July 24, 1928. 1,678,491

J. W. LAMBERT

KEY CONTROLLED OPERATING MECHANISM

Filed Sept. 21, 1925 2 Sheets-Sheet 1

FIG. 1

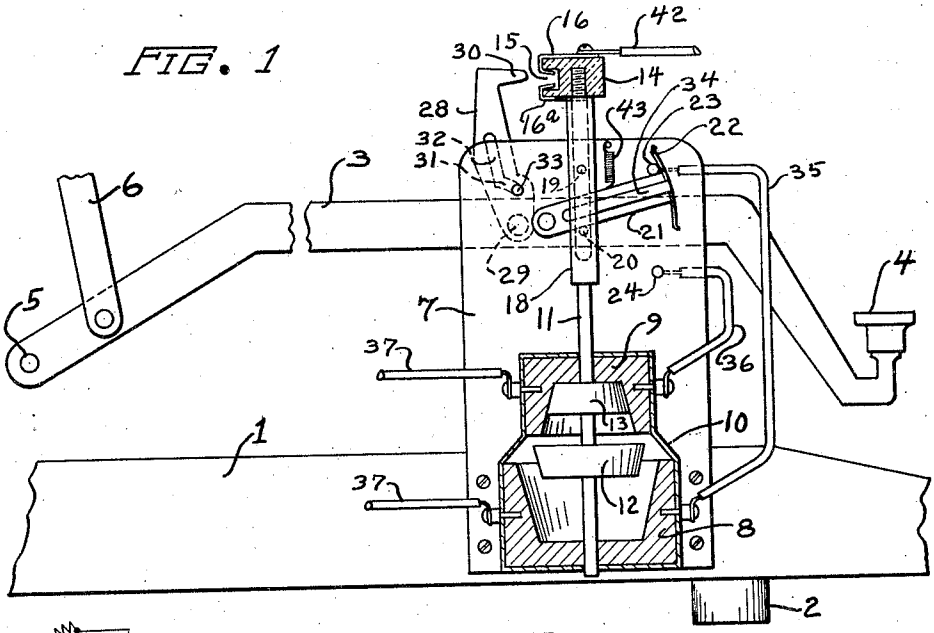
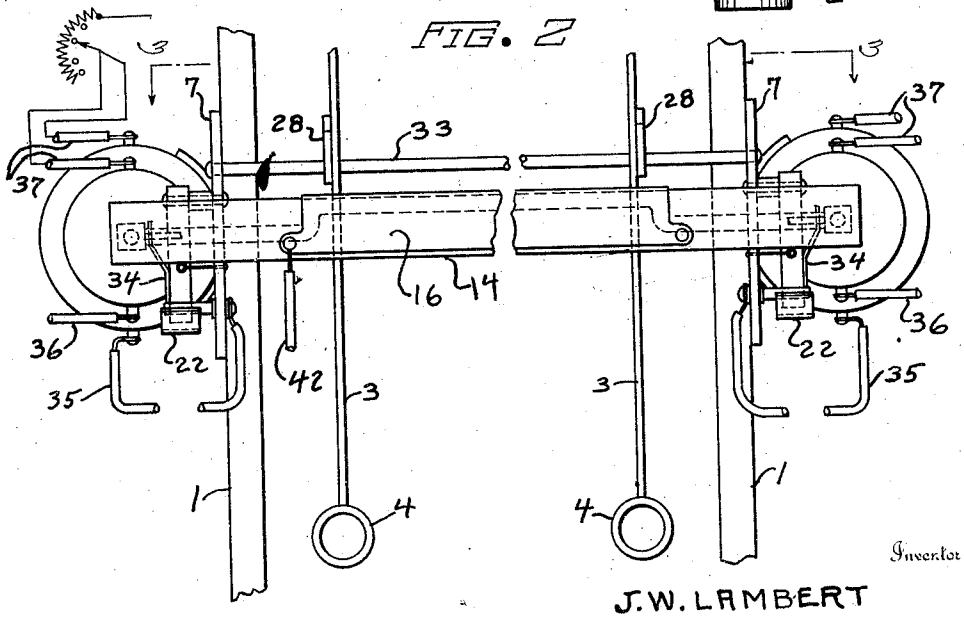


