Oct. 31, 1950 J. L. PETZ 2,528,450

POWER REGULATING MEANS FOR TYPEWRITERS

Filed Dec. 13, 1946 2 Sheets-Sheet 1

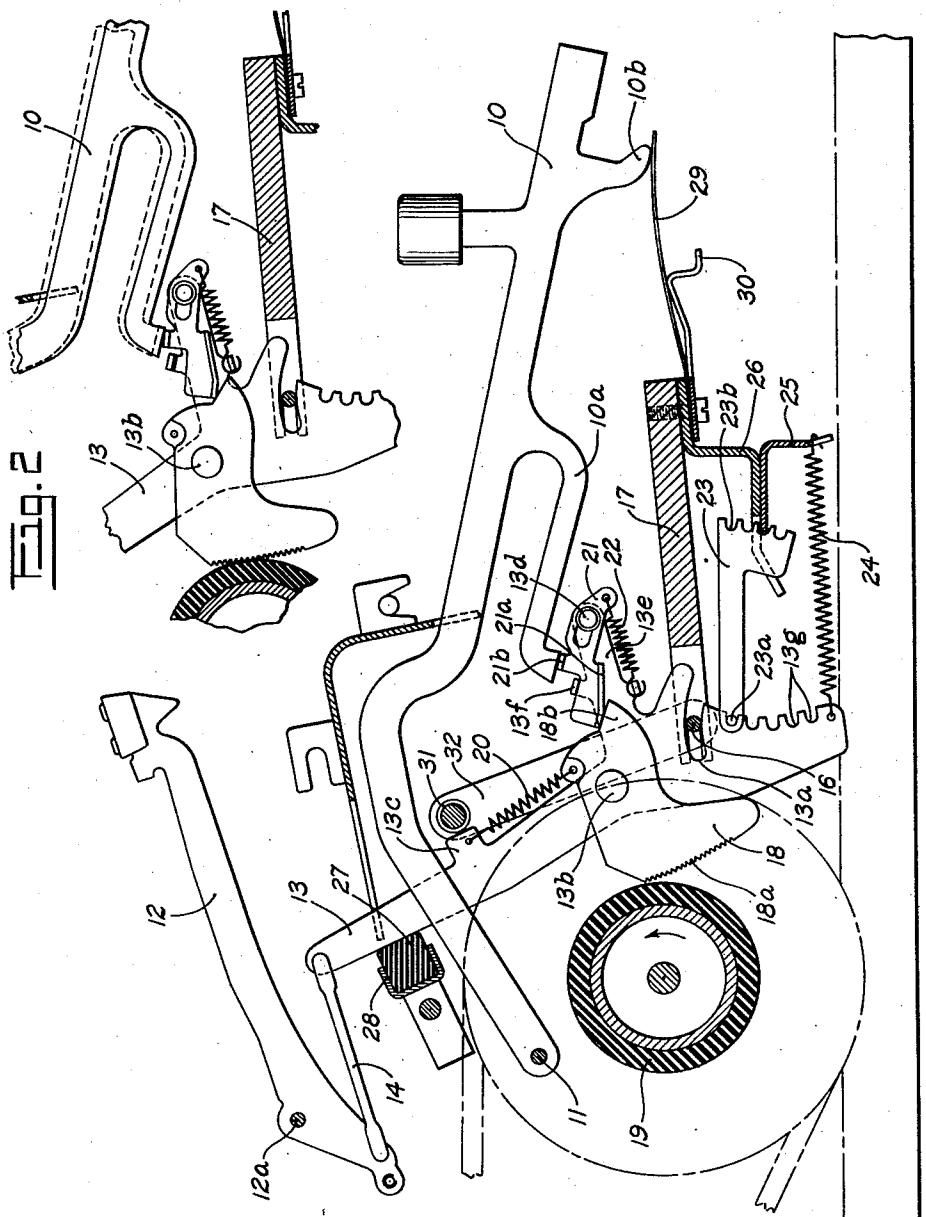

