July 23, 1940. W. F. HELMOND 2,209,227

TYPEWRITING MACHINE

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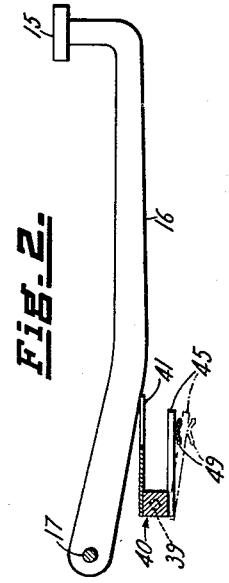


Fig. 2.

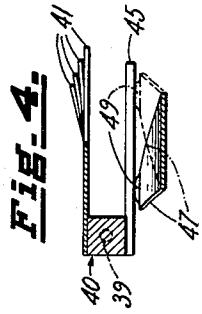


Fig. 4.

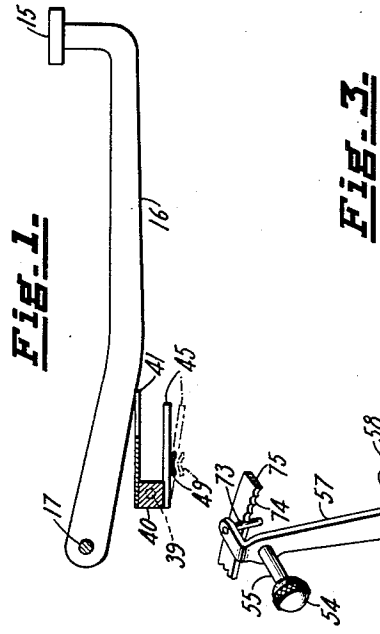


Fig. 1.

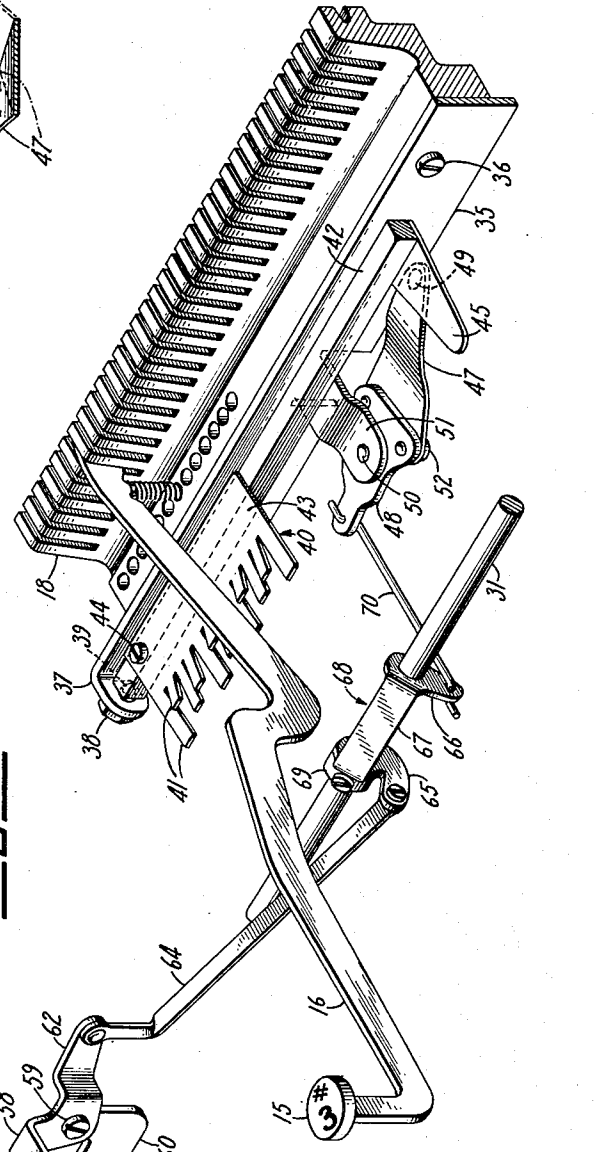


Fig. 3.

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Fig. 6.

