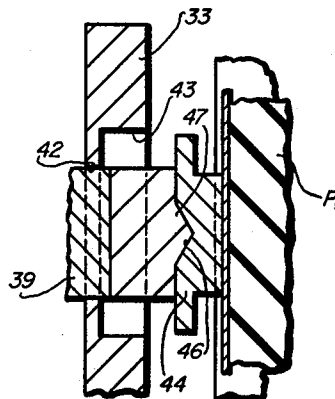


Fig. 4

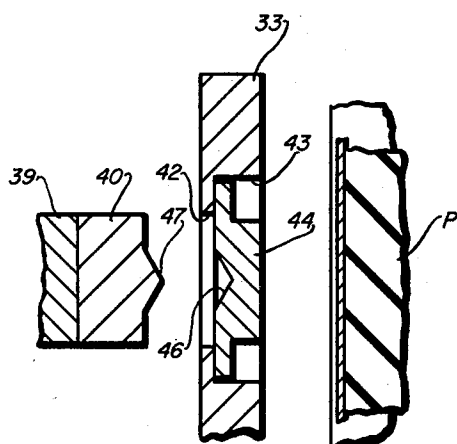


Fig. 3

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1

3,157,264 TYPEWRITER EMPLOYING SLIDES TO REMOV- ABLY AND MAGNETICALLY HOLD INDIVID- UAL TYPE ELEMENTS

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This invention relates to typewriter apparatus; more particularly it relates to typewriter apparatus of the type in which slides carrying individual type are positionable to place selected type before a common printing point and in which the selected type is propelled out of its slide toward the printing point to effect an impression; and specifically it relates to apparatus of the aforesaid type characterized by the employment of magnetic forces to hold type in associated slides, and to couple the type to the propelling device during an impression stroke; the slide member serving to decouple the type from the propelling device after an impression stroke.

Typewriter apparatus in which type are supported in frames which are movable to present selected type before a printing point and in which the selected type is driven toward the printing point by a hammer have heretofore been advanced, e.g. Patent No. 476,319. In such machines the bodies of the type are relatively large in order that they may be guidingly supported by associated frame members throughout the operative stroke of the type. In that the type are relatively large requires that the frames supporting them also be large. Further the type of such prior art machines are loosely retained in associated frames either by gravity or are mechanically movably secured to associated frames. In view of the above, such prior art machines are cumbersome, difficult to manufacture, and necessarily slow acting due to high inertia elements.

In accordance with the present invention, type formed of low retentivity magnetic material and whose body dimensions are only slightly greater than the characters carried thereby are adapted to be received within recessed openings or windows formed in slides of magnetized material thereby to magnetically retain the type in the slides and with the character surface flush with or recessed back from the slide surface. The above construction permits a plurality of slides to be juxtaposed in a very compact space. Further in accordance with the invention a common hammer provided with magnetized material on its end is engageable with the type through said openings whereby when the hammer is driven the selectively positioned type in its path is carried completely from its associated slide and magnetically retained by the hammer throughout its printing stroke. On return of the hammer to normal the window opening will strip the type from the hammer and magnetically retain it in storage.

An object of the invention resides in the provision of a compact fast acting typewriter apparatus.

Another object of the invention is to provide typewriter apparatus in which type selectively positioned before a printing point are carried toward said printing point and returned therefrom by a permanently magnetized hammer.

Still another object of the invention is to provide a typewriter apparatus in which type are magnetically retained in slides positionable to present select type before a printing station and in which the selected type are picked up and magnetically retained by a common hammer during a printing stroke.

Still another object of the invention resides in the provision of apparatus operative in response to key de-

2

pressions to position selected slides carrying predetermined type before a printing hammer, to operate a hammer to effect an impression by selected type, and to reset selected slides in timed relation.

A further object of the invention resides in the provision of apparatus of the type wherein slides carrying upper and lower case type are positionable to one or another of two active positions to present upper and lower case type in front of a common hammer.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIGURE 1 is a perspective view of a typewriter apparatus in accordance with the invention;

FIGURE 2 is a view taken along lines 2—2 of FIGURE 1;

FIGURE 3 is a top view showing the hammer in its inactive position; and

FIGURE 4 is a view similar to FIGURE 3 showing the hammer in printing position.

