Dec. 19, 1922.

1,439,250

A. S. MacDOWELL.
TYPEWRITER COPYHOLDER
FILED MAR. 27. 1920.

4 SHEETS-SHEET 1

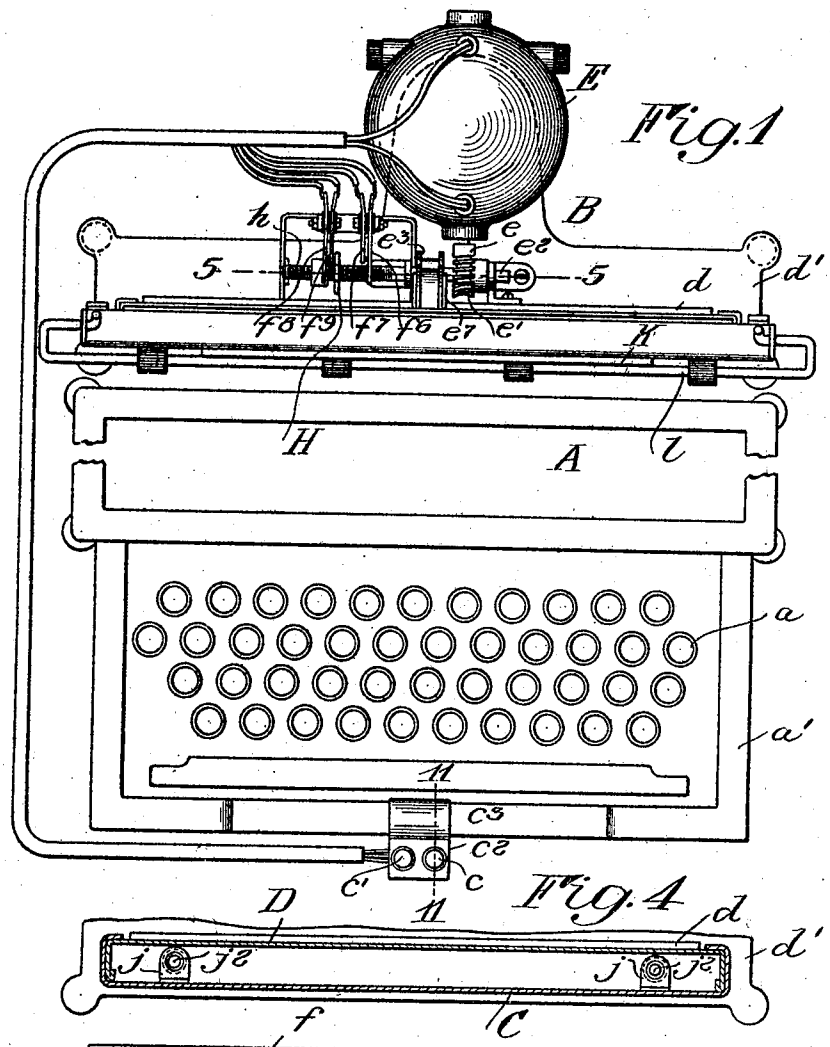


Fig. 1

Fig. 4

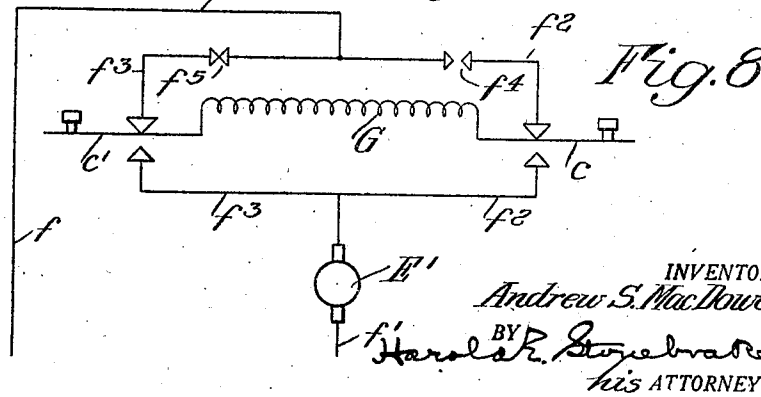


Fig. 8

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4 SHEETS-SHEET 2

Fig. 11

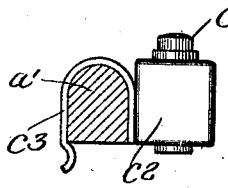


Fig. 12

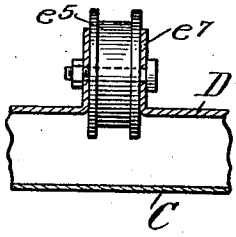
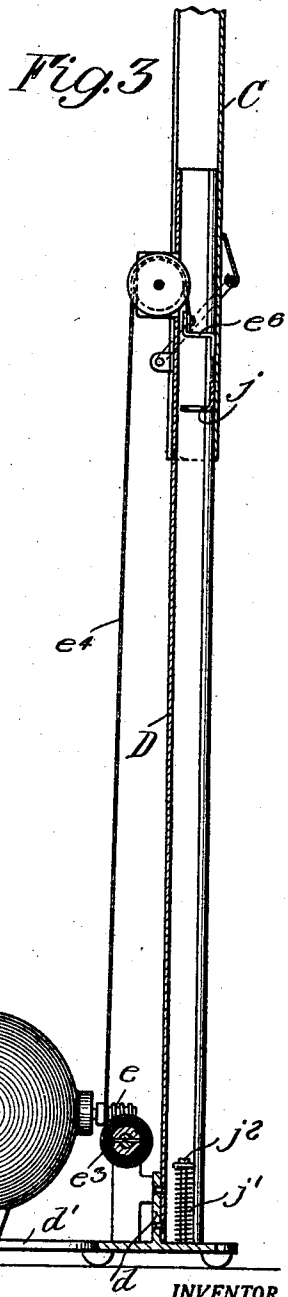