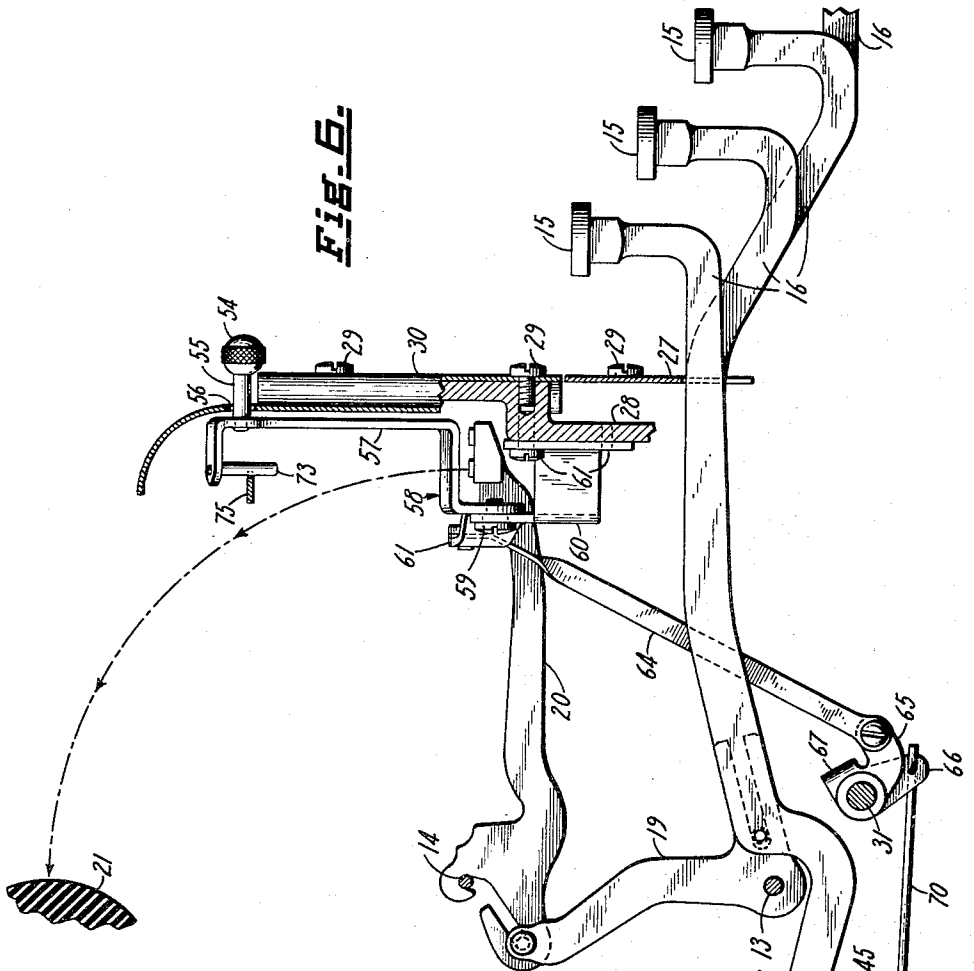
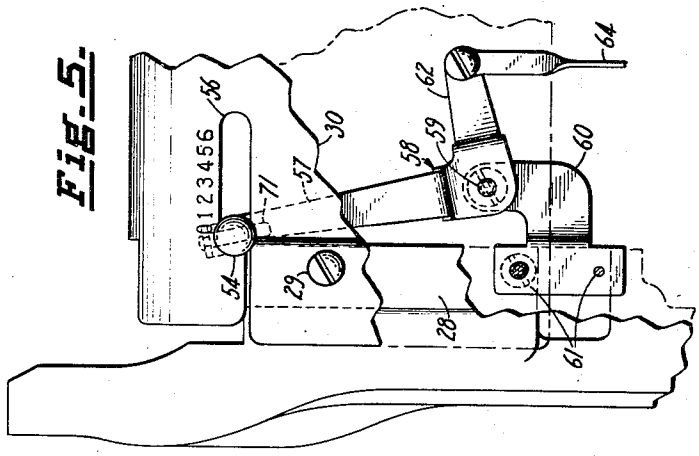


Fig. 5.



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Fig. 8.

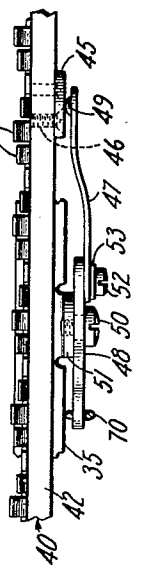


Fig. 7.

