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G. G. GOING

TYPEWRITING MACHINE

Filed April 23, 1921

2 Sheets-Sheet 1

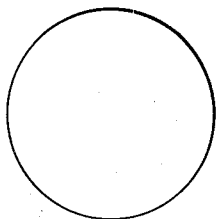
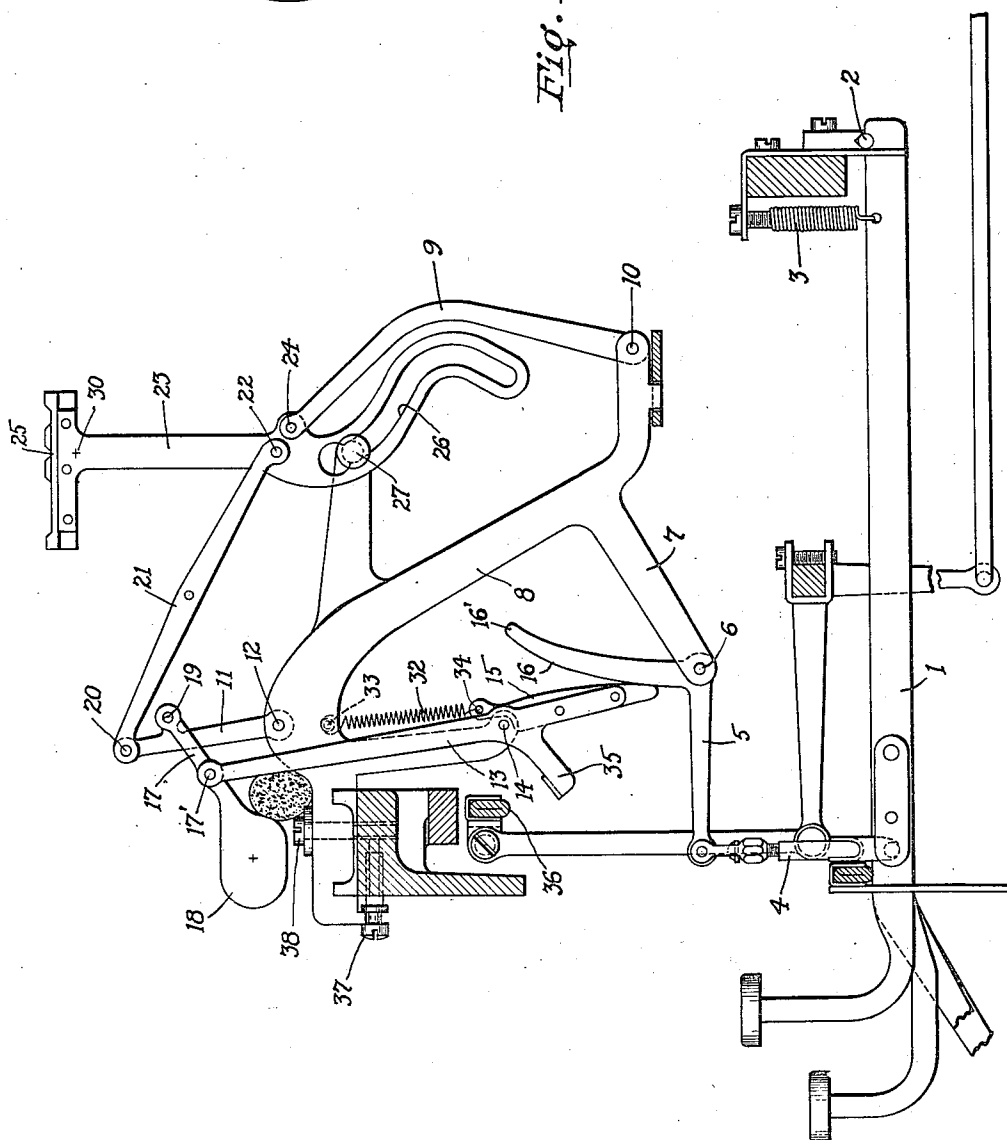