Fig. 2

Fig. 3



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4 SHEETS-SHEET 3

Fig. 5

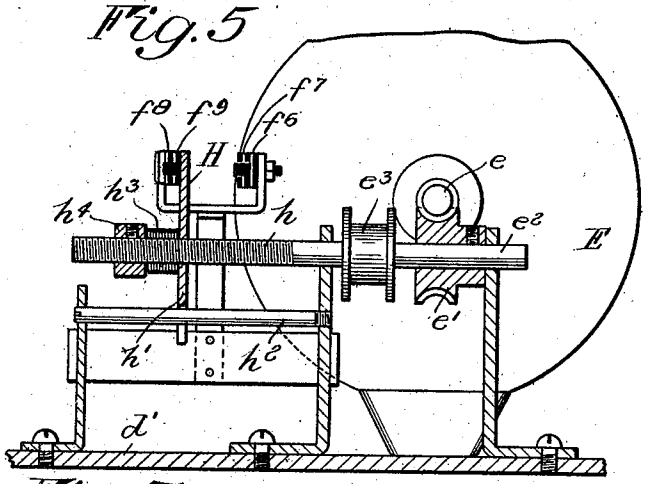


Fig. 6

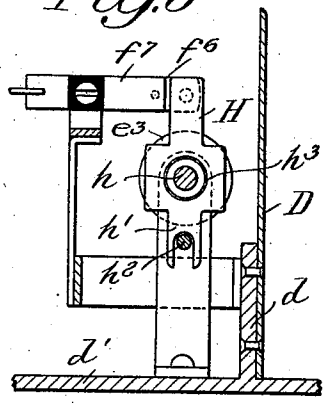


Fig. 7

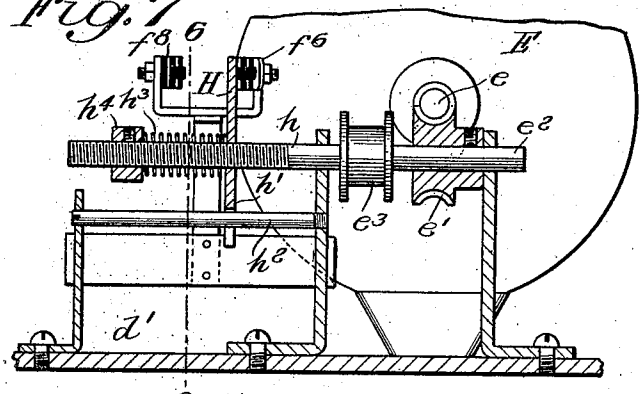


Fig. 10

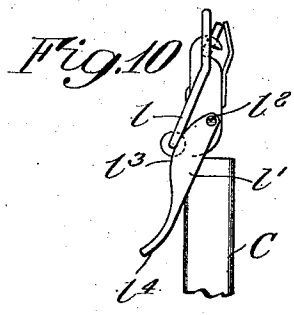
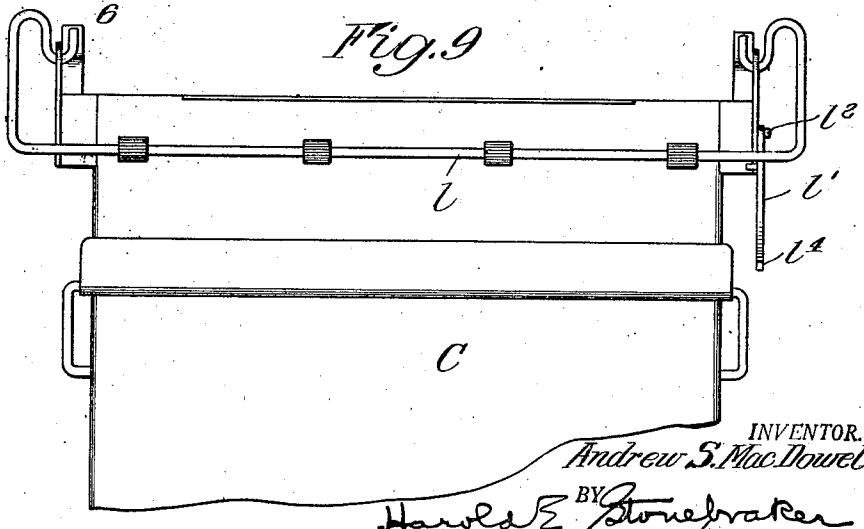


Fig. 9