Fig. 2

Fig. 1

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Fig. 3

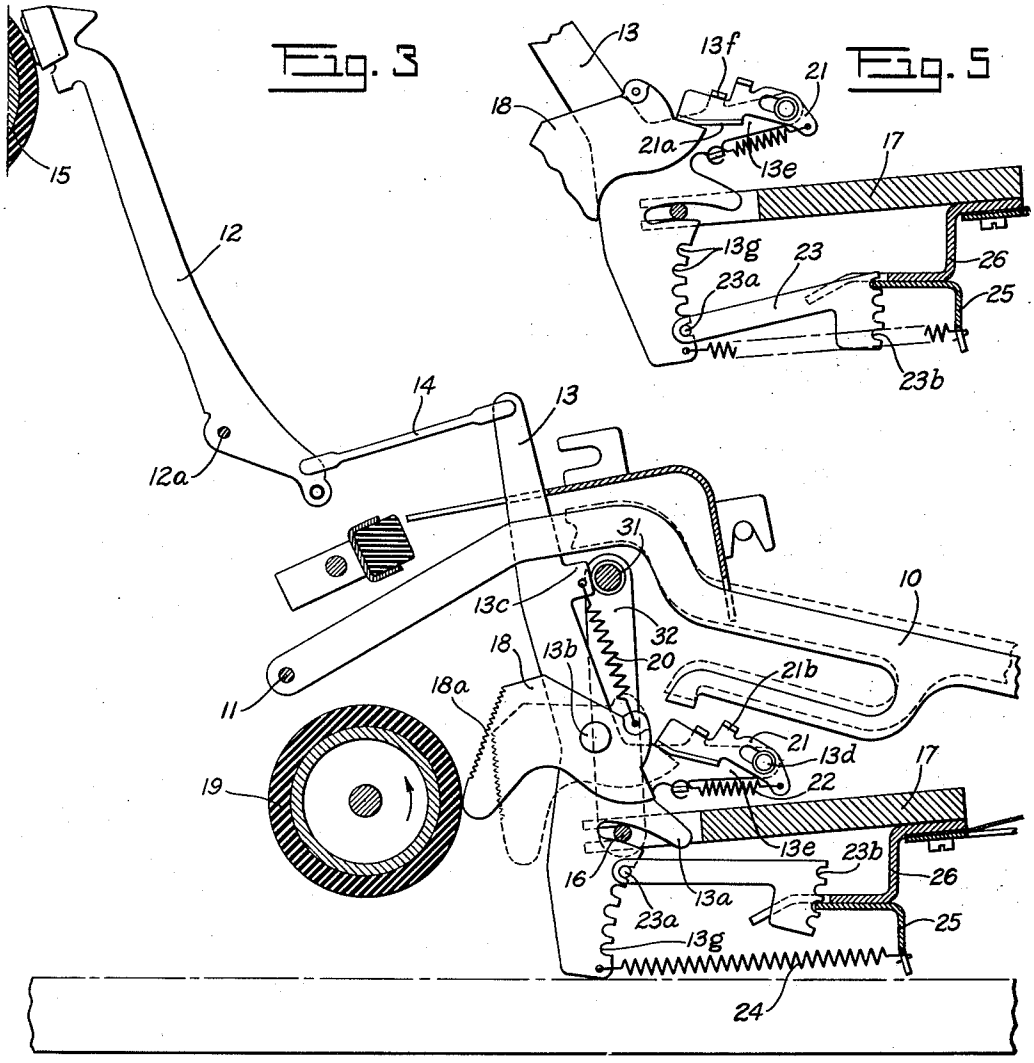
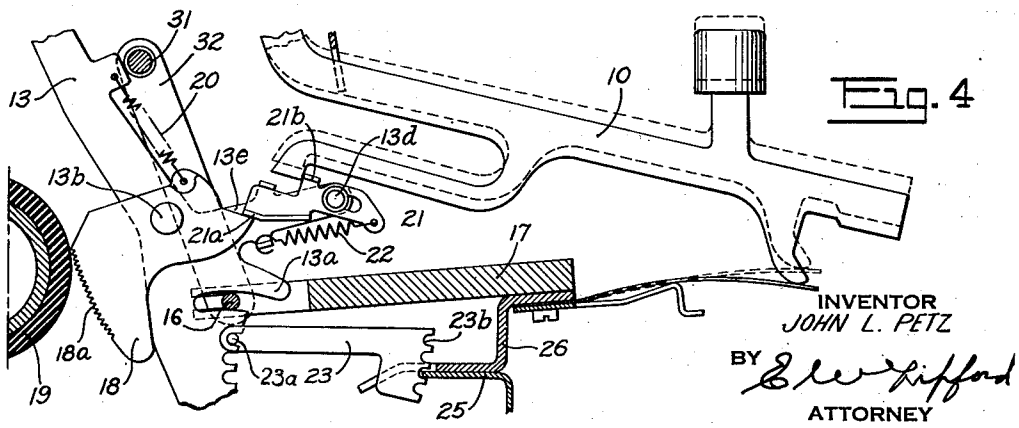


