# United States Patent

**Sillano**

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[54] **SPEED CONTROL DEVICE FOR SEWING MACHINES**


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[51] **Int. Cl.**.....**H02p 5/44**

[58] **Field of Search**.....318/337, 360, 361, 491; 240/214



[56] **References Cited**

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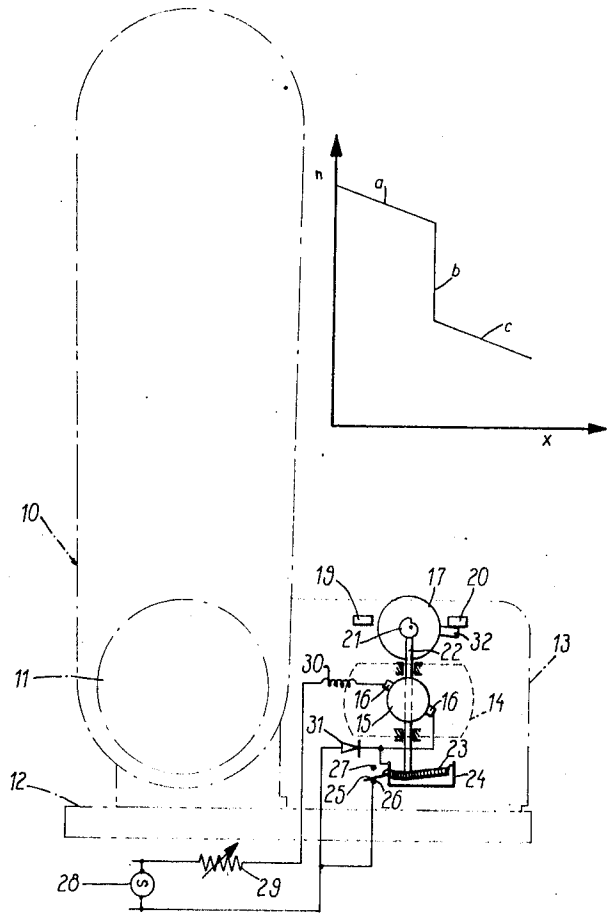
[57] **ABSTRACT**

A speed control means for a motor of the commutator type and is particularly intended for such motors as applied to sewing machines. The speed control means is arranged to rotate the brush axis while simultaneously cutting in or cutting out a diode from the motor circuit.


