Aug. 21, 1945. J. J. KITTEL 2,383,256

TYPEWRITING MACHINE

Filed July 3, 1943

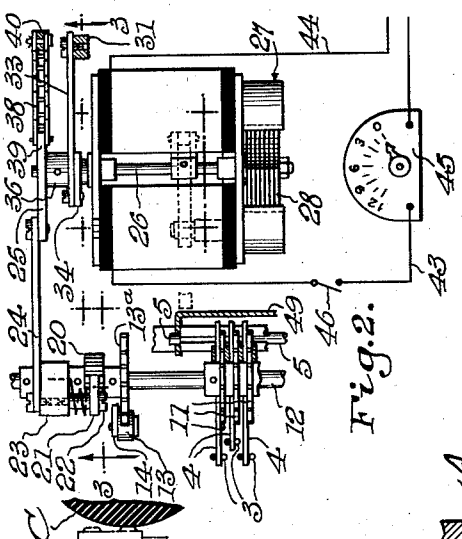


Fig. 2.

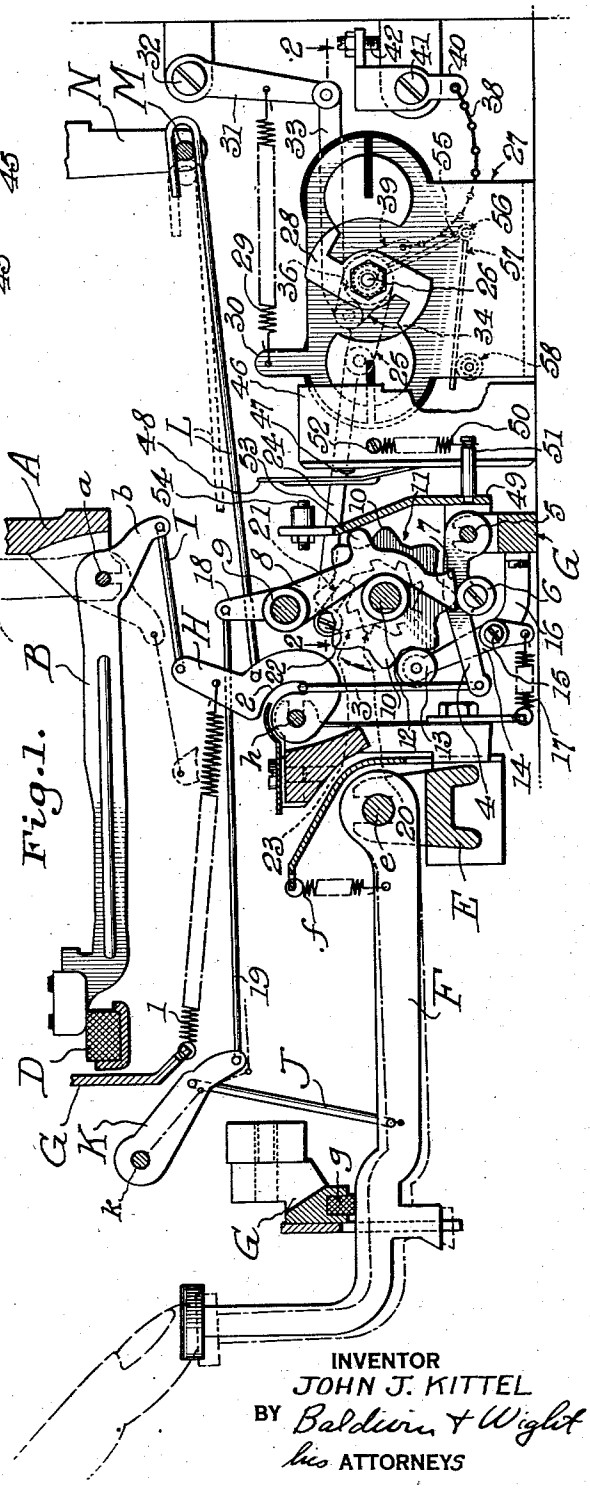


Fig. 1.

