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[54] **VARIABLE-RESISTANCE FOOT CONTROL DEVICE, FOR REGULATING THE SPEED OF AN ELECTRIC MOTOR**

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[52] **U.S. Cl.**.....**338/153,** 338/163, 338/165

[51] **Int. Cl.**.....**H01c 9/02,** H01c 5/02

[58] **Field of Search**.....338/153, 160, 162, 163, 165, 338/184, 199

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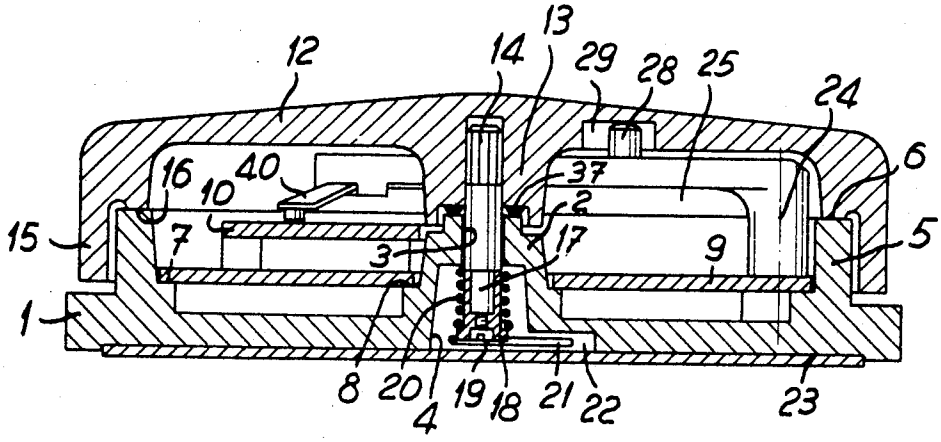
[57] **ABSTRACT**

A variable-resistance foot control device for regulating the speed of an electric motor is particularly useful for sewing machines. It has a casing containing the variable-resistance element and a speed selection slider. The actuating member comprises a cover which pivots on a vertical axle against the action of a return spring which is fixed between the casing and said axle. The casing has a peripheral collar which the skirt of the cover surrounds and an annular support surface provided on the inside of the cover faces the collar. The slider is carried by a hinged lever actuated by turning the foot on the cover, whereby a pin and groove mechanism pivots the lever and moves the slider into contact with the contact points on the variable-resistance element.

4 Claims, 4 Drawing Figures



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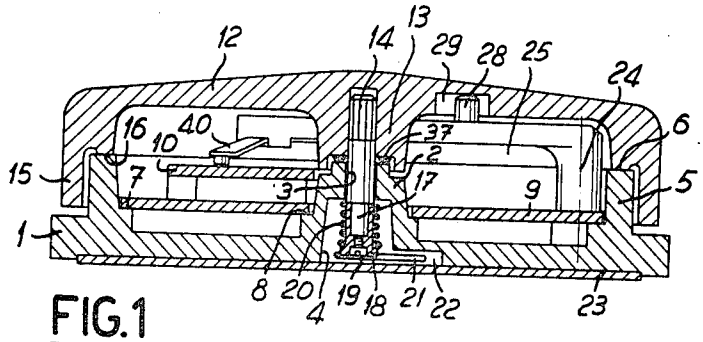

