

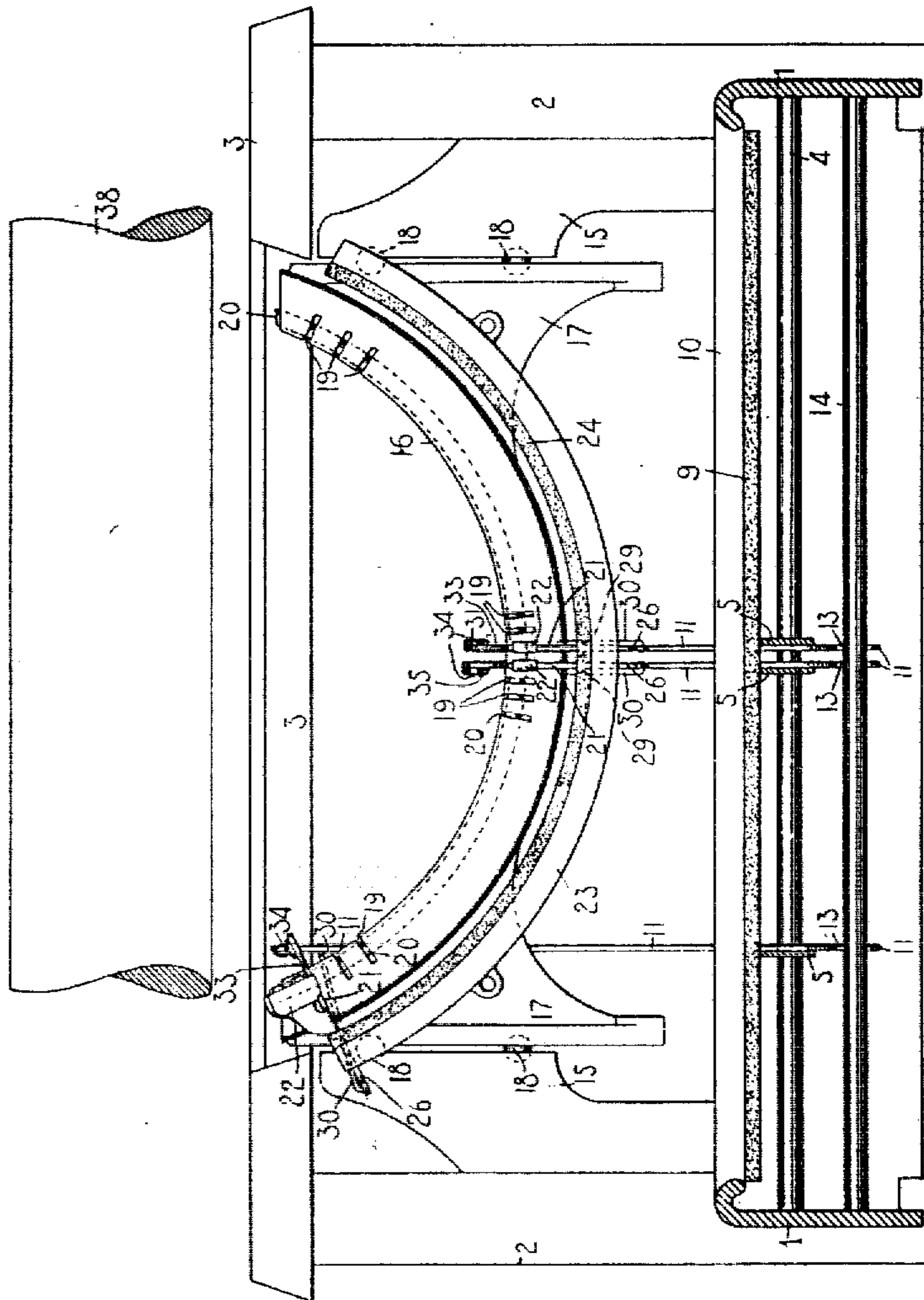
No. 815,340.

PATENTED MAR. 20, 1906.