FIG. 2



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FIG. 3

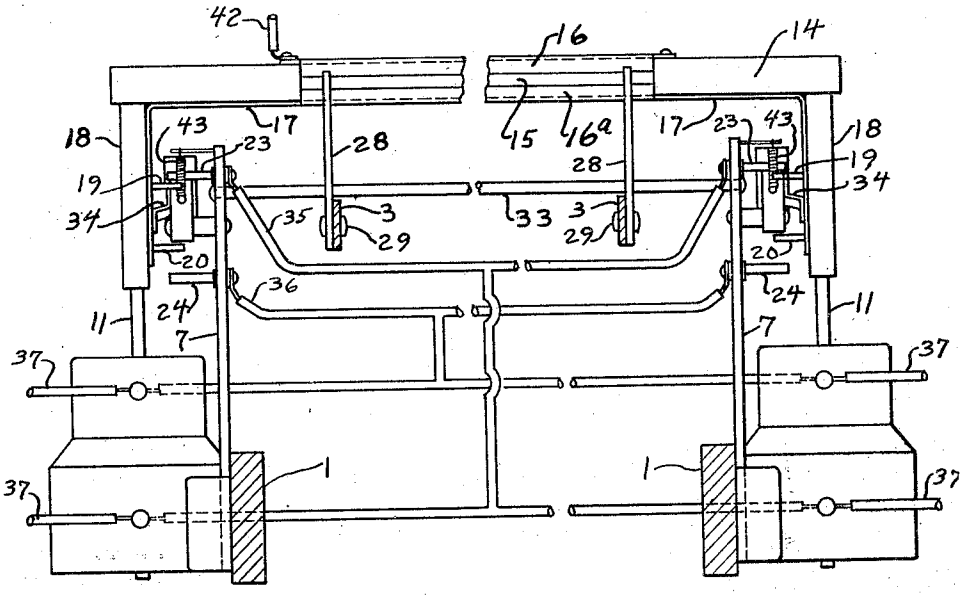
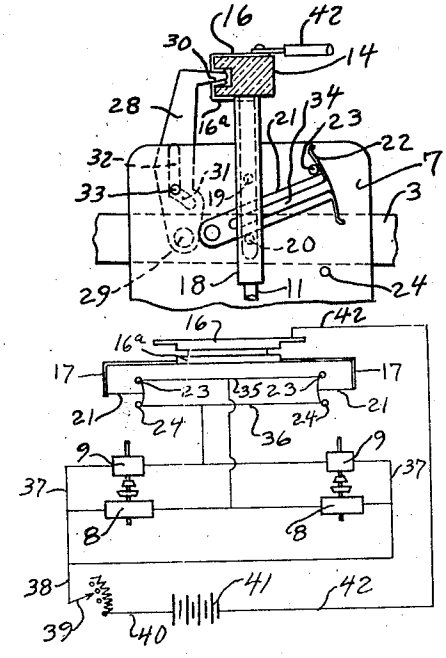


FIG. 4

FIG. 5



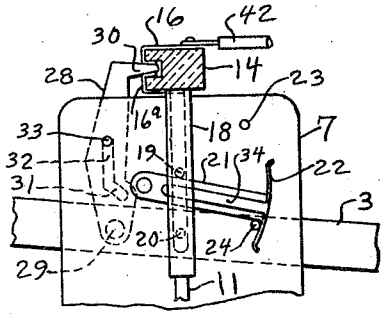


FIG. 6

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UNITED STATES PATENT OFFICE.

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KEY-CONTROLLED OPERATING MECHANISM.

Application filed September 21, 1925. Serial No. 57,582.

This invention relates to certain new and useful improvements in typewriters and other key controlled machines in which it is contemplated that the manipulation of the keys shall be responsive to a light finger touch, with the actual movement, to be imparted to the type bar or other operating mechanism, electrically produced.

My present invention has for one object the provision of a common electro-magnetically moved actuator for all type bars in combination with key control means for selectively co-ordinating the desired type bar with the common actuator contemporaneously with the closing of the circuits to effect its actuation and the concurrent operation of the selected type bar to print.