Referring now to the drawings wherein is shown an illustrative embodiment and wherein like reference numerals represent like or corresponding parts throughout the views there is shown in FIGURE 1 a key lever 11 comprising one of a plurality of identical key levers representative of type. The key lever extends toward the rear of the machine and is fulcrumed at its end to a cross shaft 12 secured to the machine frame as are all of the other key levers representative of type. The key lever 11 is shaped to provide a raised horizontal section 13 in the plane of the key lever and intermediate its ends. A depending flipper 14 pivotally secured at its uppermost end to the raised section of the key lever is biased counterclockwise as viewed in FIGURE 1 by a spring 15 secured to the flipper below its pivot and to the downwardly inclined portion of the key lever rearwardly of the raised horizontal section. The dependent flipper is provided with a rearwardly disposed bent off ear 16 which engages the bottom edge 17 of the raised horizontal section thereby to maintain the flipper in a vertically dependent position. The lower portion of the flipper body is forwardly offset thereby forming a downwardly facing shoulder 18 adapted to engage a shelf 19 on the forwardly disposed end of a sub lever 22. The sub lever extends rearwardly and upwardly from the shelf and is fulcrumed on a cross shaft 23 secured to the machine frame whereby when the key lever 11 is depressed its flipper 14 acts on shelf 19 to rotate the sub lever 22 counterclockwise and thereby effect the forward movement of the upwardly extending portion 24 of the sub lever against the force of its associated return spring 25. A common bail 26 secured rearwardly of the upwardly extending portions of the sub levers serves to limit the clockwise movement thereof. A trigger bail 27 operable by any actuated sub lever extends across the machine forwardly of the upwardly extending portions 24 of the sub levers. The trigger bail is pivotally mounted at its ends on the sub lever fulcrum shaft 23 and is biased against the upwardly extending portions of the sub levers by springs 28, only one of which is shown.

As shown in FIGURE 1 the uppermost end of the sub lever 22 has connected thereto one end of a Bowden wire 29 whose other end is connected to a latch member 31 fulcrumed on a shaft 32 secured to the machine frame. When the sub lever 22 is operated the Bowden wire 29 will pull the latch member 31 clockwise and thereby effect the release of a slide 33 associated therewith.

In accordance with the embodiment of the invention illustrated one slide 33 is provided for each key lever and each is released to position type carried therein by an action similar to that herein above described. As seen in FIGURE 1 provision is made for mounting a sufficient number of slides 33 to accommodate a full keyboard of alpha and numeric characters. As shown in FIGURES 1 and 2 a hollow rectangular housing 34 preferably of plastic material having a low coefficient of friction is secured in any suitable manner to the machine frame. The housing 34 is secured in front of the writing line 35 and centrally of the machine, i.e. centrally of a vertical line 36 through the printing station of the machine, and is formed with a plurality of parallel vertical channels 37 extending laterally to either side of the machine center thereby to accommodate half of the slides 33 to one side of center line 36 and the other half of the slides to the other side of center line 36. The channels 37 are defined by short ribs 38 formed interiorly of the housing thereby to provide access through the housing for a common hammer 39 whose center is aligned with the intersection of lines 35 and 36.

As seen in FIGURE 1 the end of the hammer facing the printing line has a permanent magnet 40 made from high retentivity material secured thereto.

With particular reference to FIGURES 2 and 3, each slide 33 is substantially rectangular and is provided adjacent the end facing the machine center with two side by side square openings 42 dimensioned to permit passage therethrough of the hammer 39. The openings 42 on the side of the slides facing the writing line 35 are enlarged to receive in recesses 43 formed thereby lower and upper case type 44 formed of low retentivity ferrous material. As seen in FIGURES 3 and 4 the forwardly facing side of each type 44 is provided with a triangular groove 46 complementary to a triangular projection 47 on the end of the hammer 39 whereby the type will be properly positioned by and magnetically retained by the magnetized end of the hammer during a printing stroke.

The slides 33 are further provided with rectangular openings 48 adjacent their outwardly facing ends which are adapted to receive simultaneously operable reset bails 49 and 52 associated with the slides on either side of centerline 36 respectively. Extending outwardly from the rectangular bodies of the slides are catches 53 adapted to be engaged by associated latch members 31. Springs 54 (FIGURE 2) secured to the catches and to the frame member by suitable means normally bias the slides inwardly toward the machine centerline 36.

Also as seen in FIGURE 2 most clearly the bottom edge adjacent the inwardly facing end of each slide is provided with staggered cutouts forming shoulders 55 and 56 each of which is on a vertical line bisecting the square openings 42 and which shoulders are adapted to cooperate with a stop or interposer 57 normally positioned to intercept shoulder 55 to permit positioning of lower case type and retractable by means hereinafter to be described so as to intercept shoulder 56 and thereby permit positioning of upper case characters.

In accordance with the invention the slides 33 are made of permanently magnetized high retentivity material thereby to firmly magnetically hold the type positioned in the slide openings. Alternatively the slides 33 may be made from light weight plastic material with the areas framing the openings 42 therein made from permanently magnetized material suitably secured to the slides.

In accordance with the invention the dimensions of the slides 33 are such that they may be considered low inertia elements. This means that when a selected slide encounters the center stop 57 there is a minimum of bounce such that it will be stationary before the hammer 39 enters the slide housing.