J. FELBEL.  
TYPE WRITING MACHINE.  
APPLICATION FILED JULY 24, 1903.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

*Marie F. Hammer.*

*H. V. Alonov.*

INVENTOR:

*Jacob Felbel*

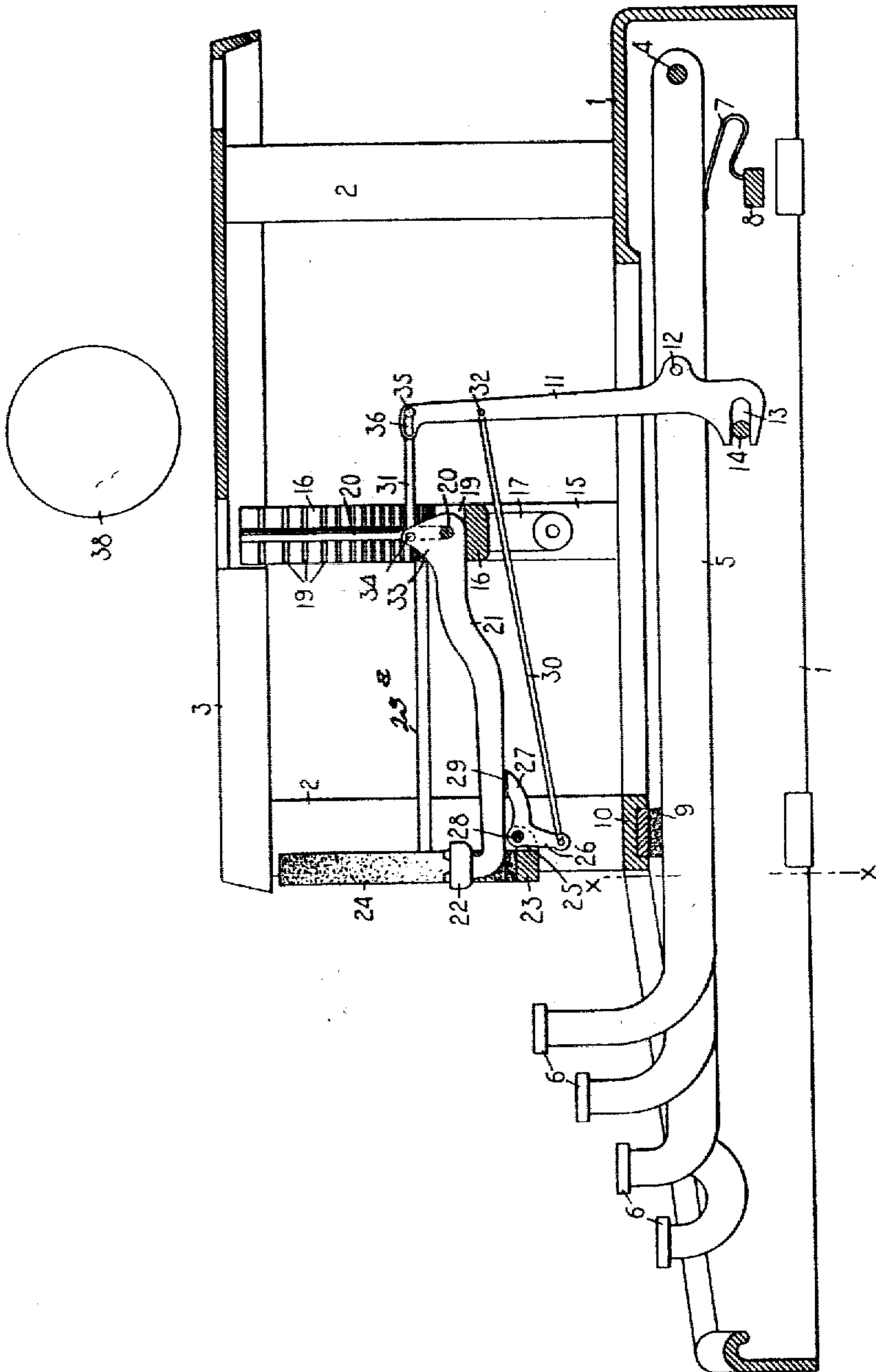
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2 SHEETS—SHEET 2.

