

Oct. 7, 1930.

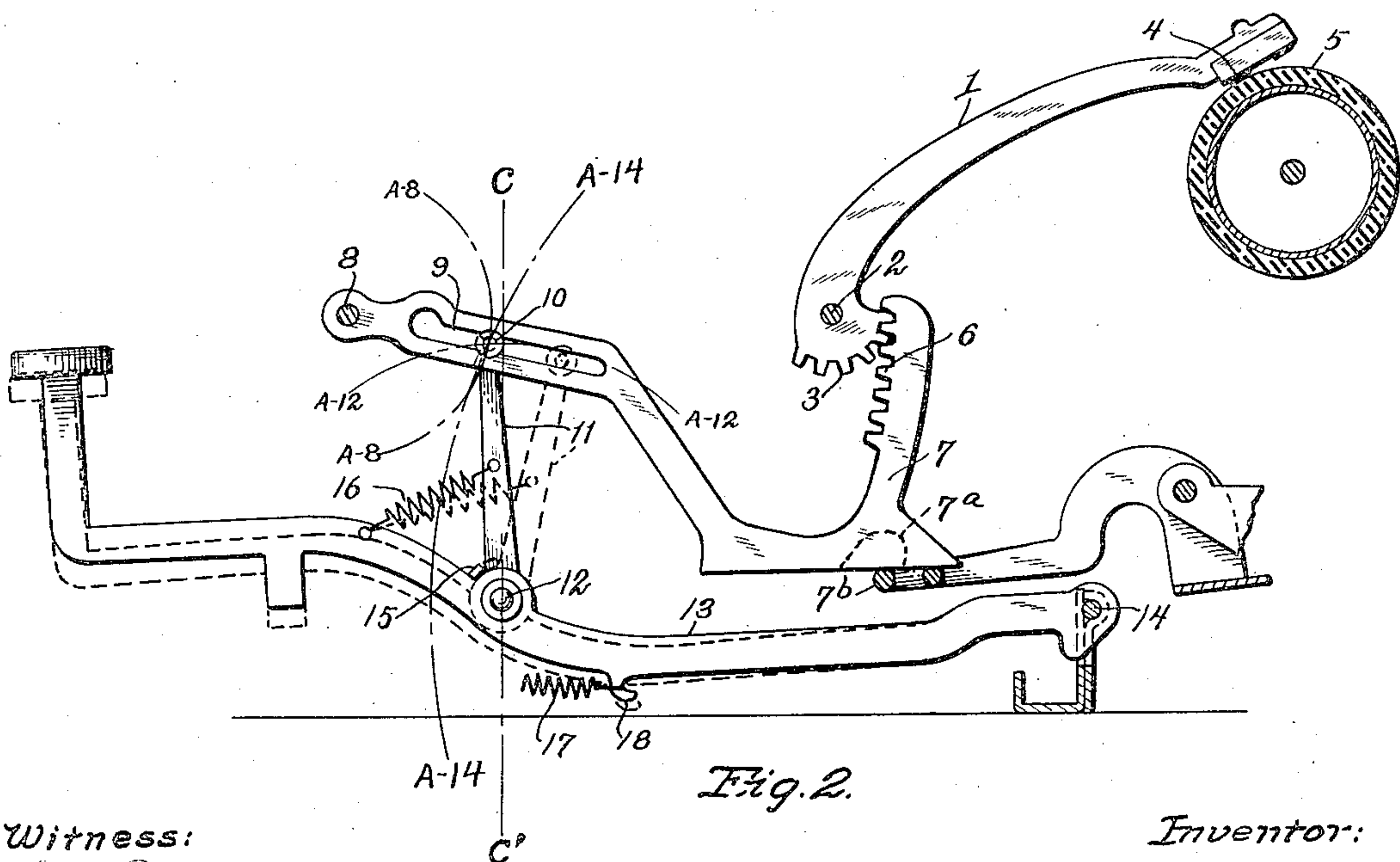
