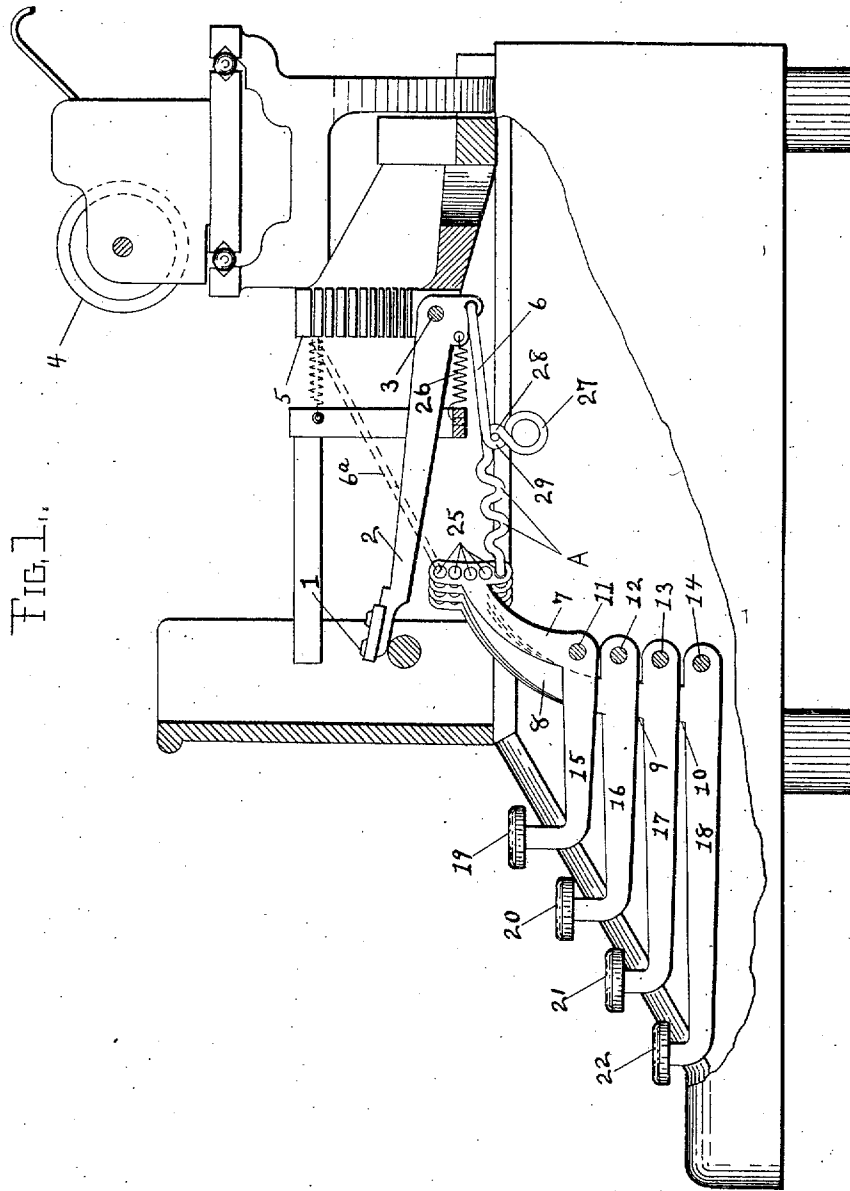


No. 884,735.

PATENTED APR. 14, 1908.