210



INVENTOR..

WITNESSES..

M. F. Hammerer,

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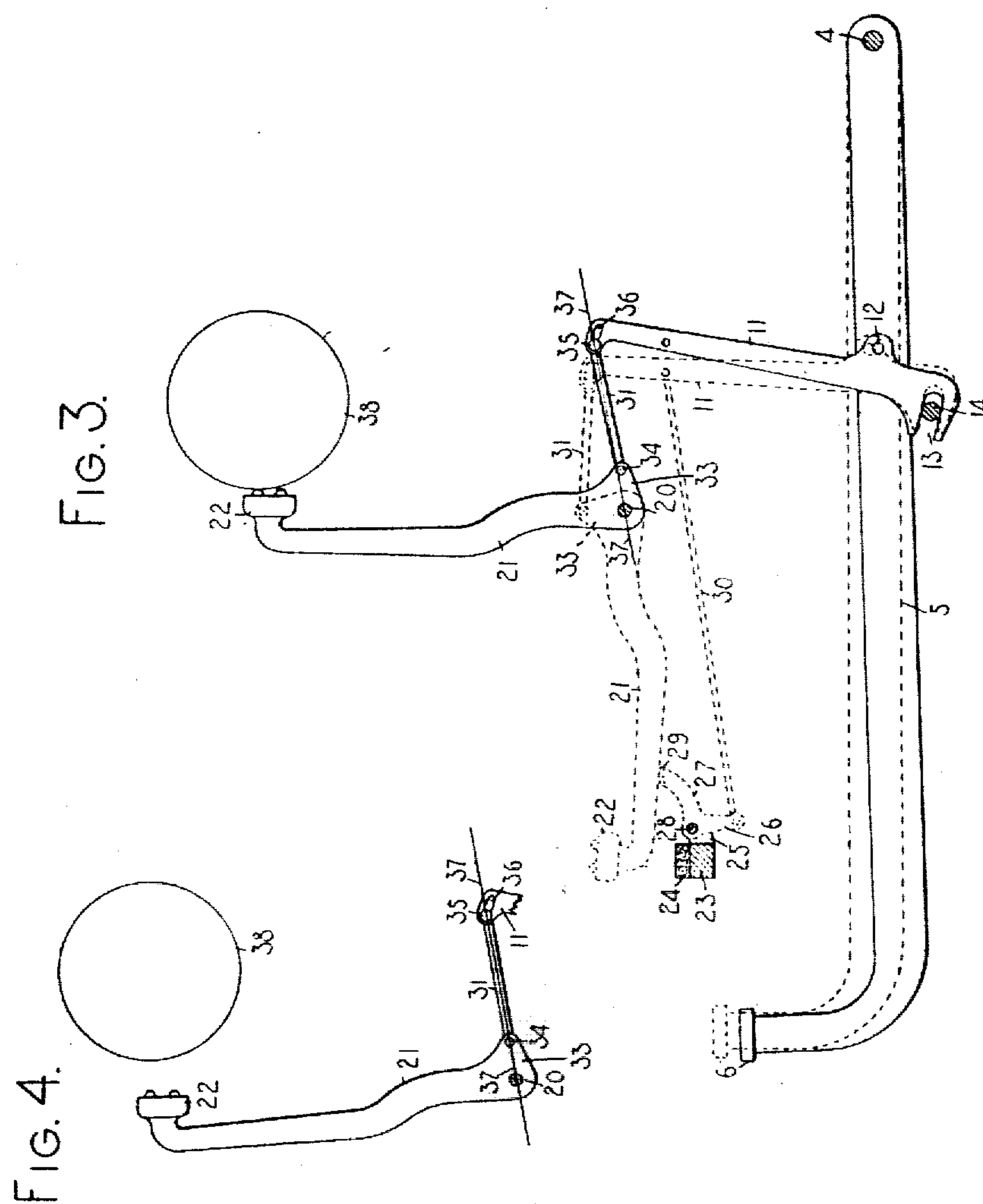
Jacob Felbel

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TYPE WRITING MACHINE.  
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3 SHEETS—SHEET 3.