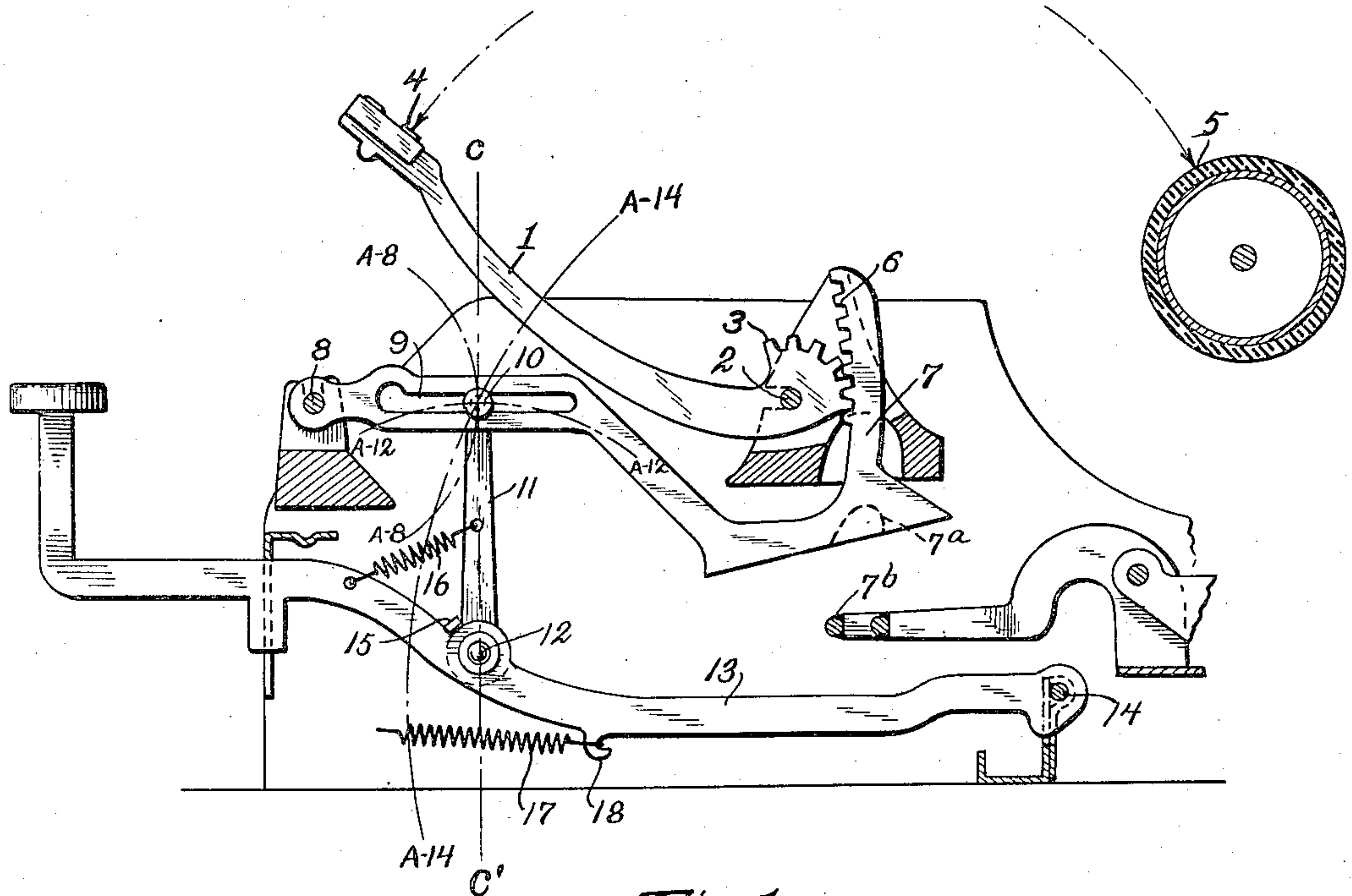
M. GARBELL

