J. T. SCHAAFF.

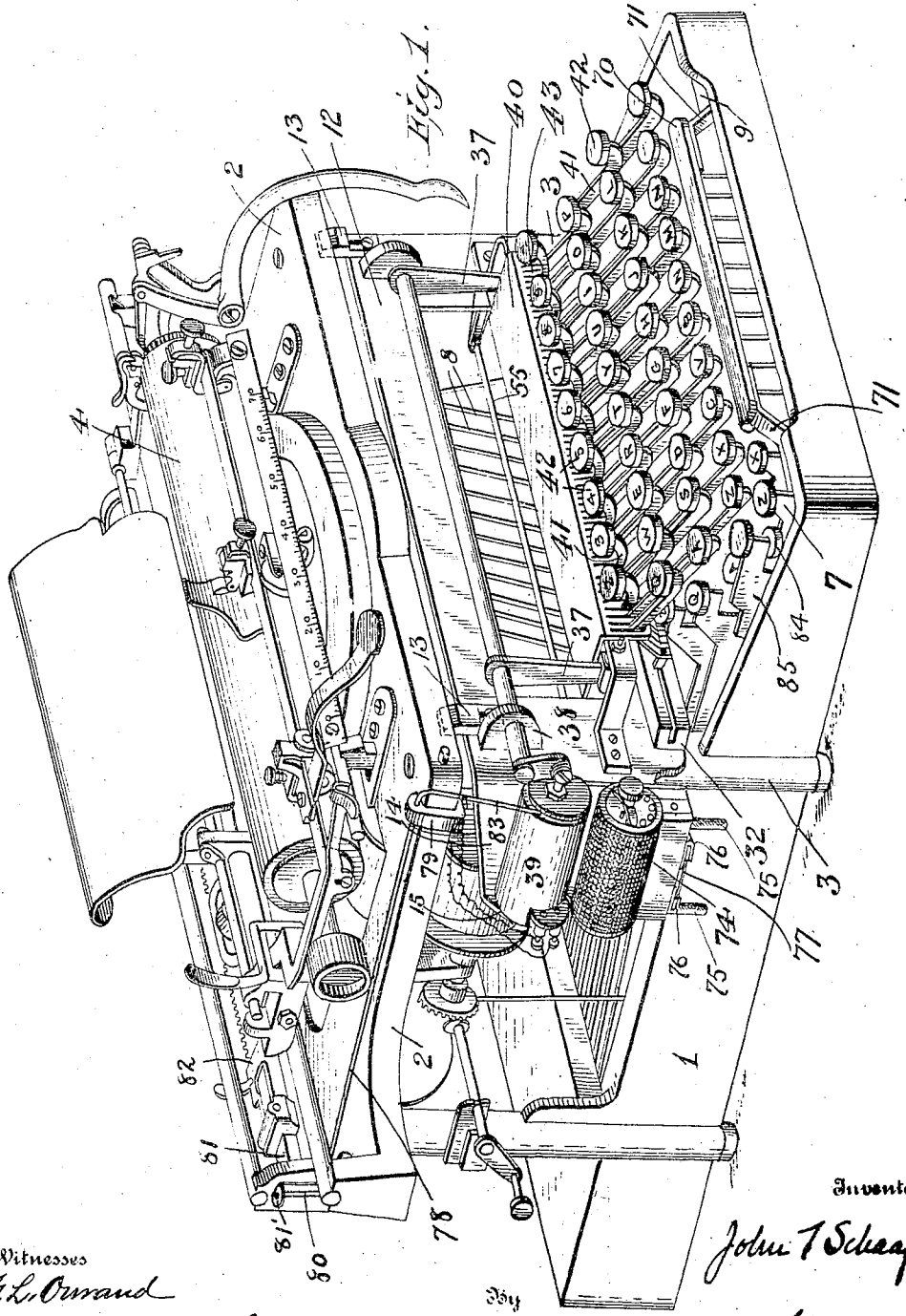
OPERATING ATTACHMENT FOR KEYBOARD MACHINES.

APPLICATION FILED DEC. 22, 1904.

1,046,865. Patented Dec. 10, 1912.

4 SHEETS--SHEET 1.

Fig. 1.



Witnesses

F. L. Ormand

C. Albert Popkins

Inventor

John T. Schaaff

By Stinchcomb & Crosley

Attorneys

J. T. SCHAAFF.

OPERATING ATTACHMENT FOR KEYBOARD MACHINES.

APPLICATION FILED DEC. 22, 1904.

1,046,865. Patented Dec. 10, 1912.

