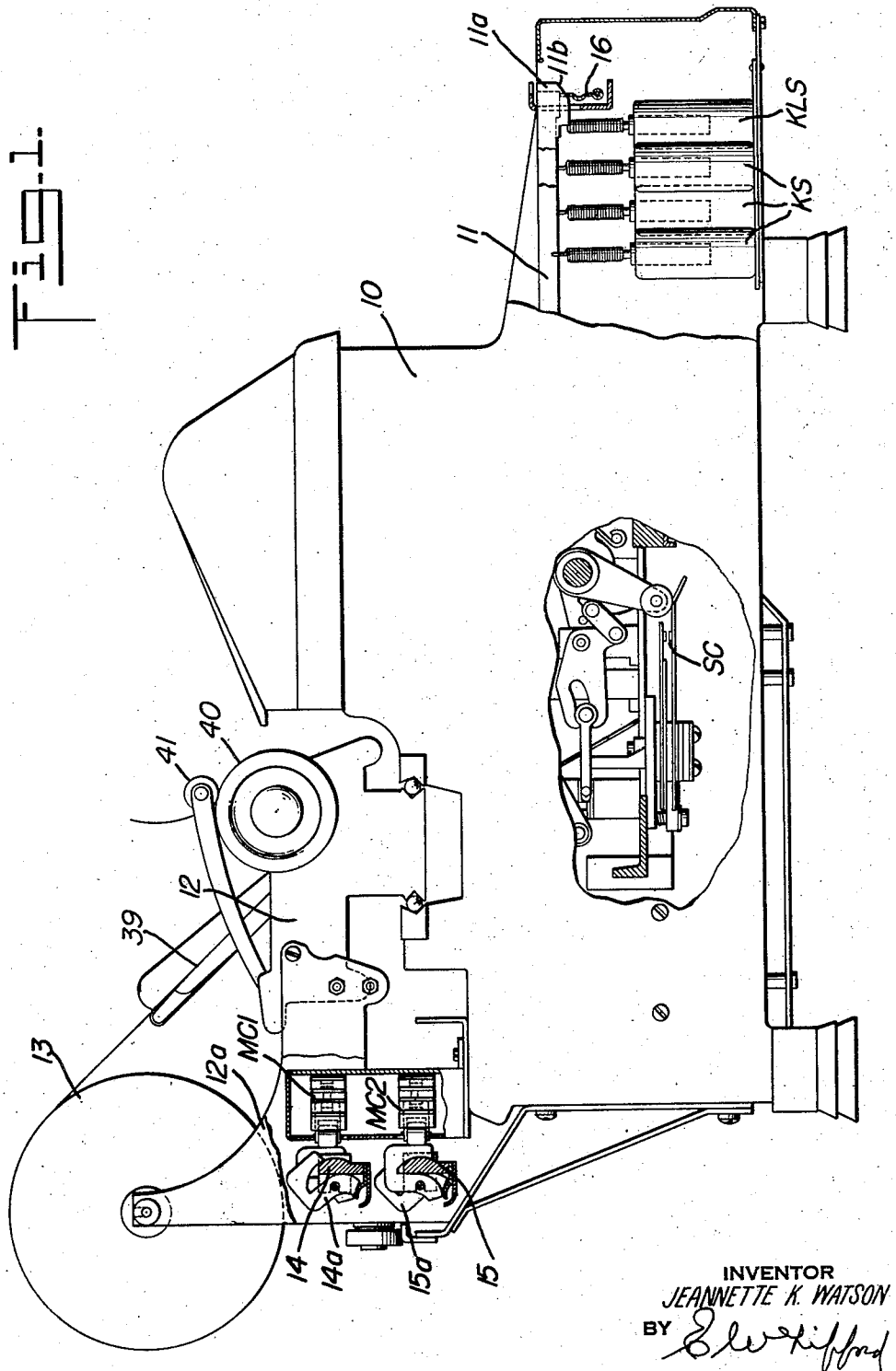
Sept. 4, 1951 J. K. WATSON 2,566,971

REMOTE CONTROL APPARATUS FOR TYPEWRITING MACHINES

Filed June 4, 1948 3 Sheets-Sheet 1

Fig. 1.

