July 24, 1928. 1,678,492

J. W. LAMBERT

ELECTROMAGNETIC ATTACHMENT FOR KEY CONTROLLED MECHANISMS

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Fig. 1

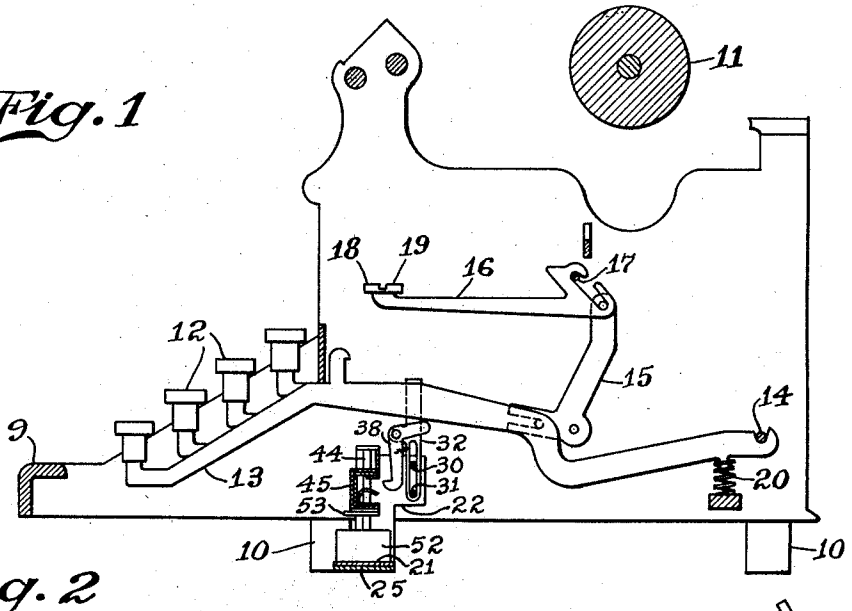


Fig. 2

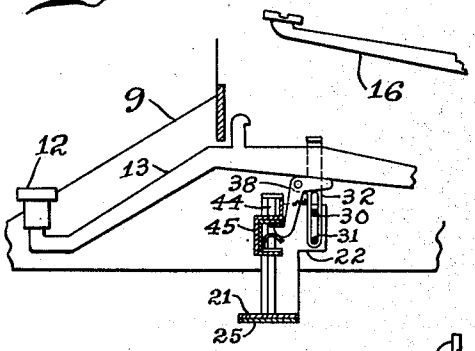
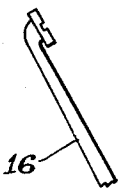


Fig. 3



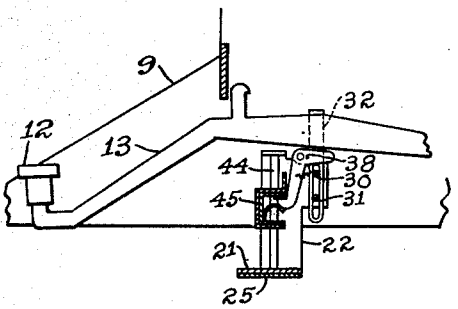
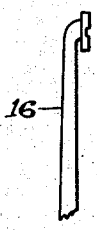
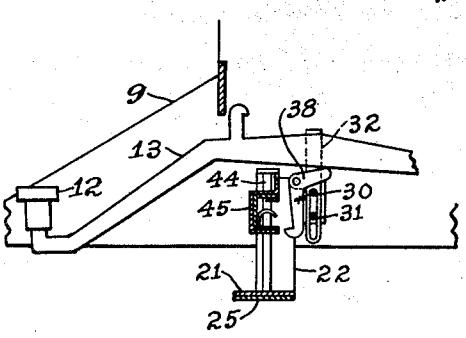