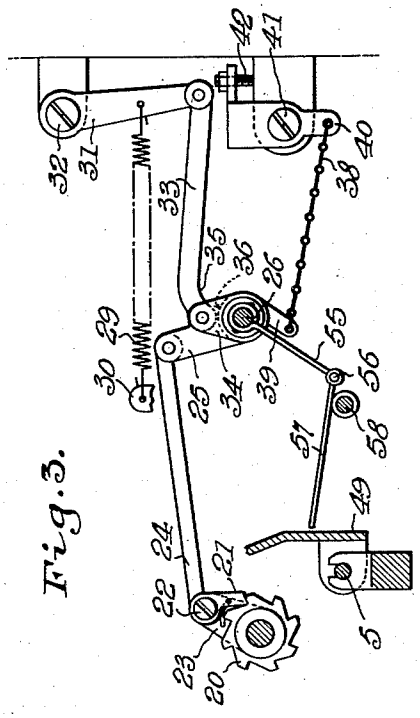


Fig. 3.

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# UNITED STATES PATENT OFFICE

2,383,256

## TYPEWRITING MACHINE

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Application July 3, 1943, Serial No. 493,449

17 Claims. (Cl. 197—17)

This invention relates to typewriting machines and more particularly to power-operated mechanism for driving the printing elements, e. g. type bars, of such machines to printing position.

In the copending application of John J. Kittel, Serial No. 493,450 filed July 3, 1943, there is disclosed and claimed a typewriting machine including, among other features, springs connected respectively to the several type bars and urging the latter to printing position. Normally each spring is restrained, but the restraint on any spring is removable in response to depression of a key lever and consequent letter spacing movement of the carriage so as to permit the spring to move the associated type bar to printing position. Intermittently operative restoring means are responsive to letter spacing travel of the typewriter carriage for moving the type bars back from printing position to their positions of rest thereby re-loading the type bar actuating springs, and for re-setting the restraining means.

Constructions embodying the present invention are, in a general way, similar to the type bar actuation mechanism outlined above and disclosed in the co-pending application, but differ therefrom in the provision of motive means other than the carriage or the carriage driving means for piloting or controlling the movement of the type bars or members to printing position, for restoring the type bars to inactive position, for re-loading the actuating springs, and for re-setting the restraining means.

An object of the present invention is to provide a type member operating mechanism of the character referred to which is of simple construction adapted for being incorporated in typewriting machines of basically standard design in a manner necessitating a minimum of changes in the usual typewriter parts.

Another object of the invention is to provide a type bar member operating mechanism of the kind referred to and in which the force of type bar impact may be regulated for producing relatively light or heavy type impressions. A related object is to provide for the regulation of type bar impact without varying the loading on the type bar actuating springs.

Another object of the invention is to provide type bar operating mechanism including an oscillatory magnetic motor for removing the restraint on a type bar actuating spring for enabling the latter to drive the type bar to printing position, and for then restoring the type bar to inactive position thereby re-loading the actuating springs, and resetting the restraining means.

Other objects will become apparent from a reading of the following description, the appended claims, and the accompanying drawing, in which:

Figure 1 is a fragmentary vertical view of mechanism embodying the invention with some parts shown in elevation and some in section, the parts being shown in full lines in the normal or state of rest positions, and some of the parts being shown in dotted lines in the positions occupied when the type bar is in printing position;

Figure 2 is a fragmentary horizontal section on the line 2—2 of Figure 1 and showing diagrammatically the connections to an oscillating electric motor; and

Figure 3 is a section on the irregular line 3—3 of Figure 2 but showing certain parts in the positions they occupy immediately following a type bar printing stroke.