WITNESSES:

Marie F. Hamner.

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

JACOB FELBEL, OF NEW YORK, N. Y., ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## TYPE-WRITING MACHINE.

No. 815,340.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed July 24, 1903. Serial No. 166,842.

*To all whom it may concern:*

Be it known that I, JACOB FELBEL, a citizen of the United States, and a resident of the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to improvements in the type-actions of type-writing machines, which comprise pivoted type-bars and mechanism to swing them on their pivots from their normal to their printing positions, one object of the invention being to render the type-action of such machines (and especially that of so-called "front-strike" machines) responsive to an extremely-light stroke or touch on the finger-keys, and particularly at the beginning of the stroke; and a further object is to prevent the type from so acting on the paper as to produce blurred or splotchy impressions.

The invention consists in the various features of construction, combinations, and arrangements of parts, all of which are hereinafter fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, in which like reference-numerals designate like parts in different views, Figure 1 is a front elevation and transverse vertical section of certain parts of a front-strike type-writing machine embodying my improvements, the section being on the plane  $xx$  of Fig. 2; Fig. 2, a central vertical section at right angles to the plane of Fig. 1; Fig. 3, a side elevation of a type-bar and of actuating mechanism connected therewith, the said view showing also the outline of a platen; and Fig. 4, a side elevation of the type-bar in another position, said view showing also only a portion of the actuating mechanism, together with the platen.

Although the invention is especially useful in a front-strike machine, and is consequently shown applied to such a machine, yet it is to be understood that it may also be embodied in other visible-writing machines and in many of the numerous under-strike machines without materially changing the character or operation of the mechanism of which the invention consists, as herein stated.

The machine-frame shown is composed of the base 1, the posts 2, and the top plate 3,

fixed on the posts 2. Within the base and near the back of the machine is a fulcrum-rod 4, which is attached at its ends to the sides of the base. The key-levers 5 are secured at their rear ends on this rod or fulcrum, and on their front ends, near which they curve upward, are the ordinary finger-keys 6. Under each key-lever, near its rear end, is a restoring-spring 7, which is attached to a cross-bar 8 and presses upward on the lever, which is normally held by the spring in contact with a pad 9 on the under side of a cross-bar 10. A sublever 11 is pivoted at 12 on each key-lever at a suitable distance in front of the fulcrum of said lever. The sublevers, which extend below the key-levers, have near their lower ends slots 13, and in these slots is a fulcrum-rod 14, which extends across the frame under the key-levers and is affixed at its ends to the sides of the base 1. Since the rod 14 is in front of the vertical plane containing the axes of the pivots 12, if the front end of a key-lever be depressed then the upper end of the sublever mounted on that key-lever will be moved backward, the sublever being carried downward by the key-lever and being at the same time turned on its pivot 12 by the pressure of the upper edge of the slot 13 on the fixed rod 14.

At the sides of the frame and nearer the front of the machine than the sublevers 11 are fixed guide-blocks 15. A type-bar segment 16 is secured between these guide-blocks, there being brackets 17 at the ends of the segment proper, and in grooves in these brackets and in the guide-blocks are antifriction-balls 18. These parts are so adjusted that the segment is easily movable up and down, but cannot swerve laterally in the guides. This segment contains a series of radial grooves 19 cut in its hollow face, the number of these grooves being equal to the number of type-bars, and within a groove crossing the grooves 19 at right angles and extending from end to end of the segment is a pivot-rod 20. The type-bars 21 are pivoted in the grooves 19 on the rod 20, there being a type-bar in each of the grooves 19. When the type-bars are in their normal positions, they extend forward from the segment 16 and the type-block 22 of each bar is level or about level with the pivotal axis of the bar. A curved type-bar rest 23 is connected to the segment 16 by bars 23\*, and on this rest is a pad 24 of soft



material—such, for example, as felt. The type-bars rests either on this pad or against starting devices which are attached to the fixed segment 23 and make contact with the backs of the type-bars. These devices, which are termed "starting" devices and which are included in the actuating mechanism of the type-bars, are pivoted to lugs 25, formed on or attached to the rear face of the segmental type-rest 23.

