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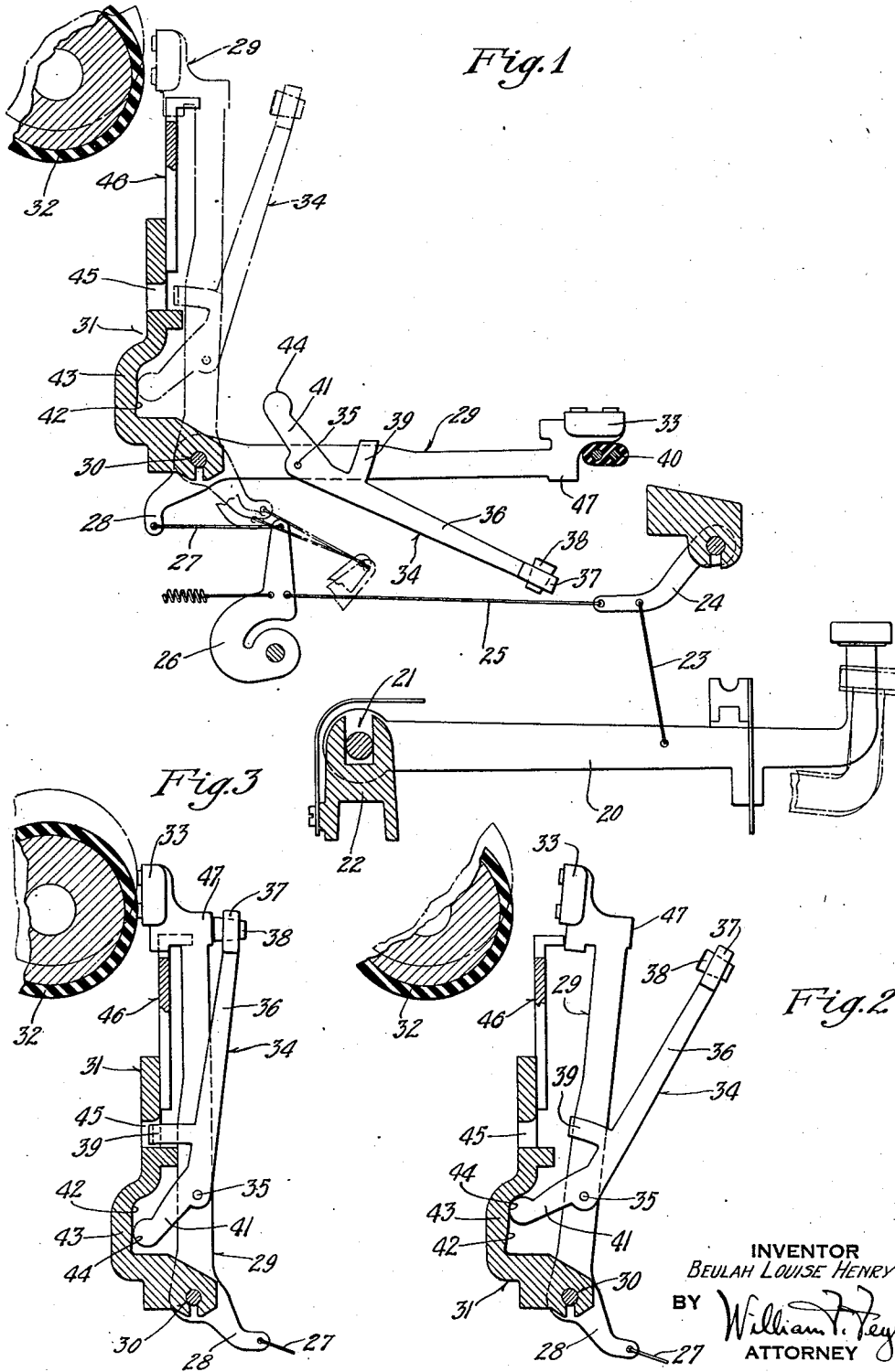
B. L. HENRY

