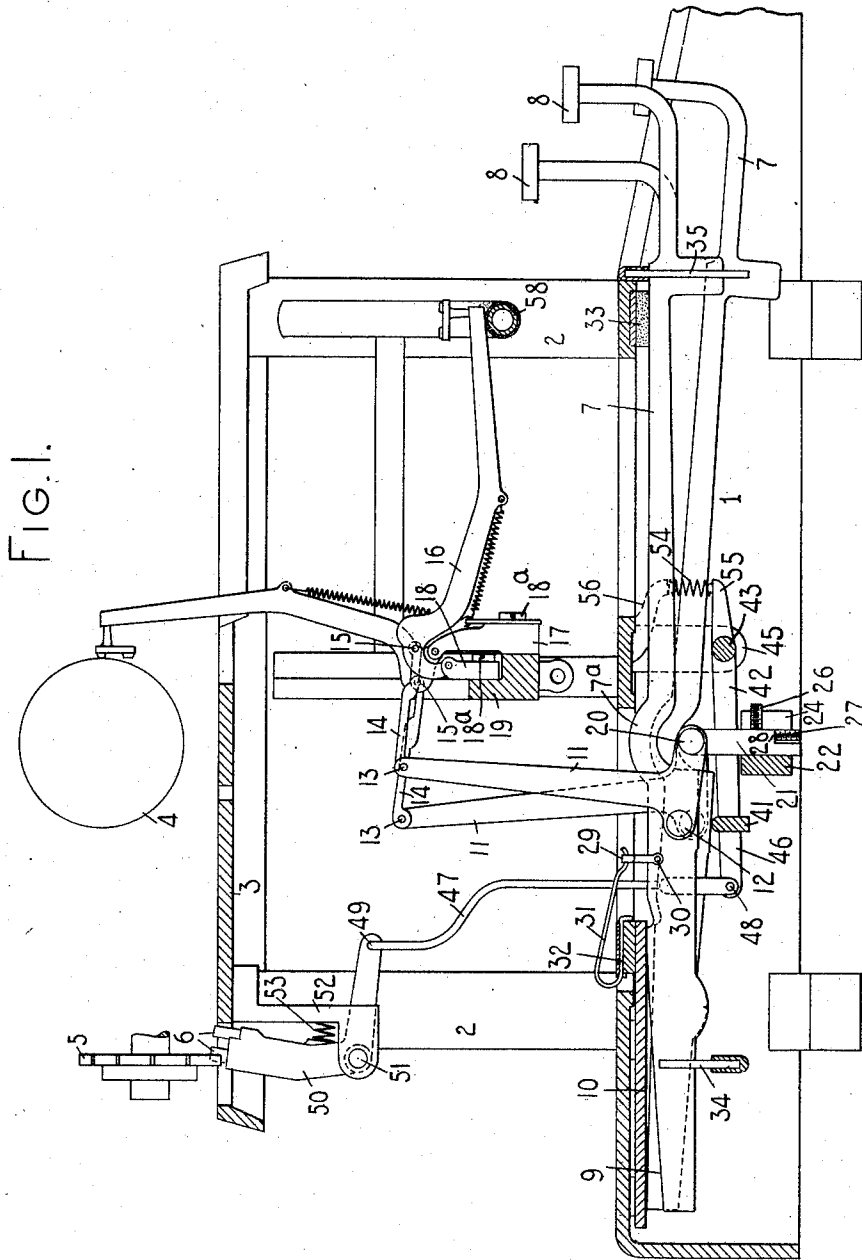


972,578.