The starting devices shown herein are also shown and form part of the invention claimed in another application filed by me February 11, 1903, and bearing Serial No. 142,930. They are therefore hereinafter claimed neither *per se* nor in combinations as broad as many of those claimed in said other application; but it is to be understood that the term "starting device" means not merely one of the particular devices shown herein attached to the bracket or rest 23 and operative to start the type-bars on their printing movements, but any device capable of performing this function and included in any of the definitions of a starting device that are contained in the claims.

The starting devices herein shown are levers of the bell-crank type and by whose action the type-bars are started on their printing movements. These bell-cranks, each having arms 26 and 27, are mounted on pivots 28, secured in the lugs 25. There may be as many bell-cranks as there are type-bars, and when the type-bars are in their normal positions there may be a bell-crank under or behind each type-bar, the bell-cranks attached to the central portion of the segment being under the central type-bars and those attached to the segment near its ends being rather behind than under the side type-bars. On the arm 27 of each bell-crank is a shoe 29, whose width is greater than the thickness of a type-bar. Each of the sublevers 11 is connected with one of the bell-cranks and with the type-bar on which that bell-crank is operative by links 30 and 31, respectively. The link 30 is pivoted at one end to the sublever at 32 and at its other end to the arm 26 of the bell-crank. When the key-levers 5, the sublevers, type-bars, and bell-cranks are in their normal positions, then the shoes 29 of the bell-cranks are either in contact with the type-bars (the bell-cranks constituting, if desired, rests for the type-bars in addition to or in lieu of the pad 24) or else the shoes 29 are close to the type-bars. The link 31 is pivoted at its front end to an arm 33 on the type-bar, the axis of the pivot 34 of the link and type-bar being in a plane that both contains the pivotal axis 20 of the type-bar and forms right angles or almost right angles with a plane also containing said pivotal axis 20 and cutting the type of the type-bar. At its rear end the link 31 is secured to the sublever by a lost-motion connection composed of a

pivot-pin 35 on the link and a slot 36 in the lever, the pin being loosely confined in the slot and being at the rear end of the slot when both the type-bar and sublever are in their normal positions. The upper end of the sublever is movable backward with the depression of its key-lever as far as it is allowed by the link 31 to travel in that direction, the sublever being in the position indicated in Fig. 4 when the finger-key is fully depressed. Then the common pivot 34 of the type-bar and link 31 is in alinement with the pivot 20 of the type-bar and the common pivot 35 of the link 31 and sublever 11, or, in other words, the relations of the pivot 34 to the other two pivots is then such that if a straight line 37 be drawn from the axis of the pivot 35 midway between its ends to the pivotal axis of the type-bar midway between the sides of the type-bar that straight line would cut the pivot 34. In the operation of the type-bar by its actuating mechanism the pivot 34 is drawn by the link 31 into alinement with the pivots 20 and 35 before the type-bar reaches the end of its printing movement or when it arrives in the vicinity of the position shown in Fig. 4, where the type is quite near the platen 38.

The full stroke of a type-bar is produced by the action, first, of the starting device, then of the link 31, to continue the printing movement of the type-bar, and then of the momentum of the type-bar to advance the bar to its printing position from where it is shown in Fig. 4, the momentum being rendered thus operative by the means comprising the sublever, the arm 33 of the type-bar, and the pivots 34 and 35 in connection with the link 31, arranged in the relations shown and described and capable of coacting, as hereinafter explained. With the depression of a finger-key to actuate the sublever on the key-lever the lower end of the arm 26 of the bell-crank is drawn backward and the arm 27 of the bell-crank acts on and in sliding contact with the type-bar, pushing the type-bar before it, and thus starting the bar on its printing movement. The starting device or bell-crank is operative with a very light pressure on the finger-key, for it acts on the type-bar, it will be seen, under an excellent mechanical advantage, the force exerted by it being applied to the type-bar near its printing end and acting nearly in the direction of the printing movement of that end of the type-bar at the beginning of the movement. During the action of the bell-crank on the type-bar the upper end of the sublever and the link 31 travel backward together, the link being pushed backward by the arm 33, and the front end of the slot 36 approaches and at length overtakes the pin 35. Thereupon the link 31 is brought into action to continue the printing movement of the type-bar, which is pulled by the link away from