Fig. 1



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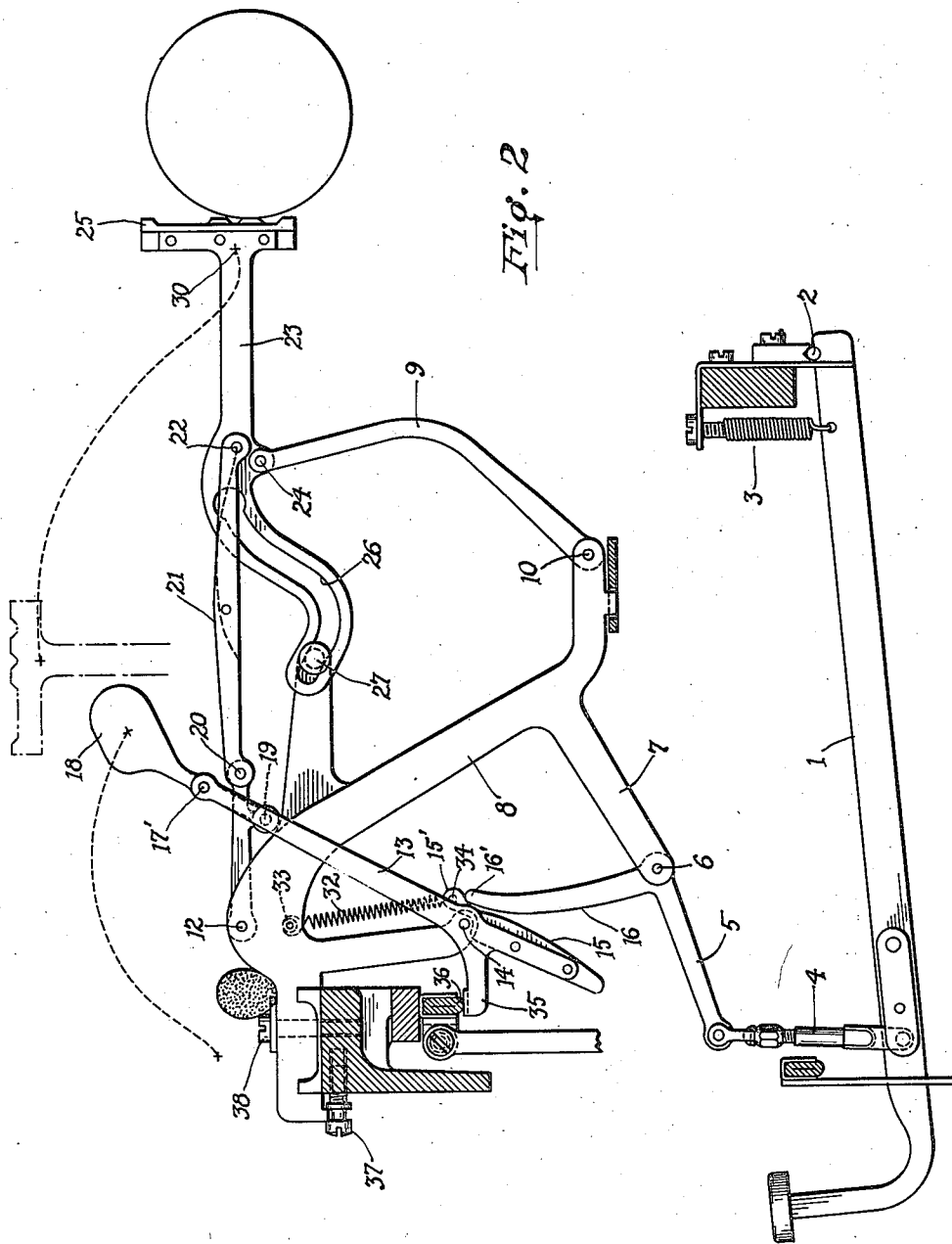
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TYPEWRITING MACHINE

Filed April 23, 1921

2 Sheets-Sheet 2



INVENTOR  
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BY  
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## UNITED STATES PATENT OFFICE.