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4 SHEETS-SHEET 4

Fig. 13

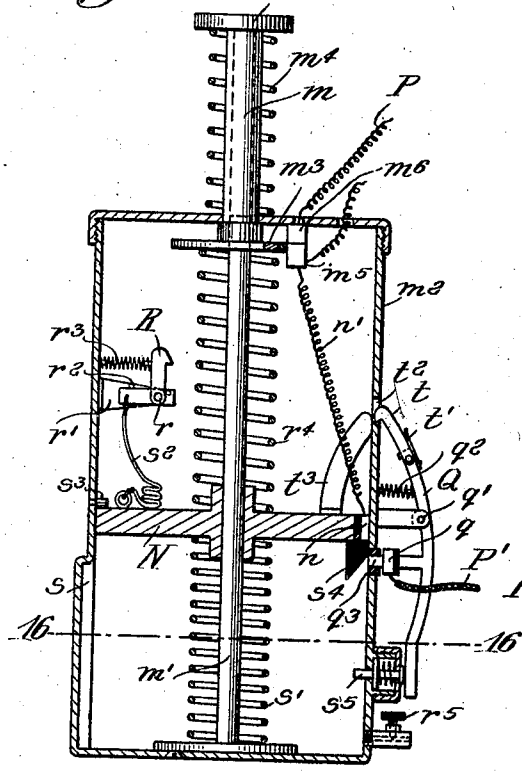


Fig. 14

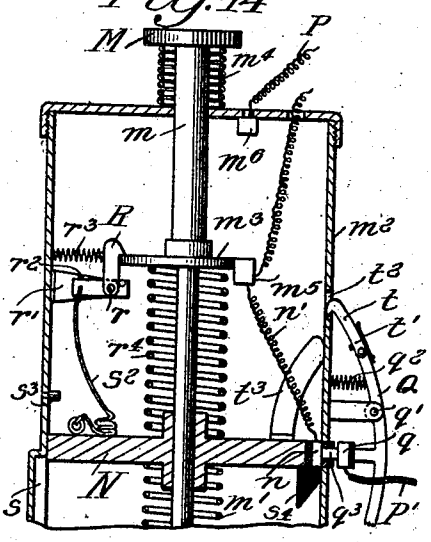


Fig. 15

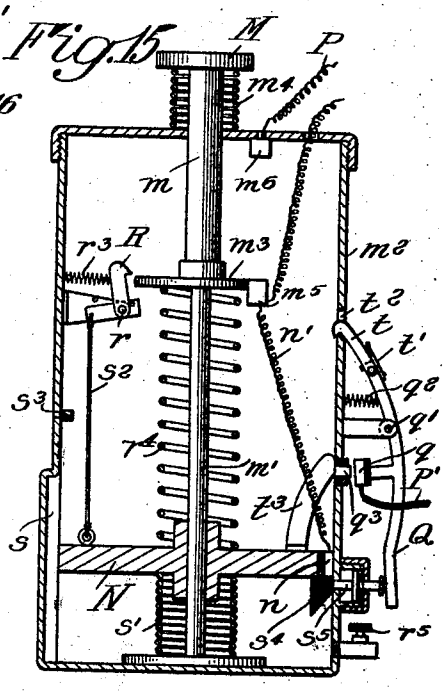
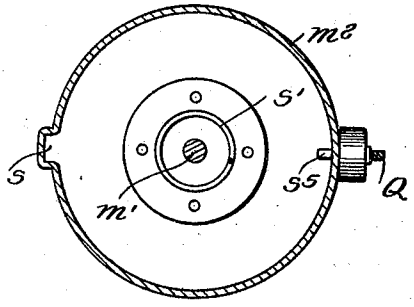


Fig. 16



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UNITED STATES PATENT OFFICE.