Such an arrangement reduces to a practically negligible quantity the possible multiple engagement of type bars which causes them to interlock, with the resultant disadvantages well known to those skilled in this art. The chief advantages of this arrangement are the simplicity of the electro-magnetic mechanism, the facility with which it can be applied to existing typewriters, and the relative inexpensiveness with which it can be constructed and installed.

More particularly my invention contemplates the utilization of a transverse actuator bar, adapted to be reciprocated in both directions by electro-magnetic means, preferably disposed at or near its ends, each key actuated lever of the typewriter machine being adapted when lightly depressed to be brought into operative connection with the type bar by means which will contemporaneously energize the bar actuating magnets to move it in a direction that will cause the bar to print and to throw switch mechanism which, at about the completion of the printing stroke, will energize the electro-magnetic means to effect return of the actuator and type bar.

My invention also contemplates novel details of construction in the key lever operated means for engaging and disengaging the lever from the common actuator bar, and also any means for dishpotting the action of the actuator to make the mechanism run smoothly and without undue vibration and noise.

My invention further comprises the novel details of construction and arrangement of parts which, in their preferred embodiment only, are hereinafter more particularly described and claimed and which are illustrated in the accompanying drawings which form a part of this specification, and in which:

Figure 1 is a side elevation of the part of a frame of a conventional typewriter, with the type bars omitted, a single key lever shown, and the magnetic means at one side of the machine shown in vertical central cross-section.

Figure 2 is a plan view of the parts of the machine shown in Figure 1, here only one key at each side of the machine being shown, and the actuator bar and its contact plate being broken away.

Figure 3 is a cross-sectional view through the frame taken on the line 3—3 of Figure 2.

Figures 4 and 5 are detail views, showing different positions of the key control latch for interlocking each type bar with the actuator bar.

Figure 6 is a small diagrammatic view of the electric circuits.

Similar reference numerals refer to parts throughout the diagrams.

It is to be understood that my present invention is capable of ready adaptation to any keyboard controlled selective operating mechanism for printing or performing any other desired function; and in describing my invention as applied to a typewriter I in nowise intend to limit its application to such mechanism. However, the typewriter presents a field of most available use for my invention and enables a more ready grasp of its construction and operation.

I have illustrated just such parts of a typewriting machine as are necessary for the understanding of the operation of my invention, those shown comprising: side frame members of the base, 1; the supporting feet, 2; levers, 3, adapted to be depressed by the manipulation of the keys, 4, of the keyboard, and the key levers pivotally mounted at 5. A type bar, 6, conventionally shown, is adapted to be operated by the depression of its respective key lever, and to print in the manner well understood in this art.

In adapting my present invention to a conventional typewriting machine, I mount, on the opposite sides of its base, plates 7, each of which carries a pair of opposed magnets, the magnet 8 representing in the con-

struction shown the printing magnet, and the magnet 9 the return magnet. These magnets are shown enclosed in any suitable jacket, 10, and they are arranged concentrically, one above the other, and provided with the lining center holes through which the rod 11, carrying the armatures 12 and 13, passes and is guided in its vertical reciprocations. The magnets are shown arranged with reversely tapering recesses which receive the reversely tapering armatures with a sufficiently close fit to enable the armatures to be dashpotted to the desired extent when moving into position in their respective magnets.

The rod 11 at its upper end is connected to a common transverse actuator bar 14, which, in the drawings, is shown disposed above the bank of key levers 3, but which may obviously be arranged in whatever relation to such levers will prove most convenient and economical as applied to different types of machines. The bar is preferably of insulation and has the upper ends of the actuating rods at each side rigidly engaged therewith, so that it forms with the rods an inverted U-bar actuator adapted to be magnetically reciprocated vertically and without angular variation. The actuator bar 14 along one side edge is provided with a longitudinal notch or indentation 15, which is preferably lined with spaced strips of contact metal 16 and 16ª, the strip 16 extending above the actuator bar along its upper edge and the strip 16ª under the actuator bar along its lower edge and having lateral extensions 17 which reach nearly to the ends of the bar and are downturned along an insulating covering 18 for the upper ends of the rods 11. Each rod 11 carries spaced stop pins 19 and 20 which pierce the contact plate 17 and are adapted to engage and shift the arm 21 of a circuit changing switch comprising contact plate 22 adapted to co-act alternately with the contact points 23 and 24. The contact strips 16 and 16ª are spaced to provide yielding jaws to receive the circuit closers hereinafter described.

