June 5, 1945. R. VON REPPERT 2,377,831

TYPEWRITING MACHINE

Filed Jan. 11, 1944

FIG. 1.

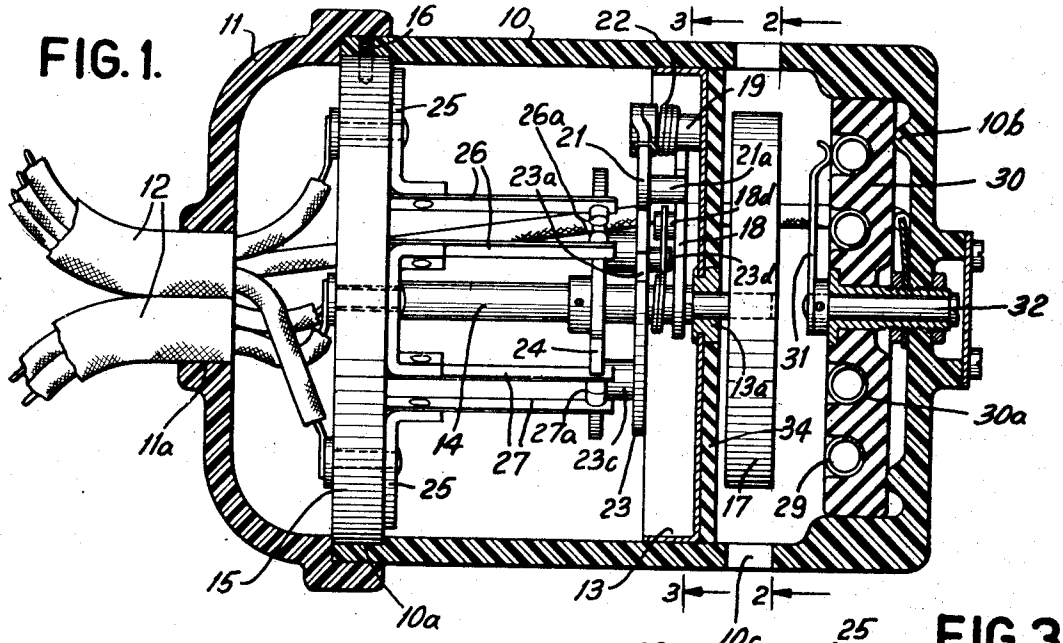


FIG. 2.

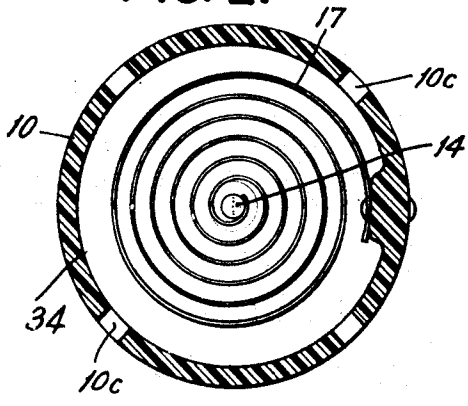


FIG. 3.

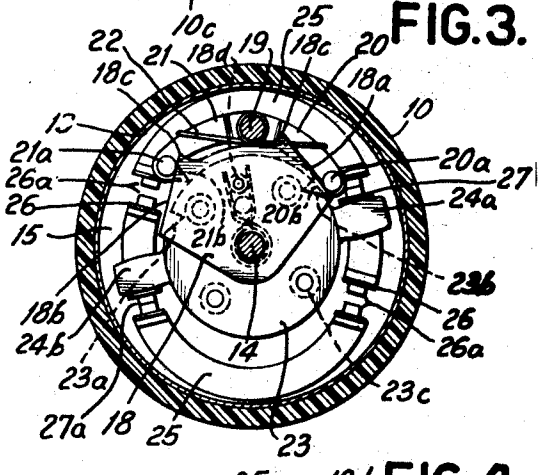


FIG. 4.