ANDREW S. MacDOWELL, OF ROCHESTER, NEW YORK.

TYPEWRITER COPYHOLDER.

Application filed March 27, 1920. Serial No. 369,431.

To all whom it may concern:

Be it known that I, ANDREW S. MacDOWELL, a citizen of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Typewriter Copyholders, of which the following is a specification.

My invention relates to improvements in typewriter copyholders, and has for its purpose to afford a mechanism in which the movable copy supporting element is controlled electrically, thereby simplifying the operation, reducing the number of parts, and lessening the cost of manufacture.

In a more particular aspect, the invention is intended to make it possible for an operator to control the movement of a copyholder by merely pressing a button or key, sufficiently to open or close a switch, which button or key may form part of the conventional typewriter keyboard, or be located in a juxta-relation to the keyboard, or in any other position of convenient access.

Another object of the improvement is to provide a copy supporting member which can be moved in either direction through the instrumentality of an electric motor, and to govern said motor by a circuit arrangement that permits of operating the motor in either direction by a switch closing operation; also to automatically stop the motor when it has rotated a predetermined amount, thereby preventing it from rotating any farther in a given direction after the copy supporting member reaches the limit of its travel.

A further purpose is to afford means for automatically raising the copy supporting member a predetermined distance at each operation of a button or key, as for instance, where a motor is employed, by causing the motor circuit to remain closed a predetermined period of time, and then automatically opening the same, the motor circuit remaining closed sufficiently long to elevate the copy supporting member through the distance of one line, or any desired number of lines.

Other purposes and advantages will appear from the following description, in conjunction with the accompanying drawings, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a plan view illustrating the application of one embodiment of my invention to a typewriter of usual form, and showing in open position the automatic switch which functions as the copy supporting member reaches its downward position;

Figure 2 is a vertical sectional view of a copyholder constructed in accordance with the invention, and showing the copy supporting member in its lowermost position;

Figure 3 is a view similar to Figure 2, with the copy supporting member in its uppermost position;

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 2;

Figure 5 is a sectional view on line 5—5 of Figure 1;

Figure 6 is a sectional view on line 6—6 of Figure 5;

Figure 7 is a sectional view similar to Figure 5, with the automatic switch actuator at the opposite limit of its movement;

Figure 8 is a diagrammatic view of the motor circuit and switches;

Figure 9 is a front elevation of the upper portion of the copy supporting member;

Figure 10 is an end elevation of the clamping rod and its controlling lever;

Figure 11 is a sectional view on line 11—11 of Figure 1;

Figure 12 is a sectional view on line 12—12 of Figure 2;

Figure 13 is a vertical sectional view of my improved circuit closing mechanism, for automatically opening the electric circuit after a predetermined time, showing the parts in normal position;

Figure 14 is a similar view with parts broken away, illustrating the position when the circuit is closed;

Figure 15 is a similar view illustrating the position of the parts after the electric circuit has been opened, and with the key about to return to its normal position, and

Figure 16 is a horizontal sectional view on line 16—16 of Figure 13.

There are various ways in which the purposes of the invention can be accomplished in a practical manner, and for purpose of explanation, I will describe one successful operating arrangement, which is intended merely to exemplify the invention, and not

in any sense to limit the scope of my improvements to the particular construction disclosed.

In the illustrated embodiment, A designates a conventional form of typewriter, (see Figure 1) having the keyboard a and the frame a' surrounding the keyboard. Located in rear of the typewriter is the copyholder, designated as a whole at B, and adapted to be controlled by buttons or keys c and c', arranged in juxtaposition to the typewriter keyboard. The keys c and c' are mounted on a carrier c^2 which is provided with a spring clamp c^3 adapted to detachably engage the frame a' of the typewriter, as shown in Figure 11.

The keys or buttons c and c' form a part of and operate switches, to close the motor circuit for movement in one direction or the other, although it is not my intention to limit the invention to the use of a motor, since other electrical instrumentalities might be employed to control the operation of the copy supporting member, and likewise be readily governed, as for instance from the typewriter keyboard, or a point in juxtarelation thereto.