**1,777,466**

## TYPE BAR ACTUATING MECHANISM

Filed Dec. 5, 1927

2 Sheets-Sheet 1



Witness:

De, D. J. 1912

*Inventor:*

Max Garbell

By Jones, Addington, Ames & Seibold

*Attorneys.*

Oct. 7, 1930.

M. GARBELL

1,777,466

TYPE BAR ACTUATING MECHANISM

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2 Sheets-Sheet 2

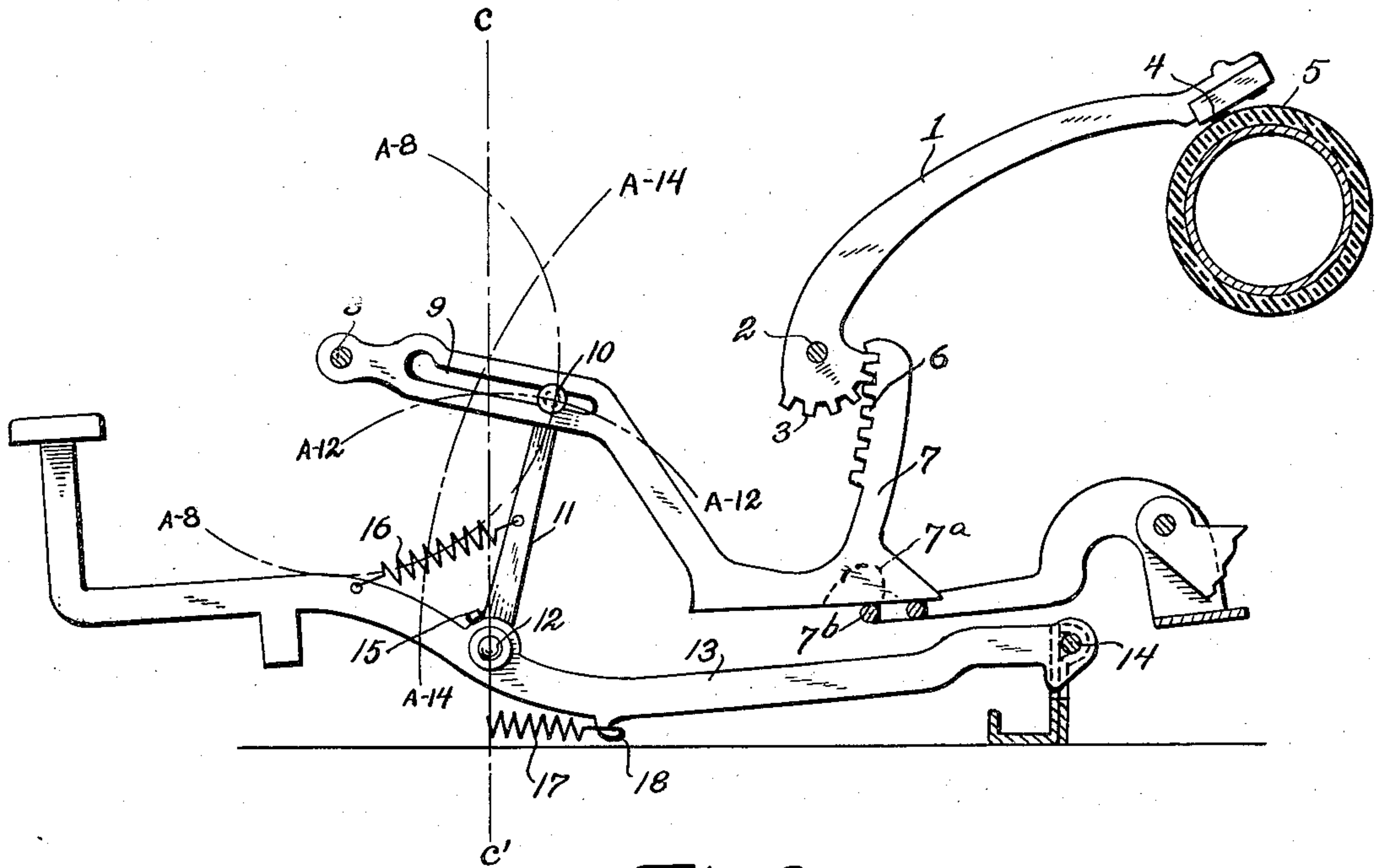


Fig. 3.

Witness:  
*Carl Marx*

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## UNITED STATES PATENT OFFICE

MAX GARBELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO VICTOR ADDING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

## TYPE-BAR ACTUATING MECHANISM

Application filed December 5, 1927. Serial No. 237,597.

My present invention concerns a mechanism for actuating type-bars of typewriting machines, and has for one of its purposes the production of a type-bar actuating mechanism which presents peculiar advantages from the viewpoints of ease of assembly, cheapness of manufacture, and a minimum of parts.

This invention is an improvement upon that disclosed and claimed in my co-pending application, Serial No. 720,255, filed June 16, 1924, for Typewriting machines, and assigned to the assignee of the present application.