2,267,915

TYPEWRITING MACHINE

Filed March 26, 1938

3 Sheets-Sheet 1



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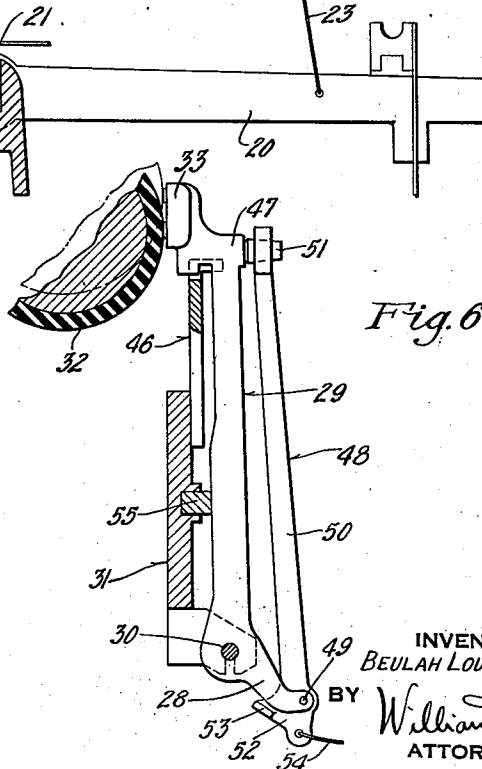
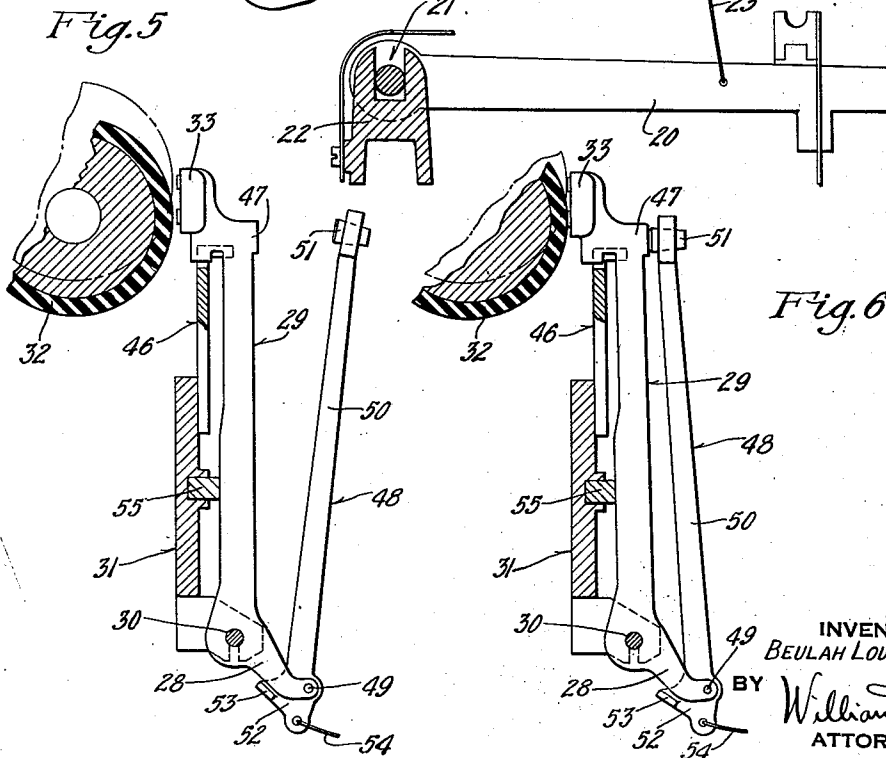
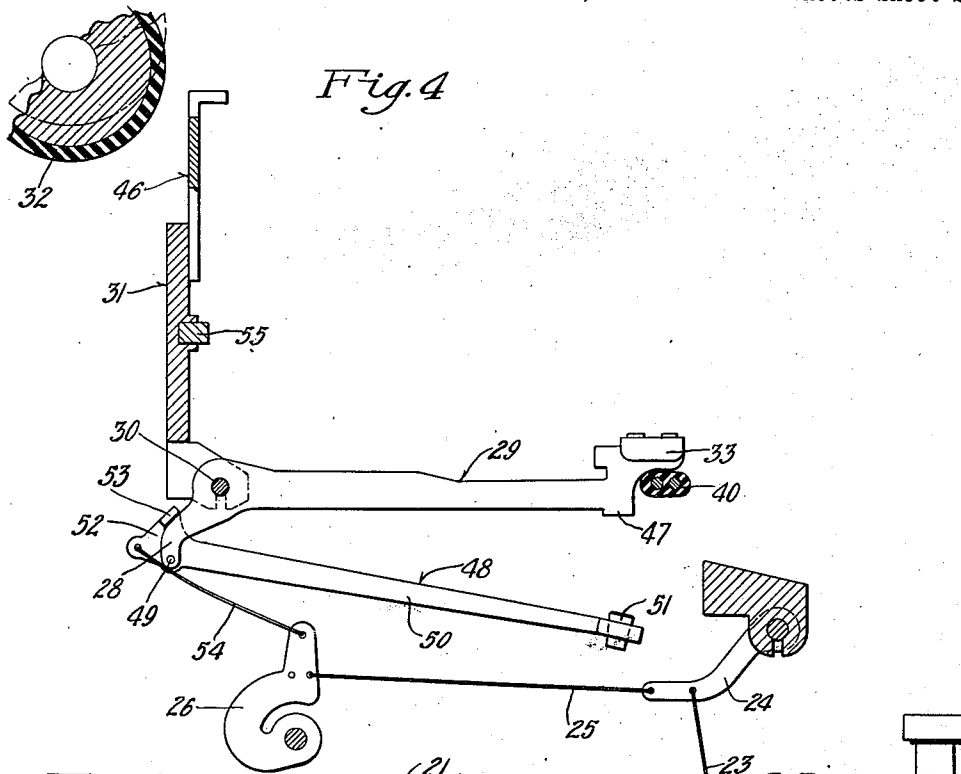
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TYPEWRITING MACHINE