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Filed June 4, 1948 3 Sheets-Sheet 2

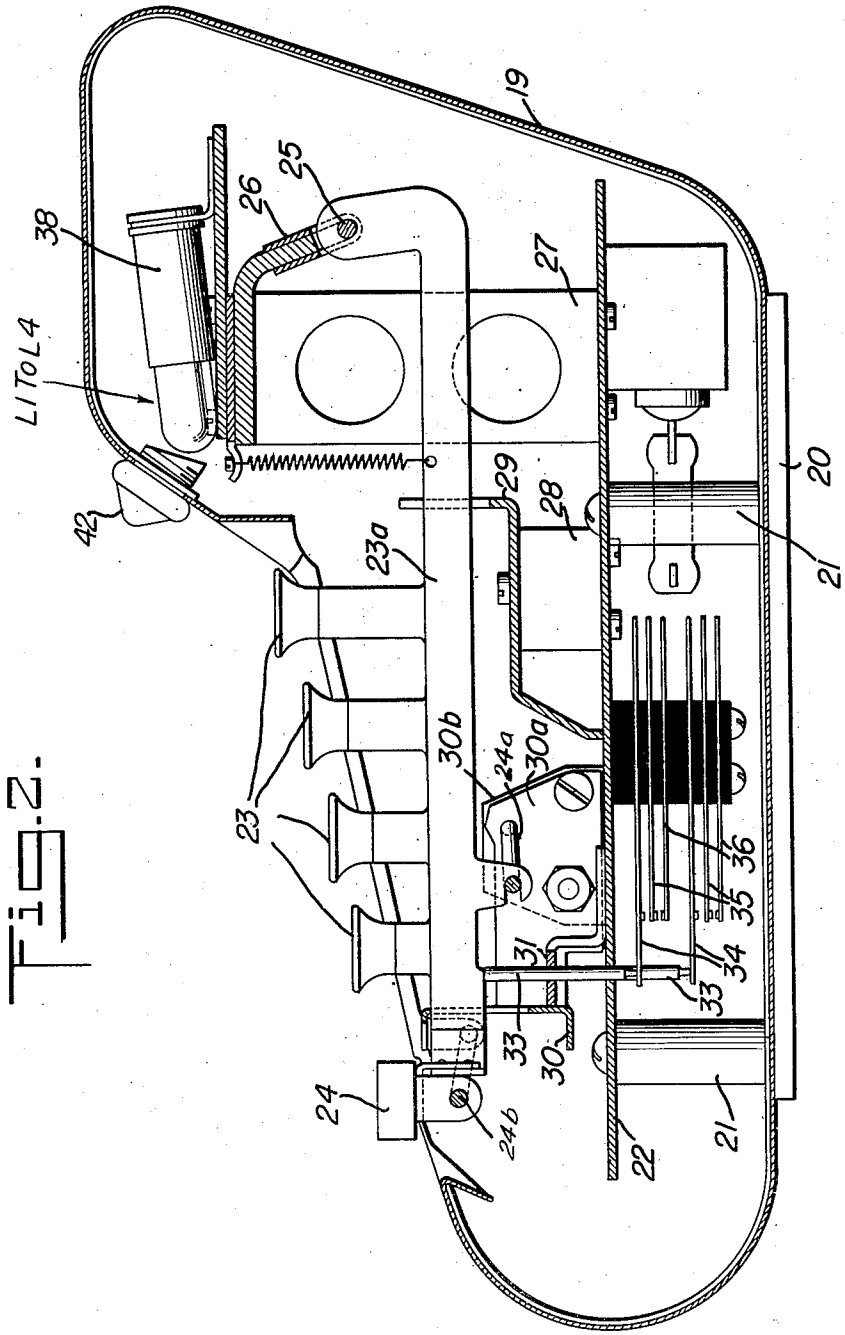


Fig. 2.