One of the objects of my invention is to provide a type-bar mechanism comprising a pivoted key-lever, a pivoted intermediate lever, and a pivoted type-bar, in which the key-lever is connected to the intermediate lever in such a way that the point connecting the two will move substantially in a straight line, so that there will be a minimum of friction and at the same time a certainty of action not hitherto attained by mechanisms similar to the one that forms the subject matter of my present invention.

Another object of my invention is to reduce the number of parts required in making a type-bar actuating mechanism, by providing a lateral arm integral with a key-lever and connected with an intermediate lever by means of a pin and slot, the pivotal points of the key-lever, intermediate lever, and type-bar being so located as to present certain advantages which will be more fully set forth hereinbelow.

In the drawings which accompany the present specification, Figure 1 is a diagrammatic side elevational view of the type-bar actuating mechanism, made in accordance with my present invention, shown at its normal position of rest;

Fig. 2 represents the same mechanism in its position at the extreme end of the printing stroke, the said Figs. 1 and 2 also having certain geometrical lines upon the same showing the alignment of pivotal points and the arcs upon which various parts of the mechanism swing when they are moved.

Fig. 3 is an enlarged view of the slot and pin connection on the intermediate lever.

Fig. 4 is a side elevational partially sectional view of Fig. 3.

Similar characters refer to similar parts in all of the figures.

Figs. 1 and 2 show the construction of my improved type-bar actuating mechanism. It will be seen that I have provided a type-bar 1 having a pivot 2 and a number of gear-teeth 3 at its pivoted end, the free end being provided with one or more type characters 4 which are capable of making an impression upon a suitable piece of paper or other material placed upon the platen 5. There is also an intermediate lever 7 having a gear segment or teeth 6 and pivoted about the point 8. The said intermediate lever also has a slot 9 capable of engaging a pin or roller 10 upon the vertical arm 11 of a key-lever 12, the latter having a pivot 13 at one end.

The pivotal points 2 and 8 and the point of connection of the arm 11 at the pin or roller 10 form a straight line A—A' as shown in Fig. 1 when the mechanism is in its normal at rest position. The pivotal points 8 and 13 at the point of attachment of the pin or roller 10 will also form a straight line when the mechanism is in the furthest advanced printing position, as shown in Fig. 2 by the line B—B'.

The teeth 3 on the type-bar and the teeth 6 on the intermediate lever are in such intermeshing relationship that the downward movement of the said intermediate lever 7 will cause the type-bar 1 to swing about its pivot 2 and strike the platen 5. It will be noted that the intermediate lever 7 swings about the pivot 8 and the dotted circle C—C' shows the line of motion of the point 10 located centrally of the slot 9 in the intermediate lever 7. The dotted circle D—D' shows the line of motion of the pivotal connection 10 upon the arm 11 of the key-lever 12, the center of this circle D—D' being at the pivot 13.

As the result of the location of the pivots 8, 2, 13, and 10 it will be noticed that the direction traversed by the connecting point 10 where the said arm 11 engages the slot 9



of the key-lever 7 will be virtually a straight line, so that despite the fact that the pin 10 entering the slot 9 is free to move in said slot, the actual movement at this point will be negligible, and as a result of this construction, there will be a minimum of friction at the sides of the slot 9 and the pin 10 so that it will not be necessary to make this connection by means of the roller but a common pin may be provided having a somewhat enlarged head 10<sup>a</sup> to prevent disengagement of the pin from the slot, the head of the said pin being of such a size that it may readily enter the enlarged portion 14 of the said slot. This is shown more clearly in the enlarged view in Fig. 3. As a matter of fact the pin 10 can also be placed in a hole in the intermediate link if the ease of assembly incident to the slot 9 is foregone, since that point 10 does not move any appreciable amount along said slot, as herein after explained.

Provision is also made for actuation of an escapement universal bar 16 by depression of the intermediate lever 7 and there also may be provided an additional universal bar for actuating the ribbon mechanism of the typewriter. In order to provide for so-called "dead" keys, the said intermediate lever 7 may have a recess 17 formed in the same, of such size and shape that the universal bar 16 may enter therein and fail to be actuated.

Fig. 3 is a fragmentary view of the intermediate lever 7. It will be noted that the enlargement 14 is of sufficient size to admit the head 10<sup>a</sup> of the pin 10 which is riveted or integral with the vertical arm 11 on the key-lever 12. Fig. 4 is a detail showing how the head of the pin prevents its withdrawal from the slot.