Fig. 4





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Fig. 5

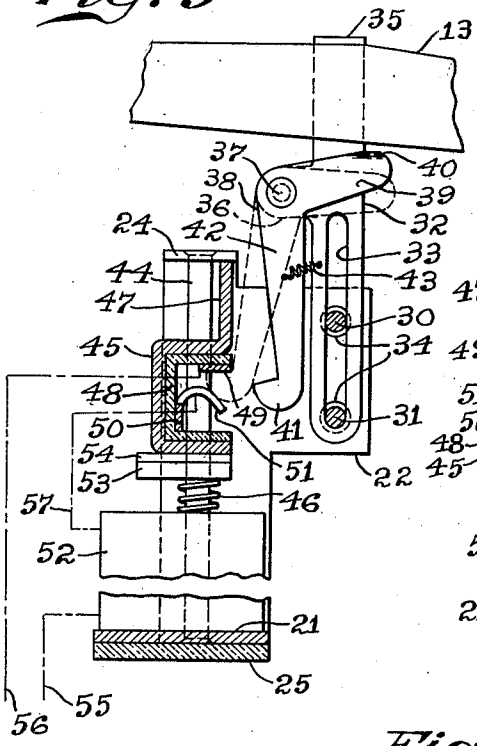


Fig. 6

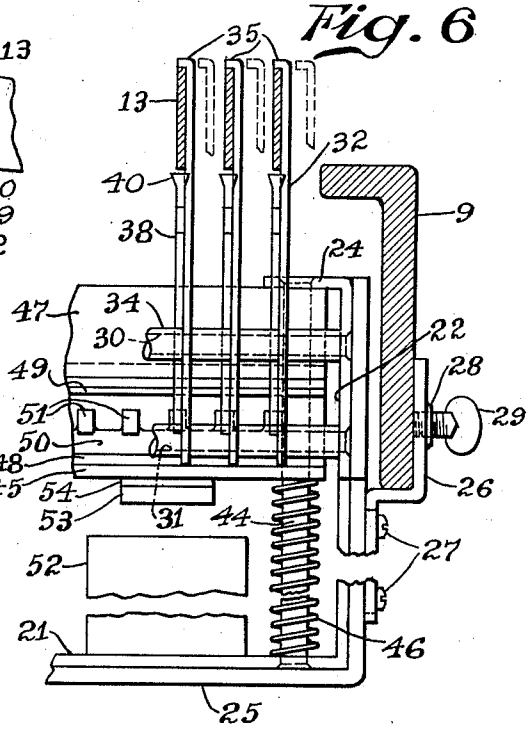
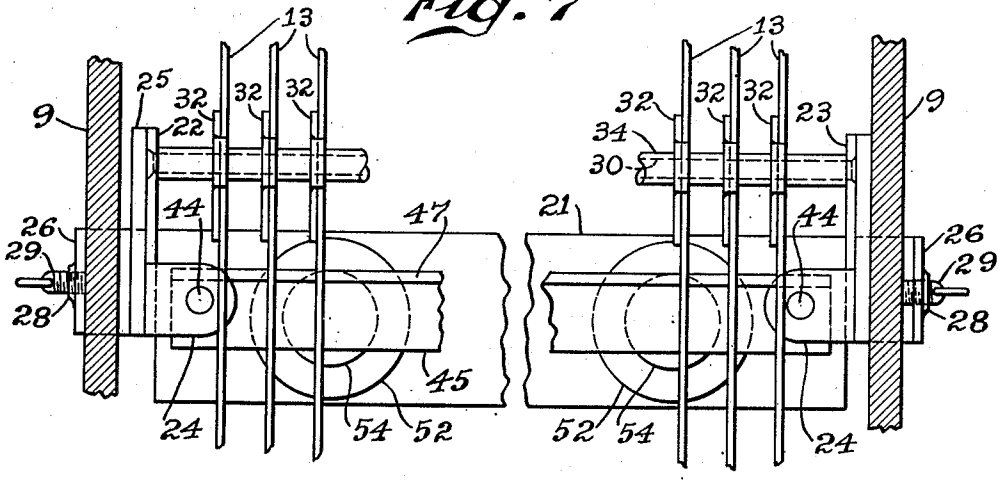


Fig. 7



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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC ATTACHMENT FOR KEY-CONTROLLED MECHANISMS.

