Jan. 20, 1931. F. F. DORSEY 1,789,808

POWER MECHANISM

Original Filed Oct. 26, 1927

Fig. 3

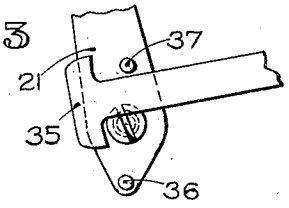


Fig. I

Fig. 2

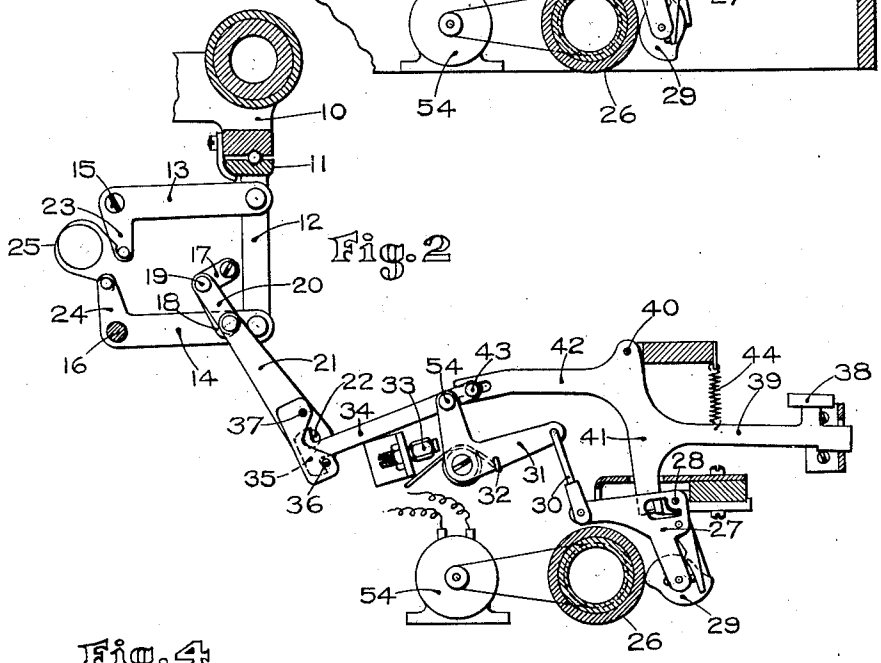


Fig. 4

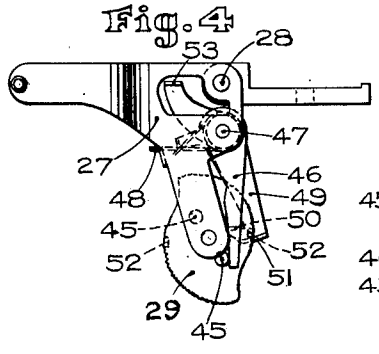
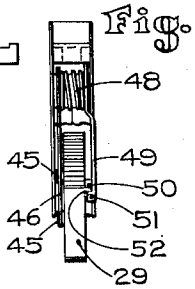


Fig. 5



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1,789,808

UNITED STATES PATENT OFFICE

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POWER MECHANISM

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This invention relates particularly to mechanism for use in a typewriter in which the operative movements of the parts are produced by power, under the control of the keys of the machine.

In the case-shift mechanism of a typewriter as ordinarily constructed, the upward and downward movements of the carriage, or of the type basket, are limited by adjustable stops, and a certain amount of jar and noise results from the sudden arrest of the parts by the stops. Where such a mechanism is operated by power the jarring and noise are accentuated, especially if the machine is adjusted to operate at the speed which is desirable in such a machine.

One object of the present invention is to provide a case-shift mechanism, of the power operated type, in which the carriage or other shiftable member is moved upwardly and downwardly, and is brought positively and accurately to rest in its upward and lower positions, without shock or noise. To this end there is interposed between the carriage and the source of power, a linkage comprising two toggles, the parts being so arranged that one of these toggles, when straightened, arrests the carriage in its upper position and the other toggle, when straightened, arrests the carriage in its lower position.