In Fig. 2, it will be seen that when the type-bar 1 has swung into its extreme advanced position and has made contact with the platen 5, the pivotal points 8 and 13 will form a straight line with the pin 10, the line of motion of the said pin being indicated by the short heavy dotted line E—E' in both figures.

The action of the mechanism will be evident from the drawings and the description forming a part hereof, as the depression of the key-lever 12 will exert a downward pull upon the arm integral therewith causing the intermediate lever 7 to swing about its pivot 8 by virtue of the connection made therewith by the pin 10 causing said pin to describe an arc along the circle C—C', while at the same time, the point 10 will tend also to describe part of an arc along the circle D—D' by reason of the pivotal point 13 on the key-lever 12. As this motion, however, is in actual practice, and in one exemplification of my present invention, only about  $\frac{3}{16}$  of an inch, it will be seen that there is substantially no tendency for the pin 10 to slide within the slot 9 and, therefore, sliding friction usually encountered in type-action mechanisms simi-

lar to the one herein described is substantially avoided. The result of the location of the various pivotal points is much the same as though the arc C—C' were the pitch line of an actual gear wheel, and the arc D—D' that of a second gear wheel intermeshing with the first-mentioned gear wheel, so that the entire action would take place during the time one tooth was in engagement with one interdental space in the larger wheel.

The mechanism may be retracted to its normal position by means of a spring 15 attached to the key-lever, but it is within the scope of my invention to employ springs upon any other part of the mechanism, provided that they perform the function of returning the same to its initial position.

Obviously, modifications within the skill of the mechanic may be made in the shape and in the constructional details of my herein described type-bar actuating mechanism, the essential feature being the alignment of the pivotal points, in such a manner as to avoid substantially all sliding friction, so that all parts will move right on the dead centers of their pivots and will therefore provide a very steady and positive type-bar action.

Having disclosed my invention, what I desire to claim is:

1. In a type-bar mechanism, a pivoted type-bar, a pivoted key-lever, and a pivoted intermediate lever operatively connected at an intermediate point thereof to said key-lever, the pivots of said intermediate lever and type-bar and said connection point lying in a substantially straight line when the parts are in normal position and the pivots of said intermediate lever and said key-lever and said connection point lying in another straight line when said type-bar is at printing position, the pivots of said key-lever, type-bar and intermediate lever never being in one line, and each being located at one end of the respective levers and bar.

2. In a type-bar mechanism, a type-bar pivoted at its end, a key-lever pivoted at its end, and an intermediate lever pivoted at its end and operatively connected at an intermediate point thereof to said key-lever, said connection point lying in a substantially straight line connecting said intermediate lever pivot and said type-bar pivot when the parts are in normal position, and movable into, but not beyond, a substantially straight line connecting said intermediate lever pivot and said key-lever pivot when the parts are moved to printing position.

3. In a type-bar mechanism, a pivoted key-lever having a vertically extending arm, a pivoted slotted intermediate lever engaged by said arm, an internal gear segment on the free end of said intermediate lever, a pivoted type-bar having a gear at its pivoted end engaging said gear segment, the point of engagement of said arm and intermediate lever



being located substantially on a straight line drawn between the pivots of the intermediate lever and the pivot of the type-bar when the mechanism is in its normal position.

5 4. In a type-bar mechanism, a pivoted key-lever having a vertically extending arm, a pivoted slotted intermediate lever engaged by said arm, an internal gear segment on the free end of said intermediate lever, a pivoted  
10 type-bar having a gear at its pivoted end and engaging said gear segment, the point of engagement of said arm and intermediate lever being located substantially on a straight line drawn between the pivots of the intermediate  
15 lever and the pivot of the key-lever when the mechanism is in the printing position.

5. In a type-bar actuating mechanism for typewriters, the combination of a pivoted key-lever, an arm integral therewith and dis-  
20 posed substantially vertically, a pivoted intermediate lever, a sliding connection between said arm and said intermediate lever, a pivoted type-bar, gears connecting said intermediate lever and type-bar, the point of  
25 interconnection between said arm and intermediate lever being positioned so that it will move substantially on a straight line when the mechanism is operated.

In witness whereof, I have hereunto sub-  
30 scribed my name.

MAX GARBELL.

## Certificate of Correction

Patent No. 1,777,466.