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2,209,227

TYPEWRITING MACHINE

William F. Helmond, West Hartford, Conn., assignor to Underwood Elliott Fisher Company, New York, N. Y., a corporation of Delaware

Application June 30, 1938, Serial No. 216,786

8 Claims. (Cl. 197—33)

This invention relates to key operated machines such as typewriters, an object is to provide an efficient, durable, simple and inexpensive key-touch regulating mechanism. Another object is to have said mechanism adjustable at will from a conveniently accessible point on the machine. Still another object is to provide a mechanism readily applicable to existing machines, such as the Standard Underwood typewriter for example, with minimum change in the existing structure.

The invention is herein illustrated with reference to regulating the touch of a set of type operating key levers presenting keys arranged in the usual transverse rows or banks of a typewriter keyboard.

A universal pressure bar is employed to cooperate with any key lever to affect its key touch, and is rockable by any of the key levers about a suitable axis. A part or finger may be integral with said pressure bar to receive key touch regulating pressure or resistance at different points from said axis, whereby, correspondingly, to affect variably the key touch.

A spring device or resistor is shiftable to engage and react on said finger at said different points. Said spring device may of itself be uniform in its force at the several points of said part or finger, but since said points are at different distances from the pressure bar axis, corresponding variations of key touch are obtainable. A feature of the invention conducing to simplicity resides in providing a simple spring, preferably a leaf spring, acting cantilever-wise to resist the pressure bar, and further resides in shiftably mounting said spring, as by mounting it to be turnable about a suitable pivot, so that its pressure imparting end may react upon said pressure bar finger or part at one or another of said several points.

A key touch regulator or key, manually adjustable at will, may be disposed, say at the front of the machine in the vicinity of the keyboard, so as to be conveniently accessible. Connections from said key-touch regulator to said spring device translate the adjustments of the regulator into shifts of said spring device to one or another of said different points on said part or finger of the pressure bar.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Figure 1 is a side view of a conventionally outlined type key lever and a cross section of the pressure bar showing the spring device engaging the pressure bar at a point close to the pressure bar axis.

Figure 2 is like Figure 1 except that it shows the spring device engaging the pressure bar finger at a point farther from the pressure bar axis.

Figure 3 is a perspective of the touch regulating mechanism.

Figure 4 is a fragmentary cross section, showing the pressure bar and extreme positions of the spring device relatively to the pressure bar.

Figure 5 is a fragmentary front elevation showing details of the key touch regulator at the front of the machine.

Figure 6 is a cross sectional side elevation of the key touch regulating mechanism and type actions.

Figure 7 is a bottom view of the machine and the key touch regulating mechanism.

Figure 8 is a fragmentary front view of the pressure bar and spring device.

Type keys **15**, arranged in the usual rows or banks of a keyboard, are mounted on key levers **16**, Figure 6, fulcrumed at **17** in a cross bar **18** of the machine frame. Each key lever operates through a bell crank **19**, Figure 6, fulcrumed at **13**, to swing a type bar **20** fulcrumed at **14**, upwardly and rearwardly to a platen **21**. Each key lever **16** is urged to its normal position by its individual restoring spring **23** adjustable by means of a screw **24** in the cross bar **18**. A transverse resilient bar **25** attached to the cross bar **18** as at **26** engages flattened sides of the spring adjusting screws **24** to keep them in their adjusted positions as in Figure 6. A front key lever guide-comb **27** cooperates to stop the key levers in their normal positions. Behind the keyboard, a frame part **28** supports by means of screws **29** a mechanism-masking vertical plate **30**, Figures 5 and 6.

A rock shaft **31**, Figure 7, journaled in the framework has arms **32** mounting the usual space key bar, not shown, and also has an arm **33** operatively connected to the carriage escapement mechanism, not shown. **34** is a restoring spring for said rock shaft **31**.

The structure thus far described represents generally known features of a typewriter, such as the Standard Underwood, for example.

The key touch regulating mechanism will now be described.