Mechanism embodying the invention is adapted for use in typewriter constructions of different kinds. The illustrative mechanism is shown in association with known typewriter parts constructed and arranged substantially as in the well known Royal Standard typewriter. The previously known parts shown include a type bar segment a portion of which is shown at A in Figure 1, a type bar B pivoted on the segment A as at *a*, a platen C, a type bar head rest D, a key lever bracket E, and a key lever F pivoted on the bracket E as at *e*. The key lever F is urged upwardly by a spring *f* to normal or at rest position against a stop *g* on the machine frame G. An intermediate lever H pivoted as at *h* on the machine frame is connected by a link I to a short arm *b* on the type bar B.

The key lever F is connected by a link J to a lever K pivotally mounted as at *k*. A link L is connected between the intermediate lever H and the usual universal bar M connected in a known manner to escapement mechanism N.

The type bar operating means thus far described is similar to that customarily embodied in Royal Standard typewriters. However, in the Royal Standard construction the levers corresponding to the lever K shown herein are connected by links to levers corresponding to the lever H so that depression of a key lever will rock the lever H counter clockwise to move the associated type bar to printing position by manually applied force. Such an arrangement is shown, for example, in the patent to Hart No. 2,202,451 granted May 28, 1940.

It will be understood that the key F, type bar B, and associated parts shown in Figure 1 are representative of each of the plurality of type bar actions and associated key mechanism embodied in a typewriter, although only one complete type bar action is illustrated in this figure of the drawing. Generally stated the type bar operating mechanism to be described for operating the single type bar shown is identical with other mechanism units associated respectively with the other type bars (not shown), and it will be understood that the description of one complete type bar action or mechanism is to serve as a description of the other actions (not shown).

In accordance with the present invention the depressing of a key lever F is not made effective for applying manually exerted force for moving the type bar B on its printing stroke, but is utilized for releasing the restraint on a spring 1 connected between the intermediate lever H and a fixed part of the frame so as to enable the spring to contract and rock the lever H counterclockwise, thereby swinging the type bar B to printing position.

Depending from a curved slot 2 in the lever H is a link 3 pivoted at its lower end to a lever 4 in turn pivoted as at 5 on the frame G. The lever 4 is equipped with an anti-friction roller 6 which normally is held against upward movement by the restraining face 7 of a bar lock keeper 8 pivoted as at 9. The roller 6 also is restrained against upward movement by the crest of one of the eight lobes 10 on a cam 11 secured to a shaft 12 journaled on the typewriter frame G by suitable bearings (not shown). A detent roller 13 mounted on a lever 14 pivoted as at 15 on a frame bracket 16 is urged by a spring 17 into contact with a detent wheel 13a fast with the cam shaft 12 for yieldably maintaining the cam with the crest of a lobe 10 directly above the roller 6. Thus, both the bar lock keeper 8 and the cam 11 normally prevent rising of the roller 6 and therefore normally restrain the lever 12 from being rocked by the spring 1. In order to remove the restraint and permit the spring 1 to contract and drive the type bar to printing position, it is necessary to displace the restraining face 7 of the keeper 8 from above the roller 6 and also to rotate the cam 11 so as to allow the roller to move into the depression between two cam lobes 10.

The bar lock keeper 8 is adapted to be rocked upon depression of the associated key for displacing the restraining face 7 from above the roller 6. For this purpose an arm 18 on the keeper 8 is connected by a link 19 to the key operated lever K. Thus, upon depression of the key F, the link J will rock the lever K clockwise to pull on the link 19 and rock the keeper 8 counterclockwise, thereby moving the keeper face 7 away from the roller 6.

Thereafter, to enable the spring 1 to actuate the lever H, link I, and type bar B, the cam 11 is rotated one-eighth of a revolution. When the depression between the lobe 10 last positioned above the roller 6 and the next adjacent lobe is presented above the roller the lever 4 is permitted to rock clockwise. Hence the power means, i. e. the spring 1, contracts and rocks the intermediate lever H counterclockwise, thereby pulling the link I forwardly to swing the type bar B from inactive position to printing position.