Where both the upward and the downward movement of the carriage or other part are caused by successive operations of the power mechanism occurring, the one when the shift key is depressed, and the other when the shift key is permitted to rise, it is possible that the power mechanism may at some time fail to operate upon one of the two key movements referred to. In such a case, in power-shift mechanism as heretofore proposed, the shift movement and the key movement get out of phase, that is to say, after such accidental omission of a power operation the parts assume such relative positions that the carriage will fall when the key is depressed and rise when the key is released, thus causing lower-case letters to be written where upper-case letters are desired, and vice versa. Another object of the present invention is to produce power-operated shift mechanism in which the parts cannot get out of phase as just described. To this end it is proposed to interpose, between the actuating mechanism and the carriage or type basket, a selecting device or interponent by which the direction of motion imparted to the carriage or type basket is determined, this selecting device being connected with and controlled by the shift key, so that the mechanism is incapable of imparting motion to the carriage or type basket except in the proper direction according to the position of the key.

In the accompanying drawings Fig. 1 is a sectional side elevation showing the essential elements of a case shifting mechanism embodying the present invention, the shift key and carriage being in their normal positions. Fig. 2 shows the same mechanism as Fig. 1, but with the parts in the position assumed during the carriage-elevating movement. Fig. 3 is an enlarged detail of the selecting device shown in Figs. 1 and 2. Figs. 4 and 5 are, respectively, a side elevation and an end elevation of the cam unit constituting a part of the power actuating mechanism in Figs. 1 and 2, but on a larger scale.

The invention is illustrated as embodied in a typewriter in which the platen and the platen carriage are raised and lowered to perform the case-shifting operation. A portion only of the carriage 10 is shown, this carriage being supported, in any ordinary or suitable way, upon the usual transverse rail 11. This rail is shown as supported, at its ends, upon upright arms 12. Only one of such arms is shown, but it will be understood that two may be used, near opposite sides of the machine, as in a form of construction familiar to those skilled in the art. Each arm 12 is guided to insure substantially vertical rectangular movements, by means of upper and lower levers 13 and 14, pivoted upon the frame of the machine, the lever 13 being pivoted on a screw or stud 15, while the lever 14 is attached to the usual rock shaft 16 by which the movements of the opposite ends of the rail 11 are coordinated.

The toggle mechanism, by which the upward and downward movements of the car-

riage are directly produced and controlled, comprises a link 17, pivoted at its upper end to the frame of the machine, and a second link 18, pivotally connected, at its upper and lower ends, with the link 17 and the lever 14. The pivot 19, which connects the links 17 and 18, is also connected, by a link 20, with a lever 21 which is pivoted, at 22, on the frame of the machine. The links 17 and 18 constitute one toggle by which the lever 14, and hence the carriage and platen, may be raised and lowered, while the link 20 and the lever 21 constitute another toggle, through which the toggle 17, 18 is actuated. When the carriage is in its lower position the toggle 17, 18 is straight, and thus limits the downward movement of the carriage under the influence of gravity. When the carriage is in elevated position, as shown in Fig. 2, the toggle 17, 18 is bent, but the extent of its bending movement is limited by the straightening of the toggle 20, 21, so that the latter toggle positively limits the upward movement of the carriage.

In order that the carriage may have an upward bias when in its upper position, and thus draw the toggle 20, 21 into and hold it in straight-line position, means are provided for counterbalancing the carriage when raised. For this purpose the levers 13 and 14 are shown as provided with arms 23 and 24 extending toward each other, and a spring 25 of the hairpin type is pivotally attached to the ends of these arms. The angular position of the arms is such that they extend directly toward each other when the carriage is down, thus permitting gravity to bias the carriage downwardly in this position. When the carriage has been raised, however, the arms are swung away from each other, as in Fig. 2, and the spring 25 then becomes effective with a tendency to cause continued movement of the levers 13 and 14 in the same direction, thus overcoming the effect of gravity and giving the carriage a definite bias toward further upward movement.