Filed March 26, 1938

3 Sheets-Sheet 2



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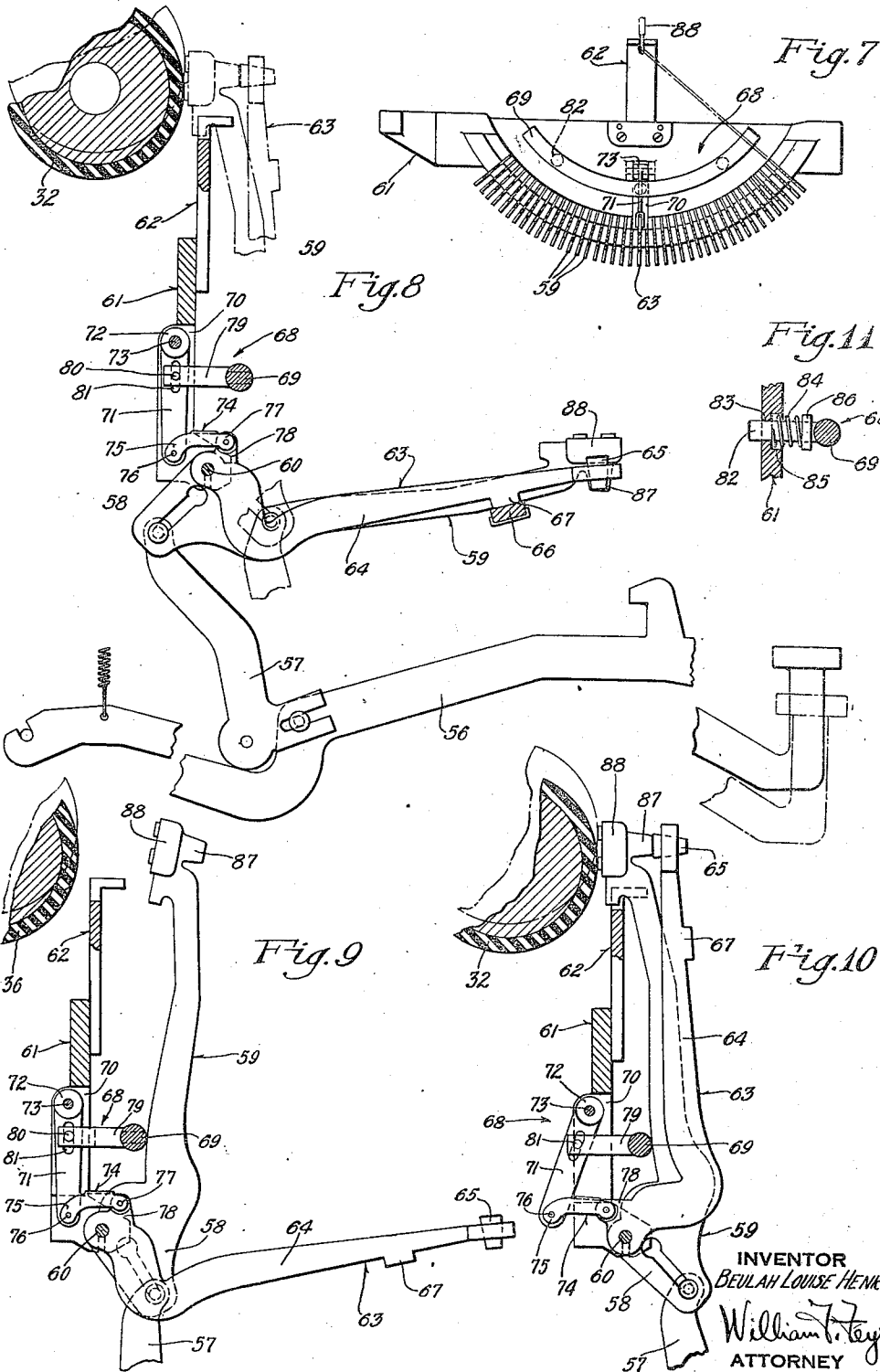
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TYPEWRITING MACHINE

Filed March 26, 1938

3 Sheets-Sheet 3



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2,267,915

TYPEWRITING MACHINE

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Application March 26, 1938, Serial No. 198,218

11 Claims. (Cl. 197—23)

This invention relates to typewriting machines and more particularly to machines in which pivoted type bars are moved toward a sheet supporting platen.