Referring now to Figures 2, 3 and 4, C designates the vertically movable copy supporting member, guided upon the stationary vertically arranged frame D, which is fixedly attached to an upstanding portion d of the base plate d', upon which latter the several parts of the copyholder, now to be described, are mounted or attached.

I preferably employ electrical means for elevating the copy supporting member, and in the present embodiment, there is shown an electrical device in the form of a motor E, which is operatively connected with the copy supporting member C in the following manner. The motor shaft carries a worm e which engages and drives the worm gear e' mounted on the shaft e^2. Also fixed on the shaft e^2 is a drum e^3 to which is attached one end of a flexible connection e^4. The latter is preferably in the form of a metallic ribbon, and extends upwardly over a guide pulley e^5, its opposite end being connected to a lug e^6 which is carried by the copy supporting member C. The guide pulley e^5 is journalled in lugs e^7 which are struck from the stationary frame D. When the motor is rotated in one direction, the flexible connection e^4 is wound on the drum e^3 and the copy supporting member is elevated, and when the motor is reversed, the flexible connection e^4 unwinds, and the weight of the copy supporting member C causes it to move downwardly, as the connection e^4 unwinds.

The motor E is controlled by the buttons or keys c, c', already referred to, through a circuit which will now be described. Referring to Figure 8, f designates one side of the line which supplies current to the motor armature E', the other side of the line being designated by f'. Between one side of the line f and the motor armature E', are two circuits f^2 and f^3 arranged in parallel, and the keys c and c' operate double throw switches in said circuits f^2 and f^3, which switches are normally held in contact on the upper element by means of springs. G designates the field winding which extends between the two circuits f^2 and f^3, and is connected between the middle contacts of said switches c and c'. Also arranged in the circuits f^2 and f^3 are automatic limit switches f^4 and f^5, see Figure 8, the purpose of which will appear presently. One of the advantages of the above described switch control is that there is no possibility of causing a short circuit through the motor, and if by accident both switches c and c' are closed at the same time, the circuit remains open. This arrangement of switches and field for reversing a series wound motor, is novel, so far as I am aware.

In the practical operation of the mechanism, the copy supporting member is elevated, usually one step or one line at a time, and to accomplish this, it is necessary that the elevating key be depressed momentarily, to close the motor circuit long enough to rotate the motor and elevate the copy supporting member a slight distance. Both of the switches c and c' are shown in normal open position in Figure 8, being held by springs on the upper contacts, and if it is desired to elevate the copy supporting member, the switch c is depressed, causing current to flow from f' through armature E' to the circuit f^2, through the lower contact of switch c to the field G, thence through the upper contact of switch c' to the circuit f^3, and through automatic limit switch f^5 to line f. When the copy supporting member reaches the upper limit of its movement, the switch f^5 is automatically opened and the motor thereby stopped, preventing further upward movement of the copy supporting member.

In Figure 8, the switch f^4 is shown in open position, which occurs at the downward limit of travel of the copy supporting member, as also illustrated in Figure 1. To cause the copy supporting member to travel downwardly, assume that the switch f^4 is in normal closed position: then by depressing the switch c' the current is caused to travel through the field G in a reverse direction to that already described. This reverses the motor and lowers the copy supporting member.

The automatic limit switches designated in Figure 8 at f^4 and f^5 are illustrated more fully in Figure 1, and comprise spring arms f^8 and f^9, f^6 and f^7 respectively, see Fig. 1. The contacts f^6 and f^7 are normally in engagement, and the contacts f^8 and f^9 are

normally in engagement, closing both circuits. The spring contacts f^6 and f^8 are provided with projections which lie in the path of the travelling switch actuator H. The latter is threaded, as shown in Figure 5, and engages the threaded portion h of the shaft e^2, and also has a downwardly projecting part h' which is guided on the spindle h^2. As the shaft e^2 rotates, the threaded portion h, engaging the acutator H, moves the latter in one direction or the other, and when the actuator H reaches either limit of its movement, it engages one or the other of the spring arms f^6 and f^8 and opens the corresponding circuit, stopping the motor.

It is desirable to impart a more or less gradual braking action to the copy supporting member as it reaches the limit of its downward travel, and to accomplish this, there is provided a spring h^3 arranged in the path of the actuator H, and retained on the shaft by a fixed collar h^4. The parts are shown in Figure 5 in the position which they assume when the copy supporting member reaches its downward limit, the spring h^3 being compressed by the travel of the actuator H toward it, and the contact f^8 being moved away from the contact f^9, thereby breaking the motor circuit.