FIG.1

FIG.2

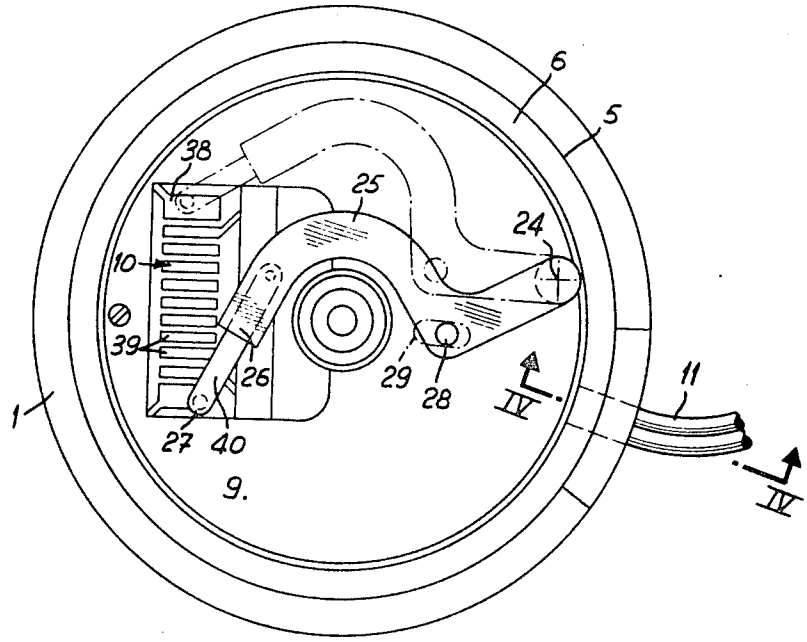

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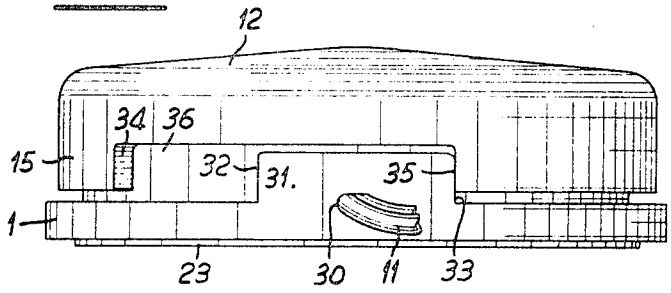
FIG. 3



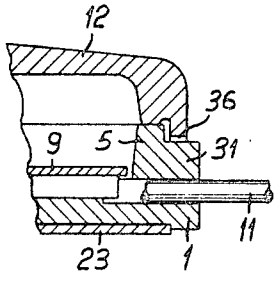


FIG. 4

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VARIABLE-RESISTANCE FOOT CONTROL DEVICE, FOR REGULATING THE SPEED OF AN ELECTRIC MOTOR

The present invention relates to a variable-resistance foot control device, for regulating the speed of an electric motor. More particularly, it relates to devices of this type comprising a casing containing a variable-resistance element and a speed selection slider, a control member movable with respect to the casing and of which the travel is adjustable at will against the action of a spring, acting on said slider.

Numerous devices of this type are already known, used especially for controlling sewing machines. Among known devices, the most commonly used comprise a pedal hinged on a support, which pedal the user must thrust down more or less to regulate the speed of the sewing machine motor. These pedals can create a certain fatigue for the user who must raise his foot each time that he wishes to stop the sewing machine or reduce the speed of the latter. In fact, the user cannot simply allow his foot to rest on The pedal.

It is a specific object of the invention to provide a device to remedy this drawback.

Other objects and advantages will be apparent from the description which follows.

According to the invention, there is provided a variable-resistance foot control device, for regulating the speed of an electric motor, said device comprising an actuating member mounted to pivot on a substantially vertical axis.

In order that the invention may be more fully understood, one embodiment of the control device according to the invention is described below, purely by way of illustrative but non-limiting example, with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 is a view in transverse section of said embodiment;

FIG. 2 is a plan view, the cover of the device being removed;

FIG. 3 is a view in side elevation of the device; and

FIG. 4 is a view in section of a detail of this embodiment, along the line IV—IV of FIG. 2.

With reference to FIGS. 1 and 2, the foot control device shown comprises a casing 1 of generally circular form. This casing has a central boss 2 having an opening 3 therein and in the lower portion of said opening there is arranged a housing 4. At the periphery of this casing 1 is arranged a cylindrical wall 5 of which the upper face constitutes a peripheral collar 6. Shoulders 7 and 8 are formed, on one hand, on the inside of the cylindrical wall 5, and on the other hand, around the boss 2. On these shoulders is fixed an intermediate support plate 9. This intermediate support plate 9 bears a variable resistance 10, as well as the printed electrical circuit for connecting between the electric cable 11 for connecting the control device to the supply system, to the motor to be controlled and to the variable resistance 10.

On this casing 1 is arranged a cover 12 which comprises the actuating member of the device. The cover 12 is also of generally annular form and has at its center a boss 13 inside of which is fixed a rotatable axle 14. The edge 15 of the cover 12 surrounds the peripheral collar 6 formed on the wall 5. An annular support surface 16 is arranged inside the cover 12 so as to be facing said peripheral collar 6. The lower end 17 of the axle 14 is engaged a bush 18 held on the axle by an axial screw threaded into a hole of the axle 14. Around the bush 18 is engaged a helical spring 20 fixed to the bush 18 by winding turns next to one of its ends. The other end 21 of this spring is supported in a slot 22 arranged in the bottom of the casing 1.

A plate 23 of nonskid material, for example, of rubber or plastics material, covers the bottom of the casing 1.

The casing 1 is provided with a hinging axle 24 for a lever 25 of which the end 26 serves as support for the slider 27 of the variable resistance 10.