It is an object of the invention to provide such a typewriting machine in which the noise thereof will be substantially reduced.

To the end of providing such a typewriting machine which is substantially noiseless in its operation the proposals heretofore advanced have in the main involved either the provision of a means for thrusting the type head toward the platen or the provision of a mechanism in which the movement of the type bar toward the platen is arrested, following which the type bar is struck by a hammer blow to cause the actual printing impression.

It is an object of the present invention to provide such a typewriting machine utilizing a hammer blow on the type bars to cause the actual printing impression but which is more efficient in its operation than machines embodying this general principle heretofore proposed.

A feature of the invention, therefore, resides in providing a typewriting machine in which a pivotally mounted hammer is utilized to strike a type bar when the type head thereof is adjacent the platen and in which a positive and continuous force is applied to the hammer to move the latter to strike the type bar.

Another feature of the invention resides in providing a typewriting machine in which a hammer is carried by a type bar and in which a single means is utilized for arresting movement of the type bar toward the platen and for continuously moving the hammer to strike the type bar.

Another feature of the invention resides in providing a typewriting machine in which a hammer bar is pivotally carried by the type bar and in which there is provided a means for initially moving the type bar and hammer bar toward the platen and for subsequently positively accelerating the hammer to strike the type bar when the latter is adjacent the platen.

Another feature of the invention resides in providing a typewriting machine with a pivotally mounted hammer bar and in which energy is translated from the type bar to the hammer bar to accelerate the latter to strike the type bar and cause the printing impression.

A further feature of the invention resides in providing a typewriting machine in which a hammer bar is pivotally carried by a type bar and in which there is a means for translating energy from the type bar to the hammer bar to

accelerate the latter to strike the type bar and cause the printing impression.

Other objects and features will hereinafter appear.

In the drawings:

Figure 1 is a fragmentary side view, partially in section, showing one of the type actions and so much of the associated mechanism as is necessary to understand the operation thereof.

Fig. 2 is a view similar to Fig. 1 but showing the type bar and associated hammer bar in an intermediate position.

Fig. 3 is a view similar to Fig. 2 but showing the type bar and hammer bar in a completely advanced position.

Fig. 4 is a fragmentary side view showing one of the type actions of a modified form of the invention, together with such other mechanism as is necessary to understand the operation thereof.

Fig. 5 is a view similar to Fig. 4 but showing the type bar and hammer bar in an intermediate position.

Fig. 6 is a view similar to Fig. 5 but showing the type bar and the hammer bar in a completely advanced position.

Fig. 7 is a fragmentary front view, partially in section, of the frame of a typewriting machine embodying another modified form of the invention.

Fig. 8 is a fragmentary side view, partially in section, of one of the type actions of the modification shown in Fig. 7, together with such mechanism as is necessary to understand the operation thereof.

Fig. 9 is a fragmentary view similar to Fig. 8 but showing one of the type bars and the hammer bar in an intermediate position.

Fig. 10 is a view similar to Fig. 9 but showing a type bar and the hammer bar in a completely advanced position.

Fig. 11 is a fragmentary detail view showing one of the ball bar guiding means of the form illustrated in Figs. 7 through 10.

While in the drawings there has been completely disclosed only one complete type action for each of the forms it will be appreciated that the one type action illustrated for each of the forms is representative of all of the type actions in that particular form.

Moreover, before describing the present improvements and mode of operation thereof in detail it should be understood that the invention is not limited to the details of construction and arrangement of parts shown in the accompanying

drawings, which are merely illustrative of the present preferred embodiments, since the invention is capable of other embodiments, and the phraseology employed is for the purpose of description and not of limitation.

Referring more particularly to the drawings and first to Figs. 1 through 3, there is disclosed for the purpose of illustrating one form of the invention, one of the type actions of the well-known "Royal" typewriter, including a key lever 20 pivotally connected at 21 to a portion 22 of the typewriter frame, and connected through link 23, lever 24, link 25, lever 26 and link 27 to a finger 28 extending from a type bar 29 pivotally mounted at 30 on a portion 31 of the typewriter frame. In the usual operation of this mechanism a depression of the key lever 20 achieves a quick and accelerated movement of the type bar 29 to cause a printing impression on a sheet on a platen 32 through the usual inked ribbon.

Because of the very high speed at which the type head 33 on the type bar is travelling at the moment of its impact, considerable noise is produced. To substantially reduce this noise it has been heretofore proposed, as above explained, to arrest movement of the type bar and head before the latter makes the actual printing impression and to strike the type bar a hammer blow with a striking member to cause the printing impression.