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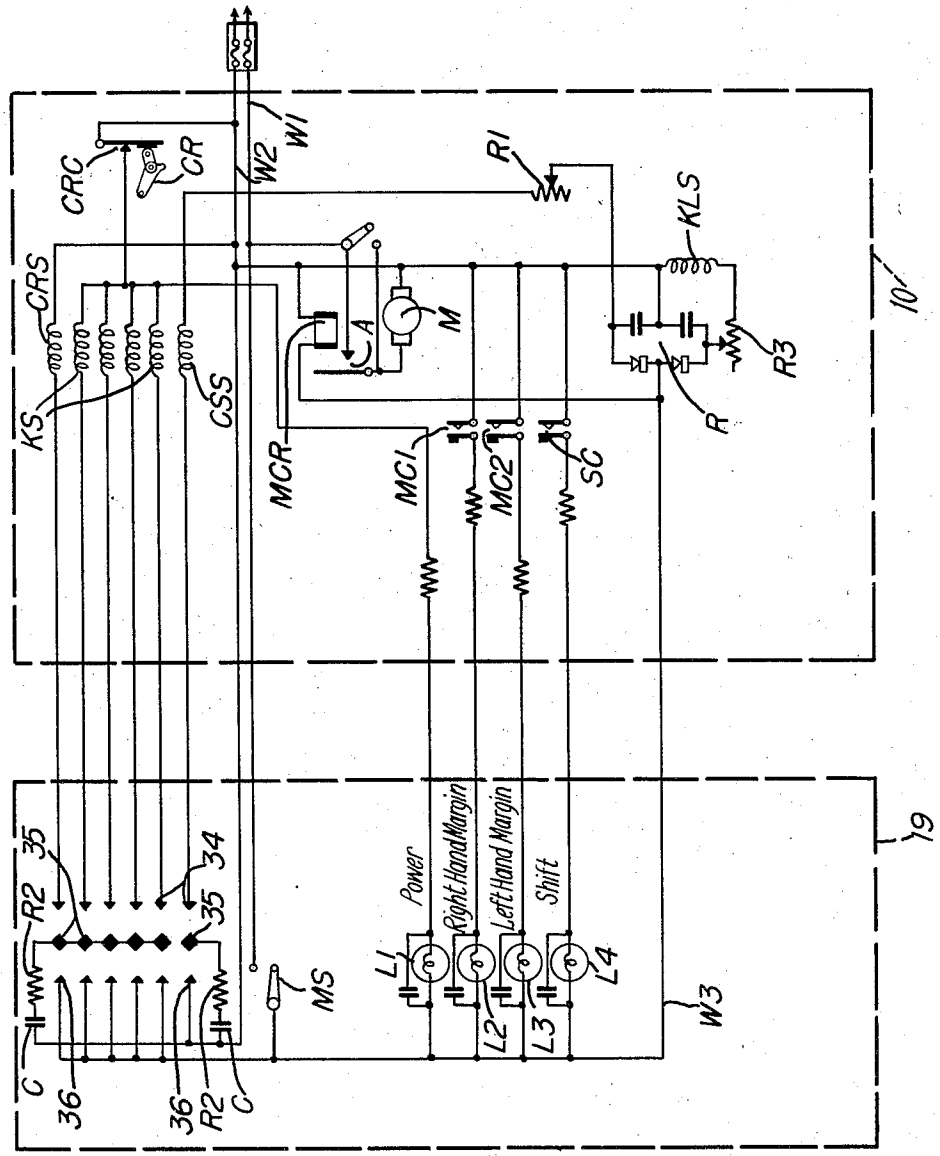


FIG. 5

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2,566,971

## REMOTE CONTROL APPARATUS FOR TYPEWRITING MACHINES

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Application June 4, 1948, Serial No. 31,143

7 Claims. (Cl. 197—19)

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This invention relates to typewriting machines.

The primary object of the present invention is to provide a machine which may be readily operated by a physically handicapped person such as a cripple, an invalid, or a bedridden person.

An object is to provide a machine which may be used in the rehabilitation of the physically handicapped, invalids, and bedridden persons who would be unable to use a standard typewriter because of the fact that they may be partially paralyzed, confined to bed, or for some reason may be unable to get in the proper position to operate a standard typewriter.

An object is to provide a means of remotely controlling a standard typewriter including a small, relatively light keyboard which may be held in the lap of a bedridden or crippled person and which enables the standard typewriter to be completely controlled in all of its functions.

In the rehabilitation of disabled persons, such as war wounded, spastics, and paraplegics, it has been found that their recovery may be hastened or their condition improved if they have an interest in life or a means of whiling away idle hours which may help to keep their minds off their injuries to an extent to encourage recovery. There are also certain classes of disabled or crippled persons in which the nature of their injuries is such that they cannot manipulate a pen or pencil due to partial paralysis of the fingers or arm, yet have sufficient control of one or more fingers or of their arm to enable them to operate a typewriting machine, although perhaps with some difficulty. Such persons often show a marked recovery if the injured arm or hand is given a certain amount of regular exercise. Such exercise may be given by the use of a typewriting machine, but in many cases, the person who would be benefited is bedridden or forced to remain in such a position that it is impossible to get close to a standard machine.