5 SHEETS—SHEET 1.



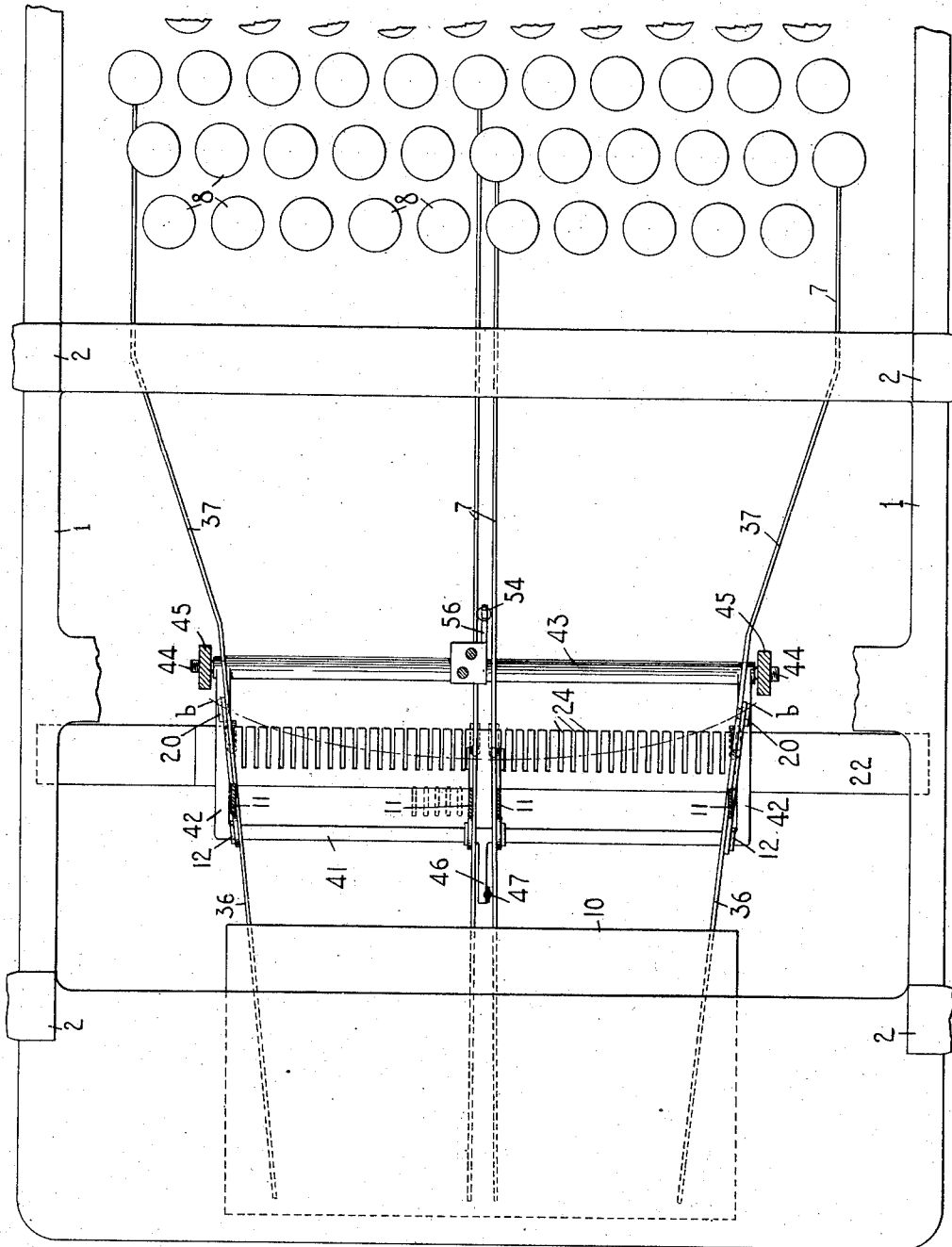
J. B. Reeves
 Wm. E. Smith.

George A. Scio
By Jacob F. Fildes
HIS ATTORNEY

972,578.

Patented Oct. 11, 1910.

5 SHEETS—SHEET 2.



WITNESSES:

J. B. Reeves
Charles Smith

FIG. 2.

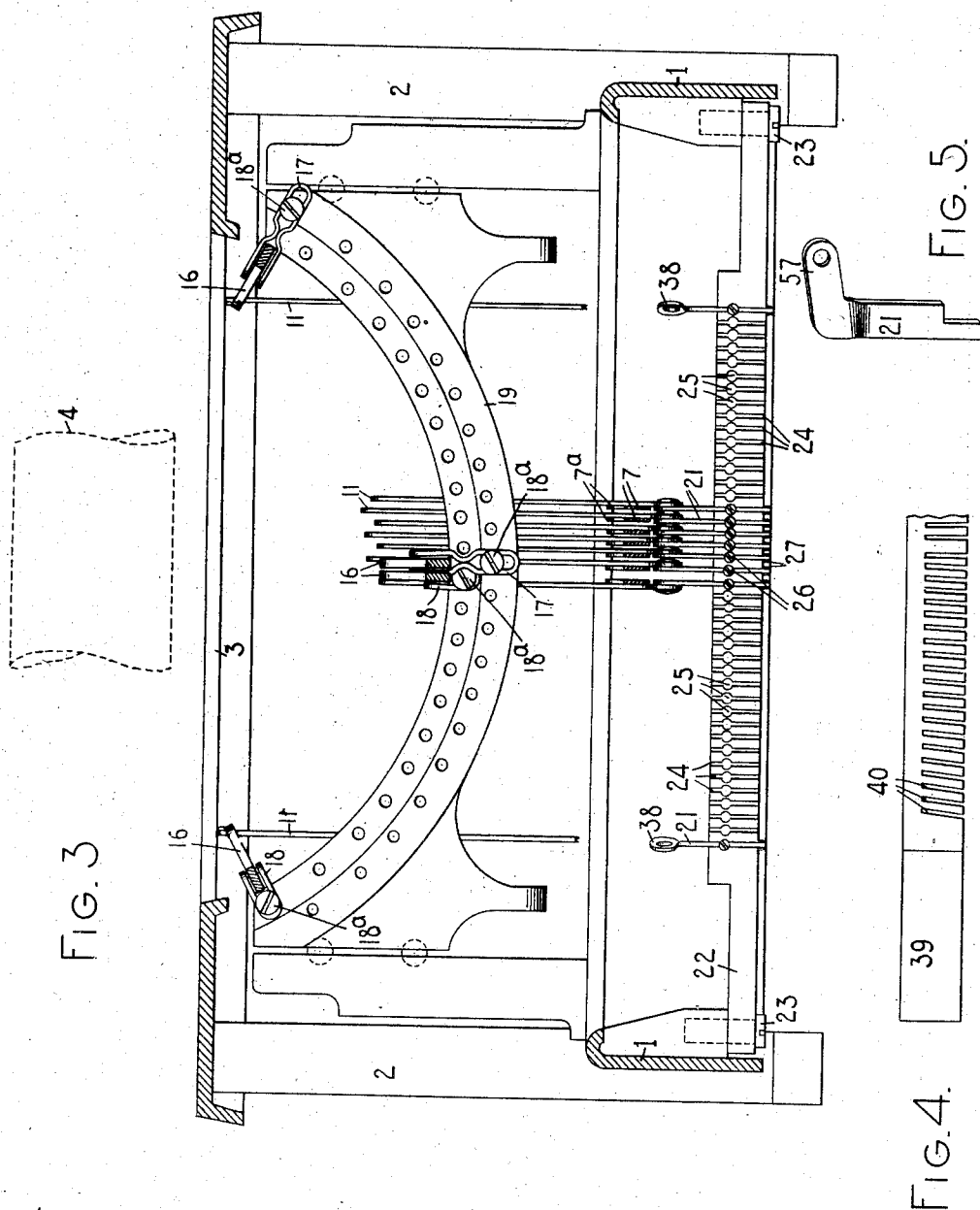
INVENTOR:

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972,578.