Application filed December 2, 1926. Serial No. 152,270.

This invention has general reference to typewriters and other key-controlled mechanisms having means associated therewith by which certain manually-initiated movements of parts of the mechanism are either accompanied or followed by movements of the same or other parts, due to their being acted upon electrically or magnetically; but more particular reference will be made herein to mechanisms of the said general character in which manually-initiated movement of any one of a plurality of keys, renders electromagnetic means effective to cause a predetermined movement or movements of an operating part or parts of the mechanism,—as, for example, in the electro-magnetic operation of a typewriter.

A primary object of the present invention is to produce key-controlled mechanism having associated therewith means which render it adapted for either solely-manual or combined manual and electro-magnetic operation, and in which provision is made for completely disassociating from the manually-operable parts all of those which are not necessary for manual operation, but are employed during electro-magnetic operation only; and to accomplish such disassociation without its being necessary either to remove any of the parts employed for electro-magnetic operation or to cut off the supply of electric current to the magnet or magnets.

Another object is to provide a typewriter attachment comprising means by which mechanism such as is commonly employed for the manual operation of a standard form of typewriter may be operated electro-magnetically without change in the working parts of such mechanism.

A further object is to provide such an attachment which may be employed with a standard form of typewriter without the necessity of any change in the frame of the typewriter or in the base or the support upon which it rests.

And a still further object is to provide means for the manually-initiated, electro-magnetic operation of a typewriter, in which manual depression of the keys is not limited or interrupted materially due to the electro-magnetic operation, and hence there is no perceptible difference in the "touch" when a change is made on the same typewriter from ordinary manual operation to manually-initiated, electro-magnetic operation, or vice versa.

The means by which the foregoing and other objects are accomplished by my invention, and the manner of their accomplishment, readily will be understood from the following description on reference to the accompanying drawings, which depict preferred embodiments of the invention, and in which:—

Fig. 1 is a sectional side elevation of parts of the frame of a conventional form of typewriter, showing a key lever and associated parts in their positions of rest, and the electro-magnetically-operated means which I preferably employ for completing the writing movement of the key lever after its key has initially been slightly depressed manually.

Fig. 2 is a fragmentary detail view indicating the positions of the key lever and the type bar when the lever has been depressed manually to the slight extent required to render the electro-magnetically-operated mechanism effective to cause further downward movement of the key lever.

Fig. 3 is a view similar to Fig. 2, but showing the positions of the parts upon completion of the power movement of the key lever.

Fig. 4 is a view similar to Fig. 2, but showing the positions of the parts upon completion of the momentum movement of the key lever.

Fig. 5 is an enlarged fragmentary detail view of the electro-magnetic mechanism and one of the key levers, in sectional side elevation.

Fig. 6 is an enlarged fragmentary detail view of the electro-magnetic mechanism and some of the key levers at one side of the typewriter, in sectional front elevation.

Fig. 7 is an enlarged fragmentary detail view of the electro-magnetic mechanism and some of the key levers at the respective sides of the typewriter, in sectional plan.

As shown in the drawings, in which like parts are identified by corresponding reference characters throughout the several views, the typewriter has the usual frame 9, mounted upon suitable supports 10, which ordinarily are formed partly or wholly of rubber; a platen 11; keys 12, each carried at the free end of a key lever 13, the other end of which engages a fulcrum-rod 14; bell-crank levers 15, by which each of the key levers 13 is connected with a type bar 16, one end of which is hung upon a suitable supporting-

rod 17, while at its other end are the upper-case and lower-case type characters 18 and 19; and compression springs 20, one of which provides for the upward return of each of the key levers after it has been depressed during the writing operation.