A bracket bar **35** secured to the cross bar **18** as by screws **36** has forwardly turned end ears **37** that mount pivot screws **38** for rockably supporting, as at **39**, Figure 7, a key-touch-affecting pressure bar generally indicated by the reference

40. Said bar 40 represents tongues 41 individual to and engageable by the corresponding key levers 16. The tongues 41 extend forwardly from the pressure bar and are of graded extents, from the pressure bar axis at 39 to their key lever engaging ends, according to the different distances of the several rows or banks of keys 15 from the common key lever fulcrum axis 17. As determined by suitable stop-means not shown, the dip or printing stroke of the keys 15 is substantially uniform in the several banks wherefore the key levers of the different banks have different angular movements. Nevertheless, it results from the differing extents of the key lever engaged tongues 41 of the pressure bar 40 that the angular movement of the latter may be uniformly proportional to the dip of a key in any key bank. It also results that key-touch-affecting pressure or resistance applied to said pressure bar 40 has uniform effect in respect of the several key banks.

The tongues 41 are individually bendable toward or from the key levers 16 so that their ends appropriately meet and are suitably timed with their points of engagement on said key levers.

The feature of providing bendable tongues such as 41 in conjunction with a key-lever or like actuated universal bar is disclosed in my copending application, Serial No. 69,130, filed March 16, 1936, now Patent No. 2,178,688, dated Nov. 7, 1939.

The pressure bar 40 may be a composite structure comprising a cross shaft 42 engaged at its ends by the pivot screws 38, and a plate 43 formed with the graded-length tongues 41 and attached to said cross shaft as by screws 44. A pressure or resistance receiving part or finger 45 is attached to said cross shaft 41 as by screws 46, Figure 7, and extends preferably forwardly from the pressure bar axis 39 to receive pressure at points variantly distant from said axis.

A pressure imparting device or resistor comprises a leaf spring 47 mounted cantilever-wise on a lever 48 so that the free end of said spring underlies and may react on the pressure bar finger 45 and thereby impart key touch affecting resistance to the universal pressure bar 40. Said spring presenting lever 48 is turnable about a headed pivot 50 that is substantially perpendicular to the face of the pressure bar finger 45 and is mounted on a forwardly extending arm 51 of the bracket bar 35. The leaf spring 47, Figure 7, tapers down, in outline, from its base to its free end which is shown, Figure 8, formed into a pressure-bar-engaging bead 49. At its base the leaf spring 47 is secured to the lever 48 as by screws 52 and a clamp plate 53, Figures 7 and 8.

By turning the leaf spring 47 by means of the lever 48 to place the spring-end bead 49 at different distances from the pressure bar axis 39, the force or resistance of said spring 47, although substantially uniform at different places, will variably resist, according to said distances, rocking of the pressure bar 40 by any key lever 16 at the printing stroke of the latter, and thus variations in the key touch are obtainable.

A key touch regulator or key 54 is disposed, for convenient accessibility, at the left and front of the masking plate 30, Figure 5, and is manually shiftable laterally for adjusting the key touch. Said key 54 is operatively associated, Figures 3, 5, 6 and 7, with the key-touch-affecting leaf spring 47 as follows:

A stem 55 of said key 54 passes through a clearance slot 56 of the masking plate 30 and is attached to an upright arm 57 of a bell crank 58 pivoted at 59 in a bracket 60 attached to the frame part 28 at 61. A lateral arm 62 of said bell crank 58 is connected by a link 64 to an arm 65 laterally offset from another arm 66 by a yoke 67, the arms 65, 66 and yoke 67 forming an intermediate lever 68 mounted rotatably loose on the rock shaft 31 and positioned laterally between a collar 69 and the arm 32 of said shaft 31. The arm 66 is connected by a link 70 to the leaf spring carrying lever 48.

It will be obvious, now, that by moving the key 54 laterally over a suitable range which may be divided into different key-touch-defining stations indicated by markings 0 to 6 on the masking plate 30, Figure 5, the bell crank 58, intermediate lever 68 and links 64, 70, cooperate to turn the spring carrying lever 48 correspondingly, to place the leaf spring end 49 for engaging the pressure bar finger 45 at different distances from the pressure bar axis 39. With the key 54 placed at the station 0 as in Figure 5, the leaf spring end 49 will be closest to the pressure bar axis 39 as in Figure 1 and the spring 47 will offer a minimum key-touch-affecting resistance to rocking of the pressure bar 40 by any key lever 16. And with the key 54 placed at station 6, said spring end 49 will be farthest from the pressure bar axis 39 as in Figure 2 and the spring 47 will offer a maximum key-touch-affecting resistance. With the key 54 placed at any one of the intermediate stations 1 to 5, the spring end 49 will be placed corresponding distances from the pressure bar axis 39, intermediately of the extreme placements indicated by the full and dotted outlines of the spring end 49 in Figure 4, and the spring will offer correspondingly intermediate key-touch-affecting resistances. The mechanism is adaptable to locate said extreme placements as desired. For example, the minimum resistance placement of the bead 49 may be directly under the axis 39.