G. A. SEIB.
TYPE WRITING MACHINE.
APPLICATION FILED APR. 14, 1909.

Patented Oct. 11, 1910.
5 SHEETS-SHEET 3.



WITNESSES:

J. B. Reeves.
Charles Smith

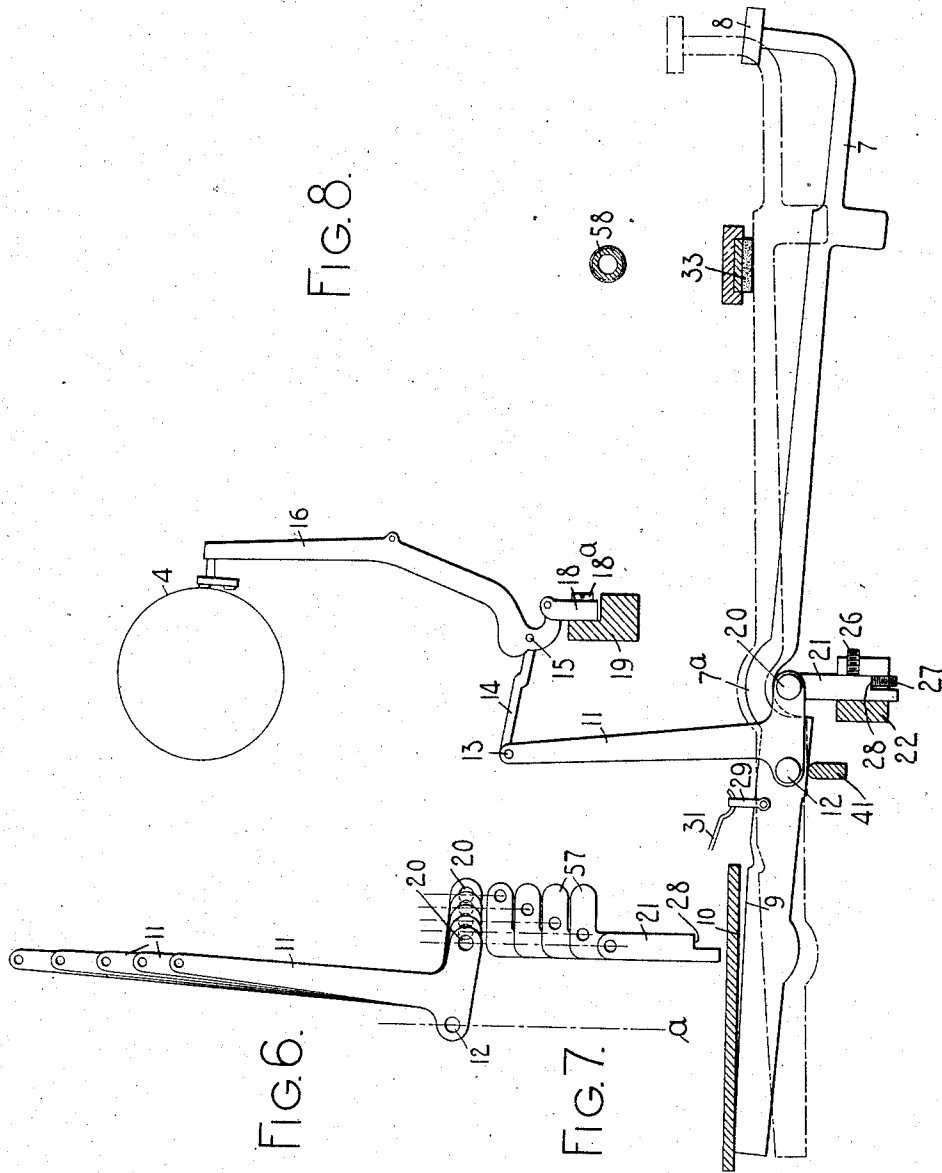
INVENTOR:

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972,578.

G. A. SEIB.
TYPE WRITING MACHINE.
APPLICATION FILED APR. 14, 1909.

Patented Oct. 11, 1910.
5 SHEETS—SHEET 4.