To achieve this desired action in a particularly advantageous and novel manner there is provided by the present invention a pivotally mounted means for striking the type bar a hammer blow to cause the actual printing impression.

As shown in Figs. 1 through 3 this striking means is embodied in a hammer bar 34 carried by the type bar 29 and pivotally connected thereto by a pin 35. It is contemplated that such a hammer bar 34 will be connected to each of the type bars in the usual series present in a typewriting machine.

Extending forwardly and downwardly from the pivot pin 35, as viewed in full lines in Fig. 1, is a main portion 36 of the hammer bar 34, having suitably secured to the free end 37 thereof a striking head 38, preferably of lead to reduce the noise when the latter engages the type bar 29. A finger 39 is provided on the main portion 36 of the hammer bar and extends upwardly, as viewed in full lines in Fig. 1, to overlie the type bar 29 to thus maintain the striking head 38 of the hammer bar in a fixed spaced relation with the type bar when the latter is in the lowered and retracted position shown against a conventional head rest 40, and to carry the hammer bar and striking head upwardly and in predetermined relation with the type bar as it is moved toward the platen 32.

Of particular importance there is formed on the hammer bar and extending forwardly and upwardly from the pivot pin 35, as viewed in full lines in Fig. 1, an actuating finger 41 through which the hammer bar is positively and continuously moved to strike the type bar a hammer blow and thus cause the actual printing impression of the type head.

For cooperation with the actuating finger 41 to thus move the striking head 38 of the hammer bar 34 to engage the type bar 29 a forwardly facing cam surface 42 is provided on the rear portion 31 of the typewriter frame. Preferably, and as shown, this cam surface 42 is achieved by

forming a grooved section 43 extending transversely of the frame.

With this construction, when a key lever 20 is depressed the connected type bar 29 is initially moved upwardly toward the platen in the usual manner. When, however, the type bar 29 reaches the position shown in Fig. 2, a preferably rounded section 44 on the free end of the actuating finger 41 engages the cam surface 42. Further movement of the type bar, therefore, is retarded by this engagement of the actuating finger 41 and energy from the type bar is translated to the hammer bar. As the type bar continues to advance at a reduced velocity, the actuating finger rides over the cam surface 42 and is positively and continuously urged to accelerate the hammer bar 34 toward the type bar, as shown in dotted lines in Fig. 1. A suitable slot or opening 45 is provided in the rear portion 31 of the typewriter frame above the grooved section 43 to receive the fingers 39 on the respective hammer bars 34 as the latter move relative to the type bars 29.

The design of the finger 39, hammer bar 34 and cam surface 42 is such that the hammer blow of the striking head 38 on the type bar is delivered when the type head is closely adjacent the platen 32 and between the usual type bar guide 46, see Fig. 3, and after its forward momentum has been substantially checked by the cooperation of the cam surface 42 and the actuating finger 41. A raised shoulder 47 is preferably, and as shown, formed on the rear of the type bar 29 to receive the hammer blow from the striking head 38.

It is thus seen that there is provided in the form shown in Figs. 1 through 3, a typewriting machine in which the usual series of key levers 20 is actuated in the conventional manner but in which the objectionable noise caused by a high velocity printing impact of the type bar is substantially eliminated and in which the printing impression is achieved by a hammer blow on the type bar after the forward momentum thereof has been substantially reduced. Moreover, it is seen that a single means, the cam surface 42, by cooperation with the actuating finger 41 not only checks the forward motion of the type bar but also serves to translate energy from the type bar to move the pivoted hammer bar 34 toward the type bar to deliver the hammer blow thereto, which hammer blow does not produce the objectionable noise attendant upon the usual printing impact of the type bar.

In Figs. 4 through 6 there is disclosed a modified form of the invention. In this form of the invention, as in the form first described, there is disclosed for the purpose of illustration only one of the plurality of type actions of the series of type actions with which a typewriting machine is normally equipped. This type action is patterned after that in the well-known "Royal" typewriter, as illustrated in Figs. 1 through 3, but is modified to incorporate therein the novel mechanism of the present invention.

Like the form first described this modified form involves the utilization of a separate hammer bar 48 pivotally associated with each of the type bars 29 and adapted to strike the latter a hammer blow to cause the actual printing impression. Also like the form first described there is disclosed for the purpose of illustration a key lever 20 pivotally connected at 21 to a portion 22 of the typewriter frame and connected through a link 23, lever 24 and link 25 to a rocking lever 26. However, instead of being connected directly to a finger 28 extending from the type bar by

means of a simple link connection as in the form first described and as in the well-known "Royal" typewriter, the lever 26 is connected to the type bar through intermediary of the hammer bar 48.