GEORGE GOULD GOING, OF MIDDLETOWN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NOISELESS TYPEWRITER COMPANY INC., A CORPORATION OF DELAWARE.

## TYPEWRITING MACHINE.

Application filed April 23, 1921. Serial No. 464,048.

*To all whom it may concern:*

Be it known that I, GEORGE GOULD GOING, a citizen of the United States, residing at Middletown, in the county of Middlesex and State of Connecticut, have invented certain new and useful Improvements in Typewriting Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to typewriting machines, and more particularly to improved type actions thereof.

It is an object of the invention to provide an improved type action including a bodily movable type carrier and force-transmitting and direction-and speed-controlling connections thereto, to permit rapid operation and effect printing substantially without noise.

It is a further object to provide a practical and efficient type action wherein the type head has a relatively long movement from retracted to printing limits while the type carrier has a shorter bodily movement, whereby an increased number of the actions can be arranged in an arc in advance of the platen, but without materially extending the fore-and-aft dimension of the machine.

Another object is to provide a simple and improved type action having features of structural superiority and functional advantage.

Other objects and advantages will be in part noted hereinafter in connection with the following description of the accompanying drawings, which illustrate an exemplary embodiment of the invention, and in which

Figure 1 is a side view of the improved type action with certain of the associated parts of the machine, and

Figure 2 is a similar view showing the parts of the type action in printing position, that is, at the end of the printing stroke.

As illustrated, the respective key levers 1 are pivotally mounted at the rear ends on a fulcrum 2, being urged upwardly by a coil spring 3. Each key lever is connected through a link 4, adjustable in length, to the fore end of the horizontal arm of a bell crank lever 5, the latter being pivoted at 6 on a downwardly and forwardly projected arm 7 of a supporting plate or bracket 8. Bracket 8 further pivotally supports a link 9 at the

rear point 10, a link 11 at the top point 12, and a sub-lever 13 at front point 14. Lever 13 has attached to the lower end thereof a plate 15 provided with a cam edge against which the cam edge 16 of the vertical arm of the bell crank 5 contacts and works. The lever 13 at its upper end is pivotally connected at 17 to an element 17, having an enlarged or weighted portion 18 at one (front) end and having its opposite (rear) end connected at 19 to an off-set portion of link 11, the free end of the latter being pivotally connected at 20 to the fore end of a link 21 in turn pivotally connected at 22 to a bodily movable type carrier 23. Link 9, pivoted at its lower end to supporting plate 8, is also pivotally connected at 24 to the type carrier 23. The carrier itself comprises a straight end portion which carries the type head 25 and an angular portion provided with a cam slot 26 receiving the headed pivot stud 27 fast on a rigid arm of the support 8. Movement is imparted to the type carrier 23 through the link 21, while the path of movement of the type head 25 of the carrier 23 is in turn controlled by the link 9 and the pin and slot connection 27, 26.

In operation, as the key lever 1 is depressed from the Figure 1 position, bell crank 5 is rocked to swing lever 13 about its axis of motion 14 and at an accelerated speed due to the rolling contact between the edge 16 of the vertical arm of the bell crank and the edge 15 of the lower end of the lever 13; that is, the point of contact progresses away from the axis 6 and towards the axis 14 as the key lever is depressed, to rapidly accelerate movement of the upper end of the lever 13 which carries the link 17 and the weighted portion 18. Movement of the type carrier 23 is contemporaneously effected through the link 17 to link 11 to link 21. On account, however, of the link 9 and the pin and slot connection 27, 26, the course of movement of a given point 30 of the type head 25 is parabolic, as shown in dotted lines, Figure 2. The face of the type head, moreover, on account of the same conditions, is changed from horizontal in retracted position to vertical in printing position. Towards the end of the stroke of the type carrier, the lower portion of the cam slot 26 co-acts with the pin 27 to insure