4 SHEETS—SHEET 2.

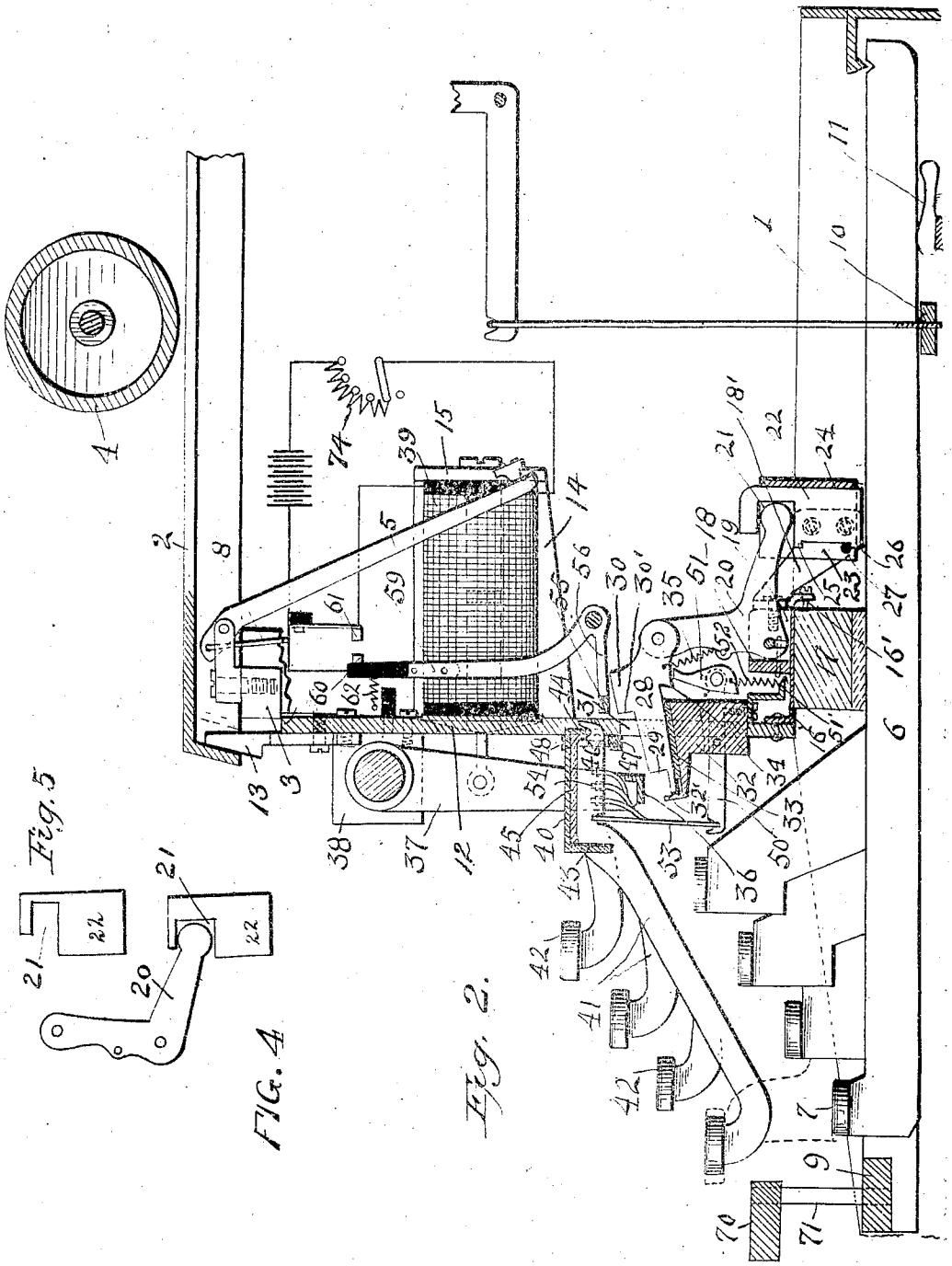


Fig. 2.

FIG. 4

Fig. 5

Witnesses

Frances L. Orrand

Albert Dipkins

John T. Schaaff

By Stinstman & Brumley

Attorney

J. T. SCHAAFF.

OPERATING ATTACHMENT FOR KEYBOARD MACHINES.

APPLICATION FILED DEC. 22, 1904.

1,046,865. Patented Dec. 10, 1912.