WITNESSES:

J. B. Reeves.
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972,578.

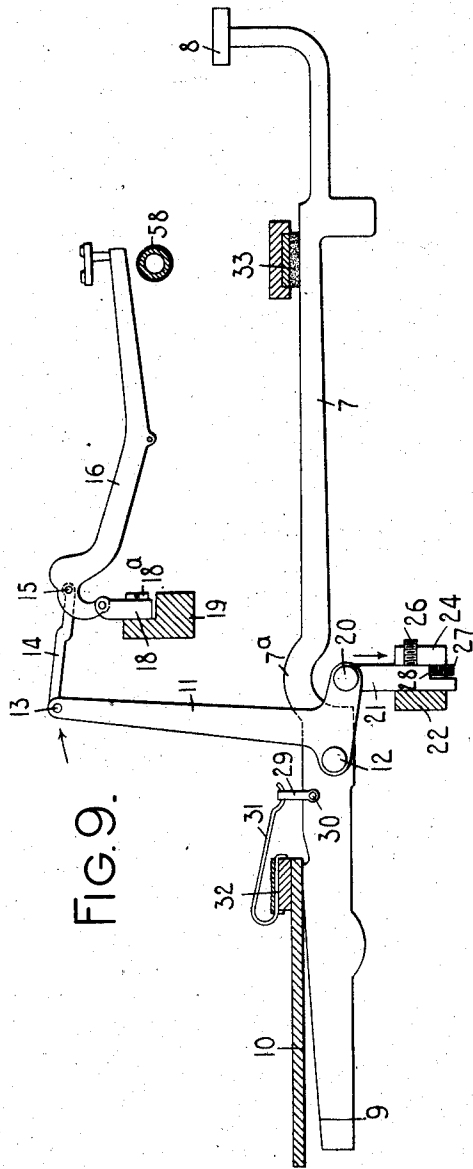


FIG. 9.

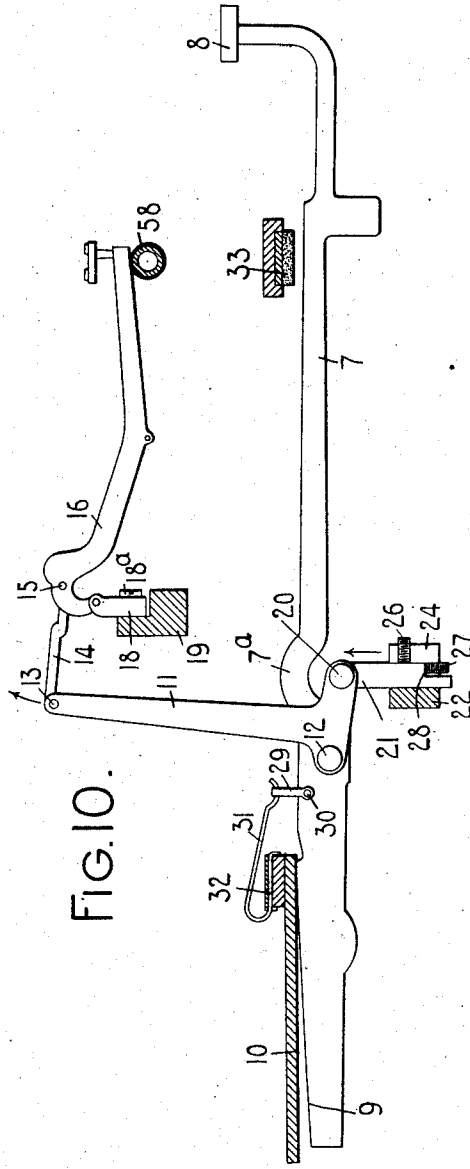


FIG. 10.

WITNESSES:

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 Charles E. Smith.

INVENTOR:

George A. Seib
 By Jacob F. Hill
 HIS ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE A. SEIB, OF ILION, NEW YORK, ASSIGNOR TO THE MONARCH TYPEWRITER COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

972,578.

Specification of Letters Patent.

Patented Oct. 11, 1910.

Application filed April 14, 1909. Serial No. 489,916.

To all whom it may concern:

Be it known that I, GEORGE A. SEIB, citizen of the United States, and resident of Ilion, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to typewriting machines and more particularly to type actions.

One of the objects of my invention is to provide substantially a uniform leverage throughout the system and to provide substantially a uniform dip for the various printing keys.

Another object of my invention is to provide means by which each type action as an entirety may be readily removed from the machine when desired.

Still another object of my invention is to provide means whereby the "let-off" of the escapement will be uniform with reference to the printing stroke of the type bar irrespective of the varying conditions of the key stroke.

A still further object of my invention is to provide efficient means for adjusting parts of the type action.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangements of parts and combinations of devices to be hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings wherein like reference characters indicate corresponding parts in the various views, Figure 1 is a central, vertical, fore and aft sectional view of a typewriting machine embodying my invention, only so much of the machine being shown in this and the remaining views as is necessary to illustrate my invention. Fig. 2 is a horizontal sectional view of the same, the section being taken above the base of the machine. Fig. 3 is a vertical, transverse sectional view of the machine, the section being taken forward of the type bar segment. Fig. 4 is a detail fragmentary plan view showing a part of a modified form of a kerfed supporting bar for the devices on which the sub-levers are pivoted. Fig. 5 is a detail perspective view of one of the devices on which a sub-lever at or near the side of the system is pivoted. Fig. 6 is a

side view showing a group of sub-levers. Fig. 7 is a side view showing a group of devices on which the sub-levers shown in Fig. 6 are pivoted. Figs. 8, 9 and 10 are skeleton views showing a type action in side elevation under different conditions of adjustment and use.

I have shown my invention embodied in the present instance in a typewriting machine similar to the Monarch machine in which a series of segmentally arranged type bars are mounted to strike against the front face of the platen and in which the type bar segment receives a case shifting movement relatively to the platen; but it should be understood that the invention may be embodied in other styles of typewriting machines.