Granted October 7, 1930, to

MAX GARBELL.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: After the heading to the printed specification beginning with line 1, page 1, strike out all printed matter to the end of the specification including the claims, and insert instead the following:

The present invention relates to an improved type-bar actuating mechanism for typewriters, and comprises novel means for taking up the shock upon the key-levers comitant with the sudden arrest of the mechanism when the type-bars make contact with the platen when in the printing position.

This invention is an improvement upon that disclosed and claimed in my co-pending application, Serial No. 720,255, filed June 16, 1924, for Typewriting machines, and assigned to the assignee of the present application.

One of the objects of my invention is to provide resilient means allowing the key-levers to make a slight downward movement when the type-bar strikes the platen, and to accomplish this by a novel arrangement of key-levers, intermediate links, type-bars and springs, as will be clearly set forth hereinbelow.

A further object of my invention is to provide a type-bar actuating mechanism which makes the touch of the typewriter to which it is applied very smooth and velvety, and also contributes partly to silent and efficient operation. These advantages are particularly manifest when my said type-bar actuating mechanism is applied to portable typewriters.

In its essential features my new mechanism comprises a pivoted type-bar provided with a gear at its pivoted end, a pivoted intermediate lever provided with a gear at its free end intermeshing with the gear on the type-bar, a pivoted key-lever having a link pivoted to the same and which link engages a slot in the aforesaid intermediate lever, the connection preferably, but not necessarily, being accomplished by means of a roller on a pin at the end of said link. There is further provided a tension, a compression or a leaf spring biasing said link in one direction, and a stop on the key-lever limiting the pivotal motion of the said link in a similar direction, so as to compel the sliding connection in the slot of the intermediate lever to move in a certain direction, but which direction will be reversed the moment the type-bar strikes the platen, so that the

key-lever will make a further slight movement downwardly, giving what might be termed a cushioning or "shock-absorbing" effect.

The advantages of this arrangement are manifold, as the type-bar action will be remarkably smooth and free from jerkiness, and the touch of the machine will approach or excel that produced by having rubber or spring-cushioned key-covers on the end of the key-levers.

My present invention is illustrated upon the drawings which accompany and form a part of the present application. In these drawings:

Figure 1 is a side elevational view of my improved type-bar actuating mechanism shown in the position at rest, that is to say, when the type-bars are resting against their support and the key-levers are in their normal position ready for use.

Fig. 2 is a similar view of the same parts in the position at the moment when the type-bars with their attached type-characters make contact against the paper or platen of the typewriter.

Fig. 3 is a similar view showing the same parts in the position they assume when the key-lever is further pushed downwardly but while the movement of the intermediate lever and type-bar is arrested by virtue of the contact of the said type-bar with the platen of the typewriter.

In all three figures similar characters refer to similar parts.

My improved type-bar actuating mechanism comprises a suitably shaped type-bar 1 having a pivot 2 and provided with a gear 3 at the pivoted end. Suitable type-characters 4 are located at the free end of the type-bar 1, and, when the type-bar 1 is in the printing position, make contact with the platen 5. A suitable gear 6 on a pivoted intermediate lever 7, which is supported by the pivot 8, intermesh with the gear 3 of the said type-bar 1. A slot 9 in the said intermediate lever 7 is in engagement with a pin and roller 10 located at the end of an intermediate link 11, which is pivoted at its other end 12 to a key



lever 13 having a pivot 14 at one extremity, and a key at the other end.

The intermediate link 11, which is free to rotate upon its pivot 12 is prevented from movement in one direction by a stop 15, and is also pulled up or biased in a direction toward the said stop 15 by a spring 16, so that when in the normal position when the typewriter is at rest the link 11 will be disposed substantially vertically and held against the said stop 15 by the tension of the spring 16. It should be understood that it is within the scope of my invention to apply other biasing means for the link 11, as for example a leaf spring.

In order to insure the return of the mechanism to its "at rest" position after a printing stroke, a spring 17 attached to a projection 18 on the key-lever 13 is provided. Furthermore, provision may also be made for preventing the actuation of an universal bar that actuates the carriage escapement by forming a recess 7<sup>a</sup> in the intermediate lever into which the said universal bar 7<sup>b</sup> will fit when the lever 7 is at its lowest downward stroke.

It should be noted that on all these figures there is a reference line C—C' passing in a vertical direction through the intermediate link 11 and its pivot 12, as the action of my improved mechanism can best be understood by the following description and the said reference line.