substantially a straight line thrust of the carrier towards the platen to effect printing. This final movement, moreover, is effected by the extension into substantial parallelism of the links 11 and 21, so that the pivotal points 12, 20 and 22 are in line, the links mentioned thus acting in the manner of a toggle to decelerate the speed of the type head and augment the effectiveness of the power transmitted thereto, which is further augmented by the contemporaneous alignment of the sub-lever 13 with the link 17 connecting the same to the link 11, that is, the points 17', 19 and 14 are moved in line as the toggle links 11 and 21 are also extended. The final movement of the type carrier is thus accomplished through a considerable leverage, insuring forceful pressure printing at the end of the type head stroke.

Such final movement of the type carrier is effected by the weighted end 18 of the link 17, this weight serving during initial depression of the key lever to acquire and store energy, which energy is expended after arrest of the key lever by continuance of the swinging movement of the weight 18 and the resultant continued movement of the type carrier. The key lever is stopped in its down stroke, (Fig. 2) by the upper end 16' of lever 16 contemporaneously contacting with the heel 15' of plate 15 where the edge is concaved instead of convexed. In practice the key lever stroke is actually limited when the end of lever 16 reaches the point of reversed curvature, that is from convex to concave, of the edge of plate 15 and the point mentioned is preferably located so that the key is slightly impelled upwardly as the type-head moves its final, say, one-eighth inch toward printing limit. By the same means, if the key is forcibly held all the way down, the type-head is thereby held slightly away from the platen.

The spring 3 serves to re-elevate the key lever and a spring 32 stretched between fixed point 33 on the bracket 8, and a movable point 34 on the lever 13 or otherwise suitably positioned and connected as desired, serves to restore the other movable parts of the action to retracted position. This restoration is further facilitated and expedited by the co-operation of an off-set arm 35 on the sub-lever 13, acting on the printing stroke of the type carrier to engage and actuate a universal bar 36, the re-action between these parts at the protracted limit of the type carrier hastening the initial impulse of the parts to return to normal position.

It will be noted that the stroke of the type carrier 23 is limited by the links 11 and 21 substantially independently of the platen. Furthermore, as the type carrier, link 11, link 9, bell crank 5 and sub-lever

13 are all mounted at relatively fixed positions on the supporting bracket plate 8, fore and aft adjustment of the latter (permitted by adjusting screw 37 and set screw 38) serves to govern the throw of the type carrier with close accuracy for the best printing results. Moreover, it is to be particularly noted that while the path traversed, for example by the point 30 in the type head, is relatively long, the movement of the parts along the first and major portion of the distance is extremely rapid, and that as the propelling force of the type carrier is shifted from the key lever (when end 16' contacts with heel 15') to the energy storing means 18, the speed of the type carrier is abruptly decreased but without actual stoppage, without shock and with, moreover, a considerably-augmented power on account of the movement into alignment of the levers 13 and 17 on the one hand and the links 11 and 21 on the other. It is to be noted, also, that the retracted position of the type carriers with the relatively long path of point 30 and the relatively short path of point 22, or a major rotary and minor bodily movement of the type carrier 23 enables a segment disposition thereof about an arc having a considerable radius from the printing point, and consequently a sufficient number of the type carriers in this arrangement is permitted to have connection with a corresponding number of key levers whereby a single shift machine is permitted; that is, each type head need carry only two type characters.

It is to be understood, also, that the embodiment of the invention illustrated is susceptible to certain modifications without departure from the scope of the invention and without sacrifice of the attendant and major features of advantage herein noted and resident in the improvement.

Having described my invention, what I claim is new and desire to secure by Letters Patent is:

1. In a typewriting machine, in combination, a key lever, a type carrier supported in a manner adapted to be movable bodily in a continuous curvilinear path, an operative connection therebetween arranged to move the type carrier quickly on the initial and major portion of its printing stroke, said connection including means for moving the type carrier relatively slowly and with augmented force on the final portion of its stroke, and independent means to control the path of movement of said type carrier.