the starting device and to the position shown in Fig. 4. Finally, the momentum of the type-bar carries the pivot 34 below the alignment of the pivots indicated by the line 37 in Fig. 3 and completes the printing movement of the type-bar. The pivot 34 is carried to its lowest position, or that shown in Fig. 3, by the momentum of the type-bar, whether or not pressure on the key is continued after the type-bar reaches the position shown in Fig. 4. Since the direction of the force acting on the pivot 34 through the link 31 when this pivot is in alignment with the pivots 20 and 35 is substantially at right angles to the direction of the movement of the pivot 34, only a very small component of that force offers a resistance to the movement of this pivot, and when the finger-key is subjected to the ordinary pressure that resistance is so slight that it is overcome by the momentum of the type-bar. The pivot 34 of course pulls on the link 31; but it acts on the link under so good a mechanical advantage that the link is drawn forward only a minutely small distance, and hence the type-bar is allowed to continue its movement until the type strikes the platen. In this movement the sublever or key-lever, or both, may spring or yield to allow the said minute forward motion of the link when the pivot 34 passes the dead-center. The link 31, pivoted to the type-bar, is operative to continue the printing movement of the type-bar after the starting device has acted on it, and the type-bar is rendered further movable by its momentum to complete its printing movement by means of the peculiar arrangement of the pivots 34 and 35 with relation to the pivot 20 and to each other and to the sublever 11 and link 31, and this means is operative with the actuating-sublever and the link 31 to instantly retract the type-bar at the end of its printing movement when pressure is exerted on the finger-key after the type strikes the platen. By maintaining the pressure on the finger-key until the type has acted on the paper the bar is instantly retracted in consequence of the upward action of the link 31 on the pivot 34, whereby the pivot is drawn back into alignment with the other pivots and the printed character is rendered clear or clean-cut.

At the beginning of a stroke, or when a type-bar is moved with the starting device, the motion of the type-bar is comparatively slow, and then it is rendered faster by the action of the link 31, yet it is slower at the beginning of the action of the link 31 than it is afterward, for the nearer the pivot 34 approaches to the line 37 the longer is the arc that is traversed by the pivot while the upper end of the sublever travels backward a certain distance, and when the action of the momentum of the type-bar succeeds that of the link 31 to complete the printing movement, as described, the type-bar is moving

more rapidly than it had been at any other instant. Not only, therefore, is the movement of a type-bar from its normal to its printing position produced with a light pressure on the finger-key, but the action of the type-bar is rendered fast as well as easy by imparting to it at first a very slow motion and afterward greatly accelerating its motion. The type-bar is also very quick to leave the platen and make way for a succeeding bar.

The type-bar is restored to its normal position by the action of gravity and by the sublever 11 and link 31 and spring-restored key-lever. If desired, each type-bar may be provided with a separate returning-spring, as heretofore. The type-bar makes contact with the shoe 29 of the bell-crank near the end of its backward movement, and the arm 27 of the bell-crank moving with it and exerting pressure against it helps to prevent it from rebounding, as explained at length in the above-mentioned application, in which a like device is claimed as an antirebounding device, and therefore this device is not so claimed herein.

Special advantages are derived from the embodiment of the invention in front-strike machines, or machines in which the printing is done on the front of the platen, because in such machines the resistance offered by the inertia of the type-bars to the action of their operating mechanism, especially that of the central bars of the series, is comparatively great at the very beginning of the printing movement, and not only is such resistance, which usually renders it necessary to strike or press the finger-keys hard, overcome by means of this invention with the application of but little force to the keys, but also by this means the continued movement of each type-bar to its printing position and an instantaneous action of the type on the paper are obtained with an exceedingly light and rapid key action.