The action of the mechanism made in accordance with my present invention is substantially as follows, reference being had to Figs. 1, 2 and 3, which show three different positions assumed by the said mechanism.

When the mechanism is at rest, as shown in Fig. 1, it will be noticed that the link 11, the roller 10 and the pivot 12 all lie substantially on a vertical line C—C' passing through the said points.

When the key-lever 13 is depressed, as by striking the key, the intermediate link 11 will exert a downward pull on the intermediate lever 7, thus causing the free end of said lever 7, bearing the gear 6, to move downwardly and, by reason of its engagement with the gear 3 on the type-bar 1, to cause the latter to swing about its pivot 2 and to approach the platen 5, eventually, at the end of the stroke, contacting with the same by its type-characters 4.

Were it not for the spring 16 biasing the said intermediate link 11 and holding it against its stop 15 on the key-lever 13, the tendency of the rolling connection made by the roller 10 in the slot 9 on the intermediate lever 7 would be to move said roller downwardly (to the right in the drawings) and the link 11 would attempt to align itself in such a way as to make a right angle with the sides of the slot 9. This is caused by the fact that link 11 is pivoted to key-lever 13 at 12, so that the roller 10 on the end of the

link 11 tends to describe an arc of a circle having its center at 12. As the intermediate lever 7 is, however, pivoted at 8, the said slot will swing on an arc having 8 as its center.

By reason of the spring 16, the intermediate link 11 will be forced to follow a different movement, namely its end 10 will be compelled to move on an arc of a circle the center of which is at the key-lever pivot 14 just as would be the case if the intermediate link had been made integral with the key-lever 13. This arc is shown in dotted lines on all three figures and is designated as A—14. The arcs having their centers at pivots 8 and 12, respectively, are likewise shown in dotted lines and bear the indicia A—8 and A—12.

As the weight of the type-bar 1 is in actual practice counterbalanced by the weight of the intermediate lever 7 and the weight of the key-lever 13, there will be but a very slight tendency for the elongation of the spring 16 as long as there is nothing to interfere with the free movement of the various parts of the mechanism. As a result of this, the mechanism will assume the position as shown in Fig. 2, which shows the mechanism at the instant when the type 4 make their incipient contact with the platen 5. It should be noted that now the roller 10 on the end of the intermediate link 11 has moved toward the left along the arc A—14, and now no longer points vertically but lies to the left of the vertical center-line C—C'. Thus far the spring 16 has served merely to keep the link 11 against the stop 15.

Now, as shown in Fig. 3, when the movement of the type-bar 1 is interrupted by its coming into contact with the platen 5, it will, by virtue of the engagement of the gears 3 and 6, likewise prevent the further movement of the intermediate lever 7 about its pivot 8. As the pressure on the key at the end of key-lever 13 is however maintained, the key-lever 13 will continue to move about its pivot 14. The intermediate link 11, were it integral with key-lever 13 would prevent this motion and as a result the key at the end of the key-lever would impart a distinct shock to the finger of the operator by reason of the sudden stopping of the mechanism.

In the construction according to my invention, however, and especially because of the spring 16 and the pivot 12, the key-lever is permitted to move downwardly a short distance, while the roller 10 slides down along the slot 9 in the intermediate lever 7, so that now the said roller will move along the arc A—12 having its center at the pivot 12 of the said intermediate link 11. It should be particularly noticed that this exerts a slight upward push on the intermediate lever 7, as the movement of the roller 10 is not in a straight line, but on an arc, and hence the type-characters on the end of the type-bar 1



will be slightly retracted, which is just what is desired in a typewriter action; in other words the impression will not be "dead" but snappy.

5 On releasing the key, the spring 16 will tend to return the link 11 to its original position, and the spring 17 on the key-lever will return the latter to its original position so that the entire mechanism will re-  
10 sume its position as shown in Fig. 1.

Attention is directed to the fact that the intermediate link 11, at the final position of the stroke, will lie to the right of the center-line C—C', as shown in Fig. 3. The position  
15 of the key-lever 13 and link 11 at the end of the stroke is also shown in dotted outlines superimposed upon Fig. 2. It will thus be seen that the spring 16 will only be under increased tension at the extreme end of the  
20 stroke, and as I contemplate making this spring of such strength that it will not move materially until the type-bar strikes the platen, it will act as an efficient shock absorber for the keys.