The type bar 29 is of the same construction as the one shown in Figs. 1 through 3, having a type head 33, a hammer bar engaging shoulder 47, and a finger portion 28, and being pivotally mounted on the frame at 30.

The hammer bar 48 is pivotally connected to the finger 28 on the type bar by a pin 49, and like the hammer bar 34 shown in Figs. 1 through 3, is formed with a main portion 50 at the free end of which is suitably secured a striking head 51, preferably of lead. A section 52 of the hammer bar 48 extending rearwardly from the pivot pin 49, as viewed in Fig. 4, provides a lever arm by which the hammer bar may be positively moved relative to the type bar as well as a means for actuating the type bar from the key lever 20. A stop 53 on the section 52 and overlying the finger 28 on the type bar serves as a means for maintaining the hammer bar 48 and striking head 51 in proper spaced relation with the type bar when the latter is in its lowered and retracted position on the head rest as shown in Fig. 4.

Of importance, the lever section 52 is so proportioned that the initial line of pull of a link 54 connecting the rocking lever 26 and the hammer bar 48 is substantially through the center of the pin 49 constituting the pivotal axis of the hammer bar. Because of this relationship, during the initial depression of the key lever 20 the type bar 29 is swung upwardly on the pivot 30 and there is substantially no relative movement between the hammer bar 48 and the type bar.

Further depression of the key lever 20 and upward movement of the type bar, however, causes the line of pull of the link 54 to shift below the pivotal axis of the hammer bar. This results, at the outset, in a slight turning movement being applied to the hammer bar 48 about the pin 49.

The relation of the link 54, rocking lever 26, lever section 52 and pin 49 is such that when the type bar 29 reaches the position shown in Fig. 5, while the upward movement of the type bar 29 has been nearly completed the movement of the hammer bar toward the type bar has been small.

At this point, however, the type bar engages a yielding stop 55, of rubber or the like, which checks the forward momentum of the type bar, and, due to the movement of the pivot pin 49 above the line of pull of the link 54 connected to the key lever 20, a positive and continuous accelerating force is applied to the hammer bar 48. This causes the hammer bar 48 to swing upwardly at an increased velocity to strike the type bar 29 a hammer blow.

It is to be noted that the lever arm provided by the finger 28 of the type bar is substantially longer than the lever arm provided by the lever section 52 of the hammer bar. With this relationship the force initially required to depress a key lever 20 is not appreciably increased over that usually required in the operation of a conventional typewriting machine and it is only after substantial momentum has been imparted to the connected type and hammer bars that the hammer bar is separately and additionally accelerated through the lever section 52. The effect of the hammer bar actuation on the usual "touch" of the key lever is thus greatly minimized.

As in the form first described, therefore, the type bar is struck a hammer blow adjacent the platen to cause the actual printing impression after the forward momentum thereof has previously been substantially checked. Moreover, it is to be noted that after the checking of the forward momentum of the respective type bars by engagement with the stop 55, a positive and continuous actuating force is applied to the respective hammer bars through their connections with the key levers.

In the form of the invention illustrated in Figs. 7 through 11 as in both of the forms illustrated in Figs. 1 through 6, there is provided a pivotally mounted means which is positively and continuously moved through the actuation of the usual type bar operating means to strike an actuated type bar a hammer blow when the latter is adjacent the platen to cause the actual printing impression. As in the form shown in Figs. 1 through 3, the form disclosed in Figs. 7 through 11 provides a single means for checking the forward movement of the type bar and for concurrently cooperating to move the striking means to strike the type bar a hammer blow.

In the modified form of the invention, disclosed in Figs. 7 through 11, however, there is provided instead of a separate striking means for each of the type bars in the series, a single striking means for engaging all of the type bars.

For the purpose of illustrating the form of the invention shown in Figs. 7 through 11, it is disclosed as applied to one of the type actions of the well-known "Underwood" typewriting machine. It is to be understood, however, that it is equally applicable to the "Royal" typewriting machine, as shown in Fig. 1, or to any other typewriting machine embodying the usual series of pivotally mounted type bars.

As shown most clearly in Fig. 8, there is disclosed a type action of an "Underwood" typewriting machine, including a key lever 56 connected through a link 57 to a lever section 58 of a type bar 59 pivoted on a pivot rod 60 in the frame 61. Such a type action is efficient but due to the high velocity of the type bar at the moment of printing impact considerable noise is produced.

To substantially eliminate the objectionable noise caused by the high velocity printing impact of the respective type bars, there is pivotally mounted on the pivot rod 60 and located centrally of the frame 61 to be in alignment with the usual type bar guide 62, a hammer bar 63 adapted to strike an actuated type bar when the latter is adjacent the platen to cause the actual printing impression.