The present invention is directed towards the provision of means enabling a crippled or disabled person to operate a machine even though the person only may have the use of one or two fingers.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a side elevation, partly in section, of a typewriting machine embodying the present invention.

Fig. 2 is a vertical section of the remote control keyboard.

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Fig. 3 is a wiring diagram.

In Figs. 1 and 3, the numeral 10 generally designates a power operated typewriter such as the well known "Electromatic," formerly known as the "International," and now known as the "IBM" electric typewriter. This machine now has become well known in the art and, in view of this, only a very general description of it as modified to adapt it to remote control will be given herein.

The typewriter 10 has all of its mechanisms operated by power through the medium of a suitable power roller (not shown) controlled by key levers 11 which, when depressed, cause the type bars, the carriage return, tabulating, back space, and carriage spacing mechanisms, to operate. For purposes of the present invention, the usual carriage 12 is modified to the extent of providing extensions 12a thereon for rotatably supporting a suitable roll 13 of paper. The carriage is also provided with a pair of stop bars 14 and 15 similar to the ones disclosed in copending application Serial No. 593,367, filed May 12, 1945, by Henry L. Tholstrup, which application has matured into Patent No. 2,439,497, dated April 13, 1948. The carriage in the present case is constructed similarly to the carriage in the foregoing application except for the provision of the additional stop bar 15 and the contacts actuated thereby. The stop bar 14, through the medium of its stops 14a, controls a pair of marginal contacts MC1 which are closed when the carriage is within a few spaces of the right-hand marginal position, whereas the stop bar 15 controls a pair of contacts MC2 which are closed when the carriage is in the left-hand marginal position. As will be seen later herein, these contacts control signal lights which operate to indicate to the operator of the machine at the remote control keyboard, the position of the carriage. The contacts MC2 open when the carriage is spaced one space away from the left-hand marginal position and the contacts MC1 open when the carriage is returned.

The machine is also provided with a pair of contacts SC which, as in the foregoing application, are normally open but are closed when the type basket is in the upper case position. These contacts similarly control a signal light which indicates to the operator at the remote control keyboard that the basket has been properly shifted and is in readiness for typing upper case characters.

The keys of the typewriter are operated by the key selecting solenoids KS (Fig. 1) which, when energized, pull down the keys 11 to cause the various mechanisms of the typewriter to operate. The machine is provided with the usual key lock-

ing bar 16 which ordinarily is connected to the switch of the machine so that turning the switch to the "on" position releases the lock. In the present case, provision must be made for operating this locking bar by remote control in order that the operator at the remote keyboard may be able to have complete control of the typewriter. To this end there is provided a key lock solenoid KLS (Fig. 1) which pulls down a special key lever 11a which does not control a cam unit, but has a cam edge 11b cooperating with an edge of the key locking bar 16 (Fig. 1) so as to cam the latter clockwise and enable the key levers 11 to be depressed. This key locking bar is slotted to permit the depression of the shift keys and the space bar.

The carriage return mechanism is provided with the interlock contacts CRC (Fig. 3) which may be actuated to open position when the toggle forming part of the carriage return mechanism is straightened to engage the carriage return clutch in a well known manner. This toggle is designated CR in Fig. 3 and is disclosed in U. S. Patent No. 2,104,559. These contacts prevent energizing any of the solenoids KS while the carriage is being returned. The carriage return key in the remote control keyboard controls a solenoid CRS which operates the carriage return key lever of the typewriter.

The shift key lever of the typewriter is operated by the case shift solenoid CSS (Fig. 3).

With these modifications, the standard machine is rendered suitable for remote control by a separate keyboard 19 (Figs. 2 and 3) capable of controlling the solenoids KS, CRS, CSS, and KLS. This keyboard is shown in vertical section in Fig. 2 and includes a base plate 20 provided with a plurality of posts 21 supporting a plate 22 parallel with the base plate 20. The plate 22 supports all of the mechanism of the remote keyboard. The remote controlling keys 23 correspond in number, position, and spacing to the keys of a standard typewriter keyboard including the carriage return, tabular, and back space keys, and a space bar 24 which is constructed in the usual way and provided with a key lever similar to the key levers 23a for the keys 23.