**1 Claim, 2 Drawing Figures**



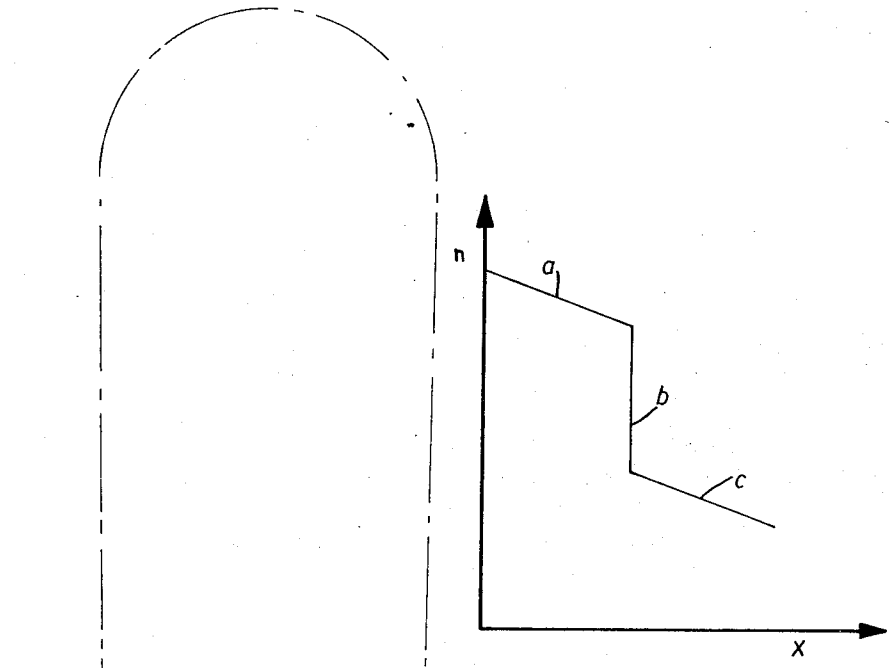



FIG. 2

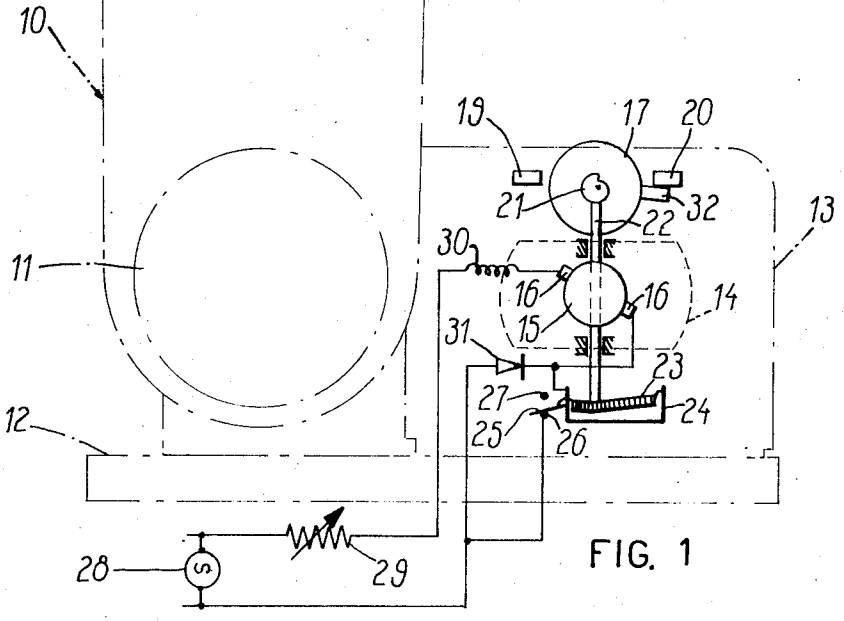



FIG. 1

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# SPEED CONTROL DEVICE FOR SEWING MACHINES

The present invention relates to a speed regulator device for commutator electric motors applied to household sewing machines.

Speed control of sewing machines of the type mentioned, when made frequently and for long time periods by means of the starting rheostat incurs several drawbacks such as that of the rheostatic resistance heating up and the consumption of the electric energy which is turned into heat, a harmful rise in temperature occuring in the rheostat if operated for a long time with a portion of its resistance in the circuit, and difficulty in realizing a uniform speed control. In household sewing machines, it is often necessary to operate at a reduced speed value relative to the nominal one and to effect variations, even if small, of the speed relative to said nominal value and at a pre-arranged reduced value.

An object of the present invention is to provide a speed control device for a sewing machine suitable to effect the aforementioned operating conditions through an easy to perform maneuver of the operator, independently of the rheostat.

In order to achieve this object, the technical problem to be solved was that of providing a single control member, in a handy position, suitable to control the speed of the machine continuously and to reversibly modify the normal circuit arrangement in order to obtain a reduced motor speed in addition to the nominal one.

The resolution of such technical problem is characterized in that a disc knob is provided in the base of the sewing machine, connected by means of a usual drive system to the motor brush holder in a manner so as to be able to rotate the brushes around the motor shaft axis. Said knob, at the same time, in correspondence to a predetermined angular position thereof, actuating the plunger of a microswitch provided to connect and disconnect a rectifier diode in series in the electric driving circuit of the motor.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIG. 1 is a schematic view of the device of the invention, and

FIG. 2 is a graph showing the relationship between motor speed and angular displacement of the adjusting disc knob.

In FIG. 1, a household sewing machine is shown schematically and is indicated at **10** provided with a handwheel **11**, a plate **12** and a base housing **13**.