Referring once again to FIGURE 1 there is shown in block schematic form a motor source 58 associated with a first cyclically operable means comprising a one revolu-

tion clutch 59 and with a second cyclically operable means comprising a one half revolution clutch 60. The one revolution clutch 59 is adapted to effect the connection of the motor source to a main cam shaft 61 in response to the actuation of a link connected between the trigger bail 27 and clutch engaging means within block 59.

The main cam shaft 61 carries a stepped by-pass cam 62, a stepped hammer cocking and release cam 63, and a slide reset cam 64. Associated with the hammer cam 63 is a cam follower 65 fulcrumed on a frame supported shaft 66. The cam follower comprises an arm 67 extending upwardly from fulcrum shaft 66 and its end is forked to effect its operative engagement with a pin 69 extending from the side of the hammer 39.

As shown in FIGURE 1 the hammer 39 is supported by and guided throughout its operative movement by passages 72 in the legs of a U-shaped member 73 suitably secured to the machine frame. The hammer is adapted to be propelled through a printing stroke by a compressed spring 74 mounted in a housing 75 formed integral with and forwardly of the member 73.

The positions of the elements shown in FIGURE 1 represents the rest position with the spring 74 held compressed by the back end of the hammer and the cam follower arm 67. As shown cam follower 65 is positioned to fall off the step of the cam 63 when the main cam shaft 61 rotates thereby to permit the spring 74 to propel the hammer 39. The spring 74 serves to bias the cam follower 65 against the cam surface in the hammer cocked position and during the interval in which the hammer is being recocked.

The reset cam 64 is similarly associated with a cam follower 78 fulcrumed on the machine frame as at 79 and biased against the cam as by a spring (not shown). Cam follower 78 is adapted when rotated counterclockwise about its pivot to act upon inwardly directed arms 82 and 83 extending orthogonally from reset bail actuating levers 84 and 85 which are fulcrumed on associated shafts 86 and biased as by a spring 87 to the rest positions shown thereby to permit unimpeded movement of selected slides 33. The ends of arms 82 and 83 are connected as by a pin and slot connection so that both may be simultaneously actuated by the cam follower 78 and thereby effect the outward movement of slide reset bails 49 and 52.

The stepped by-pass cam 62 is similarly associated with a cam follower 91 fulcrumed as at 92 and connected by a link 93 to a by-pass bail 94 positioned rearwardly of the depending tails 95 of the flippers 14. The bail is adapted to forwardly deflect the flippers away from shelf 19 should the key lever 11 remain depressed after a type action, thereby to prevent repeat actions.

The one half revolution clutch 60 is adapted to effect the connection of the motor source 58 to a shift cam shaft 96 whereon is mounted a shift cam 97. Depression of a shift key lever 101 fulcrumed at 102 effects a pull on a link 103 connected thereto and to the clutch engaging means within block 60 thereby to effect a half revolution of shaft 96. Release of the shift key lever is adapted to effect a second half revolution of cam shaft 96 as will be understood by those skilled in the art.

As seen in FIGURE 1 a cam follower 104 associated with the shift cam 97 and fulcrumed as at 105 is adapted upon cam rotation during the initial half revolution of shaft 96 to move counterclockwise and thereby release one end of a spring biased lever 106. Lever 106 is pivoted intermediate its ends as at 107 whereby when released by follower 104 it moves counterclockwise, and its other end 108 which is connected to stop 57 retracts the stop to its upper case slide intercept position.

Releasing the shift lever 101 will effect another half revolution of cam 97 during which the cam follower 104 will be driven clockwise and in turn drive lever 106 clockwise whereby the stop 57 will be returned to its lower case intercept position as shown in FIGURE 2.

In operation depression of a key lever 11 will effect the

release of a slide 33 whose spring 54 will drive it to the center stop 57 whereby the lower case opening 42 will be positioned directly in the path of hammer 39. Simultaneously the sub lever 22 will operate the trigger bail 27 and thereby through its associated link effect the actuation of the one revolution clutch 59 whereby the motor source 58 will be connected to the main cam shaft 61. As cam shaft 61 revolves, the hammer cam follower 65 drops off the step of the cam 63 thereby permitting spring 74 to propel the hammer 39 through the positioned opening 42 thereby carrying the type therein toward the printing line 35; the type being magnetically held firmly by the magnet 40 on the hammer end. The hammer carried type strikes the platen P after which the cam 63 begins to return the hammer to recocked position. When the hammer returns through the selected slide 33 the type 44 carried thereby is redeposited in and magnetically held in its associated slide recess 43. After the hammer 39 has moved out of the housing the reset cam is operative to return the selected slide. The by-pass cam follower 91 is substantially simultaneously operable with the hammer cam follower so that if the key 11 is held depressed overlong a repeat action is prevented.