4 SHEETS—SHEET 3.

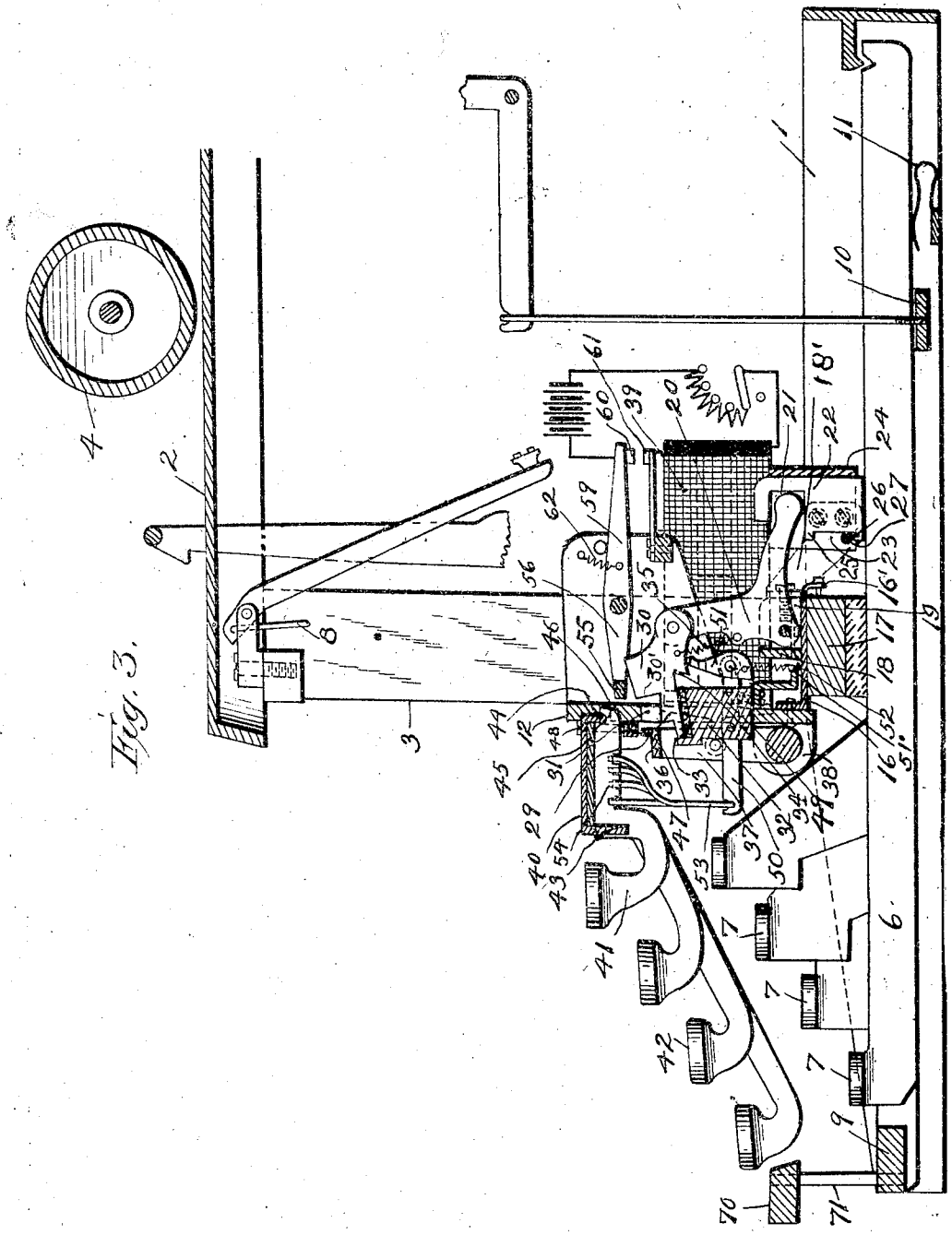


Fig. 3.

Witnesses
F. L. Ormande
Albert Popkins

Inventor
John T. Schaaff
by Stanton & Brinley
Attorneys

J. T. SCHAAFF.

OPERATING ATTACHMENT FOR KEYBOARD MACHINES.

APPLICATION FILED DEC. 22, 1904.

1,046,865. **Patented Dec. 10, 1912.**

4 SHEETS—SHEET 4.

Fig. 6

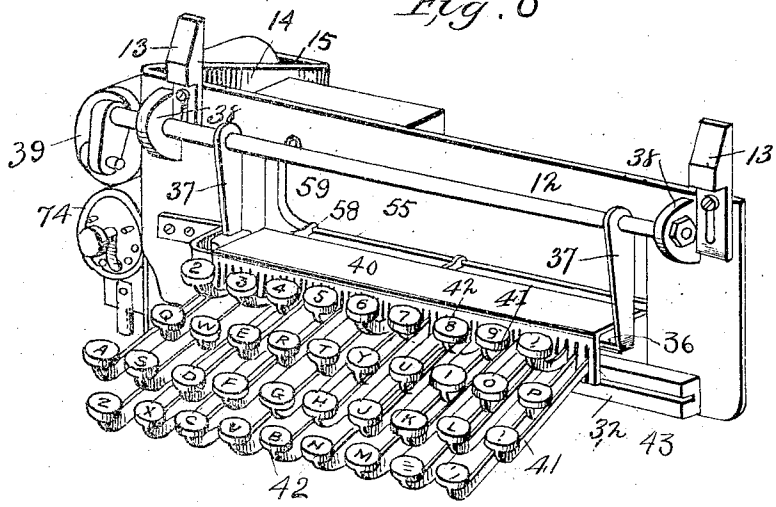


Fig. 7.

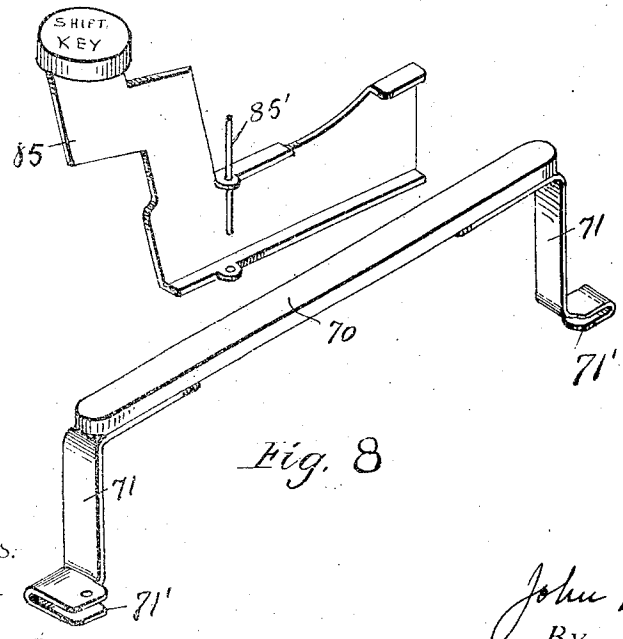


Fig. 8

WITNESSES:

F. L. Ourand

Albert Popkins

INVENTOR

John T. Schaaff

BY

Stinstra & Brady

Attorney

UNITED STATES PATENT OFFICE.

JOHN T. SCHAAFF, OF WASHINGTON, DISTRICT OF COLUMBIA.

OPERATING ATTACHMENT FOR KEYBOARD-MACHINES.

1,046,865. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed December 22, 1904. Serial No. 238,017.

To all whom it may concern:

Be it known that I, JOHN T. SCHAAFF, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Operating Attachments for Keyboard-Machines, of which the following is a description, reference being had to the accompanying drawing and to the letters and figures of reference marked thereon.