While I have selected a typewriter as a medium for illustrating an adaptation of the present invention to commercial use, and have shown somewhat diagrammatically in the drawings a typewriter of a well-known make, it is to be understood that such selection and such showing are for purposes of illustration only, and that use of my invention is not limited to any particular form or make of typewriter, to the typewriter art alone, or to any special class or classes of other key-controlled mechanisms. And, although I have shown in the drawings, and shall describe hereinafter, my improved electro-magnetic mechanism as preferably comprising a self-contained attachment for typewriters and other key-controlled devices, it is manifest that said mechanism may if desired be built into, or may otherwise constitute a component part of, the device with which it is employed.

All of the parts of the electromagnetic mechanism are carried by a plate 21, which is bent at right angles at each end to form upward extensions 22 and 23 respectively, the free ends of said extensions being bent at right angles toward each other to provide similar ears 24. Insulating material 25 extends throughout the underneath surface of the plane body portion of said plate, and covers the outer faces of the extensions 22 and 23. Adjacent the outer face of each of said extensions, a clip 26 is secured thereto by means of screws 27 which pass through a longitudinal slot in the clip and into the plate extension, so that the position of the clip is adjustable upward and downward, and clips of different shapes, conforming to the configuration of that portion of the frame of the typewriter to which the clips are to be applied, may be used interchangeably. The upper portion of the clip is bent outwardly and then upwardly, and the outer surface of its upwardly-projecting portion is provided with a boss 28, said boss and said portion of the clip having a screw-threaded opening therethrough for the reception of a thumb-screw 29. The plate 21 is arranged at right angles to the key levers 13, and its length is such that the distance between the outer surfaces of the insulating material on the extensions 22 and 23 is less than the interior width of the typewriter frame, by about one-half the distance between the opposed faces of each two adjacent ones of the key levers 13. Between the extensions 22 and 23, and rigidly secured thereto, are two similar cylindrical rods 30 and 31, which are arranged in the same vertical plane, and at right angles to the key levers 13. Upon said rods are mounted pendants 32, each having a longitudinal slot 33 therein which embraces the rods slidably, the number and spacing of said pendants corresponding with those of the key levers 13, and said pendants being kept the desired distance apart, and held substantially parallel with each other, by means of sleeves 34, which preferably are loose on the rods, so as not to interfere materially with movement of the pendants relative thereto. Each of said pendants has at its upper end a flange 35, which projects from the face of the pendant a distance approximately equal to the thickness of one of the key levers 13; and each pendant has a projection 36 lying in the same plane therewith, and extending toward the front of the typewriter below the key lever. Said projection carries a pin 37, upon which is pivotally mounted a depending connector-arm 38, having projecting from the upper end thereof, in the same plane therewith and substantially at right angles thereto, an arm 39 carrying at its free end an offset 40. The connector-arm 38 terminates at its lower end in a rounded portion 41, having at the side farthest from the adjacent one of the pendants 32 a substantially horizontal, plane surface 42, and a very light tension spring 43 has one of its ends secured to said connector arm, and its other end secured to the adjacent pendant.

Near the respective ends of the plate 21, and secured at right angles to said plate and to the ears 24, are guide rods 44 upon which an actuator-bar 45 is slidably movable up and down in front of the pendants 32, compression springs 46 being held in place by said rods between said plate and said actuator-bar. Said bar comprises a portion which is substantially U-shaped in cross-section, having its legs parallel with the plate 21, and its open side directed toward the pendants 32, and an upwardly-projecting extension-plate 47 which is substantially at right angles to the horizontal plane of the actuator-bar. The inner surface of the U-shaped portion of said bar is covered throughout its length with insulation 48, and to the inner surface of the upper leg of the U is secured a contact-plate 49, while to the inner surface of that portion of the actuator-bar which forms the base of the U is secured a contact plate 50 of resilient material, said two contact plates extending throughout the length of the actuator-bar, and the plate 50 having curved projections 51, one of which is opposite each one of the connector-arms 38 and has its free end directed angularly downward. Near each end of the plate 21, and centrally disposed with respect to the longitudinal axis of the actuator-bar, an electro-magnet 52 is secured to said plate, and an armature 53 is secured to the lower leg