The key levers 23a (Fig. 2) are pivotally mounted on a cross rod 25 carried by a cross bar 26 supported on the plate 22 by means of the frame members 27 which may be in the form of suitable brackets or posts. Also mounted on the plate 22 by means of the posts 28 is a key guide comb 29 which is vertically slotted to guide the key levers 23a. At their forward or left-hand ends, the key levers are guided by a channel shaped key guide 30 supported on plate 22 by the bracket extensions 30a which are adjustably secured to brackets 30b mounted on plate 22. Comb 30 abuts a Z-shaped cross bar 31 fixed to the top surface of the plate 22. The plate 22 and the cross bar 31 are each provided with a row of holes which are vertically aligned and also aligned with the key levers 23a. Received in these holes are the short pins or rods 33 of insulating material, the upper ends of each coacting with a key lever 23a and the lower ends coacting with a group of contacts which are operated each time the associated key lever 23a is depressed.

On account of limited space, the contacts are arranged in two sets in a vertical row, each set being operated by a pair of adjacent keys. There are three contact members designated 34, 35, 36 for each key (Fig. 2), and the pins or rods 33 are of two different lengths so that each rests upon one of the contact members 34. In order to permit the longer rods 33 to reach down to the lower contact member 34, the upper contact members 34 are cut away at their ends to provide a clear space for the longer rods 34. Thus, alternate key levers operate the members 34 in one vertical row.

The shift keys are intercoupled by a crank shaft 24a which is pivoted in the bracket extensions 30a which form part of and support the key guide 30 so that the two shift keys always travel together when either one is depressed. The space bar 24 is provided with a somewhat similar crank shaft 24b so that, except for the fact that the keys 23 operate contacts and do not control cam units by direct tripping, the keyboard is constructed similarly to the keyboard in the above named typewriter. The two shift keys control a single set of contacts 34, 35, 36 and space bar 24 likewise controls a single set of contacts.

Mounted on the top of the bar 26 are four signal light sockets 38 the lamps of which are designated L1 to L4 in Fig. 3. These lamps are controlled by the contacts MC1, MC2, and SC, described above, while the remaining one is lighted when a power switch MS is turned on.

Operation of the typewriter under remote control will now be explained in detail with reference to Fig. 3 which comprises a wiring diagram of the machine. It will be understood that the paper web from the roll 13 (Fig. 1) extends over the usual paper table 39 around the platen 40 and is held in contact therewith by the usual paper deflector and pressure rollers (not shown), and the paper bail 41. It will be assumed that the carriage 12 is in the left-hand marginal position, but that current has not yet been turned on by the operator. It should be explained that the remote control keyboard disclosed in Fig. 2 is provided with a master switch MS which is located in alignment with the row of bull's eyes 42 for the signal lights and at the center of the row.

When the switch MS is turned on by the operator at the remote keyboard, a circuit is established from the main line wire W1, through the master switch MS, wire W3, the signal lamp L1, and the carriage return contacts CRC, to main line wire W2. A parallel circuit is also established from the switch MS, wire W3, and through the motor control relay MCR, to the line wire W2, starting the driving motor M for the typewriting machine by closing the contacts A of relay MCR. Thus, the motor M will continue to run as long as the master switch MS is closed. A circuit is also closed through the rectifier R, resistor R3, and the key locking solenoid KLS which operates the key lever 11a to unlock the typewriter keyboard in the manner described above.

It is assumed that the carriage is already in the lefthand marginal position, therefore, the contacts MC2 will be closed and a parallel circuit will be established from the master switch MS, through wire W3, lamp L3, and contacts MC2, to the line wire W2. This indicates to the operator that the machine is in readiness to type a line.

If the operator wishes to write a letter, for example, the first step would be to write the date and the return address in which case the tabulating key or the space key will be operated a number of times to bring the carriage to the

proper position near the right-hand side of the sheet to begin writing the inside address. The depression of the space key or the tabulating key, whichever it happens to be, will cause the appropriate contact 34 corresponding to that key to be moved downwardly (Fig. 2) and make contact with the contact 35 and with continued depression of the key, close the contact 36. This establishes a circuit through the appropriate solenoid KS which may be traced from the line wire W1, through the master switch MS, wire W3, the contacts 36, 35, and 34 for the appropriate key, the proper solenoid KS, and contacts CRC, to the line wire W2.