C. W. HOWELL.
TYPE WRITING MACHINE.
APPLICATION FILED OCT. 20, 1906.

2 SHEETS—SHEET 1.



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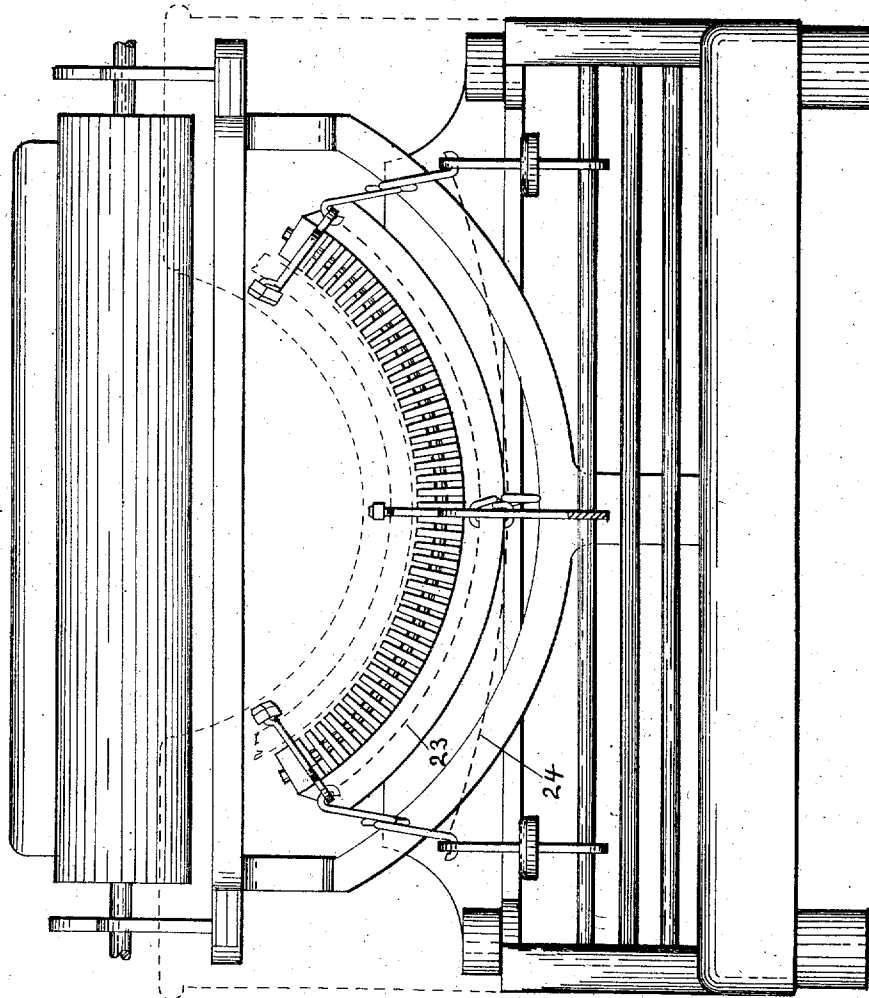


Fig. 2.

WITNESSES:

Lu S. Condit
C. W. Howell, Jr.

INVENTOR

Charles W. Howell

UNITED STATES PATENT OFFICE.

CHARLES W. HOWELL, OF NEWARK, NEW JERSEY, ASSIGNOR TO SUN TYPEWRITER COMPANY,
A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

No. 884,735.

Specification of Letters Patent.

Patented April 14, 1908.

Application filed October 20, 1906. Serial No. 339,782.

To all whom it may concern:

Be it known that I, CHARLES W. HOWELL, a citizen of the United States, residing in Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to the type actions of writing machines, especially to those in which type bars strike rearwardly against the front side of the platen.

One of the objects of the invention is to provide improved and inexpensive means for cushioning the key stroke at both the beginning and end thereof. To this end I change the form of a link which connects the key to the type bar, by making said link with a loop between its ends to permit slight lengthening of the link at the beginning of the key stroke when the key is struck sharply, and also at the end of the key stroke; and I provide means for mechanically limiting the extent of longitudinal yielding action of the link, so as to avoid undue depth of stroke of the key.

Another object of the invention is to provide a link of such form that it may be greatly lengthened or shortened by the mechanic to adjust it to its connections. This object I attain by crimping the link into zigzag form between its ends, this form enabling the workman to lengthen or shorten the link very readily.

Another part of the invention relates to the manner of connecting the keys to the type bar to secure substantially uniform dips of the keys, as well as further improvement in the touch of the keys. The type bars are pivoted in an arc at their rear ends to swing up and backwardly, said arc curving upwardly from its middle to its ends, as in the well known "Sun" front strike writing machine. I incline rearwardly the upstanding arms of the key-bearing bell-cranks at the front of the machine, so that the links which extend backwardly from said arms to the type bars lie at obtuse angles to said arms; the rear ends of the links being tilted up at the sides of the series to gradually increasing heights to accommodate the gradual increase in the heights of the types bars, and being at their forward end connected to the lever

arms at proportionally increasing heights from the middle to the sides of the set, to compensate for their increased obliquity to the levers and render the angular movements of the levers during the printing strokes substantially uniform for the set of levers.