The spring h^3 serves to gradually and positively stop the actuator H, thereby also stopping rotation of the shaft e^2, and preventing excessive turning of the drum e^3. It will be obvious that various other mechanisms may be utilized for accomplishing automatic stoppage of the motor when the copy supporting member reaches its limiting positions, in order to prevent excessive movement and consequent breakage or lost motion of any of the parts, and my invention is not limited to the precise form of automatic stop mechanism here disclosed.

The copy supporting member C is guided upon the stationary frame D, these parts being preferably constructed as shown in Figure 4, and sliding one within the other. At its lower end, the copy supporting member C is provided with a lug j, which is arranged to cooperate with and compress a spring j', for cushioning the downward movement of the copy supporting member. The spring j' is limited in its upward movement by a suitable head j^2 on a rod j^3, and the lug j has an opening adapted to pass over the head j^2, as shown in Figure 2.

At its upper end, the copy supporting member C has a laterally extending flange or ledge K against which a sheet of copy engages as it is inserted under the clamping device l, the flange K serving to limit movement of and properly position the copy on the supporting member C, as shown in Figure 2. l designates the usual type of clamping rod, extending across the supporting member C, and pivoted for movement toward and from said supporting member. In order to provide a convenient means for operating the clamping rod l, so as to permit of positioning a book or sheet thereunder, I employ a lever l', shown in Figure 10, pivoted at l^2, and having a cam surface l^3 which engages under the rod l. The lever also includes a finger portion l^4, and by engaging the latter and swinging the lever away from the supporting member C. the clamping rod l is likewise actuated away from its normal position to permit of inserting copy in the usual manner. This affords an extremely simple and efficient means of controlling the rod l, by leaving one hand of the operator free for positioning copy under the clamping rod, which immediately resumes its clamping position upon release of the lever l'.

In the practical operation of the apparatus it is not difficult for an operator to attain sufficient skill so that by merely striking the controlling key, and immediately releasing it, the motor circuit will be closed for the proper length of time to elevate the copy supporting member through a distance of one line. In some cases, however. it may be desirable to accomplish this automatically, and I have therefore provided a mechanism whereby the copy supporting member may be moved a definite and predetermined distance at each operation of the controlling key. This is illustrated in Figures 13 to 16 inclusive, and it is to be understood that the mechanism of Figures 13 to 16, now about to be described, is intended as a substitute for each of the previously described keys c, c', and will co-operate with the circuit in the same manner as keys c, c', except that the time for returning said keys to normal position is variable and automatically controlled, instead of being under the manual control of the operator, as is the case with keys c, c'.

The switch controlling key is designated at M, being mounted on a sleeve m which is slidable on the vertical guide rod m' in the cylinder m^2. The sleeve m has secured at its lower end a plate m^3. and arranged between the key M and the top of the cylinder m^2 is a spring m^4 which serves to maintain the key in its normal or uppermost position. as shown in Figure 13.

Also mounted for vertical sliding movement on the guide rod m' is a piston N, which carries an electric contact n insulated from the body of the piston, while n' is a conductor leading from the contact n to contact m^5 on the plate m^3 and insulated from the body of plate m^3. The contact m^5 is connected with the field coil circuit G as previously described, and as shown in Figure 8. and when in normal position, engages the stationary contact m^6 fixed to the underside of the top

of cylinder m^2, which leads to one side P of the line. The other side P′ of the line leads to a contact q which is mounted on a supporting arm Q, the latter being pivotally mounted at q' on a suitable bracket attached to the cylinder m^2. The supporting arm Q is held normally in the position shown in Figure 13 by the spring q^2, in which position the contact q engages a conducting portion or contact q^3 extending through an insulating sleeve in the wall of the cylinder m^2, and arranged to be engaged by the contact n as the piston N travels downwardly, as shown in Figure 14.

Upon initially depressing the circuit closing key M, the plate m^3 moves downwardly until it is engaged by a spring actuated latch R, pivoted at r on the support r', and held normally against the stop r^2 by the spring r^3. After manually depressing the key M sufficiently to permit the latch R to engage over the top of the plate m^3, as shown in Figure 14, the parts are retained in this position for the time being, and as a result, the spring r^4, which is located between the plate m^3 and the piston N, is compressed and put under tension, thereby actuating the piston N downwardly. The piston N travels slowly toward the bottom of the cylinder m^2, against the pressure of air within the chamber, and the speed of movement of the piston N is regulated by an adjustable air outlet valve r^5, which can be opened more or less to permit the air to exhaust slower or faster from beneath the piston N.