Fig. 5

Fig. 4



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POWER REGULATING MEANS FOR TYPEWRITERS

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12 Claims. (Cl. 197—17)

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This invention relates to typewriting machines.

The broad object of the present invention is to provide an improved power operating mechanism suitable for actuating the type bars and other instrumentalities or mechanisms of a typewriting machine.

Another object is to provide means for adjusting the flow or stroke of the power operating devices to compensate for different areas of type face or for compensating positional differences between the parts operated, such as the type bars.

An object is to provide an improved operating mechanism for typewriting machines using type bars mounted in the well known wire segment.

An object is to provide an improved adjustable type bar action.

An object is to provide an improved non-repeat mechanism for power operated typewriters.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a vertical section showing a power mechanism for typewriters constructed in accordance with the present invention.

Fig. 2 is a vertical section showing the key and certain other parts in operated position.

Fig. 3 is a vertical section showing the power mechanism in fully operated position.

Fig. 4 is a vertical section showing the key depressed to illustrate the action of the non-repeat mechanism.

Fig. 5 is a detail section showing the manner in which the stroke of the power operating device is adjusted.

In Fig. 1 the reference numeral 10 designates one of the character keys of the typewriter which key is pivoted on the cross rod 11. Only one key is shown but it will be understood that there are as many keys 10 as there are characters to be printed. Each key controls a power device which may be utilized to actuate the usual type bars 12 of which only one is shown. The mechanism disclosed in the drawings is designed to operate the type bars of a machine employing the so-called wire segment in which the type bars are arranged in an arc of a circle and pivoted on the curved wire 12a with each type bar reclining in the type basket at the angle shown in Fig. 1. When this type of printing mechanism is used, the type bars occupy different levels where-

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by the sub-levers which operate the type bars must necessarily vary in length and also must be bent varying degrees to make the proper connections to the type bars.

Each type bar 12 is operated by a power device under control of a key 10 which power device includes a lever 13 having a link connection 14 to the type bar 12. Rocking of the lever 13 in a clockwise direction (Fig. 1) draws the link 14 to the right, thereby actuating the type bar 12 through an arc of approximately 90° to the position of Fig. 3 to effect an impression on a work sheet carried by the usual platen 15. The levers 13 are not pivoted on fixed pivots, as is usually the custom with sub-levers commonly used in the art, but means is provided to enable adjustment of the leverage ratios of the levers 13 to vary the blow according to the area of type face.

Each of the levers 13 is formed with a curved slot 13a which embraces a pivot wire 16 supported by a cross bar 17. The cross bar 17 is vertically slotted to accommodate the levers 13 and the teeth formed by these slots are also slotted parallel with the longer edges of bar 17 to accommodate the pivot wire 16. Thus the bar 17 not only supports the levers 13, but also acts as a guide comb to space them the proper distances apart.

Pivotally mounted at 13b on the lever 13 (Fig. 1) is an L-shaped cam 18 having a serrated tread portion 18a designed to cooperate with a power roller 19 which is rotatable in the direction of the arrow (Fig. 1). The cam 18 is provided with a restoring spring 20 which is anchored to an ear formed in the cam 18 and to a lug 13c formed in the lever 13. The spring 20 urges the cam 18 in a counterblockwise direction but, in the normal position of Fig. 1, rotation of the cam counterclockwise is prevented by a cam operating finger 21 which is pivotally slidably mounted on a stud 13d carried by an extension 13e formed in the lever 13. A spring 22 anchored to an ear formed in the finger 21 and to an ear formed in the extension 13e tends to rock the finger 21 clockwise, holding said finger against a lug 13f formed in the extension 13e, the spring 22 also maintaining the stud 13d at the right hand end of the slot in the finger 21. The cam 18 has an extension 18b in engagement with a shoe portion in the form of a bent-over lug 21a in the finger 21. The latter also has a bent-over lug 21b which just clears a long curved finger 10a formed in the key 10.