The frame of the machine comprises a base 1, corner posts 2 and a top plate 3. The carriage (not shown) is or may be mounted in the usual manner on the top plate of the machine to travel from side to side thereof and carries the usual cylindrical platen 4 diagrammatically shown in the drawings. The carriage is operatively connected in the usual manner to an escapement wheel 5 with which feed dogs 6 coöperate.

Key levers 7 are each provided with a finger key 8 and have on the upper rear edges thereof curved contact edges 9 which have a rolling contact on a fulcrum plate 10 secured to the base of the machine. Each key lever has a sub-lever 11 pivoted thereto at 12. Each sub-lever is in the nature of an angular lever having an upwardly extending arm and a forwardly extending arm, the sub-lever being pivoted at 12, intermediate its ends and at the apex of the angle to the associate key lever. The pivotal points of connection 12 connecting the key levers with the sub-levers extend in a straight line, or substantially in a straight line transversely of the machine. The upper end of each sub-lever is pivoted at 13 to a draw link 14 pivoted at its forward end 15 to a type bar 16. The type bars are or may be of the same general character as those employed in the Monarch machine; and like them are mounted on two sets of hangers 17 and 18, respectively, secured in place by screws 18^a. The type bars are segmentally arranged upon a type bar segment 19 to strike upwardly and rearwardly against the front face of the platen 4. The upright arms of

the sub-levers 11 terminate substantially in an arc that corresponds with the arc-like arrangement of the set of links 14 to which said sub-levers are connected, and to the arc-like arrangement of the corresponding series or set of type bars, so that a direct fore and aft pull may be effected on the type bars through the links 14 actuated by the sub-levers 11. The forwardly extending arm of each sub-lever is fulcrumed on a pivot or fulcrum 20 carried by an upright device or supporting piece 21, mounted for vertical adjustment on a cross bar 22 which extends transversely of the machine beneath the key levers and sub-levers and which is secured at its ends to the base of the machine by screws 23 (Fig. 3). The forward side of this cross bar 22 is kerfed or slotted at 24 to receive the fulcrum supporting pieces 21. The walls of each slot 24 are drilled and tapped horizontally as at 25 to receive a set screw 26 adapted to bear at its rear end against the supporting device 21 received in the associated slot. The walls of each slot 24 are also drilled and tapped vertically to receive a set screw 27 adapted to bear at its inner end against a shoulder 28 formed on the companion supporting piece 21 in order to effect a vertical adjustment of the supporting piece or device when the screw 26 is loosened. Thus, by loosening the screw 26 the support 21 may be raised or lowered by the screw 27 until the fulcrum 20 of the associated sub-lever has been adjusted to its proper height. The screw 26 may then be tightened to secure the support 21 and the fulcrum 20 in their adjusted positions. The purpose of this adjustment of the fulcrums 20 will hereinafter more clearly appear. It will be observed that each of the key levers is arched as at 7^a to obtain the necessary clearance of the associated supporting piece 21 when the key is depressed.

In the Monarch machine as ordinarily constructed, each of the key levers has a notch or vertical slot beneath the fulcrum plate 10 and a stationary wire is provided that lies in said notches to prevent endwise motion of the key levers. It will be observed that by the present construction endwise motion of said levers is prevented by reason of the fact that each sub-lever is pivoted directly to its key lever and is also pivoted on a fixed fulcrum. The wire and notches referred to are thus rendered unnecessary and are not employed in the present construction. The pivot 12 by which the sub-lever is pivoted to its key lever, lies directly between the fulcrum 10 and the stationary fulcrum 20 of the sub-lever. By this disposition of the parts any sliding or creeping of the elongated tread 9 of the key lever on the fulcrum plate is prevented or reduced to so small an amount as to be unobjectionable. If the pivot pin 12 were not disposed in this

relation to the other parts, then when the key lever was depressed the rear end of the key lever would be caused to slide along the fulcrum plate lengthwise of said key lever and that would cause wear and friction.

Each key lever has a strap or hook 29 pivoted thereto at 30 for coöperation with the forward hooked end of a spring 31 secured at 32 to the base of the machine. These springs normally maintain the key levers in their elevated positions with the curved bearing face of the key lever in contact with the fulcrum plate 10 and with the forward end of the key lever seated against the pad 33 which limits its upward motion. The key levers are guided at their rear ends in a comb-plate 34 and at their forward ends in a comb plate 35.

From an inspection of Fig. 2 it will be observed that the key levers 7 are fanned outwardly and forwardly at 36 and 37 to compensate for the difference in width between the keyboard and the system of sub-levers pivotally connected to the key levers at the inclined or fanned portions 36 thereof, the system of sub-levers corresponding to the width of the system of type bars. In order that those portions of the sub-levers at the sides of the system which are connected to the key levers may be properly connected therewith and the sub-levers may move in the same planes as the portions 36 of the key levers to which they are connected, I have inclined the lower ends of each of the sub-levers to correspond to the inclined part 36 of the associated key lever to which it is connected. Thus from an inspection of Fig. 3 it will be seen that the upper end 38 of each of the supporting pieces 21 at the sides of the system is inclined in the same manner as the part 36 of the associated key lever and that the axis of the fulcrum 20 of each of the side actions is at right angles to the plane of the key lever at 36 where the angular sub-lever is connected therewith. It will be understood that the fanning of the key levers decreases from the sides to the middle of the system and that at the middle of the system the key levers are substantially straight fore and aft of the machine or without lateral bends, and that the associated sub-levers are situated in corresponding vertical planes which extend fore and aft of the machine. The upper end of each of the side sub-levers may be given a slight twist as indicated in Fig. 2 in order to bring the plane of the upper end sub-lever fore and aft of the machine so that the upper end of the sub-lever may properly coöperate with its associated pull link. Instead of bending or twisting the upper ends of each of the supporting pieces 21 as indicated at 38, a supporting bar 39, such as that illustrated in Fig. 4, may be employed wherein the slots 40 near the ends