For yieldably detenting the key 54 at any station, a pin 73 in the bell crank arm 57 is adapted to engage any one of a series of detent notches 74 corresponding to the stations 1–6 and presented by a detent bar 75 having a bracket 76 attached to the frame as at 77, Figure 7. The key touch regulating key 54 is, of course, manually adjustable at will to any one of the stations, and the bell crank arm 57 may be sufficiently springy to permit movement of the pin 73 to one or another notch 74.

It will be seen from the foregoing that the resistor element 47 and the rockable pressure bar 40 including the finger element 45, in their cooperative relation as set forth, constitute a leverage device, in that each of these elements 45 and 47 presents an arm or lever in operative association with the other. As the point of engagement of these elements may be varied by increasing or decreasing the effective length of the finger element 45, it follows that the leverage moment of the said device may be varied, to thus vary the opposition to key operation.

It will also be apparent that there is provided, in a touch-regulating mechanism for a multiple-key-operated typewriter, a leverage device including a resistor element 47 and means 40 having a pivotal movement opposed by the resistor 47 as any key is operated, the leverage device having a characteristic of yield, herein, by flexure of the resistor element 47, and means, comprising

the regulator key 54, bell crank 58, link 64, lever 68 and link 70, to adjust the position relation of the resistor element 47 and the pivotal means 40 to substantially vary the leverage of the device.

As aforeindicated, the keys 15 of the different key banks each have a uniform dip which, because of the varying lengths of the key levers 16 of the different key banks, causes each of the latter to assume a different angular stroke. However, through the medium of the rockable pressure bar 40 and its tongues 41 of varying lengths, the pressure bar finger 45 is actuated through a constant angle by any of the keys.

This organization of cooperative elements operates so that, for any key 15 which is depressed through the conventional range, the resilient resistor element will be distorted an equal amount in each case for a given setting; the extent of distortion being variable, however, in accordance with the setting of the regulator key 54. In the specific embodiment herein illustrated. the resistor element 47 is resilient for yielding or flexure, and it will be apparent by reference to Figures 1 and 2, that the said element is variably distorted by depression of any key 15 through the conventional range, in that as shown in Figure 1, wherein the point of engagement 49 of said element is close to the axis of the pivotally mounted element 40, the extent of distortion is relatively small; and as shown in Figure 2, wherein the point of engagement 49 is set at a greater distance from the axis of the member 40, the extent of distortion of the resistor element is appreciably greater. This variation of distortion of the resilient element and the consequent opposition to key operation, is, of course, selective; being determined by the setting of the regulator key 54 to one of a series of key-touch-regulating positions defined by the pin 73 cooperating with the notches of the detent bar 75.

It may be here noted that very little force is required to maintain the regulator key 54 in selected position by the detent elements 73, 74, and also that only a slight additional force, necessary to overcome the detent effect of the elements 73, 74, is necessary to move the regulator key to the selected key-touch-defining position. This ease of adjustment is had because of the fact that the resistor element 47, during adjustment, more particularly the point 49, is moved in a plane substantially parallel with the portion of the pressure bar 40, that is, the finger 45, with which the resistor 47 engages. This parallel movement of the resistor 45 is produced by the arrangement of the pivot axis 50 thereof transverse to the axis of the pressure bar 40. This co-relation of the elements prevents the transmission of any appreciable force or resistance to motion from the resistor element 47 to the regulator key 54 through the operative connections embodied in the levers 58 and 68 and links 64 and 70, and the regulator key 54 may thereby be set to any adjusted position with ease, and this position may be maintained by only a slight detent force.

Variations may be resorted to within the scope of the invention and portions of the improvements may be used without others.