of the U-shaped portion of said bar above each of said magnets, insulating material 54 being interposed between said leg and said armature. Insulated wires 55 and 56 lead from any suitable source of electric current, wire 55 being directly connected with one pole of each of the two electro-magnets 52, and wire 56 being connected with contact-plate 49, while from contact-plate 50 an insulated wire 57 leads to the other pole of each of the magnets.

To apply my electro-magnetic attachment to a key-controlled device, such as a typewriter, the plate 21, which carries all of the parts of the electro-magnetic mechanism, is placed in such a position relative to the key levers that said parts are in substantially the positions indicated in full lines in Figs. 1, 5 and 6, the positions of the pendants 32 relative to the key levers 13 being adjusted transversely of the typewriter by means of the thumb-screws 29, and the plate 21 with its extensions 22 and 23 being so shaped and dimensioned that the insulation at the under side of the plate 21 will rest upon the same surface that supports the typewriter, or upon some other suitable supporting surface. Having thus placed the parts in working position, if it should be desired to resume manual operation of the type-writer independently of the electro-magnetic mechanism, it is only necessary to move the plate 21 transversely of the typewriter, by adjustment of the thumb-screws 29, until the pendants 32 are in substantially the positions indicated in dotted lines in Fig. 6, whereupon all parts of the typewriter mechanism will be entirely free from all parts of the electro-magnetic mechanism, and the latter will in no wise interfere with the manual operation of the former in the usual manner.

In the electro-magnetic operation of the typewriter, slight manual depression of any one of the keys brings the corresponding one of the key levers 32 into engagement with the offset 40 therebeneath, and depresses the arm 39 sufficiently to advance the lower end of the connector-arm 38 toward the actuator-bar 45 until the plane surface 42 of said arm is in contact with the contact-plate 49, and the rounded surface 41 of said arm is in contact with one of the projections 51 of contact-plate 50. At this instant the parts are in substantially the positions indicated in Fig. 2, and the circuit to the two magnets 52 being closed, the armatures 53 are drawn downward against the cores of said magnets, thus correspondingly moving the actuator-bar, the connector-arm, the pendant, and the key lever that was initially depressed manually, and bringing the parts into substantially the positions indicated in Fig. 3. It should be noted that upward movement of arm 39 is limited by engagement of the offset 40 thereon with the rear surface of the pendant, so that when the parts are in their positions of rest the free end of arm 39 is slightly below the lower surface of the key lever, while at the same time the tension spring 43 tends to pull the connector-arm 38 toward the pendant, and thus to retain arm 39 in its uppermost position. The momentum imparted to the pendant by what may be termed its power movement causes it to continue downward after the actuator-bar has come to a stop due to engagement of the armatures with the cores of the magnets, and such continued downward movement of the pendant disengages the plane surface and the rounded surface at the lower end of the connector-arm from the contact-plate 50 and the extension 51 of the contact-plate 50, thereby breaking the current connection to the magnets, and leaving the actuator-bar free to be returned to its initial position by the springs 46. The momentum movement of the key lever and the type bar is completed when movement of the free end of said bar, carrying the type characters, is halted by the platen 11, whereupon said bar and said lever are returned by spring 20 to their initial positions, and such return movement correspondingly returns the pendant and the arm carried thereby, due to engagement of the key lever with the flange 35 of the pendant. The plate 47, which extends upward from the actuator-bar throughout the length thereof, not only serves to limit upward movement of said bar, due to engagement of the ends of said plate with the ears 24 of the upward extensions 22 and 23 of plate 21, but plate 47 also prevents depression of another key after one of the keys has been depressed and before it has returned to initial position, since when the actuator-bar is below its position of rest the plate 47 is in such a position as to prevent any considerable movement of any connector-arm away from its pendant.