The finger 21 has two functions. One function of the finger is to act as an interposer between the key 10 and the extension 18b to enable

the key to rock the cam 18 clockwise (Fig. 1) far enough for the serrated portion 18a in the cam to be gripped by the power roller 19 when the key 10 is depressed. The power roller then rotates the cam 18 clockwise and, owing to the shape of the cam 18, the lever 13 will likewise be actuated in a clockwise direction, thereby operating the type bar 12 to the position of Fig. 3.

The cam lever 13 and the cam 18 assume the positions shown in Fig. 3 when the cam 18 is operated as far as it can go by the power roller 19. As usual in typewriting machines, the last few degrees of movement of the type bar 12 are effected by inertia causing the cam 18 to be pulled slightly clear of the power roller, considering the position of the parts as in Fig. 3. This allows the spring 20 to rock the cam 18 back to the position of Fig. 1, with respect to the lever 13, as shown by dotted lines in Fig. 3, before said lever starts its return stroke, or at least before said lever has gone very far in restoring.

In order to regulate the force exerted by the upper end of each lever 13 under the stimulus of the cam 18, provision is made for individually varying the fulcrum point of each lever. For this purpose the lower end of each lever 13 is provided with a series of notches 13g which are arranged in an arc of a circle. Cooperating with one of the notches is a pin 23a carried by an L-shaped plate 23. The latter also has a series of notches 23b which are arranged different radial distances from the pin 23a for a purpose which will be made clear hereinafter.

For those type bars of an ordinary machine which are near the center of the segment and for which the corresponding levers 13 are shortest, the pins 23a may be positioned in one of the upper notches 13g as in Fig. 1 and will act as a fulcrum point for the associated levers. Thus in Fig. 1 the pin 23a is shown in the top notch 13g which is the shortest distance from the guide rod 16 and from the stud 13b. It is clear that, with the operating force of the cam 18 applied to the stud 13b and the lever 13 pivoting on the stud 23a, the upper end of the lever 13 will be thrown to the right the maximum amount when the cam 18 is operated by power roller 19 in the manner above described.

In the case of the end type bars on the segment, the levers 13 necessarily will be longer and bent different extents to accommodate the end type bars. Accordingly, the pins 23a for such type bars may be located in one of the lower notches 13g, whereby the movement of the stud 13b a fixed arcuate distance will have less effect on the upper ends of the levers 13. However, such levers, being longer to compensate the higher level of the end type bars, will have their upper ends operated the same extent as the central type bars. The rod 16 acts purely as a guide for the levers 13 and prevents them and members 23 from dropping downwardly. Each lever 13 and the corresponding type bar 12 is restored by means of a spring 24 anchored to the lower end of the lever 13.

The notches 23b are seated on the edge of a fulcrum bar 25 which extends across the machine, the plates 23 being received in slots formed in a Z-shaped comb bar 26 secured to the bar 25 and to the bar 17. The main purpose of the notches 23b is to provide a means for adusting the clearance between each cam 13 and the power roller 19 when the parts are in the position of Fig. 1 and for this reason the notches are located very slightly different radial distances from the pin 23a. By disengaging the plates 23 from the fulcrum bar 25 against the tensions of springs 24 and swinging the plates up or down and then engaging the proper notches with the fulcrum bar 25, the pins 23a may be adjustably positioned to right or left and thereby move the levers 13 and the cams 18a nearer or further away from the power roller 19 as needed. When adjusted in this manner, the upper ends of levers 13 rock slightly about a bumper bar 27 in the form of a resilient strip carried by a channel shaped member 28 supported by the side frames of the machine.