What is claimed is:

1. In a typewriter having a keyboard, the combination with type key members extending from said keyboard into the interior of the machine, of a pressure bar rockable universally by any key member about a fulcrum axis, a resilient resistor adjustable to react on said bar at different distances from said axis, said bar and resistor being disposed in the interior of the machine, a key touch regulating key mounted above and immediately behind the keyboard and shiftable in a path transverse to the machine, and connections from said key to said resistor to translate the transverse shifts of said key into adjustments of said resistor.

2. In a typewriter having a keyboard, the combination with type key members extending from said keyboard into the interior of the machine, of a pressure bar rockable universally by any key member about a fulcrum axis, a resilient resistor adjustable to react on said bar at different distances from said axis, said bar and resistor being disposed in the interior of the machine, a masking plate above and immediately behind said keyboard, a key touch regulating key having an arm guided for transverse movement behind said plate and extending through a slot in the plate to present the key at the front of the latter, and connections from said arm to said resistor to translate the movements of said arm into adjustments of said resistor.

3. In a touch-regulating mechanism for a multiple-key-operated typewriter, a leaf spring resistor pivotally mounted for adjustment, a pivoted pressure bar adapted to flex said spring and having a substantially constant angular movement from the operation of any key, and means to move said leaf spring on its pivot substantially in parallelism with the spring-engaging portion of the bar, when the latter is not being influenced by any key, to different adjusted positions toward and from the bar pivot so that the spring will be variably flexed by the same angular movement of the bar but no variable effect is transmitted to the last said means by the adjusting movement.

4. In a touch-regulating mechanism for a typewriter, the combination with a set of key operable members, of a pressure bar rockable universally by any one of said key members about a fulcrum axis and including a part presenting a face disposed substantially radially of said axis, a leaf spring having a point engaging the face of said pressure bar part to yieldably resist rocking movement of said bar, a pivotal mounting for said spring, having its axis at a right angle to the face of said bar part whereby said spring is swingable in a plane parallel to said face to set said spring point along the face of said bar part at different distances from said bar axis, and manually settable means operatively connected with said spring to swing said spring to different key touch affecting positions.

5. In a touch-regulating mechanism for a typewriter, the combination with a set of key operable members, of a pressure bar universally rockable about a fulcrum axis by any one of said key members and including a part presenting a face disposed substantially radially of said axis, a leaf spring having a point engaging the face of said pressure bar part to yieldably resist rocking movement of said bar, a pivotal mounting for said spring affording placement of said spring point along the face of said bar part at different distances from said bar axis, said pressure bar and spring being disposed in the interior of the typewriter, a swingably mounted arm manually settable at the exterior of the typewriter, means for detenting said arm at selective positions, and means operatively connecting said swingable arm and said spring to set said spring to

different key-touch affecting positions in accordance with the setting of said arm.

6. In a touch-regulating mechanism for typewriters, a resilient resistor common to multiple keys, a pivoted pressure bar engageable by said resistor and adapted to tension said resistor in an angular movement of said bar on its pivot as any key is operated, and means mounting said resistor for pivotal movement in a direction substantially parallel with the resistor-engageable portion of said pressure bar toward or from the bar pivot when the latter is not being influenced by any key, to vary the key-touch effect of said resistor on said pressure bar.

7. In a touch-regulating mechanism for typewriters, a resilient resistor common to multiple keys, a pivoted pressure bar engageable by said resistor and adapted to tension said resistor in an angular movement of said bar on its pivot as any key is operated, means mounting said resistor for pivotal movement in a direction substantially parallel with the resistor-engageable portion of said pressure bar toward or from the bar pivot when the latter is not being influenced by any key, to vary the key-touch effect of said resistor on said pressure bar, and means manually settable at the exterior of the typewriter to adjust said resistor to various key-touch affecting positions.

8. In a touch-regulating mechanism for a multiple key-operated typewriter, a resilient resistor, a pivoted pressure bar having a substantially constant angular movement from the operation of any key, an arm extending laterally from said pressure bar and engageable with said resistor, and means mounting said resistor to extend transversely of the arm and for movement of the arm-engaging portion thereof in a plane substantially parallel to said arm, to different adjusted positions toward or from the bar pivot so that said resistor will be variably tensioned by the constant angular movement of the bar.

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