The adjustment of the valve r^5 regulates the length of time during which the circuit is closed, as the contact n wipes past the contact q^3. As soon as the piston N moves downwardly far enough to disengage contact n from contact q^3, the piston N uncovers the upper end of an air passage s, permitting air to escape from the under side to the upper side of piston N, and thereby reducing the pressure under the piston N and permitting the latter to travel quickly to its lowermost position under the action of the spring r^4.

Arranged between the lower side of the piston N and the bottom of the cylinder is a spring s', which is of less power than the spring r^4 for a purpose that will appear presently, and is compressed during the final downward movement of the piston N. The piston N has attached thereto one end of a cord or connection s^2, the other end of which is connected to the latch R, and when the piston reaches the downward limit of its movement, it draws the connection s^2, as shown in Figure 15, and withdraws the latch R from engagement with the plate m^3, releasing the latter, and permitting the key M to move upwardly to its normal position. This action relieves the compression on the spring r^4, whereupon the spring s' returns piston N to its normal position, against the stop s^3.

During the return movement of the piston N, it is essential that the circuit remain open, and it is for this reason that the contact q is mounted upon the pivoted supporting arm Q, so that the arm can be moved, and the circuit broken during the upward movement of the piston N. To accomplish this, the piston N carries a projection s^4 of any suitable insulating material, which engages a spring actuated pin s^5 as the piston travels downwardly. The pin s^5 is moved outwardly against the lower end of the arm Q, swinging the arm Q to the position shown in Figure 15, and breaking the circuit by removing the contact q out of engagement with contact q^3.

In order to hold the arm in this position during the upward travel of the piston N, there is provided a pivoted latch t, mounted upon the arm Q, and held in normal position by a leaf spring t'. The latch t passes through an opening t^2 in the cylinder wall, and engages the cylinder wall, as shown in Figure 15, retaining the lower end of the arm Q in its outermost position. This relation of the parts is maintained during the upward movement of the piston N, and until the latter reaches its uppermost position, at which point the arm t^3, which is carried by the piston, engages the latch t and moves the same against the action of the spring t', out of engagement with the wall of the cylinder, as shown in Figure 13, thereby permitting the arm Q to move back to its normal position, bringing contact q into engagement with contact q^3 and closing the circuit at this point, so that it is prepared for the next operation of the key M.

The operation of the switch closing mechanism briefly described is as follows: The valve r^5 is adjusted to obtain the proper and desired length of time during which the circuit remains closed. Then, upon depressing the key M, the plate m^3 is engaged by latch R and locked in its lower position, as in Figure 14. This compresses spring r^4, which actuates the piston N downwardly, compressing the air in the lower part of the cylinder. As the piston N travels slowly in a downward direction, the contact n engages contact q^3 and the circuit is closed, as shown in Figure 14, causing the motor to operate and the copy supporting member to be moved. Further downward movement of the piston N breaks the circuit between contacts n and q^3, stopping movement of the copyholder, and at the same time releases the air under the piston N through the passage s, after which the piston is caused to move quickly to the bottom of the cylinder by the spring r^4. As the piston reaches the limit of its downward movement, the pro-

jection s^4 engages pin s^5 and swings the arm Q to the position shown in Figure 15, thus breaking circuit between contacts q and q^3 also causing latch t to engage the wall of the cylinder and hold the arm Q in this position. As the piston N reaches its lowermost position, the connection s^2 is pulled downwardly, as shown in Figure 15, and the latch R disengaged from plate m^3. The key M then returns to its uppermost position, and the spring r^4 is released. The spring s' then causes the piston N to move upwardly, and holds the piston N in its uppermost position until another operation of the key M. During the upward travel of the piston N, the circuit remains open, by reason of the disengagement of contact q from contact q^3, but as the piston N reaches its normal position, the arm t^3 strikes the latch t and releases the latter from the wall of the cylinder. This permits the arm Q to resume its normal position and the contact q moves inwardly to engage contact q^3, the parts being then ready for another similar operation.

This mechanism illustrates only one of several constructions which may be adopted for the purpose of elevating the copy supporting member through a predetermined distance, by manually closing a circuit, and causing the circuit to be automatically opened after a predetermined time, which may be a second or two, or longer, as the necessities of the operation may require.

While I have described the mechanism as controlled by keys or switches conveniently arranged in reference to the typewriter keyboard, other methods of control may readily be adopted, as for instance, the circuit closing switches may be arranged for foot control, and various modifications of the invention may be had without departing from the underlying scope of my improvement which involves, as its fundamental novelty, the utilizing of some electrical means, either motor or other unit, for controlling the actuation of the copy supporting member of a typewriter copyholder, as comprehended in the appended claims.