of the series may be cut in inclined planes so that the supporting pieces as a whole at and near the ends of the series may be set to correspond to the disposition of the upper portions 38 in the first described construction. I prefer, however, to employ the construction shown in Figs. 1 to 3 as this construction facilitates manufacture.

A universal bar 41 is secured at its ends to arms 42 which project rearwardly from the rock shaft 43 pivoted at its ends as at 44 in depending bracket arms 45 on the base of the machine. The rock shaft 43, arms 42 and universal bar 41 form a rectangular frame (see Fig. 2) from which a rearwardly extending arm 46 projects. An upwardly extending link 47 is pivoted at its lower end, as at 48, to the arm 46, whereas the upper end of the link is pivoted at 49 to a forwardly extending arm of a dog-rocker 50 pivoted at 51 to a bracket 52 secured to the frame of the machine. The dog-rocker carries the feed dogs 6 hereinbefore referred to. An expansion spring 53 restores the dog rocker and the parts connected thereto to normal position. An expansion spring 54 coöperates with a forwardly projecting arm 55 on the universal bar frame and with a bracket 56, tending normally to elevate the universal bar and maintain the parts in normal position. It will be observed that the universal bar extends transversely of the machine beneath the key levers at the pivotal point of connection 12 between the key levers and the sub-levers. This position of the universal bar with reference to the pivotal connection between the sub-levers and key levers is an important factor in that the "let-off" of the escapement, effected by the depression of the universal bar, is at all times uniform with reference to the printing movement of the type bar irrespective of varying conditions of key strokes. Thus, it will be observed from an inspection of Fig. 8 that if the key stroke is such that the key lever should jump away from the fulcrum plate as indicated in dotted lines in said figure, this movement would take place around the point of pivotal connection 12 between the key lever and sub-lever and the effect of this jumping of the key lever away from its fulcrum would not affect the universal bar so as to interfere with the uniformity of the action of the escapement, since the key lever would practically turn around the universal bar as a pivot.

It will be understood that the sub-levers extend to progressively greater heights as the sides of the system are approached in order to be brought into substantial alignment with the type bars with which they are to coöperate, it being understood that the upper ends of the sub-levers and the type bars are substantially in co-extensive arcs. As hereinbefore stated the pivotal

points of connection 12 between the sub-levers and key levers are in a straight line across the machine and in order to effect substantially a uniform leverage on the various type actions throughout the system and to compensate for the varying heights of the upright arms of the sub-levers I have arranged the fulcrums 20 for the sub-levers at progressively greater distances from the pivot 12 as the sides of the system of sub-levers are approached. An inspection of Figs. 6 and 7 makes the progressive prolongation of the short arms of the sub-levers and the progressive forward stepping of the fulcrums on the supporting pieces 21 apparent. The supporting pieces may be straight upwardly extending pieces such as that shown in Fig. 1 or they may be formed as represented in Fig. 5 with forwardly extending projections 57, the pivots or fulcrums 20 being situated at various positions along the projections 57, depending on the position of the supporting piece 21 with reference to the system of sub-levers. From an inspection of Figs. 6 and 7 it will be seen that as the upright arms of the sub-levers are progressively longer the substantially horizontally disposed forwardly extending arms of the sub-levers become progressively longer and are fulcrumed at progressively greater distances from the dotted line *a* which represents the line of the pivots 12 which connect the sub-levers to the key levers. The progressive forward stepping of the fulcrums of the sub-levers is indicated by the dotted line *b* in Fig. 2. By this arrangement any variation in leverage due to the difference in length of the upwardly extending arms is compensated for and a substantial uniform leverage is provided throughout the system.

The adjustment of the parts will best be understood by referring particularly to Figs. 9 and 10. If it be found in adjusting the machine that a type bar is normally maintained off the type rest 58 as shown in Fig. 9, then the associated set screw 26 may be loosened and the screw 27 turned down. The effect of this will be to lower the associated fulcrum 20, thereby allowing the sub-lever to turn on its pivot 12, throwing the upper end of the sub-lever forward, so that the type bar may be brought to rest on its support 58. If, on the other hand, it be found that a key lever is normally maintained away from its arresting pad 33 as shown in Fig. 10, then an upward adjustment of the supporting piece 21 is effective to produce a bodily upward movement of the sub-lever, together with the forward end of the key lever, resulting in a proper adjustment of the parts to bring the forward end of the key lever into contact with its stop 33 and yet allow the type bar to remain on the type rest or support 58. It

will be seen therefore that the adjustment of the single member 21 is effective to properly adjust the different portions of the type action relatively to each other without in any way affecting the normal operation of the type action or the acceleration of the type bar effected through the rolling contact of the key lever on the fulcrum plate. Moreover, it will be understood that the adjusting devices for each type action are individual adjusting devices and that they are situated beneath the machine where they are readily accessible. Moreover, it will be understood that by loosening the screws 26 and 27 the supporting piece 21 is free to be removed from the machine with the type action as an entirety after the screw 18^a of the type bar hanger is removed. It will also be seen that a line extending through the pivots 12 and 20 of each type action extends longitudinally of the key lever and therefore prevents any creeping, or any appreciable creeping of the key lever longitudinally on the fulcrum plate 10 and that no special means have to be employed for this purpose.