Electric motor **14** of the commutator type is positioned usually in the base housing **13** and is fed in series through commutator **15** and brushes **16**. Brushes **16** are mounted on a brush holder not shown in the figure, which is connected, through usual drive members also not shown, to a disc knob **17** freely rotatably mounted on housing **13**, as shown in U.S. Pat. application Ser. No. 885,829.

Two stops **19** and **20**, fixed to housing **13**, delimit rotation of the disc knob **17**.

A cam **21** fixed coaxially with and to disc knob **17** is rotatable together with it. The camming surface acts against the upper end of a rod-shaped plunger **22** whose opposite end rests on a coil spring **23**, fastened



at one end to an electrically conductive mounting **24**, supported within housing **13**, and at its other end to a blade **25** seated in the same mounting **24** in such a way as to be able to oscillate to either side of a contact line of mounting **24** in a manner well-known in the art of microswitches.

Said blade **25** forms the movable contact of a switch having two fixed contacts **26** and **27**.

Fixed contact **27** is a rest contact, while the fixed contact **26** is insertable into the motor feed circuit which comprises an alternating electric current source **28**, a starting rheostat **29**, an inductor winding **30** for motor **14** and finally a rectifier diode **31**.

Plunger **22**, actuated by cam **21** against the urging of coil spring **23** which is arranged so as to be always under tenxion, can move vertically between two extreme positions in correspondence to the extreme angular positions of disc knob **17**.

By varying of the vertical position of plunger **22**, the pull force exerted by coil spring **23** onto blade **25**, changes its direction.

Said blade **25** can therefore be in either of two positions: leaning against fixed contact **27** or against fixed contact **26**.

When blade **25** leans against fixed contact **26**, as shown in FIG. **1**, it permits the usual feeding of the electric motor. Namely, current flows through the resistance of rheostat **29** with a limited intensity in the starting phase of the motor when back electromotive force is small relative to the main voltage and the rheostat produces the necessary limitation of said current. Rheostat **29** is then short-circuited little by little so as to increase the motor speed. Current flows from the motor windings, back to electric source **28** through blade **25** and fixed contact **26** without passing through the diode **31** which is short-circuited in this condition.

Supposing now that the rheostat foot pedal is depressed to short-circuit the rheostatic resistance and that the disc knob **17** is made to rotate slowly clockwise; the surface of cam **21** will permit plunger **22** to move upwards and thereby decrease its pressure against coil spring **23**.

At the same time, brushes **16** are rotated together moving away more and more angularly relative to the commutating axis. By this operation, owing to a phenomenon well-known in the art of electric machines, the motor torque decreases and so does its speed, as shown in the graph of FIG. **2** having motor revolution speeds indicated on the ordinate and the disc knob angular rotation indicated on the abscissa. From this graph, it can be seen that the motor speed decreases continuously along segment *a* up to about half of the disc knob rotation. In this angular position of disc knob **17**, rod **22** has moved upwardly and has modified the direction of pull of coil spring **23** upon blade **25** so that said blade **25** can now rotate to move against rest contact **27**. Thus rectifier diode **31** is inserted into the feed circuit. The half-waves of alternating current now feeding the motor, is of reduced value thereby providing a speed much lower than the nominal one: about equal to half thereof.

The speed drop is represented by vertical segment *b*.

Rotating disc knob **17** further to bring finger **32** against stop **19** provides a further continuous reduction of the motor speed, as represented by segment *c*.

What is claimed is:

1. A speed control means for a sewing machine, comprising a drive motor of the commutator type having a rotatable brush holder, an electric circuit for driving said motor comprising in series a starting rheostat, an induction coil, and a rectifier diode, and a device for short-circuiting said diode, an operator actuable means for rotating said brush holder and for actuating said short-circuiting device in correspondence to such rotation whereby said diode is either included in said circuit or short-circuited out of it in dependence upon the angular position of said holder relative to the commutator



axis, said operator actuable means comprising a rotatable member rigidly rotatably connected with said holder and with a cam means, said cam means being arranged to actuate said short-circuiting device, said short-circuiting means comprising a microswitch of the snap-over action type and an elongate rod having one end thereof arranged to act upon said switch and the opposite end thereof arranged to contact and be driven by said cam means.

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