My invention relates to typewriting and other key-actuated machines and has for its object to provide a device capable of being readily attached to a typewriting or other key-actuated machine, provided with means for operating the key levers of the typewriting or other machine by power mechanism.

Typewriting machines as ordinarily constructed and used are arranged to be operated to effect the printing by the impact of the finger of the operator on the finger keys. The force necessary to cause the typebar to strike the platen, especially when it is desired to make carbon copies, is considerable and in order to lessen the strain upon the strength of the operator, various machines have been devised in which electric or other power is used to effect the printing, the keys being used only to select the typebar to be operated and set the power mechanism in operation or connect it with the typebar selected so as to effect its operation. Such machines have not as yet gone into extensive use for the reason that they have been, as heretofore offered on the market, more cumbersome and complicated than the ordinary typewriting machine, as well as more expensive, and because persons owning and using typewriting machines of the ordinary kind have not been willing to discard their old and fairly satisfactory machines to purchase a new machine which however satisfactory when operated by electric or other power, would become useless if the supply of current or other power failed.

By the use of the device of my present invention, an ordinary typewriting machine such as is in general use may be readily converted into a power-operated machine, without displacing or otherwise changing any of its essential features and without affecting its usefulness as an ordinary typewriting machine upon the removal of the device. The device of my invention is simple and inexpensive in construction, cannot easily get out of order and, when in position, adds comparatively little to the weight of the machine, and does not greatly change its appearance.

With this statement of the objects and use of my invention in view, the invention consists in the construction hereinafter described and particularly pointed out in the claims.

In the accompanying drawings the invention is shown as applied to a typewriting machine of what is commonly known as the Remington type, but it should be understood that it is not limited in its application to machines of that type or of any particular type of machines, as with only slight and obvious changes in the form and arrangement of parts, it may be readily adapted to other types of typewriting machines as well as to other key-actuated machines in which the actuating keys are arranged in a group or key-board.

Referring to the drawings: Figure 1 is a perspective view of a typewriting machine having the device of my invention applied thereto; Fig. 2 is a sectional view taken on a vertical plane extending from front to rear of the machine; Fig. 3 is a view similar to Fig. 2 showing a modified arrangement; Fig. 4 is a detail view of the lever and one of the slides; Fig. 5 is a detail view of one of the slides; Fig. 6 is a perspective view of the attachment separated from the machine; Fig. 7 is a detail view of an attachment for the shift key; Fig. 8 is a detail view of an attachment for the space bar.

In the drawings, 1 is the frame of the typewriting machine to which my invention is attached. The typewriting machine here shown is of what is commonly known as the Remington type, and the form of my invention here shown is particularly adapted and intended for use in connection with a typewriting machine of such type, though it may be readily adapted for use in connection with other types of typewriting machines.

2 is the top-plate; 3 indicates the front uprights or posts which support the top-plate; 4 is the platen; 5 indicates the typebars; 6 indicates the key-levers provided with finger keys 7; 8 indicates the pull-down wires or rods connecting the key-levers with the typebars; 9 indicates the space key and 10 indicates the universal space bar connect-

ed in the usual manner to the spacing mechanism and adapted to be operated by any one of the key-levers or by the space key. The key-levers are pivoted at their rear ends as usual and are held normally in elevated position by the usual springs 11.

So far as thus described, the machine does not differ from the usual form of Remington typewriting machine in general use.

The main operating parts of my attachment are carried by a plate 12 adapted to extend across the machine in front of and above the finger keys 7 and provided with means such as sliding bolts 13, adapted to engage the rear of the front flange of the top-plate to hold the plate against the front parts of uprights 3. The plate 12 is preferably provided on one side with a rearward extension 14 at right angles to the main portion of the plate, this extension, when the attachment is in position, lying along one side of the machine. The rear end of this extension is preferably bent outward to form a lug 15.

At its lower end the plate 12 is provided with an angle plate 16 which when the attachment is in position, rests on the cross-bar 17 of the typewriting machine and is held from forward movement by stops 16′ secured to the plate 16 and preferably provided with adjustable screws which rest against the rear edge of the cross-bar 17. On the upper face of the angle plate 16 is secured a bar 18 having a series of slots 19 formed therein corresponding in number to the key-levers. In these slots 19 are pivoted angle or bell-crank levers 20, the horizontal members of these angle levers extending rearward and each having its end in engagement with a recess or notch 21 of a slide 22. The slides 22 are carried in slots 23 formed in a bar 24 which extends across the machine and is secured at its ends to the bar 18 by means of braces 18′, the slides being free to move vertically in the slots. The slots 23 are so arranged that the slides 22 will each be directly above and in line with one of the key-levers 6. In order to prevent these slides from dropping out of their slots when the attachment is removed from the machine, they may be cut away on their forward faces so as to leave stops 25, 26, and a rod 27 is located between these stops as shown.

To the upper end of the vertical arm of the lever 20 is pivoted a forwardly extending push-finger 28, provided on its upper edge with a forward shoulder 29 and an upward extension 30 terminating at its forward end in a shoulder 30′. Each of the push-fingers 28 extends through a slot 31 in the plate 12, the slot being of sufficient extent vertically to permit of vertical movement of the forward end of the push-finger as hereinafter described. The push-fingers when in initial position rest on the upper face of a bar 32 carried by the plate 12 and which extends across the machine and is preferably provided on its upper face with a covering 33 of felt or other soft material. The push-fingers are cut away on their lower faces to form shoulders 34, the faces of which extend forward at an acute angle as shown. Springs 35 secured at one end to the push-fingers and at the other end to the lever 20 serve to hold the push-fingers in the position in which they are shown in Figs. 2 and 3.