The position of the restoring springs and their connections with the key levers in the rear of the sub-levers and between the sub-levers and fulcrum plate tends to prevent most efficiently the key levers from jumping away from the fulcrum plate in the operation of the machine.

Various changes may be made without departing from the spirit and scope of my invention.

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

1. In a typewriting machine, the combination of a key lever, an angular sub-lever pivoted intermediate its ends to said key lever, a type bar, connections between one end of said sub-lever and the type bar, a device pivoted at one end to the other end of said sub-lever and on which the sub-lever turns, and vertically adjustable means for adjustably connecting said device to a fixed portion of the machine.

2. In a typewriting machine, the combination of a series of key levers, a series of angular sub-levers each pivoted intermediate its ends to a key lever, a series of type bars, connections between one end of each sub-lever and a type bar, and a series of individually adjustable fulcrums coöperative with the other ends of said sub-levers, each of said fulcrums being adjustable substantially in the direction of motion of the key lever.

3. In a typewriting machine, the combination of a series of key levers, a series of angular sub-levers each pivoted intermediate its ends to a key lever, a series of type bars, connections between one end of each sub-lever and a type bar, a series of independent

devices each pivoted to the other end of a sub-lever so as to constitute fulcrums therefor, and individual adjusting means for adjustably supporting said devices on a fixed portion of the machine, each of said fulcrums being adjustable substantially in the direction of motion of the key lever.

4. In a typewriting machine, the combination of a series of key levers, a fulcrum plate on which the key levers have a rolling contact, a series of sub-levers pivoted to said key levers, type bars operatively connected with said sub-levers, and a universal bar that extends beneath the key levers directly below the points where the sub-levers are pivoted thereto.

5. In a typewriting machine, the combination of a series of key levers, a fulcrum plate, a series of sub-levers pivoted intermediate their ends to said key levers and fulcrumed at one set of the ends thereof, type bars operatively connected with said sub-levers, and a universal bar that extends beneath the key levers directly below the points where the sub-levers are pivoted thereto.

6. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars, a series of sub-levers of different lengths and which are operatively connected to said type bars, said sub-levers being pivoted to the key levers in a straight line across the machine, a universal bar that extends beneath the key levers below the points where the sub-levers are pivoted thereto, and fulcrums for said sub-levers at varying distances from the points of pivotal connection between the key levers and sub-levers.

7. In a typewriting machine, the combination of a series of segmentally arranged type bars, a series of key levers, a series of angular sub-levers pivoted intermediate their ends to said key levers and operatively connected with said type bars, the arms of the sub-levers which are connected with said type bars being longer as the sides of the series of sub-levers are approached, independent fulcrums for said sub-levers, which fulcrums have positions at different distances from the front of the machine and which are at greater distances from the said points of pivotal connection between the key levers and sub-levers as the sides of the series of sub-levers are approached, and means for adjusting said fulcrums.

8. In a typewriting machine, the combination of a series of segmentally arranged type bars, a series of key levers, a series of angular sub-levers pivoted intermediate their ends to said key levers and operatively connected with said type bars, the arms of the sub-levers which are connected with said type bars being gradually longer as the sides of the series of sub-levers are approached,

independent fulcrums for said sub-levers, which fulcrums have positions at different distances from the front of the machine and which are at progressively greater distances from the said points of pivotal connection between the key levers and sub-levers as the sides of the series of sub-levers are approached, and individual means for adjusting each of said fulcrums separately.

9. In a typewriting machine, the combination of a series of segmentally arranged type bars, a series of key levers, a series of angular sub-levers pivoted to said key levers substantially in a straight line across the machine and operatively connected to said type bars, both sets of arms of said angular sub-levers being progressively longer as the sides of the series of sub-levers are approached, fulcrums which cooperate with one set of the arms of said angular sub-levers, and means for adjusting said fulcrums individually.

10. In a typewriting machine, the combination of a series of segmentally arranged type bars, a series of key levers, a series of angular sub-levers pivoted to said key levers substantially in a straight line across the machine and operatively connected to said type bars, both sets of arms of said angular sub-levers being progressively longer as the sides of the series of sub-levers are approached, a universal bar which extends beneath said key levers substantially at the points of pivotal connection between said key levers and sub-levers, and fulcrums which cooperate with one set of the arms of said angular sub-levers.

11. In a front-strike typewriting machine, the combination of a series of upwardly and rearwardly striking type bars arranged in an arc, a series of upright angular sub-levers terminating at their upper ends in an arc substantially co-extensive with the arc in which the type bars are mounted, links which extend from the upper ends of said sub-levers to said type bars, key levers upon which said sub-levers are pivoted substantially in a straight line across the machine, fulcrums for said sub-levers at progressively greater distances from the pivotal points of connection between the key levers and sub-levers as the sides of the series of sub-levers are approached, and a universal bar which extends beneath the key levers substantially at the joints of pivotal connection between the key levers and sub-levers.