The circuit closers are formed by latches or pivoted arms 28, which are all of identical construction, and each latch is pivotally connected by a pin 29 to the side of its respective lever 3 and projects above and below same according to the arrangement of the actuator bar 14. It is provided at its upper free end with a detent 30 of conducting material adapted to engage the notch 15 in the actuator bar when moved downwardly by the depression of its respective lever 3 and close the circuit like a knife switch between strips 16 and 16ª. The engaging movement of this latch is positively accomplished by the provision in it of a slot comprising a lower end 31 disposed at an acute angle to a horizontal plane, and an upright slot 32 normally disposed at a slight rearward inclination from the vertical. All of the latches are arranged with their several slots in transverse alignment, and through all of the slots is passed a rod 33 made fast at its ends in the plates 7. The arrangement of the slots with relation to this rod 33 is such that in normal inoperative position the rod stands at the base of the slot ends 31 of all latches, and at completion of the relatively short finger stroke of the bar 3 it moves its respective latch into operative position, which brings the rod to the bottom of the upright slot 32. The movement of the latch relative to this rod responsive to the finger movement has caused the latch to rock about its pivot 29, against the rod 33 as a fulcrum, until its detent has positively engaged and become interlocked in the notch 15; and when this occurs the slot 32 will stand substantially parallel with the rod 11. As will be seen by a comparison of Figures 1 and 4, this finger actuated movement of a latch will act to close the circuit across the strips 16 and 16ª contemporaneously with the interlocking of the latch detent 30 in the actuator bar notch 15, in which position it is positively held by its pivot pin 29 and the engagement of the rod 33 in its slot 32. When the circuit is thus closed, the switch 22 will stand in the position shown in Figures 1 and 3, and current will flow from the contact strips to the extensions 17, and thence to spring contacts 34, wiping over the plates 17 at each end, and each in turn connecting to a switch blade 22 and thence to the contact posts 23 or 24. The electric circuit 35, suitably insulated, connects the contact post 23 with the electro-magnet 8; and a similar circuit 36 connects the contact post 24 with the magnet 9. Preferably the circuits 36 are joined so as to connect the magnets 9 in multiple with the contact posts 24. In like manner, the circuits 35 are joined so as to connect the contact posts 23 in multiple with the magnets 8. The circuit returns by leads 37 from both magnets which merge into the circuit 38 containing a rheostat 39, which in turn is connected with the circuit 40 by a battery 41. The circuit 42 from the battery is connected to the top contact plate 16. The rheostat enables the electro-magnetic force of the magnets to be apportioned to the duty of actuating and returning printing mechanism. A coil spring 43 acts to return the arm carrying the switch 22 to initial position, and it should be noted that this switch arm is disposed between stops 19 and 20, so that a certain predetermined lost motion is provided which will permit the mechanism to get under full operation before the switch is moved with a snap action, both to open the circuit at 22 and to close it at 23, and vice versa.

In the operation of my invention as thus far described, the circuits will be open when

all of the key levers are in raised position, because all of the latches 28 will be lifted to position in which they disengage the circuit closing detent from contact with the plates 16 and 16a. The parts are disigned and arranged so that upon manually depressing any key with a light, delicate touch for a very short distance, say about one-eighth inch (⅛″), its respective pawl or latch will be drawn forward, and by the engagement of the slot with the rod 33 will be interlocked with the actuator notch, and at the same time will close the circuit to the lower magnets 8, through the electrical conductors 17, 21, 22 and 23, and multiple circuit 35, and thence by circuits 37 and 38, through rheostat 39 and circuit 40 to the battery. This will result in the simultaneous energization of both magnets 8, which, with the depressed key lever latch interlocked therewith, will be jerked downwardly to impart the printing motion to the type bar. As this downward motion progresses the upper pin 19 will pick up the switch arm and move the switch 22 downwardly, causing it to open the circuit to the lower magnets just prior to the completion of the printing operation, and to at once close the circuits to the upper magnets 9 through posts 24 and circuits 36, thus causing these magnets to raise the armatures and to restore the key controlled mechanism to initial position. During the downward travel of the actuator 14, the stationary rod 33, co-acting with the slot 32 of the selected latch, will hold the latter positively in engagement throughout the full downstroke and throughout the upstroke until the rod 33 reaches the lower slot portion 31, which, acting on the rod 33, will throw out the latch detent from the actuator notch causing the latch to break the circuit between 16 and 16a, thereby de-energizing the upper magnets 9.