It will be clear from the above description that force applied to the push-finger 28 to drive it rearward will, through the lever 20, move the slide 22 downward to depress the key-lever 6, and through its connection with the typebar will cause the latter to be operated, the depression of the key-lever also, through the universal bar 10, releasing the carriage feed.

For the purpose of driving the push-finger rearward, I provide a motor frame 36, carried by arms 37, pivoted in lugs 38, formed on or secured to the plate 12, and arranged to be operated by a suitable motor 39 (here shown as an electromagnet) carried by the plate 12. As here shown the magnet 39 is carried by the extension 14 of the plate 12 and is secured at its rear end to the lug 15. The magnet is arranged in a normally open circuit which is arranged to be momentarily closed by mechanism hereinafter described.

On the front of the plate 12 is secured an angle plate 40 in which are pivoted the key-levers 41 of auxiliary finger keys 42. In the construction shown the angle plate 40 has a depending flange 43 in front and a depending flange 44 in rear and is provided on its under side between the flanges with a strip of felt or other soft material 45. The flanges 43 and 44 are slotted to receive the rear ends of the key-levers 41, the slots in the front flange extending nearly to the lower face of the plate, while the slots in the rear flange terminate a sufficient distance below the lower face of the plate to permit the ends of the slots to serve as the fulcra for the key-levers 41, which are notched on their upper faces at 46. In order to prevent accidental displacement of these key-levers, a bar 47 carried by bolts or screws 48 extends across the machine below the rear ends of the key levers 41, the distance of this bar below the key-levers being such that the key-levers are permitted free movement. The slots in the flanges 43 and 44 guide the key-levers 41 in their vertical movement and prevent any lateral movement.

Through the bar 32 are formed slots in line with and corresponding in number to the levers 20, and in each of these slots is pivoted a lever 50 on the rear end of which

is pivoted an arm 51, the upper end of which, when the parts are in initial position, is immediately below and in line with a push finger 28. A spring 52 secured at one end to the arm 51 below its pivot, and at the other end to a bracket 51', serves to hold the arm normally in upright position and to draw the rear end of the lever 50 downward. The forward end of the lever 50 is notched to receive the notched end of a bar or rod 53, the notched upper end of which is received in a notch 54 in the lower edge of the key lever 41. As the key-levers 41 are necessarily of different length in order that the finger keys carried by them may correspond in position with the keys 7 of the ordinary key-board, the notches 54 will be so positioned that the depression of a key 42, whatever the length of its key-lever, will depress its lever 50 the same distance. This could be provided for by pivoting the key-levers 41 at different points, but I prefer to provide for overcoming the difference in leverage by arranging the notches 54 of the several levers at different distances from the common fulcrum and by suitably bending the upper ends of the bars or rods 53 as shown.

Above the push-fingers 28 is a contact frame 55 extending across the machine, carried by arms 56 pivoted in lugs formed on or secured to the rear of the plate 12. An arm 59 carried by the contact frame carries a movable contact 60 in circuit with the current supply and adapted, when the contact frame is lifted, to be brought against a fixed contact 61 carried by the plate 12 and in circuit with the magnet, to close the circuit and thus actuate the magnet to swing the motor frame. A spring 62 secured at one end to the plate 12 and at the other end to the arm 59, serves to separate the contacts 60 and 61 and to return the contact frame to its initial position.

When the attachment is in position and the current turned on, the depression of any one of the auxiliary keys 42 will through the bar or rod 53, depress the forward end of its lever 50, raising its rear end and through the pivoted arm 51, raising the push finger 28 until the shoulder 29 is in line with the motor frame 36. As the push finger is thus raised, its upward extension 30 raises the contact frame 55 and causes the arm 59 to bring the contact 60 against the fixed contact 61, closing the circuit of the magnet, which is thus actuated to swing the motor frame rearward against the shoulder 29, forcing the push finger rearward and, through the lever 20 and slide 22, causing the key-lever to be depressed to operate the typebar. As the push finger 28 is thus moved rearward, the shoulder 30' of the upward extension 30 passes to the rear of the contact frame 55 permitting the latter to drop under the action of the spring 62, thus separating the contacts 60 and 61 and breaking the circuit of the magnet. At the same time the shoulder 34 on the under side of the push finger passes to the rear of the upper end of the pivoted arm 51, so that the pivoted arm is free to be swung into vertical position by the spring 52. The motor frame, having returned to its initial position, the push finger 28 and lever 20 are returned to initial positions by the return of the key-lever 6 to its initial position under the action of the spring 11, aided by the weight of the typebar. As the push finger is thus moved forward to its initial position, its forward end drops till it rests on the felt 33, the shoulder 34 pushing the upper end of the arm 51 forward against the force of the spring 52, until it rests against the rear face of the bar 32, the operating part thus returning to initial position without regard to the release of the auxiliary key 42. On the release of the auxiliary key 42, the spring 52 draws the rear end of the lever 50 downward and at the same time releases the upper end of the pivoted arm 51 from the shoulder 34 and returns it to its initial position. The spring 52 also acts to raise the forward end of lever 50 and through the rod or bar 53 raises the auxiliary key to initial position.

In order that the space key, when the attachment is in position, may be located in the same relative position with reference to the auxiliary key-board, which it occupies relative to the keys 7, it is preferably provided with a removable bar 70, supported by arms 71 provided with clips 71' by which it may be readily secured to the space key.

The pivots of the motor frame may be arranged either above the angle plate in which the auxiliary keys are pivoted, as shown in Fig. 2, or below the plate, as shown in Fig. 3.