12. In a front-strike typewriting machine, the combination of a series of upwardly and rearwardly striking type bars arranged in an arc, a series of upright angular sub-levers terminating at their upper ends in an arc substantially co-extensive with the arc in which the type bars are mounted, links which extend from the upper ends of said sub-levers to said type bars, key levers upon

which said sub-levers are pivoted, independent fulcrums for said sub-levers, which fulcrums have positions at different distances from the front of the machine and which are at greater distances from the pivotal points of connection between the key levers and sub-levers as the sides of the series of sub-levers are approached, and means for adjusting said fulcrums individually.

13. In a typewriting machine, the combination of a series of key levers which fan outwardly and forwardly as the sides of the series are approached, sub-levers which are pivoted to said key levers at the fanned portions thereof and which are set at angles corresponding to the angles of the fanned portions of the key levers to which said sub-levers are pivoted, and fulcrums for said sub-levers, each of said fulcrums being set according to the angular disposition of the sub-lever with which it cooperates.

14. In a typewriting machine, the combination of a series of key levers which fan outwardly and forwardly as the sides of the system are approached, sub-levers which are pivoted to said key levers at the fanned portions thereof and which are set at angles corresponding to the angles of the fanned portions of the key levers to which said sub-levers are pivoted, fulcrums for said sub-levers, each of said fulcrums being set according to the angular disposition of the sub-lever with which it cooperates, and means for adjusting said fulcrums.

15. In a typewriting machine, the combination of a series of key levers which fan outwardly and forwardly as the sides of the series are approached, sub-levers which are pivoted to said key levers at the fanned portions thereof and which are set at angles corresponding to the angles of the fanned portions of the key levers to which said sub-levers are pivoted, fulcrums for said sub-levers, each of said fulcrums being set according to the angular disposition of the sub-lever with which it cooperates, and individual means for effecting a separate adjustment of each of said fulcrums.

16. In a typewriting machine, the combination of a series of key levers which fan outwardly and forwardly as the sides of the series are approached, sub-levers which are pivoted to said key levers at the fanned portions thereof and which are set at angles corresponding to the angles of the fanned portions of the key levers to which said sub-levers are pivoted, and pivots which constitute fulcrums on which the sub-levers turn, each pivot having its axis at right angles to the plane of movement of the associated sub-lever.

17. In a typewriting machine, the combination of a series of key levers which fan outwardly and forwardly as the sides of the series are approached, sub-levers which are

pivoted to said key levers at the fanned portions thereof and which are set at angles corresponding to the angles of the fanned portions of the key levers to which said sub-levers are pivoted, pivots which constitute fulcrums on which the sub-levers turn, each pivot having its axis at right angles to the plane of movement of the associated sub-lever, and means for adjusting the said pivots.

18. In a typewriting machine, the combination of a key lever, a fulcrum plate along which the key lever has a rolling contact, a sub-lever pivoted to said key lever, and a member on which said sub-lever is pivoted for turning movement only, a line extending longitudinally of the key lever passing through the pivot which connects the sub-lever and key lever and through the pivot which constitutes a fulcrum for the sub-lever.

19. In a typewriting machine, the combination of a key lever, a type bar, an angular sub-lever connected to the type bar and carried by and pivotally attached to the key lever, a vertically adjustable support arranged below the key lever and the sub-lever, one part of said sub-lever being pivotally connected to the upper end of said vertically adjustable support.

20. In a typewriting machine, the combination of a key lever, a type bar, an angular sub-lever connected to the type bar and pivoted to the key lever, a cross bar arranged below the key lever, an upright support adjustable up and down in said bar, and one arm of the sub-lever being pivotally connected to said upright support, means for holding said support on said bar, and means for adjusting said support up and down.

21. In a typewriting machine, the combination of a key lever, a type bar, an angular sub-lever connected to the type bar and pivoted to the key lever, an upright support to which one arm of the sub-lever is pivoted,

said support being adjustable up and down and a transverse slotted bar beneath the key lever and sub-lever and in which said upright support is adjustably mounted.

22. In a typewriting machine, the combination of a type bar, a key lever having an elongated fulcrum end, a fulcrum on which the fulcrum end of said key lever rolls, a sub-lever pivoted to said key-lever and connected with said type bar, and a fixed pivot about which as a center said sub-lever turns, the point at which the sub-lever is pivoted to the key lever being directly between the elongated fulcrum of the key lever and the fixed pivot of the sub-lever.

23. In a typewriting machine, the combination of a type bar, a key lever having an elongated fulcrum end, a fulcrum plate on which said fulcrum end rolls when the key lever is operated, a sub-lever connected with said type bar and pivoted to said key lever, and a fixed pivot for said sub-lever situated in front of the forward edge of said fulcrum plate and in front of the plane of the face of said fulcrum plate, the point at which the sub-lever is pivoted to the key lever being between the fulcrum plate and the fixed pivot of the sub-lever and approximately on a straight line from said fixed pivot to the point of contact between the key lever and the fulcrum plate.

24. In a typewriting machine, the combination of a key lever having an extended tread, a fixed fulcrum plate on which said tread rolls when the key is operated, and a sub-lever pivoted to said key lever and arranged to prevent endwise displacement of said key lever.

Signed at Ilion, in the county of Herkimer, and State of New York, this twelfth day of April A. D. 1909.

GEORGE A. SEIB.

Witnesses:

JOHN MON DOUGH,
WILHELM A. SCHMIDT.