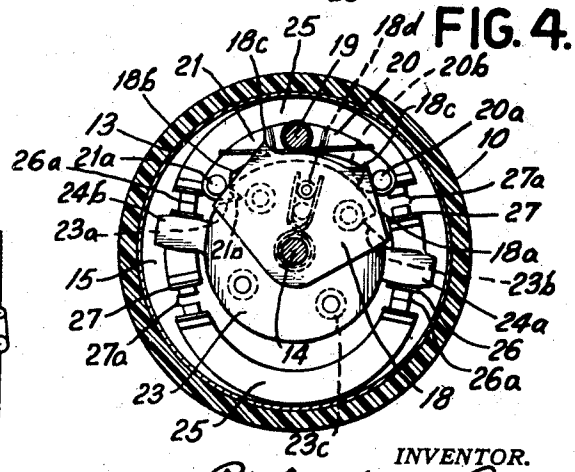
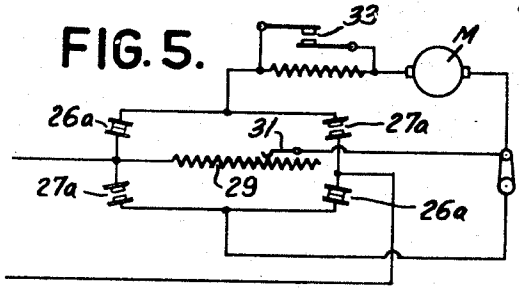


FIG. 5.



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Patented June 5, 1945

2,377,831

UNITED STATES PATENT OFFICE

2,377,831

TYPEWRITING MACHINE

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Application January 11, 1944, Serial No. 517,780

2 Claims. (Cl. 200—122)

This invention relates to typewriting machines, more specifically to typewriting machines which are operated by means of an electric motor.

The primary object of the present invention is to provide means for improving the operation of an electric motor used for operating a typewriting or other office machine.

An object is to provide means for improving the operation of electric motors employing direct current.

An object is to improve the operation of the speed controlled type of electric motor wherein suitable centrifugal force actuated contacts are used to regulate the speed of the motor.

An object is to provide an automatic reversing switch for reversing the current to an electric motor at periodic intervals.

An object is to provide an automatic reversing switch which is controlled by a thermal element.

An object is to provide a thermally responsive switching device with means for adjusting the time rate of operation of the thermal control means.

Typewriting and other office machines operated by electric motors very often must be operated on direct current which may be the only available current for operating the motor. The motors used in office machines are usually of the constant speed, adjustable speed type, particularly in typewriting machines where the force of the blow of the type bars is regulated by controlling the speed of the motor. The speed of such driving motors is most commonly controlled by means of an adjustable rheostat of some form and the speed, once adjusted, is kept constant by means of a centrifugal actuated governor mechanism wherein the opening and closing of a pair of contacts, by controlling a resistance, maintains the speed constant at its adjusted value.

In the use of machines on direct current circuits, it has been found that a transfer of metal occurs from one governor contact to the other owing to the polarity of the current which transfer continues until one of the contacts has become so badly wasted away that the contacts either function haphazardly or fail to function. This wasting away of the contacts is a well known characteristic of switching devices used in direct current circuits and arises from the arc formed when the contacts open. It has been found that when the direct current is periodically reversed the speed regulating contacts have a much longer life and operate more satisfactorily.

An object of the present invention, therefore, is to provide a switching mechanism which will cause an automatic reversal of the current at regular time intervals to prevent the wasting away of one contact and the building up of the other.

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

In the drawing:

Fig. 1 is a longitudinal section;

Fig. 2 is a vertical transverse section on the line 2—2 in Fig. 1;

Fig. 3 is a vertical transverse section on the line 3—3 in Fig. 1 and shows the contact operating mechanism at the start of a cooling cycle of the thermal control element;

Fig. 4 is a view similar to Fig. 3 showing the contact operating mechanism at the beginning of a heating period;

Fig. 5 is a wiring diagram.

The switch mechanism is housed in a one-piece cylindrical casing 10 permanently closed at its right hand end (Fig. 1) and which conventionally may be molded from a suitable plastic such as a phenolic condensation material. This housing is covered at its open end by a cap 11 which is provided with a suitable opening 11*a* through which passes the connecting cables 12. Secured near the middle of the casing 10 is a flanged disk 13, preferably of metal, to which is secured a bearing bushing 13*a* acting as a journal for the shaft 14. This shaft is reduced at its ends, the right hand end being journalled in the aforesaid bushing 13*a*, while the left hand end is journalled in a bushing carried by an insulating disk 15 which is seated in the internal annular shoulder 10*a* formed in the casing 10. Disk 15 is held in place and kept from rotating on the shoulder 10*a* by means of screws like 16 which pass through holes in the casing 10 into radial holes in disk 15. The flanged disk 13 is also secured in any suitable manner to the housing 10 to prevent its rotation within said housing.