On the extension 14, below the magnet, is preferably arranged a rheostat 74, for regulating the force of the current; and the extension also carries contact plugs 75 to which the wires from the source of current may be attached and may also be provided with sockets or clips 76 to receive a removable fuse 77.

In the construction shown in Figs. 1 and 2, it will be observed that the motor frame is pivoted above the auxiliary keyboard and the arms which carry the contact frame are also pivoted above the keyboard.

In the modification shown in Fig. 3, the lugs in which the arms 38 of the motor frame are pivoted are placed below the auxiliary keyboard these arms extending upward instead of being depending arms as in Figs. 1 and 2, and the arms which carry the contact frame are pivoted in rear of the auxiliary keyboard about on a level with the

upper key. This change in arrangement, without changing the construction or operation of the several parts, results in making the device more compact.

In Fig. 1 is shown a simple form of line locking device consisting of a rod 78 having a bearing in a removable clip 79 secured to the side edge of the top-plate, the rod extending along the side of the top-plate having at its rear end an upwardly bent arm 80 with its upper end extending through a perforation in the outwardly bent end of the spring 81′ which is in position to be struck by the end of the usual gage rod 81 of the typewriting machine as it is moved by the carriage striking the gage stop 82 when the end of the line is reached, thus rocking the rod 78 in its bearing in the clip 79. The gage rod 81 in the usual construction of the Remington machines is supported in lugs at the rear of the machine and is permitted to have a slight sliding movement through the lugs toward the left of Fig. 1 when the carriage strikes the gage stop 82, the gage bar being normally pressed toward the right of the machine by a flat spring in the same position as spring 81′. Spring 81′ differs from the usual spring employed only in having its upper end bent outward and perforated to receive the end of the upwardly bent arm 80. On the forward end of the rod 78 is a down turned arm 83, having its end in line with the space between the magnet 39 and its armature when the circuit is open, the end of this arm being normally swung outward, so that it does not interfere with the movement of the armature. When the rod 78 is rocked by the action of the gage bar, the end of this arm 83 is swung inward into the space between the armature and the magnet thus blocking the movement of the armature and consequently preventing movement of the motor frame 36, thus preventing the operation of the key-levers of the typewriting machine even though the auxiliary finger keys 42 may be struck, and the electric circuit be completed.

In order to enable the shift key 84 of the typewriting machine to be conveniently operated when the operating attachment is in position, an extension 85 is preferably secured to the lever of the shift key, by means of a pin 85′, this extension carrying a finger key directly above the shift key.

It will be understood that the support which in the construction shown includes the plate 12 together with the plate 16, bars 18, 24 and 32 and plate 40 may be secured to the frame of the typewriting machine by any convenient means which will permit of its being readily detached when it is desired to use the keys 7 for manual operation.

It will, of course, be understood that my invention is not limited to the details of construction and arrangement above set forth, as many changes may be made in the form and arrangement of the parts without departing from the spirit of the invention, particularly such changes as may be necessary to adapt the invention for use with typewriting machines of other types than that above shown. It will also be understood that my invention may readily be adapted for use with key-operated machines other than typewriting machines, such as linotype machines, cash registers, piano fortes, type-setting machines.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. An operating attachment for keyboard machines comprising a support adapted to be secured to and supported by the frame of the machine, and mechanism for operating the key levers of the machine carried by the support, said mechanism for operating the key levers comprising a single motor, a motor frame, means interposed between the motor frame and the key levers for operating said levers, and means also carried by the support for controlling said operating mechanism.

2. An operating attachment for keyboard machines comprising a support adapted to be secured to the frame of the machine and mechanism for operating the key levers of the machine carried by the support, said mechanism for operating the key levers comprising a motor, a motor frame, means interposed between the motor frame and the key levers, and finger keys also carried by the support for controlling the operating mechanism.

3. An operating attachment for keyboard machines comprising a support adapted to be secured to the frame of the machine and mechanism for operating the key levers of the machine carried by the support, said mechanism comprising a motor, a motor frame, means interposed between the motor frame and the key levers, including a movable element normally out of the path of movement of the motor frame, and means also carried by the support for moving said movable element into the path of the motor frame and for causing the motor to be operated.

4. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

5. An operating attachment for typewrit-

ing machines, comprising a support adapted to be detachably secured to and supported by the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, and means independent of the keys of the typewriting machine carried by the support for causing the motor to be actuated.

6. An operating attachment for typewriting machines, comprising a support adapted to be detachably secured to and supported by the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

7. An operating attachment for keyboard machines, comprising a support adapted to be detachably secured to and supported by the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, and means independent of the keys of the typewriting machine carried by the support arranged when actuated to close the circuit of the electro-magnet.

8. An operating attachment for keyboard machines, comprising a support adapted to be detachably secured to and supported by the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

9. An operating attachment for typewriting machines, comprising a support adapted to be detachably secured to and supported by the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, and means independent of the keys of the typewriting machine carried by the support arranged when operated to close the circuit of the electro-magnet.

10. An operating attachment for typewriting machines, comprising a support adapted to be detachably secured to and supported by the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

11. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged to control the power mechanism.

12. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and means carried by the support for controlling the power mechanism.

13. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged to control the power mechanism.

14. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

15. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and means independent of the keys of the typewriting machine carried by the support for causing the motor to be actuated.

16. An operating attachment for typewriting machines, comprising a support,

means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

17. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and means independent of the keys of the typewriting machine carried by the support arranged when actuated to close the circuit of the electro-magnet.

18. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit, carried by the support, means carried by the support adapted to be operated by the power mechanism to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

19. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and means independent of the keys of the typewriting machine carried by the support arranged when operated to close the circuit of the electro-magnet.

20. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the finger keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

21. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members normally resting on the key levers and arranged to be operated by the levers, and means carried by the support for controlling the power mechanism.

22. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members normally resting on the key levers of the machine, and finger keys carried by the support arranged to control the power mechanism.

23. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members normally resting on the key levers of the typewriting machine, and means carried by the support for controlling the power mechanism.

24. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members normally resting on the key levers of the typewriting machine, and finger keys carried by the support arranged to control the power mechanism.

25. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including levers mounted in the support and members engaged by said levers and normally resting on the key levers of the machine, and means

carried by the support for causing the motor to be actuated.

26. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the machine, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

27. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the typewriting machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the typewriting machine, and means carried by the support for causing the motor to be actuated.

28. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the typewriting machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the typewriting machine, and finger keys carried by the support, arranged when operated to cause the motor to be actuated.

29. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the machine, and means carried by the support arranged when actuated to close the circuit of the electro-magnet.

30. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the machine, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

31. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the typewriting machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the typewriting machine, and means carried by the support arranged when operated to close the circuit of the electro-magnet.

32. An operating attachment for typewriting machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the typewriting machine, said means including levers pivotally mounted in the support and members engaged by said levers and normally resting on the key levers of the typewriting machine, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

33. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and slides carried by the support and movable therein normally resting on the key levers of the machine, and means carried by the support for controlling the power mechanism.

34. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and slides carried by the sup-

port and movable therein normally resting on the key levers of the machine, and finger keys carried by the support arranged to control the power mechanism.

35. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including levers mounted in the support and slides carried by the support and movable therein normally resting on the key levers of the machine, and means carried by the support for causing the motor to be actuated.

36. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and slides carried by the support and movable therein normally resting on the key levers of the machine, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

37. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and slides carried by the support and movable therein normally resting on the key levers of the machine, and finger keys carried by the support arranged when operated to close the circuit of the electro-magnet.

38. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, and auxiliary key levers pivotally mounted in the support and arranged to control the power mechanism.

39. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, and auxiliary key levers pivotally mounted in the support and arranged when operated to cause the motor to be actuated.

40. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, a motor frame operated thereby, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, and auxiliary key levers pivotally mounted in the support and arranged when operated to close the circuit of the electro-magnet.

41. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and auxiliary key levers pivotally mounted in the support and arranged to control the power mechanism.

42. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and auxiliary key levers pivotally mounted in the support and arranged when operated to cause the motor to be actuated.

43. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support and auxiliary levers pivotally mounted in the support and arranged when operated to close the circuit of the electro-magnet.

44. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members normally resting on the key-levers of the machine, and

auxiliary key-levers pivotally mounted in the support and arranged to control the power mechanism.

45. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including levers mounted in the support and members normally resting on the key-levers of the machine, and auxiliary key-levers pivotally mounted in the support and arranged when operated to cause the motor to be actuated.

46. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including levers pivotally mounted in the support and members normally resting on the key-levers of the machine, and auxiliary key-levers pivotally mounted in the support and arranged when actuated to close the circuit of the electro-magnet.

47. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, and auxiliary key-levers pivotally mounted in the support and arranged to control the power mechanism, said auxiliary key-levers being provided with finger keys arranged directly above the finger keys of the machine.

48. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, comprising a motor frame, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, and auxiliary key levers pivotally mounted in the support and arranged when operated to cause the motor to be actuated, said auxiliary key levers being provided with finger keys arranged directly above the finger keys of the machine.

49. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, and auxiliary key-levers pivotally mounted in the support and arranged when operated to close the circuit of the electro-magnet, said auxiliary key-levers being provided with finger keys arranged directly above the finger keys of the machine.

50. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support including a single motor, a motor frame operated thereby, means carried by the support adapted to be operated by the motor frame to effect the operation of the keys of the machine, said means including a lever pivotally mounted in the support, and finger keys carried by the support arranged to control the power mechanism.

51. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor, to effect the operation of the keys of the machine, said means including a motor frame and a lever pivotally mounted in the support, and finger keys carried by the support arranged when operated to cause the motor to be actuated.

52. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a motor frame and a lever pivotally mounted in the support, and means carried by the support arranged when operated to close the circuit of the electro-magnet.

53. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism comprising a single motor carried by the support, means carried by the support adapted to be operated by the power mechanism to effect the operation of the keys of the machine, said means including a motor frame operated by said motor and a series of levers pivotally mounted in the support, and means carried by the support for selecting the lever to be operated and for controlling the power mechanism.

54. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single normally inactive motor carried by the sup-

port, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including a motor frame and a series of levers pivotally mounted in the support, and means carried by the support for selecting the lever to be operated and for causing the motor to be actuated.

55. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a single electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a motor frame and a series of levers pivotally mounted in the support, and means carried by the support arranged when actuated to select the lever to be operated and to close the circuit of the electro-magnet.

56. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, power mechanism carried by the support, a motor frame carried by the support arranged to be operated by the power mechanism, a lever pivotally mounted in the support, a push finger movably connected with one end of the lever normally out of the path of the motor frame, and means for moving the push finger into the path of the motor frame and for causing the motor frame to be actuated by the power mechanism.

57. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, a normally inactive motor carried by the support, means carried by the support adapted to be operated by the motor to effect the operation of the keys of the machine, said means including a motor frame, a lever pivotally mounted in the support, a push finger movably connected with one end of the lever normally out of the path of the motor frame, and means carried by the support for moving the push finger into the path of the motor frame and for causing the motor to be actuated.

58. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a motor frame, a lever pivotally mounted in the support for moving the push finger into the path of the motor frame and for closing the circuit of the electro-magnet.

59. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a motor frame, a lever pivotally mounted in the support, a push finger having an upward extension on its upper edge and movably connected with one end of the lever normally out of the path of the motor frame, a contact frame in the path of movement of the upward extension of the push finger and means carried by the support for moving the push finger in to the path of movement of the motor frame whereby the contact frame is operated to close the circuit of the electro-magnet.

60. An operating attachment for keyboard machines, comprising a support, means for detachably securing the support to the frame of the machine, an electro-magnet arranged in a normally open circuit carried by the support, means carried by the support adapted to be operated by the electro-magnet to effect the operation of the keys of the machine, said means including a bell-crank lever pivotally mounted in the support having an upwardly extending arm and a rearwardly extending arm, a slide normally resting on the key-lever of the machine connected with the rearward extending arm, a forwardly extending push finger pivotally connected at its rear end to the upright arm of the bell-crank lever, a bar on which the push finger is adapted to rest, a spring normally holding the forward end of the push finger in depressed position, a motor frame and means for raising the forward end of the push finger into the path of movement of the motor frame, and for simultaneously closing the circuit of the electro-magnet.

61. In a convertible typewriting machine, in combination a main keyboard comprising key levers and a space bar, a support, means for detachably securing said support to the frame of the machine, auxiliary key levers carried by said support and arranged above the main key levers, an auxiliary space bar located adjacent to the auxiliary keys, and means for securing said auxiliary space bar above the main space bar.

62. A convertible typewriting machine, in combination a main keyboard, comprising key levers, a shift bar and a shift key at-

said support and arranged above the main key levers, an auxiliary shift key located adjacent to the auxiliary keys and above said main shift key, and means for securing said auxiliary shift key to said main shift bar.

63. The combination of a motor frame arranged to move in a horizontal direction, a motor for operating the motor frame, a bell crank lever having one arm extending in a vertical direction and the other extending in a horizontal direction, a lever arranged to be operated by the horizontally extending arm of the bell crank lever, a push finger pivoted to the vertically extending arm of the bell crank lever, and means for raising the free end of the push finger into the path of movement of the motor frame and for simultaneously causing the motor to operate.

64. The combination of a motor frame, a motor for operating the motor frame, a series of levers connected each at one end with a part to be operated and each provided at its other end with a push finger, the push fingers being pivoted to the levers, and having their free ends normally below the path of movement of the motor frame, a series of finger keys, means operated by the finger keys for raising the free ends of the push fingers into the path of movement of the motor frame and means operated by the raising of the push fingers to cause the motor to operate.

65. The combination of a motor magnet arranged in a normally open circuit, a motor frame operated by the motor magnet, a contact frame adapted when operated to close the circuit of the motor magnet, a lever for transmitting movement to the part to be operated, a push finger pivoted to one end of the lever provided at its free end with a shoulder adapted to be struck by the motor frame and having on its upper edge a projection adapted, when raised, to operate the contact frame, means for raising the free end of the push finger to position it in front of the motor frame and to operate the contact frame, the push finger being provided on its under edge with a projection to be engaged by the raising means, the projections on the upper and lower edges of the push finger being so arranged that when moved rearward by the motor frame they will be disengaged from the contact frame and raising means respectively to permit the circuit to be broken and the push finger to drop before the raising means is withdrawn.

66. An operating attachment for typewriting machines comprising a support adapted to be secured to the frame of the machine, means carried by said support for operating the key levers of the machine, a motor frame adapted to operate said lever operating means, a motor for operating said frame and means for controlling the operation of said motor.

67. An operating attachment for typewriting machines comprising a support adapted to be secured to the frame of the machine, the motor frame, means carried by said support and operated by said motor frame for operating the key levers of the machine, an electromagnet in normally open circuit adapted to operate said motor frame, and means for closing the circuit in which said magnet is included when the machine is to be operated.

68. An operating attachment for typewriting machines, comprising a support adapted to be secured to the frame of the machine, a motor carried thereby, a motor frame carried by said support and adapted to be actuated by said motor, and means intermediate said motor frame and the key levers of the machine for moving said key levers from their normal position of rest as required, and means for controlling the operation of the motor, said motor being common to each of the key levers.

69. The combination of a motor frame, a motor for operating the motor frame, a series of levers connected each at one end with a part to be operated and each provided at its other end with a push finger, the push fingers being pivoted to the levers and having their free ends normally out of the path of movement of the motor frame, a series of finger keys, means operated by the finger keys for bringing the free ends of the push fingers into the path of movement of the motor frame, and means operated by a movement of the push fingers to cause the motor to operate.

70. The combination of a motor frame, a motor for operating the motor frame, a series of levers connected each at one end with a part to be operated and each provided at its other end with a push finger, the push fingers being pivoted to the levers, and having their free ends normally out of the path of movement of the motor frame, a series of finger keys, means operated by the finger keys for bringing the free ends of the push fingers into the path of movement of the motor frame, means operated by a movement of the push fingers to cause the motor to act, and means controlled by the push fingers for rendering the motor again inactive after having once actuated the motor frame.

In testimony wherof I affix my signature, in presence of two witnesses.

JOHN T. SCHAAFF.

Witnesses:
A. M. PARKINS,
WM. J. WHALLEY.