Other objects and advantages will hereinafter appear.

In the accompanying drawings, Figure 1 is a sectional longitudinal elevation taken from front to rear of a "Sun" typewriting machine provided with my improvements. Fig. 2 is a front elevation.

Types 1 are mounted upon type bars 2 pivoted at 3 to strike rearwardly against the front side of a platen 4; the type bars being pivoted at their rear ends upon a segment 5 in an arc, so as to swing upwardly and backwardly, said arc curving upwardly from its middle to its ends, Fig. 2. Links 6 extend forwardly from the type bars 2 to the upstanding arms 7, 8, 9, 10, of four sets of bell-cranks pivoted respectively on horizontal transverse rods 11, 12, 13, 14, placed one above another; said bell-cranks provided with forwardly extending arms 15, 16, 17, 18, bearing at their forward ends keys in four banks, 19, 20, 21 and 22. The upstanding lever arms incline rearwardly from the fulcrum rods and lie at obtuse angles to the links 6, each arm taken with its link forming a toggle which is only partly open so that the leverage of the key upon the type bar is greatest at the initial part of the key stroke and gradually diminishes during the printing stroke, whereby sharp resistance of the key to the finger at the beginning of the stroke is avoided, while the type bar is speeded as it approaches the platen and caused to deliver a powerful blow.

The lever arms 7, 8, 9, 10 in the four gears, are of four lengths to correspond with the various heights of their fulcrum rods and terminate nearly on a single level at their upper ends; but the forwardly extending arms 15, 16, 17, 18, are of graduated lengths due to the various resistance of the key banks from the fulcrum rods, thereby compensating for the differences in the heights of the upstanding arms, so that uniform depressions of the keys effect substantially uniform forward movements of the upper ends of the upstanding lever arms throughout the system.

The rear ends of the links are tilted up at the sides of the system to gradually increase the heights to accommodate the gradual increase in the heights of the type bars. The points of connection of the links to the stop-bar is indicated by the dotted line 23, Fig. 2. The extreme left hand link is indicated in dotted lines at 6^a, Fig. 1. The links at their forward ends are connected to the lever arms at proportionally increasing heights from the middle to the sides of the system to compensate for their increased obliquity to the levers, whereby the angular movements of the levers during the printing strokes and hence the dips of the keys are rendered substantially uniform all over the keyboard. The points of connection from the forward ends of the links to the upstanding lever arms are indicated roughly by a dotted line 24, Fig. 2. It will be understood that the links may be connected to the short arms at different heights to the points of connection of the long arms in order to preserve uniformity of dip of the finger keys. Each lever may be provided with a series of eyes 25, Fig. 1, into any one of which the link may be caught. The width of the system of elbow levers is greater than the width of the system of type bars, as seen at Fig. 2, and the links 6 fan out or diverge slightly from the type bars forwardly to the lever arms. The type bars and levers are returned to normal position by any suitable springs 26.

Each of the links 6 is formed with springy wire, and is formed between its ends with a loop 27 to permit lengthening of the link at the operation of the key. Means are also provided upon the link for mechanically limiting the extent of the longitudinal yielding action of the link, this being preferably done by twisting the loop so that the legs 28 and 29 thereof, cross or hook into each other, said legs being slightly separated but engageable with each other during the lengthening of the link to prevent further lengthening of the latter. Thus the loop may be made so weak as to yield readily and cushion the key touch without being subject to such an undue extent of yield as to render the dip of the key so great as to be prohibited. The loops 27 may lie conveniently alongside of one another, and hence the cushioning of the keys is provided for without calling for an undue amount of room for cushioning mechanism.

The link 6 may be crimped into zigzag form as at A, with five or more bends, as illustrated at Fig. 1, for convenience in lengthening or shortening the link to accommodate it to different positions on different levers. When it is desired to lengthen the link all of the crimps may be opened slightly, or to shorten the link, they may be closed slightly by a suitable tool.

variations may be resorted to within the

scope of my invention, and portions of my improvements may be used without others.