The hammer bar 63 is formed with a main portion 64 having a striking head 65 secured to its free end and extending forwardly from the pivot rod 60, as viewed in Fig. 8, to rest upon a support 66 together with the type bars 59 when in a retracted and completely inoperative position. As shown, when in this retracted position the hammer bar 63 lies between the two middle type bars of the series, see Fig. 7, and is preferably formed with a projecting lug 67 to rest upon the support 66.

For operating the hammer bar 63 in timed relation with an actuated type bar 59 there is provided a control mechanism 68, including a ball bar 69 extending transversely of the frame and positioned to be engaged and forced rearwardly by the respective type bars 59 when the latter

are actuated in the usual manner by the connected key levers 56.

For translating the movement of the ball bar 69 to the hammer bar 63 there is located in a central vertical slot 70 in the frame 61 above the pivot rod 60, a link 71 having an upper boss portion 72 pivotally supported on the frame by a pin 73. A double yoke link 74 having rear ears 75 pivotally connected to the free end of the link 71 by a pin 76, and having forward ears 77 pivotally connected to an upwardly extending lever section 78 on the hammer bar 63, serves to operatively associate the links 71 and the hammer bar 63. A forwardly extending link 79 having a pin 80 and slot 81 connection with the link 71 and suitably secured to the ball bar 69 is provided for actuating the link 71 from the ball bar.

The weight of the hammer bar 63 serves to normally maintain the control mechanism 68 in the forward position shown in Fig. 8. Preferably, however, and as shown in Fig. 7 and in detail in Fig. 11, there are connected to the rear of the ball bar 69 and spaced from the link 79 at opposite sides thereof, guide rods 82 extending through guide holes 83 in the frame. Springs 84 on each of the guide rods 82, positioned in sockets 85 in the frame and engaging forward collars 86 on the rods 82, serve to supplement the natural weight of the hammer bar 63 in normally maintaining the control mechanism 68 in the forward position, while the guide rods 82 serve to maintain the ball bar 69 in proper alignment.

With this construction when a type bar 59 is moved upwardly in the usual way through actuation of a key lever 56, the forward momentum thereof is checked by engagement with the ball bar 69 of the control mechanism 68, see Fig. 9. After engagement with the ball bar 69, an actuated type bar continues to move forwardly but at a greatly reduced velocity, and, of particular importance, the energy of the initially fast moving type bar is through the control mechanism 68 transferred to the hammer bar 63 which is thereby moved upwardly with a relatively high velocity to strike a control shoulder 87 on the rear of an actuated type bar when the latter is closely adjacent the platen to thus cause the actual printing impression of a type head 88, see Fig. 10 and dotted line showing in Fig. 8.

Upon a release of the key lever 56 in the usual manner the springs 84 and weight of the hammer bar 63 serve to return the latter very quickly to its initial inoperative and retracted position so that the desirable high speed operation of the typewriting machine is not impeded.

It is thus seen that with all of the forms of the invention the objectionable high velocity printing impact of the type heads is eliminated and that the printing is achieved in a relatively noiseless manner by a blow delivered from a pivotally mounted hammer bar.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention, what is claimed as new is:

1. In a typewriting machine, the combination of a platen; a type bar mounted for pivotal movement upwardly toward said platen; a hammer pivotally mounted below said platen for upward swinging movement toward said platen and for movement relative to said type bar to strike the latter; means for moving said type bar toward said platen; and a single means for retarding movement of said type bar toward said platen

when said type bar has reached a predetermined position relative thereto and for concurrently moving said hammer relative to said type bar to strike the latter.

2. In a typewriting machine having a platen, the combination of a type bar having a type head thereon, movable toward said platen and having a lower inoperative and upper operative position; a hammer bar carried by and movable with said type bar toward said platen, said hammer bar having a main striking section with a striking portion thereon spaced from said type head and said type bar when the latter is in its inoperative position, and having a lever section relatively short as compared with said striking section; pivot means intermediate said striking and lever sections for mounting said hammer bar on said type bar; and means operatively associated with said type bar and hammer bar for moving said hammer bar and type bar toward said platen and for positively acting on said lever section to swing said hammer bar on said pivot means and cause said striking portion to strike said type head when said type bar has been moved to a position adjacent said platen.

3. In a typewriting machine, the combination of a frame; a platen; a movable type bar; a hammer pivotally mounted on the type bar for movement therewith; mechanism for conjointly moving said type bar and hammer toward said platen; and abutment means engageable by said hammer during the latter portion of its movement with the type bar for slowing movement of the type bar as it approaches the platen and for imparting a relatively higher speed of travel to the hammer to cause the latter to strike said type bar.