From the foregoing it will be seen that I accomplish all of the objects of my invention by simple and relatively inexpensive means comprising few different parts, including the very important object of producing a self-contained attachment which is adapted to be used with a typewriter or other key-controlled mechanism without any change whatever in the working parts or the frame or the base thereof, so that such an attachment may be added to a standard machine without cutting, drilling, or otherwise working upon, any part of the mechanism or frame of the device with which the attachment is to be used.

Various modifications of minor details of the improvements disclosed herein doubtless readily will suggest themselves to those skilled in this art, but such modifications fall within the scope of my inventive rights, and my invention is not to be construed as being

limited to any details not specifically set out in the claims.

Having now fully disclosed the invention, what I claim as new, and seek to secure by Letters Patent, is:—

1. The combination with a typewriter having a supporting frame and a plurality of spaced apart manually operable key levers, of a self contained electro-magnetic mechanism for aiding in the operation of the key levers, a supporting member for the electro-magnetic mechanism, key lever operating means carried by the supporting member and interleaving with the key levers, and adjustable means for laterally shifting the supporting member with respect to the frame to bring the key lever operating means into and out of operative relation with the key levers.

2. The combination with a typewriter having a plurality of spaced apart manually operable key levers, of a self contained electro-magnetic mechanism for aiding in the operation of the key levers, key lever operating means included in the electro-magnetic mechanism and interleaving with the key levers, and shifting means for the electro-magnetic mechanism to connect and disconnect the key lever operating means with the key levers, an electric circuit for the electro-magnetic means, and means carried by the key lever operating means for controlling the electric circuit.

3. The combination with a typewriter having a frame and a plurality of spaced apart pivoted manually operable key levers extending generally in a horizontal direction across the frame, of a self contained electro-magnetic mechanism for aiding in the operation of the key levers and positioned beneath the key levers, upwardly extending key operating means included in the electro-magnetic means and interleaving with the key levers, key lever engaging means carried by the operating means, and means for bodily shifting the electro-magnetic means to bring the key lever engaging means into or out of the plane of movement of the key levers.

4. The combination with a typewriter having a frame with lower side members and a plurality of spaced apart pivoted manually operable key levers extending generally in a horizontal direction across the frame, of a self contained electro-magnetic mechanism for aiding in the operation of the key levers and positioned beneath the key levers between the side members of the frame, upwardly extending key operating means included in the electro-magnetic means and interleaving with the key levers, an upwardly extending operating finger for each of the key levers included in the electro-magnetic mechanism and adapted to be hooked over its associated key lever to operate said lever, and means cooperating with the typewriter frame to bodily shift the electro-magnetic mechanism laterally to bring all the fingers into or out of operative engagement with the key levers.

5. The combination with a typewriter having a frame with lower side members and a plurality of spaced apart pivoted manually operable key levers extending generally in a horizontal direction across the frame, of a self contained electro-magnetic mechanism for aiding in the operation of the key levers and positioned beneath the key levers between the side members of the frame, upwardly extending key operating means included in the electro-magnetic means and interleaving with the key levers, an upwardly extending operating finger for each of the key levers included in the electro-magnetic mechanism and adapted to be hooked over its associated key lever to operate said lever, and means cooperating with the typewriter frame to bodily shift the electro-magnetic mechanism to bring all the fingers into or out of operative engagement with the key levers, a circuit for the electro-magnetic means, and circuit controlling elements pivotally connected to the operating fingers and responsive to partial manual depression of a key lever to energize the electro-magnetic means.

In testimony whereof I affix my signature.

JOHN W. LAMBERT.