1. In a typewriting machine, the combination with a type-bar and a key, of an intervening link formed of springy metal having a loop between its ends to permit lengthening of the link when the key is struck sharply; means being provided for mechanically limiting the extent of longitudinal yielding action of the link.

2. In a typewriting machine, the combination with a type-bar and a key, of an intervening link formed of springy metal having a loop between its ends to permit lengthening of the link when the key is struck sharply; means being formed upon the link for mechanically limiting the extent of longitudinal yielding action of the link.

3. In a typewriting machine, the combination with a type-bar and a key, of an intervening link in the form of a wire which between its ends is formed into a spring; two parts being formed upon the link one of which is movable into engagement with the other during the lengthening of the link to prevent further lengthening of the latter.

4. In a typewriting machine, the combination with a type-bar and a key, of an intervening link in the form of a wire which between its ends is formed into a loop to permit longitudinal extension of the link; the loop being twisted so that one leg thereof hooks into the other; said legs being slightly separated but engageable with each other during the lengthening of the link to prevent further lengthening of the latter.

5. In a typewriting machine, the combination with a type-bar and a key, of an intervening link of springy metal, said link formed between its ends into a loop to permit longitudinal extension of the link, an obstruction being formed upon said link in the path of one leg of said loop, to permit the link when tensioned to lengthen only until said leg engages said obstruction.

6. In a typewriting machine in which type bars are pivoted in an arc at their rear ends to swing upwardly and backwardly against the front side of a platen, said arc curving upwardly from its middle to its ends, the combination with a set of rearwardly inclined upstanding lever-arms pivoted upon a common horizontal transverse axis, of pull-links extending backwardly from said lever-arms to said type-bars and lying at obtuse angles to the lever-arms; the rear ends of the links being tilted up at the sides of the series to gradually increasing heights to accommodate the gradual increase in the heights of the type-bars, and being at their forward ends connected to the lever-arms at proportionally increasing heights from the middle to the sides of the set, to compensate for their increased obliquity to the levers and

render the angular movements of the lever during the printing strokes substantially uniform for the set of levers.

7. In a typewriting machine in which type bars are pivoted in an arc at their rear ends to swing upwardly and backwardly against the front side of a platen, said arc curving upwardly from its middle to its ends, the combination with a set of keys arranged in banks at different heights, of elbow levers carrying said keys and fulcrumed behind the keys upon a set of horizontal transverse fulcrum rods one above another; the levers upon the topmost rod carrying the keys in the rear banks, the levers upon the next lower rod bearing the keys in the next forward bank, and the levers upon the next lower rod bearing the keys in the next forward bank; said elbow levers being formed with upstanding arms inclining rearwardly of said rods; said elbow levers so proportioned that uniform dips of the keys in the several banks produce substantially uniform forward movements of the upper ends of said arms; and pull links extending backwardly from said arms to said type-bars and lying at obtuse angles to the lever-arms; the rear ends of the links being tilted up at the sides of the series to gradually increasing heights to accommodate the gradual increase in the heights of the type-bars and being at their forward ends connected to the lever arms at proportionately increasing heights from the middle to the sides of the system of lever arms to compensate for the

increased obliquity of the links to the lever arms, and to render the dip of the keys substantially uniform for the set of type-bars.

8. In a typewriting machine in which type bars are pivoted in an arc at their rear ends to swing upwardly and backwardly against the front side of a platen, said arc curving upwardly from its middle to its ends, the combination with a set of keys arranged in banks at different heights, of elbow levers carrying said keys and fulcrumed behind the keys upon a set of horizontal transverse fulcrum rods one above another; the levers upon the topmost rod carrying the keys in the rear banks, the levers upon the next lower rod bearing the keys in the next forward bank, and the levers upon the next lower rod bearing the keys in the next forward bank; said elbow levers being formed with arms upstanding from said rods; and pull-links extending backwardly from said arms to said type bars; the rear ends of the links being tilted up at the sides of the series to gradually increasing heights to accommodate the gradual increase in the heights of the type-bars; the width of the system of elbow levers being greater than the width of the system of type-bars, and said links diverging from the type-bars forwardly to the lever-arms.

CHARLES W. HOWELL.

Witnesses:

WM. H. CAMFIELD,
RALPH LANCASTER.