If it be desired to repeat the printing operation of any selected key, it is only necessary to hold the type bar depressed at the normal distance depressed in its manipulation, and the detent will thus be held interlocked with the actuator bar, and the latter will vibrate, repeating the printing operation for the time that the key lever is partially depressed. The rheostat enables the magnetic force of magnets 8 and 9 to be varied according to the duty required.

What I claim is:

1. In a key controlled mechanism of the character described, an electric circuit, an electro-magnetically controlled reciprocable actuator forming a part of the circuit, a plurality of independent arms pivotally connected with the respective keys and adapted to be selectively engaged with and automatically disengaged from said actuator to close the circuit and transmit movement to the keys upon engagement with the actuator, and means associated with the keys for controlling the selective engagement of said arms with said actuator.

2. A key controlled mechanism, according to claim 1, in combination with means for pneumatically dash potting the action of the actuator at the respective ends thereof.

3. A key controlled mechanism, according to claim 1, including electromagnetic means for moving the actuator in both downward and reverse directions, and a reversing switch controlled by the actuator; and wherein the pivoted arms are in positive engagement with the actuator for the entire movement thereof, and the energization of the actuator is controlled jointly by the pivoted arms and by the reversing switch controlled by the actuator.

4. A key controlled mechanism, according to claim 1, including electromagnetic means for moving the actuator in both downward and reverse directions, and a reversing switch controlled by the actuator; and wherein the pivoted arms are in positive engagement with the actuator for the entire movement thereof, and the energization of the actuator is controlled jointly by the pivoted arms and by the reversing switch operated with a lost motion action by the actuator.

5. In a key controlled operating mechanism embodying manually operable key levers, an electro-magnetic power means, a normally open circuit for the electro-magnetic means, a common actuating element for all the key levers and included in the circuit, and actuated by said power means and means associated with each of the key levers for selectively engaging and interlocking with the common actuating element for power transmission to the key lever and for closing the circuit.

6. In combination with a key controlled mechanism, a normally open electric circuit, an electrically operated actuating device for the key controlled mechanism and forming a part of the circuit, and power transmission means carried by each of the keys and responsive to partial manual depression thereof to interlock with the actuating device to control the keys and close the circuit.

7. In a key controlled operating mechanism embodying manually operable key levers, a reversible electro-magnetic power means, a normally open circuit for the electro-magnetic means, a common actuating element for all the key levers, included in the circuit, and actuated by the power means, means carried by each of the key levers for selectively engaging and interlocking with the common actuating element upon partial depression of the key for imparting reciprocal motion to the key and for closing the circuit, and a reversing switch for the circuit operated by the actuating element.

8. Apparatus as set forth in claim 7 together with means operable during the completion of the reverse travel of the actuating device to positively disengage the actuating element and the means carried by the lever and open the circuit.

9. In a key controlled operating mechanism embodying manually operable key levers, a reciprocable electro-magnetic power means, a normally open circuit for the electro-magnetic means, a common actuating element for all the key levers, included in the circuit, and actuated by the power means, means carried by each of the key levers for selectively engaging and interlocking with the common actuating element for transmitting power in both directions from the actuating element to the key and for closing the circuit, and a reversing switch included in the circuit and operated by the actuating element.

10. Apparatus as set forth in claim 9 together with pneumatic cushioning means included in the electro-magnetic power means for cushioning the movements thereof at both ends of its travel.

In testimony whereof I affix my signature.

JOHN W. LAMBERT.