A pin and corresponding groove drive device is formed between an intermediate portion of the lever 25 and the bottom of the cover 12. In the example shown, a pin 28 is carried by an intermediate portion of the lever 25, said pin 28 being engaged in a groove 29 arranged in the thickness of the cover 12. Thus, any angular displacement of the cover 12 will cause an oscillating movement of the lever 25 driven by cooperation of the groove 29 and of the pin 28.

To limit the amplitude of the angular movements of the cover 12 which comprises the actuating member, the casing 1 has a boss 31, on its periphery at the location of the opening 30 provided for the cable 11. The two sides 32 and 33 of the boss 31 cooperate with the two sides 34, 35, respectively of a slot 36 arranged in the edge 15 of the cover 12. In the case where the casing 1 and the cover 12 are made of a material of great hardness, flexible stops, for example of rubber, can be arranged either on the edges 32, 33, of the boss 31, or against the sides 34, 35 of the slot 36. These stops would be particularly useful in the case where the casing 1 and the cover 12 are of metal. However, it is preferable to produce these parts of molded synthetic material, for example of plastics material. To facilitate the rotary movement of the cover 12 on the casing 1, an elastic washer 37 is inserted between the upper portion of the boss 2 of the casing 1 and the boss 13 of the cover 12.

The use of the variable resistance foot control device, for regulating the speed of an electric motor especially of sewing machines, is effected by the action of the foot on the cover 12 after having first connected the cable 11 to the sewing machine and to the electrical supply source respectively. The foot can then rest freely on the cover 12 comprising the actuating member, without fatigue to the user. In the rest position of the device, although the electric motor is not supplied with current, the cover 12 is in the position wherein the edge 32 abuts against the side 34 of the cover 12, the lever 25 being in the position shown in dotted lines in FIG. 2. In this position, the slider 27 is in contact with an insulated portion 38 of the variable resistance 10. As soon as the user causes an angular displacement in clockwise direction of the cover 12 by making his foot turn, the groove 29 by driving the pin 28 causes a displacement of the lever 25 in anticlockwise direction, the slider 27 coming into contact with one or other of the intermediate contact steps 39 of the variable resistance 10. The highest speed of rotation of the electric motor is obtained when the cover 12 is in the position shown in FIG. 3 wherein the edge 33 of the boss 31 is in contact with the side 35 of the cover 12, the variable resistance 10 being shunted by the slider 27.

Preferably, the lever 25 is formed of insulating synthetic molded material, the slider 27 being attached by an elastic strip 40 on the lever 25.

The presence of the peripheral collar 6 cooperating with the annular support surface 16 avoids any risk of damaging the device, when heavy pressure is exerted by the foot of the user on one edge of the cover 12. It is to be noted that a certain play may be left, in the inactive state, between the peripheral collar 6 and the annular support surface 16, which facilitates angular displacement of the cover 12 with respect to the casing 1. It is only in a situation where the user exerts a possibly eccentric pressure with respect to the cover 12 that the peripheral collar 6 cooperates with the annular support surface 16 to avoid any damage of the pivoting axle 14 of the cover 12.

We claim:

1. A variable-resistance foot control device for controlling the speed of an electric motor, said device comprising, a casing including a variable-resistance element mounted therein, a peripheral cylindrical collar and a centrally located support member, a cover for said casing, said cover having a groove in its lower surface and an annular support surface facing and movably contacting said collar, an axle fixed in said cover and depending therefrom, said axle rotatably mounted in said centrally located support member in the casing, a lever pivotally mounted in said casing eccentrically of said centrally located support member, a pin on the upper surface of said lever, said pin fitted within the groove in said cover, a slider carried by the free end of said lever and selectively engaging said variable-resistance element, a spring acting on said vertical axle such that said cover is normally urged into a position placing

said slider in an inactive position, whereby rotation of said cover by the operator's foot causes said lever to pivot from an inactive position on an insulated portion of said resistance element to an active position in engagement with contact points on the resistance element to place said motor to be controlled in operation and regulate the speed thereof according to the extent of rotation of said cover.

2. A variable-resistance foot control device according to claim 1, wherein said casing includes an intermediate support plate, said variable-resistance element mounted on said plate, an electrical printed circuit also mounted on said plate, and an electric cable connecting said printed circuit, the motor to be controlled and the variable resistance to a supply of electricity.

3. A variable-resistance foot control device according to claim 1, wherein said centrally located support member includes a housing in which said spring is located, said spring being of the helical type fixed at one of its ends around a bush attached to the lower part of the axle, the other end of the spring supported in a slot in the bottom of the casing.

4. A variable-resistance foot control device according to claim 1, including an elastic washer mounted on said centrally located support member to facilitate rotation of said cover relative to said casing.

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