2. In a typewriting machine, in combination, a key-lever, a type-carrier bodily movable in a curvilinear path, an operative connection therebetween to move the latter quickly on the initial and major portion of its printing stroke and relatively slowly and with augmented force on the final por-

tion of such stroke, and independent means including a link pivoted to said type-carrier and having a fixed axis of motion, to control the path of movement of said type-carrier.

3. In a typewriting machine, in combination, a key-lever, a type-carrier bodily movable in a curvilinear path, an operative connection therebetween to move the latter quickly on the initial and major portion of its printing stroke and relatively slowly and with augmented force on the final portion of such stroke, and independent means including a link having a fixed axis of motion at one end and pivotally connected to said carrier at its other end to control the path of movement of said type-carrier.

4. In a typewriting machine, in combination, a key-lever, a type-carrier bodily movable in a curvilinear path, an operative connection therebetween to move the latter quickly on the initial and major portion of its printing stroke and relatively slowly and with augmented force on the final portion of such stroke, and independent means including a link having a fixed axis of motion at one end and pivotally connected to said carrier at its other end, and a cam slot and co-operable stationary pin, to control the path of movement of said type-carrier.

5. In a typewriting machine, in combination, a key-lever, a type-carrier bodily movable in a curvilinear path, an operative connection therebetween to move the latter quickly on the initial and major portion of its printing stroke and relatively slowly and with augmented force on the final portion of such stroke, and independent means including a link having a fixed axis of motion at one end and pivotally connected to said carrier at its other end, and a cam slot on said carrier and co-operable stationary pin to control the path of movement of said type-carrier.

6. In a typewriting machine, in combination, a platen, a depressible key-lever, a type-carrier bodily movable in a continuous curvilinear path and provided with a type head substantially at right-angles to the length of the carrier, supporting means for said carrier having operative connection with the latter to govern the positions thereof and arranged to insure a final linear advance of said carrier against said platen, and independent means including an energy storing member operatively connecting said key-lever and said type-carrier to move the latter, said energy storing member being arranged to spend its energy during the final linear advance of said type carrier.

7. In a typewriting machine, in combination, a platen, a depressible key-lever, a type-carrier bodily movable in a curvilinear path and provided with a type head substantially at right-angles to the length of the carrier, supporting means for said car-

rier having operative connection with the latter to govern the positions thereof, said means acting to position said carrier substantially vertically when withdrawn from said platen and substantially horizontally when moved against said platen, and independent means operatively connecting said key-lever and said type-carrier to move the latter.

8. In a typewriting machine, in combination, a platen, a depressible key-lever, a type-carrier bodily movable in a curvilinear path and provided with a type head substantially at right-angles to the length of the carrier, supporting means for said carrier having operative connection with the latter to govern the positions thereof, and independent means operatively connecting said key-lever and said type-carrier to move the latter, said last-mentioned means including a member to store energy on depression of said key-lever and to expend such energy in completing the movement of said type-carrier.

9. In a typewriting machine, in combination, a platen, a depressible key-lever, a type-carrier bodily movable at a curvilinear path and provided with a type head substantially at right-angles to the length of the carrier, supporting means for said carrier having operative connection with the latter to govern the positions thereof, and independent means operatively connecting said key-lever and said type-carrier to move the latter, said last-mentioned means including a member to store energy on depression of said key-lever and to expend such energy in completing the movement of said type-carrier, and including a lost-motion device intermediate said member and said key-lever.

10. In a typewriting machine, in combination, a platen, a depressible key-lever, a type-carrier bodily movable in a curvilinear path and provided with a type head substantially at right-angles to the length of the carrier, supporting means for said carrier having operative connection with the latter to govern the positions thereof, said means acting to position said carrier substantially vertically when withdrawn from said platen and substantially horizontally when moved against said platen, and independent means operatively connecting said key-lever and said type-carrier to move the latter, said last-mentioned means including a member to store energy on depression of said key-lever and to expend such energy in completing the movement of said type-carrier.