Step movement of the pilot device or cam 11 through one-eighth of a revolution in response to each depression of a key F is effected by turning a ratchet wheel 20 secured to the cam shaft 12. The ratchet wheel 20 is operable by a pawl 21 pivoted as at 22 on a rock arm 23 pivoted on the shaft 12. The arm 23 is connected by a link 24 to a crank arm 25 secured to the armature pivot shaft 26 of an oscillating electric motor 27. Normally the motor armature 28, shaft 26, crank arm 25, and connected parts are yieldably held in the positions shown in full lines in Figure 1 by a spring 29 interposed between a fixed ear 30 and a lever 31 pivoted as at 32 on the frame G and connected by a link 33 to an arm 34 secured to the armature shaft 26. Movement of the armature shaft 26 and connected parts under the urge of the spring 29 is limited by engagement of a curved stop part 35 of the link 33 with the hub 36 of the crank arm 25.

When the motor 27 is energized the armature 28 and shaft 26 are rocked clockwise as viewed in Figure 1, thereby pulling on the link 24 and moving the parts to the positions shown in Figure 3 and thus causing the pawl 21 to drive the ratchet wheel 20 and the cam shaft 12 through one-eighth of a revolution. The driving of the armature 28 and movement of the parts is stopped upon opening of the motor circuit in a manner to be described, and overthrow of the armature is prevented by a noiseless stop or limiting chain 38 interposed between an arm 39 on the shaft 26 and an anchor device 40 pivoted as at 41 on the frame G and held in adjusted position by a screw 42. Adjustment of the screw 42 will variably fix the position of the cam 11 when it comes to rest at the end of each operating cycle and it thus is possible easily to set or adjust the parts so that when they are in their normal positions the crest of a cam lobe 10 will be in correct registration with the roller 6.

As shown diagrammatically in Figure 2, the motor 27 is adapted to be connected to a source of electric power by conductors 43 and 44. Interposed in the conductor 43 is a resistor 45 and a switch 46 which is operable by mechanism shown in Figure 1 in response to depression of a key F for energizing the motor and removing the restraint on the spring 1 in the manner already described. As shown in Figure 1, the switch 46 has a button 47 depressible by a spring finger 48 for closing the motor circuit. Rockably mounted on the frame pivot 5 is a universal plate 49 which extends parallel to and behind the whole complement of cams 11 and bar lock keepers 8. The universal plate is urged counterclockwise as viewed in Figure 1 by a spring 50 connected between a post 51 on the plate and a screw 52 on the casing of the switch 46. In this way the universal frame is held yieldably in contact with heels 53 respectively on the keepers 8. When, as a result of depressing a key F, the associated keeper 8 is swung counterclockwise from the position shown in Figure 1, the heel 53 on that keeper will rock the universal frame 49 so as to bring an adjusting screw 54 on the universal frame to bear upon the finger 48 which then depresses the switch button 47 and closes the motor circuit.

The latter part of the actuating movement of the motor armature is utilized for operating a circuit breaker to open the switch 46. An arm 55 secured to the armature shaft 26 has pivotally connected to it as at 56 a floating pusher bar 57 supported to slide on a guide 58 fast with the motor frame. When the armature 37 approaches the end of its operating movement the free end

of the pusher bar 57 is projected against the universal frame 49 and the latter is kicked away from the spring finger 48, thereby deenergizing the motor. The spring 50 will complete the returning of the universal frame to its normal position after the key lever F has been released and raised by the spring *f*.

The force of the type bar impact may be varied by setting or adjusting the resistor 45 so as to regulate the speed of the operating throw of the armature 37. As has been pointed out above, the spring 1 can contract to move the type bar B to printing position only after the keeper restraining face 7 has been withdrawn from above the roller 6 and the cam 11 has subsequently been moved to present a cam depression for the roller 6 to move into. Thus, as the cam 11 moves, the roller goes down the retreating slope of the contacting cam lobe 10 thereby piloting the type bar B to printing position. If the cam movement is slow the roller 6 will be retarded more than if the cam movement is rapid. Therefore, increasing resistance in the resistor 45 will slow up the driving of the cam 11, consequently lessening the force of the type bar impact, and conversely decreasing the electrical resistance will provide for more rapid cam movement with consequent increase in the force of the type bar impact.