In the space between the right hand end (Fig. 1) of the housing 10 and the disk 13, adjacent said disk, is mounted thermostatic coil spring 17, the inner end of which is connected to the shaft 14 (Fig. 2) while the other end is secured to the housing 10. When this spring is heated it tends to increase in length thereby tending to rotate the shaft 14 counterclockwise in Fig. 2, and when cooled tends to shrink and rotate the shaft clockwise. Secured to the shaft 14 is a cam 18 (Figs.

3 and 4) formed with the cam surfaces 18a, 18b and the stop portions 18c which restrict angular movement of the shaft 14 and the cam 18 to an angle of approximately 60° by engagement with a stud 19 carried by the disk 13. Pivoted on the stud 19 are the detents 20, 21 which are provided with pins 20a, 21a held on the cam surfaces 18a, 18b by means of a common spring 22 coiled around the stud 19. The detents 20 and 21 are formed with teeth 20b and 21b, respectively, one of which normally engages a locking notch 23a or 23b in a locking disk 23 loosely mounted on the shaft 14.

In Fig. 3, the right hand detent 20a and its tooth 20b is engaged in the right hand notch 23b to prevent rotation of the locking disk 23 in a clockwise direction. In Fig. 4 the conditions are reversed and the left hand detent 21 through its tooth 21b and notch 23a is holding disk 23 against counterclockwise rotation. One or the other of the detents 21 is always operative to hold the locking disk against rotation.

The locking disk 23 is secured to a contact operating disk 24 (Figs. 1, 3 and 4) through suitable posts 23c which space disks 23, 24 apart. The disk 24 is formed with two contact operating lugs 24a located on diametrically opposite sides of the shaft 14. Secured to the right hand face of the disk 15 (Fig. 1), which preferably is composed of insulating material, are four brackets 25 which support four sets of contact members 26, 27 provided with contacts 26a, 27a. The contact members 26, 27 extend approximately parallel with the shaft 14 and one of each pair is positioned to be engaged by the contact operating lugs 24a. In Fig. 3, the lugs 24a are in a position to hold closed the contacts 27a whereas, in the alternate position of the disks 23, 24 of Fig. 4, the contacts 26a are held closed. The brackets 25 not only act as supports for the contact members 26, 27 but also act as connecting straps whereby each contact 26a is electrically connected to one of the contacts 27a.

The cam 18 is provided with a pin 18d (Figs. 1, 3 and 4) the sides of which are engaged by the parallel branches of a hairpin spring 28 partly coiled around the shaft 14 and crossed between the pin 18d and the shaft 14 as best shown in Figs. 3 and 4. The disk 23 is also provided with a pin 23d which extends into the space between the two branches of the spring 28 and between the pin 18d and the shaft 14.

The operation of the mechanism so far described will now be explained in detail. Let it be assumed that the starting position of the parts is shown in Fig. 3 and that with reduction in temperature the spring 17 is shrinking, tending to turn the shaft 14 in a clockwise direction in Fig. 3 thereby rotating the cam 18 slowly at a speed which depends upon the rate of change of temperature. The cam 18a will gradually urge the pin 20a radially of the shaft 14 until ultimately the tooth 20b will clear the notch 23b and release the locking disk 23. As the cam 18 rotates in a clockwise direction, the pin 18d will rotate the right hand branch of spring 28 thereby increasing the tension of the spring 28. However, the disk 23 cannot follow the cam 18 for the time being because of the fact that the detent 20a prevents such action. When the tooth 20b finally clears the notch 23b, however, increased tension of spring 28 will cause the disk 23 and the contact operating disk 24 to snap in a clockwise direction to the position of Fig. 4 in which the detent 21, through lug 21b and notch 23a, locks the disk 23 against counterclockwise rotation. This, of course, causes the contacts 26a to close and the contacts 27a to open as in Figs. 3 and 5. If now the thermostatic spring 17 is heated, it tends to rotate the cam 18 in a counterclockwise direction with the result that the pin 21a next is gradually moved radially by the cam 18b until ultimately the tooth 21b clears the notch 23a. The counterclockwise rotation of the cam 18 causes the pin 18d to rock the left hand branch of the spring 28 counterclockwise and increase the tension of the spring 28 in the opposite sense. Ultimately, the tooth 21b will clear the notch 23a and, in consequence of the tension of spring 28, the disk 23 will be rocked in a counterclockwise direction back to the position of Fig. 3 to reclose the contacts 26a and open the contacts 27a.