The adjustability of the clearance between the cams 18 and power roller 19 makes it possible to vary the blow of the type bars to suit the area of type face of the characters printed. It has been found that, when the clearance space is at a minimum, the actuation of cam 18 by key 10 will engage the cam with the power roller 19 at the extreme upper end of the serrated tread 18a and the cam will coact with the power roller for a longer period than when the clearance space is large. It has been found that increasing the clearance between the cam 18 and the power roller 19 has the effect of increasing the blow of the type. It is believed that this is due to the fact that, with an increase in clearance between the cam 18 and the power roller 19, the cam must be rotated further before it engages the power roller and consequently starts the type bar at a higher rate of acceleration owing to the increased steepness of the cam at a point beyond the normal engaging position which is at the upper end of the tread 18a.

The foregoing description has assumed that the arms of the type bars 12 to which the links 14 are pivoted are of equal lengths, as would ordinarily be the case in conventional typewriters, particularly of the type employing a wire segment. In such a machine the adjustment of the pins 23a in the notches 13g may be used as a means of compensating for the varying lengths and positional differences of the levers 13, and the adjustment of the notches 23b may be used as a means of varying the blow of the type bars. It is possible, however, to use other means for compensating the different lengths of the levers 13 and their positional differences in the machine which necessitates bending them to such an extent as to affect their leverage ratios. This may be done by making the arms of the type bars 12 to which the links 14 are connected of varying lengths. For example, those type bars in the center of the machine, which necessarily are operated by the shorter levers 13, will have shorter arms, whereas the type bars at the ends of the segment will have longer arms, whereby the driving ratios of all of the type bars 12 with reference to the levers 13 will be constant when the levers 13 are actuated a constant angular distance. In such a machine the adjustment of pins 23a may be used to give a coarse adjustment of the blow and the adjustment of the notches 23b used to obtain a fine adjustment of the blow.

The bar 26, a leaf spring plate 29, and a spring tension comb plate 30 are secured to the cross bar 17 by means of common screws. The spring plate 29 is formed like a comb, the teeth of which engage extensions 10b formed in the keys 10 and the spring tension plate 30 is formed with a series of teeth bent as shown in Fig. 1 to form bearings for the teeth 29 on the spring comb plate. This construction enables a great amount of flexibility to be obtained from the teeth of the

spring plate 29 while maintaining enough tension to restore the key 10.

The members 21 which are interposed between the extension 10a of the keys and the extensions 18b of the cam 18 also function to prevent repeated operation of the cam 18 in the event that the key 10 is held depressed.

When the key 10 is depressed and released immediately the member 21, as described above, merely rocks the cam 18 far enough to engage the power roller 19 and is immediately restored to the position of Fig. 3 by the spring 22. The operation of the lever 13 by the cam 18 causes the extension 13e to travel clockwise in an arc of a circle, with the pin 23a as a center, to the position of Fig. 3 in which the lug 21b on the member 21 occupies a position to the right and below the end of the extension 10a. When the lever 13 is restored by spring 24, the member 21 will be permitted to move, without obstruction by the extension 10a, back to the position of Fig. 1, owing to the clearance which is provided between the lug 21b and the extension 10a. If, however, the key 10 is held depressed as shown in solid lines (Fig. 4), the end of the extension 10a will remain in the path of movement of the lug 21b with the result that such lug will be engaged by the extension and held as shown in Fig. 4, sliding on the stud 13d against the tension of the spring 22. Thus, when the lever 13 is fully restored, the member 21 will have the position shown in Fig. 4, preventing a second operation of the cam 18 until the key 10 is released. As soon as the key is released the extension 10a will clear the lug 21b and allow the spring 22 to snap said lug back underneath the extension as shown in Fig. 1.

The lugs 13c engage a universal bar 31 common to all of the type bars. This universal bar is mounted on arms 32 pivoted on the cross rod 16 and is operated each time a type bar is actuated. The universal bar is restored by a spring (not shown) and may be used to actuate the usual inking ribbon mechanism.

While there have been shown and described and pointed out the fundamental novel features of the invention, as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a power mechanism having a power roller, a cam, a cam lever, and means to render the cam operable by the power roller to actuate said cam lever; in combination with said cam lever, means to vary the leverage ratio of said lever, comprising a fulcrum element having a pin pivotally engageable with said lever at different radial distances from the end of one arm of said lever.