The segment 16, on which the type-bars are shown mounted, is like that heretofore patented by me and in which the type-bars are raised by lifting the segment to bring them to proper positions for upper-case printing.

Since the mechanism for raising and lowering the segment does not form part of this invention, it is not shown herein. Obviously the invention substantially as it is shown herein may be applied to machines in which the platen, instead of the type-bars, is shifted for the purpose stated.

Various changes may be made in the mechanism above described without avoiding the spirit of the invention and some parts may be used without others. For example, the initial starting devices 27 and 30 may be omitted in so far as the feature of printing by momentum is concerned, and in that case the



slot 36 would be substituted by a mere perforation for the pivot 35, since no lost motion would be required.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a lever, a device to start the type-bar on its printing movement, and another device to continue the printing movement of the type-bar, said devices being separately connected with said lever, and said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement.

2. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a lever, a device to start the type-bar on its printing movement, and a link pivotally connected to the type-bar and operative to continue the printing movement thereof, the starting device and link being separately connected with said lever, and said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement.

3. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a lever, and a link pivotally connected to the type-bar and lever and operative by the lever to move the common pivot of the type-bar and link into alinement with the pivot of the type-bar and the common pivot of the link and lever before the completion of the printing movement of the type-bar.

4. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a lever, a link pivotally connected to the type-bar and lever and operative by the lever to move the common pivot of the type-bar and link into alinement with the pivot of the type-bar and the common pivot of the link and lever before the completion of the printing movement of the type-bar, and a connection between the starting device and said lever.

5. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a link pivotally connected to the type-bar, a lever, a lost-motion connection securing the link to the lever, means to actuate the lever to move the common pivot of the type-bar and link into alinement with the lost-motion connection and the pivot of the type-bar, before the completion of the printing movement of the type-bar, and a connection between the starting device and said lever.

6. In a type-writing machine, the combination of a pivoted type-bar, and actuating

mechanism comprising a starting device to push the type-bar from its normal position, said device being arranged to act on the type-bar between the printing end and pivot of the type-bar, and another device operative to pull the type-bar from the starting device toward its printing position, said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement.

7. In a type-writing machine, the combination of a pivoted type-bar, an actuating mechanism comprising a key-lever, a device to start the type-bar on its printing movement, and another device to continue the printing movement of the type-bar, said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement, and said key-lever being operative on the type-bar at the end of its printing movement to instantly retract the type-bar.

8. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a lever, a link pivotally connected to the type-bar and lever and operative by the lever to move the common pivot of the type-bar and link into alinement with the pivot of the type-bar and the common pivot of the link and lever, before the completion of the printing movement of the type-bar, and a link connecting the starting device with said lever.

9. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a link pivotally connected to the type-bar, a lever, a lost-motion connection securing the link to the lever, means to actuate the lever to move the common pivot of the type-bar and link into alinement with the lost-motion connection and the pivot of the type-bar, before the completion of the printing movement of the type-bar, and a link connecting the starting device with said lever.

10. In a type-writing machine, the combination of a set of pivoted type-bars, and actuating mechanism comprising a system of levers, a set of devices operative on the type-bars respectively to start the type-bars on their printing movements, and a set of other devices operative on the type-bars respectively to continue the printing movements of the type-bars, said sets of devices being separately connected with said levers, and said mechanism including means to render each type-bar further movable by its momentum to complete its printing movement.

11. In a type-writing machine, the combination of a set of pivoted type-bars, and actuating mechanism comprising key-levers, devices operative on the type-bars respectively to start the type-bars on their printing



movements, and other devices operative on the type-bars respectively to continue the printing movements of the type-bars, said mechanism including means to render each type-bar further movable by its momentum to complete its printing movement, and said key-levers being operative on the type-bars at the end of their printing movements to instantly retract the type-bars.

12. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a lever, and a connecting device pivotally secured to the type-bar and lever and operative to move the common pivot of the type-bar and connecting device into alinement with that of the connecting device and lever.

13. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, another device pivotally connected to the type-bar, the axis of the common pivot of this device and type-bar being in a plane that both contains the pivotal axis of the type-bar and forms right angles or almost right angles with a plane also containing said pivotal axis and cutting the type of the type-bar, and means to actuate the latter device to continue the printing movement of the type-bar.

14. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a lever extending above the key-levers and movable backward and forward at its upper end, and a link pivotally connected to the type-bar and lever, the axis of the common pivot of the link and type-bar being in a plane that both contains the pivotal axis of the type-bar and forms right angles or almost right angles with a plane also containing said pivotal axis and cutting the type of the type-bar.

15. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a device to start the type-bar on its printing movement, a key-lever, a sublever mounted on and extending upward from the key-lever behind the type-bar and movable backward and forward at its upper end, and a link pivotally connected to the type-bar above the pivotal axis thereof and to the sublever, the axis of the common pivot of the link and type-bar being in a plane that both contains the pivotal axis of the type-bar and forms right angles or almost right angles with a plane also containing said pivotal axis and cutting the type of the type-bar.

16. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the

key-lever, and a device pivotally connected to the sublever and to the type-bar and operative to actuate the type-bar, the pivot connecting said device with the type-bar being movable into alinement with the other pivot of said device and the pivot of the type-bar.

17. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the key-lever, a link pivotally connected to the sublever and to the type-bar and operative by the sublever to move the common pivot of the type-bar and link into alinement with the pivot of the type-bar and the common pivot of the link and sublever, before the completion of the printing movement of the type-bar.

18. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the key-lever, and a device connecting the sublever with the type-bar and operative to actuate the type-bar in its printing movement, said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement, and being operative on the type-bar at the end of its printing movement to instantly retract the type-bar.

19. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the key-lever and extending upward therefrom back of the pivoted end of the type-bar, and a link pivoted at its rear end to the sublever and at its front end to the type-bar, the front pivot of said link being movable into alinement with the rear pivot of the link and the pivot of the type-bar.

20. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the key-lever and extending upward therefrom back of the pivoted end of the type-bar, a link pivotally connected to the upper end of the sublever and to the type-bar and operative by the sublever to move the common pivot of the type-bar and link into alinement with the pivot of the type-bar and the common pivot of the link and sublever, before the completion of the printing movement of the type-bar.

21. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the key-lever and extending upward therefrom back of the pivoted end of the type-bar, and a device connecting the upper end of the sublever with the type-bar and operative to ac-



tuates the type-bar in its printing movement, said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement, and being operative on the type-bar at the end of its printing movement to instantly retract the type-bar.

22. In a front-strike type-writing machine, the combination with the platen, of a type-bar having a pivot as 20 and a crank-arm as 33, a key-lever, a sublever operatively connected to said key-lever, and a link pivoted at 34 to the crank-arm 33 and pivotally connected at 35 to the sublever; the combination and arrangement being such that the pivots 20, 34 and 35 are all adapted to come into alinement before the type strikes the platen.

23. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a lever, a starting device connected with said lever and operative thereby to start the type-bar on its printing movement and another device separately connected with said lever and operative thereby to continue the printing movement of the type-bar, said mechanism also comprising means to render the type-bar further movable by its momentum to complete its printing movement.

24. In a type-writing machine, the combination of a pivoted type-bar, and actuating mechanism comprising a device to start the

type-bar on its printing movement, said device being arranged to act on the type-bar between the printing end and pivot of the type-bar, and another device to continue the printing movement of the type-bar, said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement.

25. In a type-writing machine, the combination of a front-strike pivoted type-bar, and actuating mechanism comprising a key-lever, a sublever operatively connected with the key-lever, a starting device operative on the type-bar between the printing end and pivot of the type-bar, a connection extending from the sublever to the starting device, and a device pivotally connected to the sublever and to the type-bar and operative to continue the printing movement of the type-bar, one of the pivotal connections of this device being a lost-motion connection, and said mechanism including means to render the type-bar further movable by its momentum to complete its printing movement.

Signed in the borough of Manhattan, in the city of New York, in the county of New York and State of New York, this 22d day of July, A. D. 1903.

JACOB FELBEL.

Witnesses:

K. V. DONOVAN,  
M. F. HANNWEBER.