25 Obvious modifications may be made without departing from the scope of my present invention.

What I claim is:

1. In a type-bar action, a key-lever, a type-  
30 bar, an intermediate lever, and a connection between said intermediate lever and said key-lever, comprising a link pivotally mounted on said key-lever and moving in a slot in said intermediate lever, said link being spring  
35 restrained in one direction to permit the key-lever to continue its movement after the completion of the printing stroke of said type-bar and at the same time to give said type-bar an initial kick-back.

40 2. In a type-bar mechanism for typewriters the combination of a pivoted key-lever, a link pivoted to the same, a pivoted intermediate lever having a slot, connection between said slot and said link comprising a  
45 pin thereon, a pivoted type-bar, and gears on said type-bar and intermediate lever engaging each other.

3. In a type-bar mechanism for typewriters the combination of a pivoted key-lever, a link  
50 pivoted thereto, a stop on said key-lever limiting the movement of said link in one direction, a spring biasing said link in the direction of said stop, a pivoted intermediate lever having a slot, connection between said slot  
55 and said link comprising a pin and roller thereon, a pivoted type-bar and gears on said type-bar and intermediate lever engaging each other.

4. In a type-bar mechanism for typewriters  
60 comprising a key-lever and a slotted intermediate lever, the combination of a connecting link pivoted on said key-lever and having a portion engaging the slot of said intermediate lever, a stop on said key-lever lim-  
65 iting the pivotal movement of said link in one

direction and a spring biasing said link against said stop.

5. In a type-bar mechanism for typewriters comprising a slotted pivoted intermediate lever connected with a link by means of a pin,  
70 the combination of resilient means biasing said link in a direction toward the pivot of the intermediate lever.

6. In a type-bar action mechanism for typewriters, the combination of a key-lever,  
75 a link pivoted thereto, an intermediate lever having a slot engaging a roller on the free end of said link, a spring biasing the link in a direction toward the pivot of said intermediate lever, and a stop limiting the movement  
80 of said link.

7. In a type-bar action for typewriting machines, the combination of a key-lever pivoted at one end, a link pivoted to said key-  
85 lever, a slotted intermediate lever pivoted at one end and having a gear at its free end, a pin on said link in sliding engagement with said intermediate lever, and a pivoted type-bar having a gear at its pivoted end, said  
90 gears being in engagement with each other.

8. In a type-bar action for typewriting machines, the combination of a key-lever pivoted at one end, a link pivoted at one end thereof to said key-lever, a stop to limit the pivotal  
95 motion of said link in one direction, an intermediate lever pivoted at one end and having a gear at its free end and a slot near the pivoted end, a pin on said link in sliding engagement with said intermediate lever, and a  
100 pivoted type-bar having a gear at its pivoted end in engagement with the teeth on said intermediate lever.

9. In a type-bar action for typewriting machines, the combination of a key-lever pivoted at one end, a link pivoted at one end thereof  
105 to said key-lever, a stop to limit the pivotal motion of said link in one direction, an intermediate lever pivoted at one end and having a gear at its free end and a slot near the pivoted end, a pin on said link in sliding engagement  
110 with said intermediate lever, and a spring tending to force said link toward the said stop.

10. In a type-bar mechanism for typewriters comprising a key-lever, a slotted and piv-  
115 oted intermediate lever, and a pivoted link on said key-lever having a pin in slidable engagement with said slot, the combination of a stop on said key-lever and a spring connecting said key-lever and said link, said stop  
120 limiting the pivotal movement of said link in one direction and the spring biasing said link against said stop.

11. In a type-bar mechanism for typewriting machines having a pull-bar pivoted to a  
125 key-lever and having said pull-bar in slidable engagement with a slot in an intermediate lever by means of a pin, the combination of means for limiting and controlling the move-  
130 ment of said pull-arm comprising a resilient



connection between the said pull-arm and said key-lever and a stop on said key-lever.

12. In a type-bar mechanism for typewriters, a key-lever and resilient means for taking up the shock when the key-lever reaches the extreme lower end of its stroke comprising a link pivoted on said key-lever, a stop on said key-lever in fixed relation to the pivot point of said link, and a spring biasing said link toward said stop.

In witness whereof, I have hereunto subscribed my name.

MAX GARBELL.

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of January, A. D. 1931.

[SEAL.]

M. J. MOORE,  
*Acting Commissioner of Patents.*