It will be apparent that with the carriage biased as just described, the upward movement of the carriage is arrested by the straightening of the toggle 20, 21, in consequence of tension imparted to it through the toggle 17, 18, while downward movement is limited by a straightening of the toggle 17, 18 through tension imparted to it from the downward movement of the lever 14. The limits of movement of the carriage are therefore determined wholly by the toggles and without impact of any part of the mechanism against a stop. The upward and downward movements may be caused by rocking the lever 21 upon its pivot 22, and the resultant of the serial operation of the two toggles, when the lever 21 is moved from one position to the other, in either direction, at approximately uniform speed, is to produce an approximation to harmonic movement in the carriage, that is to say, the carriage is gradually accelerated at the beginning of each movement and gradually retarded at the end of each movement, so that the movements may be produced at any desired speed without jar or noise.

The power mechanism for actuating the lever 21 is of the type in which a constantly rotating roller is engaged by a key-controlled cam, through which movement is imparted to actuating mechanism connected with the lever. As illustrated, this power mechanism comprises a power roller 26, driven constantly by any means such as an electric motor 54. The "actuator" is in the form of a bell crank lever 27, pivoted at 28 on the frame of the machine and carrying, at its lower end, a pivotally mounted cam 29. The horizontal arm of the actuator lever is connected, by a link 30, with a bell-crank lever 31 pivoted upon the frame of the machine. A spring 32, engaging the lever 31, tends to rock it in a direction to press the cam 29 against the power roller, but this movement is limited by a stop 33 upon the frame of the machine. The lever 31 is pivoted to an interponent 34 in the form of a bar provided, at its rear end, with a cross head 35. This bar lies between two pins 36 and 37 projecting from the lever 21 and located at equal distances below and above the pivot 22 on which the lever is mounted.

The actuator and its cam are controlled by means of the usual shift key 38 of the typewriter, this key being mounted on a key lever 39 which is pivoted, at 40, on the frame of the machine. The key lever has a depending arm 41 which controls the actuator, as hereinafter described, and a rearwardly projecting arm 42 which is slotted to receive a stud 43 projecting from the forward end of the interponent 34. The actuator is so constructed that it operates once upon the bell crank lever 31 when the key 38 is depressed, and again when the key is released and the key lever is raised by a spring 44 attached to it. For the proper operation of the shift mechanism it is essential that the first of these two movements of the bell-crank lever 31 cause the upper end of the lever 21 to swing rearwardly, so as to bend the toggle 17, 18 and raise the carriage while the second operation, resulting from the release and return of the shift key, must always cause the lever 21 to be swung in the opposite direction. This correct sequence and relation of movements is assured by the use of the interponent 34. When the key 38 is depressed, for the purpose of raising the carriage, the arm 42 of the key lever, acting upon the stud 43, at first rocks the interponent upon its pivot 54 in a direction to cause the lower end of the cross head 35 to engage with the pin 36 on the lever 21, so that, upon the occurrence of the immediate-

ly following forward movement of the interponent, resulting from the operation of the actuator, the pin 36 is pulled forwardly and the lever 21 is rocked in the appropriate direction. This operation is shown in Fig. 2, in which the shift key is shown in depressed position, and the actuator is in the act of moving the parts to the position in which the carriage is raised. Upon the release and return of the shift key, the first part of its return movement causes the interponent to swing in the opposite direction, so that its cross head may engage the pin 37, and the movement of the actuator resulting from the last part of this return movement of the shift key then causes the lever 21 to be swung back to the position in Fig. 1. It will be apparent that even if, from any cause, a downward or upward movement of the shift key fails to result in a movement of the carriage, this cannot cause the parts to become permanently out of phase, since the correct relation and operation of the parts will be resumed upon the next operation of the shift key; that is to say, it is impossible for a falling movement of the carriage to result from depression of the shift key or for a rising movement to result from the release and return of the shift key.