11. In a typewriting machine, in combination, a platen, a depressible key-lever, a type-carrier bodily movable in a curvilinear path and provided with a type head substantially at right-angles to the length of the carrier, supporting means for said carrier having operative connection with the latter to

govern the positions thereof, said means acting to position said carrier substantially vertically when withdrawn from said platen and substantially horizontally when moved against said platen, and independent means operatively connecting said key-lever and said type-carrier to move the latter, and including a lost-motion device intermediate said member and said key-lever.

12. In a typewriting machine, in combination, a platen, a type-carrier having a rotary and translatable movement, a key lever, and operative connecting means therebetween to effect an accelerated initial rotary movement of said carrier and a decelerated final translatable movement thereof on its stroke toward said platen, said connecting means, including energy storing member, arranged to augment the pressure of the type carrier during its final movement.

13. In a typewriting machine, in combination, a platen, a type-carrier having a rotary and translatable movement, a key lever, and operative connecting means therebetween to effect an initial rotary movement of said typecarrier for carrying the type through a major portion of its path of travel and a final translatable movement for carrying the type through a final minor portion of its path on the stroke toward said platen, said connecting means, including an energy storing member arranged to augment the pressure of said type carrier against the platen during its final movement.

14. In a typewriting machine, in combination, a platen, a type-carrier having a rotary and translatable movement, a key lever, and operative connecting means therebetween to effect an accelerated initial rotary movement of said carrier and a decelerated final translatable movement thereof on its stroke toward said platen, said means including means to store energy during said initial movement and to expend such energy in effecting said final movement of said carrier.

15. In a typewriting machine, in combination, a platen, a type-carrier having a rotary and translatable movement, a key lever, and operative connecting means therebetween to effect an initial rotary movement of said typecarrier for carrying the type through a major portion of its path of travel and a final translatable movement for carrying the type through a minor portion of its path on the stroke toward said platen, said means including means to store energy during said initial movement and to expend

such energy in effecting said final movement of said carrier.

16. In a typewriting machine, in combination, a type-carrier slidably mounted and arranged to have both rotary and translatable movement, a key-lever, and operative connecting means therebetween including two sub-levers having rolling contact, one of said sub-levers having a portion of reversed curvature to limit the movement of the other.

17. In a typewriting machine, in combination, a type-carrier slidably mounted and arranged to have both rotary and translatable movement, a key-lever, and operative connecting means therebetween including two sub-levers having rolling contact, the point of such contact progressing from the axis of the impelling sub-lever toward the axis of the impelled sub-lever on the printing stroke to accelerate the latter, one of said sub-levers having a portion of reversed curvature to limit the movement of the other.

18. In a typewriting machine, in combination, a type-carrier slidably mounted and arranged to have both rotary and translatable movement, a key-lever, and operative connecting means therebetween including two sub-levers having rolling contact, the point of such contact progressing from the axis of the impelling sub-lever toward the axis of the impelled sub-lever on the printing stroke to accelerate the latter, said impelled sub-lever having a portion of reversed curvature to limit the movement of the impelling sub-lever and the down-stroke of said key lever.

19. In a typewriting machine, in combination, a type-carrier slidably mounted and arranged to have both rotary and translatable movement, a key-lever, and operative connecting means therebetween including two sub-levers having rolling contact, the point of such contact progressing from the axis of the impelling sub-lever toward the axis of the impelled sub-lever on the printing stroke to accelerate the latter, said impelled sub-lever having a portion of reversed curvature to limit the movement of the impelling sub-lever and the down-stroke of said key lever prior to the final movement of said type-carrier on its printing stroke.

In testimony whereof I affix my signature, in the presence of two witnesses.

GEORGE GOULD GOING.

Witnesses:

A. W. AUSTIN,  
N. M. SEIFERMAN.