Upper case printing is effected by depressing the shift key lever 101 which moves the center stop 57 as hereinbefore explained whereby it will intercept the upper case shoulder 56 to position an upper case opening directly in front of the hammer.

As will be understood in the art any suitable escapement device operative to position a carriage one increment after each action can be provided.

Further, while the code slides 33 have been shown to be directly operable by associated key levers 11, and while each of the slides shown carries only two type (upper and lower case), it is to be understood that slides having several type may be provided, each adapted to be selectively positionable to present selected type in front of the hammer by a suitable code translating system.

It should be understood that the foregoing disclosure relates to only a preferred embodiment of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention claimed is:

1. Typewriter apparatus comprising a magnetized hammer mounted for operative movement toward and away from a printing point,
 - a plurality of individual permanently magnetized slides each having a plurality of openings therein,
 - type magnetically retained in said openings,
 - key operated means for effecting movement of associated slides thereby to position selected type in the path of said hammer,
 - and means operable in response to said last named means to effect hammer operation whereby said selected type is magnetically coupled to said hammer while being driven thereby from said slide toward said printing point.
2. Typewriter apparatus comprising a permanently magnetized hammer mounted for operative movement toward and away from a printing point,
 - a permanently magnetized slide having a plurality of openings therein,
 - type magnetically retained in said openings,
 - means for effecting slide movement thereby to position selected type in the path of said hammer,
 - and cyclically operable means responsive to said last named means for operating said hammer whereby said selected type is magnetically coupled to said hammer while being driven thereby from said slide toward said printing point and while being returned thereby to said slide after printing.
3. Typewriter apparatus comprising a permanently

magnetized hammer operable toward and away from a printing point,

a plurality of slides normally positioned out of the path of said hammer,

said slides having openings therein defined by permanently magnetized material,

type magnetically retained in said openings,

a plurality of key levers,

means operable in response to the depression of a key lever for selectively positioning an associated slide thereby to place a selected type carried thereby into the path of said hammer,

a power source,

a cam shaft,

clutch means responsive to the depression of a key lever for connecting a cycle of said source to said cam shaft,

means associated with said cam shaft for effecting the operation of said hammer through a positioned slide opening whereby the type therein is driven and magnetically held by said hammer to effect printing, said means effecting retraction of said hammer after printing thereby to redeposit said type in said slide, and means associated with said cam shaft operative to reset said selected slide.

4. Typewriter apparatus comprising a permanently magnetized hammer operatively mounted for movement toward and away from a printing point,

a permanently magnetized slide having several adjacent openings therein adapted to magnetically retain type therein,

said slide having staggered stop surfaces each associated with a type mounted therein,

a stop member selectively positionable to intercept a stop surface associated with a selected type thereby to position said selected type in the path of said hammer,

and key operated means for moving said slide relative to said stop member whereby a selected type in an opening is positioned in the operative path of said hammer,

and means responsive to said key operated means for cycling said hammer through the selected opening.

5. Typewriter apparatus comprising a plurality of slides mounted in planes parallel to and forward of the printing plane of said apparatus,

openings in said slides,

type slugs magnetically retained in said openings adapted to be propelled from said slides toward a printing point and redeposited in said openings after a printing operation,

a hammer movable perpendicular to and through the planes of all of said slides during an operative stroke adapted to engage and magnetically retain a type slug as it passes through the opening in an associated positioned slide to effect printing and after printing to redeposit said type slug in said opening,

means for moving a selected slide whereby an opening therein is positioned in the path of said hammer,

and means responsive to slide selection for cycling said hammer through an operative stroke.

6. Typewriter apparatus comprising a plurality of slides mounted for movement in planes parallel to and forward of a printing plane,

a magnetized hammer mounted for movement through the planes of said slides toward and away from a printing point, said slides being normally positioned out of the path of said hammer and adapted to be selectively operated into the path of said hammer, at least one opening in each of said slides,

type slugs magnetically retained in said openings,

means for operating a selected slide whereby the type slug retained therein is in the path of said hammer, cyclically operable means responsive to the selection of a slide,

7

means operable by said cyclically operable means for effecting hammer movement toward and away from said printing point whereby said type slug is propelled from said slide and magnetically retained by said hammer during its movement toward said printing point to effect printing, and redeposited in said slide when said hammer moves away from said printing point,

and means responsive to said cyclically operable means for resetting selected slides.

7. Apparatus as recited in claim 6 wherein each of said slides has a plurality of openings therein and type slugs magnetically retained in each of said openings, and in-

8

terposer means operable to limit the movement of a selected slide thereby to position a selected type slug in the selected slide in the path of said hammer.

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