The precise form and mode of operation of the actuator are not essential to the present invention but, for the sake of illustration, the actuator is shown as comprising a lever 27, having parallel side members between which a two-lobe cam 29 is journalled, the cam lobes being serrated to secure frictional engagement with the roller 26. Two pins 45 project from one side of the cam, and cooperate with an arm 46 which swings upon a pivot 47 mounted on the lever 27. A spring 48 swings the spring arm 46 in a direction to press it against one or the other of the pins 45, as shown in Fig. 4, thus tending to turn the cam in the direction in which it is rotated by engagement with the roller. The rotation of the cam is controlled by a stop lever 49, having two detent lugs 50 and 51 projecting from its lower end. These detents cooperate with two oppositely disposed stop lugs 52 projecting laterally from the cam. Normally, one of the stop lugs engages the detent 51, as shown, and the parts have the position shown in Figs. 1 and 4, in which the cam is out of engagement with the cam roller.

The stop lever 49 has an offset arm 53 at its upper end, which engages the slotted extremity of the arm 41 on the shift-key lever 39. When the shift key is depressed the stop lug 49 is swung in a direction to disengage its detent 41 from the stop lug 52, whereupon the spring arm 46 causes a partial rotation of the cam which brings one of its lobes into frictional engagement with the power roller. The roller then causes continued rotation of the cam during which, owing to the form of the cam lobe, the actuator lever 27 is rocked, as shown in Fig. 2. Upon the completion of substantially half a rotation of the cam, the actuator lever is permitted to return to normal position, owing to the presentation of one of the reentrant faces of the cam to the power roller, and the cam is brought to rest by engagement of one of the stop lugs 52 with the detent 50 on the stop lever. The parts then remain in this position until the shift key is released and permitted to rise. When this occurs the stop lever is swung in a direction to disengage the detent 50 from the stop lug on the cam, whereupon the cam again engages the power roller, makes another half rotation, and again moves the actuator lever 27.

The cam-operated actuating mechanism just described is not claimed herein, as it constitutes no part of the present invention.

While the mechanism herein described is particularly useful in connection with the case-shift movement in a typewriter, it will be apparent that it may also be used in various situations wherein a part is to be moved from one position to another, and then back again, whenever a controlling key or member is operated and released.

The invention claimed is:

1. In a typewriter or the like, the combination, with a part to be shifted and a key for controlling the shifting operation, of a power-operated actuator controlled by said key and operating once when the key is depressed and again when it is released, and mechanism connecting said actuator with said part and including an interponent connected with and movable by the key to determine the direction of the motion imparted to said part through said mechanism.

2. In a typewriter or the like, the combination, with a part to be shifted and a key for controlling the shifting operation, of a power-operated actuator controlled by said key and operating once when the key is depressed and again when it is released, and mechanism connecting said actuator with said part and including an interponent connected with and movable by the key, said mechanism being arranged to move said part in one of its directions of motion only when said interponent is in the position resulting from depression of the key.

3. In a typewriter or the like, the combination, with a part to be shifted and a key for controlling the shifting operation, of a power-operated actuator controlled by said key and operating once when the key is depressed and again when it is released, mechanism connecting said actuator with said part and movable into two positions in one only of which it may actuate said part in one of its

directions of motion, and connections between said mechanism and said key whereby the mechanism is moved from one to the other of its said two positions according as the key is depressed or raised.

4. In a typewriter or the like, the combination, with a part to be shifted, of a power-operated actuator, and connections, between said part and said actuator, comprising two toggles, one of which is straightened and limits the movement of said part at one extreme, and the other of which is straightened and limits said movement at the other extreme said part being biased toward each extreme position, so that one or the other toggle is extended under tension in each said positions.

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