2. In a power operated typewriter, a power actuator, a power device operable by said actuator including a rock lever and a coupling element normally clear of the power actuator but engageable therewith to cause the power device to be actuated by said actuator; and a fulcrum member having a pivot to said lever which pivot is adjustably shiftable along an arm of said lever to vary the leverage ratio of said lever and having a stationary pivot and movable relative to said stationary pivot and transversely of said shifting

movement to vary the clearance between said actuator and coupling element.

3. In a power-operated typewriter, a fixed frame member, a main power actuator, a power device including a rock lever and a coupling element normally clear of the actuator for operatively coupling the rock lever to the actuator, and an adjustable fulcrum for said lever comprising a plate having a pin pivotally connected to said lever and having a series of notches at different radial distances from said pin, a selected one of said notches being pivotally engaged by said frame member to predetermine the clearance between the coupling element and said actuator.

4. In a power-operated typewriter, a power actuator, a device capable of being coupled to the power actuator including a rock lever having a guide slot and provided with a series of notches disposed along one arm thereof at different distances from said slot, a fulcrum plate having a pin registering with a preselected one of said notches and serving as a fulcrum for said lever, said pin being normally positionable in any one of said notches to vary the leverage ratio of said lever, a fixed guide element extending into said slot for guiding said lever in its rocking movement on said pin, and a spring for holding said pin in the selected notch.

5. In a power operated typewriter, a power actuator, a power device operable by said actuator including a rock lever and a coupling element normally clear of the power actuator but engageable therewith to cause the power device to be actuated by said actuator; and a fulcrum member pivotally connected at one end to said lever to act as a fulcrum therefor and having a relatively fixed pivot at its other end, said member being adjustably rockable on one of said pivots to vary the leverage ratio of the lever and adjustably rockable on the other of said pivots to vary the clearance of said member from said actuator.

6. The invention set forth in claim 5 characterized by the fact that the pivots for said fulcrum member comprise, in each case, a pin and a series of indexing notches receiving said pins, the clearance adjusting notches being different radial distances from the ratio adjusting notches.

7. In a power-operated typewriter, a power actuator, a power device operable by said actuator including a rock lever and a coupling element normally clear of the power actuator but engageable therewith to cause the power device to be actuated by said actuator, and means to vary the leverage ratio of said lever, said means including a plate having a possible pivotal relation to said lever at any one of a series of points along one arm of the lever and pivotally mounted to permit rocking of said plate to select the pivot point.

8. In a power-operated typewriter, a power actuator, a power device operable by said actuator including a rock lever and a coupling element normally clear of the power actuator but engageable therewith to cause the power device to be actuated by said actuator, and means to vary the clearance between said element and said actuator, said means including a plate pivotally connected to one arm of said lever and having a series of pivots at different radial distances from the pivotal connection of the plate to the arm, and fixed means cooperating with any selected one of said pivots.

9. In a power-operated typewriter, a main frame, a power actuator, a power device operable

by said actuator including a rock lever and a coupling element normally clear of the power actuator but engageable therewith to cause the power device to be actuated by said actuator, and means for varying both the leverage ratio of said lever and the clearance of the element from the actuator, said means including a plate having shiftable pivotal connections to both an arm of said lever and said frame.

10. A power mechanism for typewriting machines comprising a power roller, a cam unit operable by the power roller and including a rockable cam frame and a cam rotatable in said frame by said roller to rock said frame, and means to fulcrum said frame and arranged to be shiftable different distances from the axis of rotation of the cam to vary the extent of rocking motion of the frame by the cam.

11. In a power operating mechanism for typewriters and other office machines, a fixed frame member, a main power actuator, a power device including a rock lever having a coupling element thereon normally clear of the actuator for operatively coupling the rock lever to the actuator, and a fulcrum member adjustably mounted at one end in said frame member and at its other end being pivotally adjustably connected to said rock lever for movement along said lever to vary the leverage ratio of said lever.

12. In a power operating mechanism for typewriters and other office machines, a fixed frame member, a main power actuator, a power device including a rock lever having a coupling element thereon normally clear of the actuator for operatively coupling the rock lever to the actuator, and a fulcrum plate adjustably movably connected to one arm of said lever to vary its leverage ratio and adjustably movably mounted on said frame member to vary the clearance between said coupling element and said actuator.

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