4. In a typewriting machine having a platen, the combination of a pivotally mounted type bar movable toward said platen; means for arresting forward movement of said type bar when the latter is adjacent said platen; a hammer bar carried by and movable with said type bar, having a main striking section and a lever section; pivot means for mounting said hammer bar on said type bar intermediate said striking and lever sections; means for limiting pivotal movement of the striking section of said hammer bar away from said type bar while permitting pivotal movement thereof toward said type bar when the latter is moved toward said platen; and means including an actuating means connected to said lever section, for initially concurrently moving said hammer bar and said type bar toward said platen and for subsequently accelerating said hammer bar to strike said type bar when the latter engages said arresting means adjacent said platen.

5. In a typewriting machine having a platen, the combination of a pivotally mounted type bar movable toward said platen; means for arresting forward movement of said type bar when the latter is adjacent said platen; a hammer bar pivotally carried by said type bar and movable therewith toward said platen; means for limiting pivotal movement of said hammer bar away from said type bar while permitting pivotal movement thereof toward said type bar when the latter is moved toward said platen; and actuating means including a link connected to said hammer bar, for initially concurrently moving said hammer bar and said type bar toward said platen and for subsequently accelerating said hammer bar to strike said type bar when the

latter engages said arresting means adjacent said platen.

6. In a typewriting machine having a platen, the combination of a pivotally mounted type bar having a main section, movable toward said platen; pivot means for said type bar; means for arresting forward movement of said type bar when the latter is adjacent said platen; a finger on said type bar, extending on the opposite side of said pivot means from said main section; a hammer bar pivotally connected to said finger and movable with said type bar toward said platen; a lever section on said hammer bar; means for limiting pivotal movement of said hammer bar away from said type bar while permitting pivotal movement thereof toward said type bar when the latter is moved toward said platen; and actuating means including a link connected to said lever section, for initially concurrently moving said hammer bar and said type bar toward said platen and for subsequently accelerating said hammer bar to strike said type bar when the latter engages said arresting means adjacent said platen.

7. In a typewriting machine having a platen, the combination of a series of pivotally mounted type bars movable toward said platen; a hammer bar swingable upwardly toward said platen; means for pivotally mounting said hammer bar, located below said platen; and a single means engageable by said type bars for retarding movement thereof toward said platen and for concurrently moving said hammer bar to strike an actuated type bar in said series.

8. In a typewriting machine having a platen, the combination of a type bar movable toward said platen and having a type head thereon; a hammer bar having a striking portion; means including a pivot for mounting said hammer bar on said type bar for movement therewith and with the striking portion normally spaced from said type bar and said type head, said mounting means being such as to permit movement of said hammer bar and striking portion toward said type bar when the latter is moved toward said platen; a yielding stop engageable by said type bar for arresting movement thereof before contact with said platen; and actuating means connected to said hammer bar for moving said type bar to a position engaging said yielding stop, said last-named means being so disposed relative to said hammer bar and said pivot that the hammer bar is continuously accelerated to strike said type bar after the latter engages said stop.

9. In a typewriting machine having a platen,

the combination of a type bar movable toward said platen; means for striking a type bar, swingable upwardly toward said platen; pivot means for said striking means, mounted on said type bar and movable therewith; and means including actuating means connected to said striking means, for actuating said type bar, said means connected to said striking means and said pivot means for said striking means being so disposed relative to each other that the striking means is continuously accelerated to strike said type bar when the latter is adjacent to said platen.

10. In a typewriting machine having a platen, the combination of a type bar swingable upwardly toward said platen from a lower inoperative to an operative position and having a type head thereon; pivot means for mounting said type bar; a finger on said type bar, located on the opposite side of said pivot means from said type head; a hammer bar having a main striking arm section with a striking portion thereon, and a lever arm section; pivot means intermediate said striking arm and lever arm sections, for connecting said hammer bar to said finger; stop means for maintaining said striking portion in predetermined spaced relation with respect to the type bar when the latter is in its lower inoperative position; and actuating means connected to said lever arm section, said actuating means being so directed and said lever arm section being so proportioned that the action thereon by said actuating means initially is substantially on a line passing through the hammer bar pivot means to concurrently swing said type bar and said hammer bar upwardly toward said platen at substantially equal speeds, and subsequently as the type bar and the hammer bar are swung upwardly, is on a line below the hammer bar pivot means to swing the hammer bar on the latter at increased speed to strike the type bar adjacent the platen.

11. In a typewriting machine having a platen and a type bar movable toward and away from said platen, the combination of a hammer bar pivotally mounted for movement relative to said type bar and having a lever arm and a striking arm for striking said type bar, said lever arm being relatively short as compared to said striking arm; and means operatively associated with said type bar and hammer bar for moving said type bar toward said platen and for acting upon said lever arm to move said hammer bar relative to said type bar and cause said striking arm to strike the type bar when the latter has been moved to a position adjacent said platen.

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