Preferably the motor armature 28 is of laminated construction so as to minimize the retarding effect of eddy currents and to make the motor operable on either direct or alternating current.

To recapitulate the operation of the mechanism disclosed, it will be assumed that the parts are in their normal positions as shown in full lines in Figure 1. The spring 1 is restrained from operating the type bar B by engagement of the roller 6 with the restraining face 7 of the keeper 8 and with the crest of the lowermost lobe 10 on the cam 11. When the key F is depressed, the link J, lever K, and link 19 are operated to rock counterclockwise the keeper 8 associated with that particular key F and type bar B, thereby displacing the actuated keeper face 7 from above the associated roller 6. The keepers associated with the other type bar actions will remain in restraining position so that depression of the key F conditions only one type bar action for operation. Rocking of the keeper 8 then swings the universal frame 49 to close the switch 46 and cause the armature 28 to rock and actuate the ratchet drive 21—20 to rotate the cam shaft 12 one-eighth of a revolution. The roller 6 can then move down the slope of the retreating cam lobe, thus enabling the spring 1 to move the type bar B to printing position. The type bar will reach this position when the cam shaft 12 has turned through one-sixteenth of a revolution at which time the roller will be free in the recess between two cam lobes 10 with a slight clearance between the roller and the root of the depression. Movement of the type bar B to its printing position is accompanied by operation of the escapement mechanism N through the link L and universal bar M.

During the next one-sixteenth revolution of the cam shaft 12 the next cam lobe 10 will force the roller 6 downwardly to restore the type action to normal position and re-load the spring 1. The motor circuit is broken by operation of the pusher bar 57 in the manner previously described, and the key F, upon being released by the operator, is returned to normal position by the spring *f*, which will also move the keeper 8 to restraining position over the roller 6.

The mechanism disclosed embodies the invention in the form now preferred but it will be apparent that changes may be made without departing from the invention as it is defined in the claims.

I claim:

1. In a typewriter or like machine, a movable type member; power means urging said member to typing position; means normally restraining said power means; key responsive means for releasing said restraining means to enable said power means to move said member to printing position; means for both piloting said member to printing position and for resetting said member in inactive position; an electric motor including a pivoted oscillatory armature; and means operatively connecting said armature to said piloting and resetting means.

2. In a typewriter or like machine, a movable type member; power means urging said member to typing position; means normally restraining said power means; key responsive means for releasing said restraining means to enable said power means to move said member to printing position; means movable step-by-step for piloting said member to active position and resetting said member in inactive position; an electric motor including a pivoted oscillatory armature; means for controlling said motor to effect one oscillation of said armature in response to each actuation of said key-responsive means; and connections between said armature and said piloting and resetting means for effecting a step movement of said resetting means in response to each armature oscillation.

3. In a typewriter or like machine, a movable type member; power means urging said member to typing position; means normally restraining said power means; key responsive means for releasing said restraining means to enable said power means to move said member to printing position; means rotatable step-by-step for resetting said member in inactive position; an oscillatory electric motor; means for controlling said motor to effect one oscillation thereof in response to each actuation of said key-responsive means; and connections including a pawl and ratchet between said motor and said resetting means for effecting a step movement of said resetting means in response to each motor oscillation.

4. In a typewriter or like machine, a movable type member; power means urging said member to typing position; means for normally restraining said power means to maintain said member in inactive position and for resetting said member from typing position to inactive position, said restraining and resetting means including a cam follower connected to said member, and a rotatable multilobed cam cooperable with said follower; an oscillatory electric motor; connections including a pawl and ratchet between said motor and said cam for moving the cam through the space between two lobes in response to each oscillation of said motor; and key responsive means for operating said restraining and resetting means to effect removal of said restraint and operation of said type member by said power means and for effecting an oscillation of said motor and movement of said cam to reset said type member in inactive position.