For the purpose of controlling this action, which is produced by alternate heating and cooling of the thermostatic spring 17, there is provided an adjustable heater consisting of a suitable resistance coil 29 (Fig. 1) mounted in two concentric grooves 30a in a disk 30 of insulating material, such as porcelain, which is mounted on an internal shoulder formed in the closed end of the housing 10 but separated from the closed end by a circular rib 10b. The heater unit is constructed similarly to a conventional rheostat or potentiometer and is provided with a contact arm 31 secured to the left hand end of a slotted head stud 32. By turning the screw, the contact element 31 may be rotated to increase or decrease the resistance of that part of the coil 29 which is included in the circuit (Fig. 5). By increasing the effective length of the coil the resistance is increased and the heating effect is reduced since less current can flow through the increased length of coil. Also, increasing the length of the coil increases the heating time of the coil since the heating effect varies inversely as the square of the resistance. In other words, the speed of heating will be increased by shortening the coil and decreased by lengthening the coil.

In Fig. 5, there is shown a wiring diagram illustrating the connection of the heater coil or resistance 29 to the contacts 26a, 27a and the motor M.

When the parts are in the position of Fig. 4 with the contacts 26a closed and contacts 27a open, the heater 29 is operative and current is flowing in a given direction through the motor M. When the thermostatic spring 17 has rotated the cam disk 18 from the position of Fig. 4 to the position of Fig. 3 to effect the closure of contacts 27a, the heater 29 is shunted by one pair of the contacts 27a thereby allowing the heater and the thermostatic spring 17 to cool and gradually move the parts back to the position of Fig. 4. At the same time, the closure of the other pair of contacts 27a effects a reversal in a direction of the current through the motor M which, of course, does not effect its direction of rotation but does change the polarity of the speed control contacts 33 (Fig. 5).

For the purpose of promoting rapid cooling of the spring 17, the housing 10 is provided with ventilating holes 10c which also prevent overheating of the switch in the event cam 18 should stick in the position in which the heater element 29 is operative. In order to prevent the switch mechanism from becoming overheated there is provided a washer 34 of heat insulating material such as asbestos. This also assists in producing a fast snappy action of the switch since a large amount of heat stored in the metallic parts would

tend to retard the rate of cooling of the thermostatic element 17.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification 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. In a thermally responsive switch, contact means, an oscillatable member for operating said contacts and in one position holding the contact means open and in another alternate position holding said contact means closed; a pair of latches coacting with said member to hold it in the open contact and closed contact positions, respectively, one latch for each position, one of said latches normally holding said member against movement to the alternate position to thereby hold said contact means open, a release member oscillatable between alternate positions to release said latches, a thermal element operative when heated to actuate the releasing element to release the latch normally holding the first member and thereby enable the first member to move to a position to close the contact means, a heater in parallel with said contact means and operative to heat said thermal element when the contact means is open to thereby cause the release member to move to the alternate position and release the latch holding the first member in open contact position, spring means between said members tensioned when said releasing member is moved from one latch releasing position to the other and operative to actuate the said member to its other position when a latch holding it in one of its positions is released, and a second contact means actuated to open and closed position by said first member, and means to vary the heating effect of said heater.

2. In a thermally responsive switch, contact means, an oscillatable member for operating said contacts and in one position holding open the contact means and in another alternate position holding said contact means closed; a pair of latches coacting with said member to hold it in open contact and closed contact positions, respectively, one latch for each position, one of said latches normally holding said member against movement to the alternate position to thereby hold said contact means open; a release member oscillatable between alternate positions to release said latches, a thermal element operative when heated to actuate the releasing element to release the latch normally holding the first member and thereby enable said first member to move to a position to close the contact means, a heater in the form of an electrical resistance in parallel with said contact means and operative to heat said thermal element when the contact means is open to thereby cause the release member to move to the alternate position and release the latch holding the first member in open contact position, spring means between said members tensioned when said releasing member is moved from one latch releasing position to the other and operative to actuate the said member to its other position when a latch holding it in one of its positions is released, a second contact means actuated to open and closed positions by said first member, and means to variably cut in or out part of said resistance to vary the heating effect of said heater.

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