I claim:

1. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose the lines of copy successively, and electrical means operatively connected with said member and acting to move it upwardly or downwardly.

2. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, and an electrical device operatively connected with the copy supporting member and actuating it upwardly.

3. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, and an electric motor operatively connected with the copy supporting member and actuating it either upwardly or downwardly.

4. A typewriter copyholder comprising a member for supporting a copy in a vertical plane and movable vertically to expose lines of copy successively, electrical means effecting the vertical movement of the copy supporting member upwardly or downwardly, and an electric switch positioned in juxta-relation to a typewriter key board and operable to control said copy supporting member.

5. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, an electrical device operatively connected with said copy supporting member for actuating the latter upwardly, and an electric switch positionable in juxta-relation to a typewriter keyboard and operable to control said electrical device.

6. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, an electric motor operatively connected with said copy supporting member for actuating the latter either upwardly or downwardly, and an electric switch positionable in juxta-relation to a typewriter keyboard and operable to control said motor.

7. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, an electric motor operatively connected with said copy supporting member for actuating the latter either upwardly or downwardly, and a pair of electric switches positionable in juxta-relation to a typewriter keyboard and operable to drive said motor in either direction and thereby to elevate or lower the copy supporting member.

8. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, an electric motor operatively connected with said copy supporting member for actuating the latter either upwardly or downwardly, a pair of electric switches positionable in juxta-relation to a typewriter keyboard and operable to drive said motor in either direction and thereby to elevate or lower the copy supporting member, and a switch carrier adapted to be detachably supported on the typewriter frame adjacent to the keyboard.

9. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, a stationary frame, a drum near the bottom of said frame, a guide pulley near the top of the frame, a flexible

connection leading from said drum around the pulley and connected to the copy supporting member, and a reversible electric motor operatively connected with said drum.

10. A typewriter copyholder comprising a vertically movable copy supporting member, an electric motor operating said supporting member in either direction, and means acting automatically to stop said motor as the copy supporting member reaches its uppermost or lowermost position.

11. A typewriter copyholder comprising a vertically movable copy supporting member, an electric motor operating said supporting member in either direction, an electric circuit for the motor, a pair of normally closed switches, and a movable switch actuator controlled by the travel of the copy supporting member and acting to automatically open one of said switches and thereby stop the motor as the copy supporting member reaches the limit of its travel in either direction.

12. In a typewriter copyholder, the combination with a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, of an electric motor actuating the latter in opposite directions, a pair of circuits arranged in parallel between the motor armature and the line, a manually operated switch in each of said parallel circuits, a field winding extending from one of said parallel circuits to the other and between said manually operated switches which may be alternately operated to rotate the motor in either direction and thereby raise or lower the copy supporting member, an automatic switch in each of said parallel circuits, and a movable switch actuator governed by the travel of the copy supporting member and operating to open one of said automatic switches and thereby stop the motor as the copy supporting member reaches the limit of its travel.

13. A typewriter copyholder comprising a copy supporting member, electrical means for controlling the copy supporting member, a circuit, and a switch which is closed by a manual operation and is automatically held closed for a predetermined period of time and then automatically opened.

14. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, electrical means effecting movement of the copy supporting member, and a device governing the electrical means whereby a manual operation of said device serves to actuate the electrical means and move the copy supporting member a predetermined distance.

15. A typewriter copyholder comprising a copy supporting member, an electric motor operatively connected with the copy supporting member, a motor circuit, a switch governing the motor circuit and manually operable to close the same, and automatic means acting to hold the switch closed a predetermined length of time and then open it.

16. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, electrical means effecting movement of the copy supporting member, and a manually operable device controlling the electrical means and acting to cause a predetermined movement of the copy supporting member.

17. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, a shaft operatively connected to said vertically movable member, a worm gear on said shaft, a reversible electric motor, and a worm on the motor shaft having engagement with said worm gear.

18. A typewriter copyholder comprising a member for supporting copy in a vertical plane and movable vertically to expose lines of copy successively, a shaft, a flexible member operatively connecting the shaft with said movable member, whereby rotation of the shaft causes a corresponding vertical travel of the movable member in one direction or the other, a reversible electric motor, a worm gear on said shaft, and a worm on the motor shaft engaging said worm gear.

In witness whereof, I have hereunto signed my name.

ANDREW S. MacDOWELL.