5. In a typewriter or like machine, a movable type member; power means urging said member to typing position; means for normally restraining said power means to maintain said member in inactive position and for resetting said mem-

ber from typing position to inactive position, said restraining and resetting means including a cam follower connected to said member, and a rotatable multilobed cam cooperable with said follower; an oscillatory electric motor; connections including a pawl and ratchet between said motor and said cam for moving the cam through the space between two lobes in response to each oscillation of said motor; key responsive means for operating said restraining and resetting means to effect removal of said restraint and to energize said motor; and a circuit breaker responsive to a partial oscillation of the motor for deenergizing said motor.

6. In a typewriter or like machine, a movable type member; power means urging said member to typing position; releasable means for normally restraining said power means to permit said type member to remain in inactive position and for controlling the speed of travel of said member to typing position, said releasable means including a pilot device adapted to retard said member during at least a part of its typing stroke; an oscillatory electric motor; means operatively connecting said motor to said pilot device; and key responsive means for operating said releasable means to release the restraint on said power means and for operating said electric motor to drive said pilot device.

7. In a typewriter or like machine, a movable type member; power means urging said member to typing position; releasable means for normally restraining said power means to permit said type member to remain in inactive position and for controlling the speed of travel of said member to typing position, said releasable means including a pilot device adapted to retard said member during at least a port of its typing stroke; an oscillatory electric motor; means operatively connecting said motor to said pilot device; key responsive means for operating said releasable means to release the restraint on said power means and for operating said electric motor to drive said pilot device; and means for varying the speed of oscillation of said motor to thereby vary the speed of said pilot device and the speed of the type member during its typing stroke.

8. In a typewriter or like machine, a movable type member; power means urging said member to typing position; releasable means for normally restraining said power means to permit said type member to remain in inactive position and for controlling the speed of travel of said member to typing position, said releasable means including a rotatable lobed cam, a cam follower, means connecting said follower to said type member, and means normally positioning said cam substantially with the crest of a lobe in engagement with said follower; an oscillatory electric motor; means operatively connecting said motor to said cam; and key controlled means for effecting oscillation of said motor to rotate said cam and thereby to enable said follower and said type member to be moved by said power means with the follower in contact with the retreating cam lobe whereby the cam pilots the type member to typing position.

9. In a typewriter or like machine, a movable type member; power means urging said member to typing position; releasable means for normally restraining said power means to permit said type member to remain in inactive position and for controlling the speed of travel of said member to typing position, said releasable means including a rotatable lobed cam, a cam follower, means connecting said follower to said type member, and means normally positioning said cam substantially with the crest of a lobe in engagement with said follower; an oscillatory electric motor; means operatively connecting said motor to said cam; key controlled means for effecting oscillation of said motor to rotate said cam and thereby to enable said follower and said type member to be moved by said power means with the follower in contact with the retreating cam lobe whereby the cam pilots the type member to typing position; and means for varying the speed of oscillation of said motor.

10. In a typewriter or like machine, a movable type member; power means urging said member to typing position; releasable means for normally restraining said power means to permit said type member to remain in inactive position and for controlling the speed of travel of said member to typing position, said releasable means including a rotatable lobed cam, a cam follower, means connecting said follower to said type member, and means normally positioning said cam substantially with the crest of a lobe in engagement with said follower; an oscillatory electric motor; means operatively connecting said motor to said cam; key controlled means for effecting oscillation of said motor to rotate said cam and thereby to enable said follower and said type member to be moved by said power means with the follower in contact with the retreating cam lobe whereby the cam pilots the type member to typing position; and means for so limiting the oscillation of said motor that a single complete operation thereof will drive said cam through the distance between two cam lobes.