The next act will be to write the digits of the street number, in which case the next solenoid KS selected, by a circuit similar to the above, will correspond to one of the numeral keys. In a similar fashion, the successive character keys and space bar involved in writing the address to select the proper solenoids KS for printing the inside address will be manipulated. The writing of the inside address will require the depression of the shift key which will select solenoid CSS to operate the shift key on the typewriter and this solenoid, if necessary, may be kept energized by means of a conventional shift lock key provided in the remote control keyboard which is constructed similarly to the typewriter keyboard, as explained above. The circuit for solenoid CSS extends from line wire W2, contacts 36, 35, 34 for the shift key, solenoid CSS, resistor R1, rectifier R, wire W3, and switch MS, to line wire W1.

After each line of the return address has been written, the operator will press the carriage return key on the remote control keyboard which will energize the carriage return solenoid CRS by a circuit traced from the line wire W1, through the switch MS, contacts 36, 35, 34 for the carriage return key, and the carriage return solenoid CRS, to line wire W2. This causes the cam unit which controls the carriage return mechanism in the typewriter to be tripped and the carriage returns in the usual way. The operation of the carriage return cam unit actuates contacts CRC to open said contacts and prevent any circuits from being established through the solenoids KS while the carriage is returning, this acting as an interlock to prevent damage to the machine or mussing the paper due to the accidental operation of the tabulating mechanism and the back spacing mechanism or of a type bar while the carriage is returning.

As soon as the carriage moves away from the left-hand marginal position, the contacts MC2 open and extinguish the signal lamp L3 to indicate to the operator that the carriage is no longer in the left-hand marginal position. When the carriage gets within a few letter spaces of the right-hand marginal position, the contacts MC1 close and cause the signal lamp L2 to be lighted over a circuit from the master switch MS through the contacts MC1, to line wire W2. The contacts MC1 remain closed while the operator is typing the last few characters in the line and, as soon as the carriage is returned, the contacts MC1 open.

Whenever the operator depresses the shift key to shift the type basket, the contacts SC are closed by the movement of the type basket and light lamp L4 to indicate to the operator that the machine is in condition to type upper case letters. If the shift lock key in the remote control keyboard is operated, the contacts SC will remain continually lighted, but will be extinguished as soon as the main shift key is depressed in the usual way to unlock the type basket and cause it to be shifted back to the lower case position.



The contacts 35 are not essential to the closing of circuits through the solenoids KS, CRS, CSS, but are provided for the purposes of eliminating arcing between the contacts when the keys are released. For this purpose all of the contacts 35 with the exception of the one associated with the shift key, are connected in common to a condenser and resistor in series between said contacts and the line wire W2. The contacts are so adjusted that the contacts 34, 35, close first and the contacts 35, 36 close last and this order is reversed when the key is released so that any inductive disturbances caused by the interruption of the current through the solenoids KS will be shunted through the resistor and capacitor. It will be noted that the resistor R2 and the capacitor C will, in effect, connect the selected solenoid KS in a series circuit which includes the line wire W2 and the contacts CRC so that the inductive discharge is dissipated in the condenser C and resistor R2 whenever the circuit is broken to any solenoid KS. In view of the use of direct current to operate the shift solenoid CSS, there is provided a separate resistor R2 and capacitor C which is individual to the contacts 35 for the shift key of the remote control keyboard.

It will be noted that the return circuit for the signal light L1 is carried through the carriage return contacts CRC. This signal light may be a green light signifying to the operator that the typewriter is in operation and ready for use. When the carriage is returned, the signal lamp L1 will be extinguished, since contacts CRC open for this operation, thereby warning the operator not to operate any of the character keys until lamp L3 lights to show full return of the carriage. It should be explained that in many applications of a machine of this type, it is quite possible that the person using the machine may be so incapacitated as to be unable to see the typewriter and has no means of knowing that the carriage may have jammed in the process of being returned and might depress keys which, in view of the breaking of the circuits for the solenoid KS, would have no useful effect, and only a part of the data represented by depressed keys might actually be written. Failure of the lamp L1 to light is a warning that the typewriter is not ready to operate.