11. In a typewriting or like machine, a movable type member; power means urging said member to typing position; means for normally restraining said power means to permit said type member to remain in inactive position and for resetting said type member in inactive position following a typing stroke of said member, including a cam follower, means connecting said follower to said member, a rotatable lobed cam, an oscillatory electric motor, connections between said motor and said cam for driving said cam through the space betwen two adjacent cam lobes in response to each motor oscillation; and key responsive means for first energizing and then deenergizing said motor to effect an oscillation thereof.

12. In a typewriter or like machine, a movable type member; power means urging said member to typing position; a keeper normally restraining said power means; a member for piloting said type member to typing position and for resetting said type member in inactive position; an electric motor including a pivoted oscillatory armature; means operatively connecting said armature to said piloting and resetting member; and key controlled means for actuating said keeper to discontinue its restraint on said power means, and for energizing said motor to effect oscillation of said armature, operation of said piloting and resetting member, and returning of said type member from typing to inactive position.

13. In a typewriter or like machine; a type member; a step-by-step rotary device for controlling the movement of said member to typing position and back to inactive position; an electric motor having an oscillatory armature; a pawl and ratchet connection between said armature and said rotary device; a spring normally hold-

ing said armature at one limit of its oscillation; means for energizing said motor to move said armature against the urge of said spring; means for limiting each movement of said armature; and means for deenergizing said motor to permit said armature to be returned by said spring.

14. In a typewriter or like machine, a type member; a step-by-step rotary device for controlling the movement of said member to typing position and back to inactive position; an electric motor having an oscillatory armature; a pawl and ratchet connection between said armature and said rotary device; a spring normally holding said armature at one limit of its oscillation; means for energizing said motor to move said armature against the urge of said spring; means for limiting each movement of said armature comprising an arm oscillatable with said armature, a chain connected to said arm, and a fixed anchorage for said chain; and a circuit breaker responsive to movement of said armature against the urge of said spring for deenergizing said motor to permit said motor to be returned by said spring.

15. In a typewriter or like machine, a type member; a spring urging said type member to move from inactive position to typing position; a rotatable multilobed cam; a follower engaging said cam; means connecting said follower to said type member; means for driving the cam step-by-step and for determining its position between steps comprising an oscillatory electric motor and connections including a pawl and ratchet between said motor and said cam; and means for controlling the operation of the motor comprising a key, a switch in circuit with said motor, means responsive to operation of said key for closing said switch, and means responsive to predetermined operating movement of said motor for opening said switch.

16. In a typewriter or like machine, a plurality of movable type members; individual springs respectively urging said type members to move from inactive position to typing position; a rotatable multilobed resetting cam; a plurality of aligned followers engageable with said cam; means respectively connecting said followers to said type members; a plurality of aligned keepers releasably engageable with said followers respectively for normally maintaining the associated type members restrained against movement by said springs; an oscillatory electric motor; pawl and ratchet drive connections between said motor and said cam; a switch in circuit with said motor; a universal member extending adjacent said keepers and being movable for cooperation with said switch; and a plurality of key members connected respectively to said keepers and being individually operable for moving a selected keeper out of restraining engagement with the associated follower and for moving said universal member to close said switch.

17. In a typewriter or like machine, a plurality of movable type members; individual springs respectively urging said type members to move from inactive position to typing position; a rotatable multilobed resetting cam; a plurality of aligned followers engageable with said cam; means respectively connecting said followers to said type members; a plurality of aligned keepers releasably engageable with said followers respectively for normally maintaining the associated type members restrained against movement by said springs; an oscillatory electric motor; pawl and ratchet drive connections between said motor and said cam; a switch in circuit with said motor; a universal member extending adjacent said keepers and being movable for cooperation with said switch; a plurality of key members connected respectively to said keepers and being individually operable for moving a selected keeper out of restraining engagement with the associated follower and for moving said universal member to close said switch; and a pusher bar operable by said motor and being engageable with said universal member for moving the latter out of its switch closing position.

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