It will be understood that the typewriter 10 and the remote control keyboard 19 are connected by a suitable cable containing the wires between the two units.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A typewriting machine for the physically handicapped, comprising a typewriter having a carriage and printing means and having a series of function controlling electromagnets for selectively controlling the printing means and movements of the carriage, said typewriter also having contact means operated in different positions of the carriage; and a keyboard separate from said

typewriter and having a cable connection to said typewriter, said keyboard having a series of keys connected to said electromagnets through said cable for selectively controlling said electromagnets and having a series of signal lights responsive to said contact means to denote the position of said carriage.

2. A typewriting machine for the physically handicapped, comprising a typewriter having a carriage and printing means and having a series of function controlling electromagnets for selectively controlling the printing means and movements of the carriage, including a case shift electromagnet for causing the printing means to print in upper case, said typewriter also having contact means closed when the printing means is printing in upper case, and contact means operated in different positions of the carriage; and a keyboard separate from said typewriter and having a cable connection to said typewriter, said keyboard having a series of keys connected to said electromagnets through said cable for selectively controlling said electromagnets and having a series of signal lights responsive to said first and second named contact means to denote the position of said carriage and whether or not the printing means is printing in upper case.

3. A typewriting machine for the physically handicapped, comprising a typewriter having a carriage and printing means and having a series of function controlling electromagnets for selectively controlling the printing means and movements of the carriage, said typewriter also having contact means operated in different positions of the carriage, means for locking the printing means against operation and an electromagnet for releasing the locking means; and a keyboard separate from said typewriter and having a cable connection to said typewriter, said keyboard having a series of keys having contact means connected to said electromagnets through said cable for selectively controlling said electromagnets and having a series of signal lights responsive to said first named contact means to denote the position of said carriage, said keyboard also having circuit closing means for energizing the electromagnet for releasing the locking means.

4. A typewriting machine for the physically handicapped, comprising a typewriter having a carriage and printing means and having a series of function controlling electromagnets for selectively controlling the printing means and movements of the carriage, including a case shift electromagnet for causing the printing means to print in upper case, said typewriter also having contact means closed when the printing means is printing in upper case, means for locking the printing means against operation, an electromagnet for releasing the locking means, and contact means operated in different positions of the carriage; and a keyboard separate from said typewriter and having a cable connection to said typewriter, said keyboard having a series of keys having contact means connected to said electromagnets through said cable for selectively controlling said electromagnets and having a series of signal lights responsive to said first and second named contact means to denote the position of said carriage and whether or not the printing means is printing in upper case, said keyboard also having circuit closing means for energizing the electromagnet for releasing the locking means.

5. A typewriting machine for the physically handicapped, comprising a power operated typewriter having a driving motor, a carriage and printing means and having a series of function controlling electromagnets for selectively controlling the printing means and movements of the carriage, said typewriter also having contact means operated in different positions of the carriage; and a keyboard separate from said typewriter and having a cable connection to said typewriter, said keyboard having a series of keys connected to said electromagnets through said cable for selectively controlling said electromagnets and circuit closing means for starting said motor, said keyboard also having a series of signal lights responsive to said contact means and circuit closing means to denote the position of said carriage, and whether or not the motor has been started.

6. A typewriting machine for use by the physically handicapped, comprising a power operated typewriter having a carriage, carriage return means, and printing means and having a series of function controlling electromagnets for selectively controlling the carriage return means, the printing means, and the movements of the carriage, said typewriter also having contact means operated in different positions of the carriage and contact means operated by the carriage return means; and a keyboard separate from said typewriter and having a cable connection to said typewriter, said keyboard having a series of keys having contact means connected to said electromagnets through said cable for selectively controlling said electromagnets and having a series of signal lights responsive to said different contact means to denote the different positions of said carriage and when the carriage is in the process of being returned.

7. A typewriting machine for use by the physically handicapped, comprising a power operated typewriter having a carriage, carriage return means, and printing means and having a series of function controlling electromagnets for selectively controlling the carriage return means, the printing means, and the movements of the carriage, said typewriter also having contact means operated in different positions of the carriage and contact means operated by the carriage return means; and a keyboard separate from said typewriter and having a cable connection to said typewriter, said keyboard having a series of keys having contact means connected to said electromagnets through said cable for selectively controlling said electromagnets and having a series of signal lights responsive to said first and second named contact means to denote the position of said carriage and when the carriage is in the process of being returned, said carriage return contact means being operative to interrupt the circuits between the electromagnets for controlling the printing means and the contact means for said electromagnets while the carriage is being returned.

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