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(54) **Electronic accident prevention device for electric sewing machines**

(57) This invention concerns an electronic device installed on sewing machines which detects the presence of the hand close to the needle and immediately stops the needle which automatically resumes working only when the hand is withdrawn from this area.

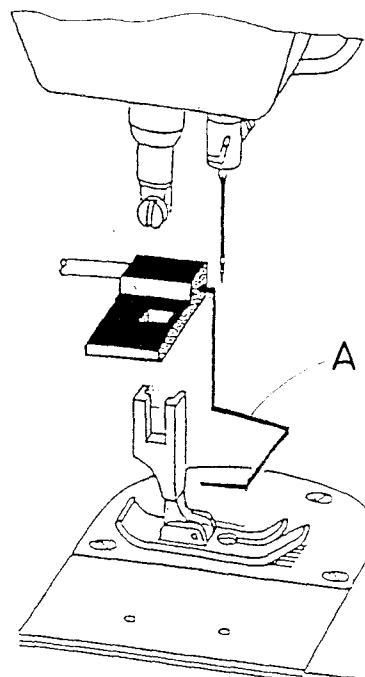


FIG. 2

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Description

This patent application concerns an electronic accident prevention device for sewing machines designed to prevent the fingers of the operator from being accidentally pierced by the needle of the sewing machine.

Industrial sewing machines are supplied by electric motors operated by one or more pedals acting as accelerator and brake.

While the operator works his or her hands are often close to the moving needle so that a moment of inattention or an improper movement can lead to a finger being pierced by the needle.

This type of accident is unfortunately fairly frequent and recently specific safety regulations were issued requiring that special metal "finger-guard" rings be applied under the needle to prevent fingers from going under the needle.

These protection rings interfere however with sewing operations and often are not accepted by the operator who will remove the ring in order to have more space and work more comfortably on the working area under the needle.

Over and above this, these finger-guard rings do not in fact eliminate the above risks altogether in that although their shape does provide a mechanical barrier to placing a finger under the needle, the finger can be placed over the ring and into the dangerous area they delimit.

The purpose of this invention is to design an electronic accident prevention device which during sewing detects that the hand has been placed in the danger area and immediately stops the needle which automatically resumes working only when the hand is withdrawn from this area.

An additional scope of this invention is to design an electronic accident prevention device of the above kind, which may be also installed on existing sewing machines without the need for special modifications or the intervention of specialised technicians.

The device in question consists of sensor devices, detection devices and operating mechanisms; the sensor devices detect the contact with the hand of the operator while the detection devices transmit a control signal to the operating mechanisms which instantaneously stop the needle.

The needle may be stopped either by automatically disengaging the clutch of the motor or automatically activating the brake, both of which sewing machines are provided with.

The device in question uses a traditionally shaped metal ring as sensor fitted around the needle, said ring being supported by a base which allows the same to be fitted under the sewing head on the support of the pressure foot.

The electronic device is designed to stop the needle within several tenths of a millisecond if the finger or the hand of the operator touches the ring.

The device in question is based on the fact that the human body with respect to an electric circuit acts as an earthing bridge, contrary to fabrics or leather which are commonly used to make clothing items and which do not behave in this way.

For major clarity the description continues with reference to the enclosed drawings which are intended for purposes of illustration and not in a limiting sense whereby:

- fig. 1 shows the electronic accident prevention device according to the invention in block diagram form.
- fig. 2 is a schematic view of the ring shaped sensor positioned close to the needle.

In fig. 1, block (1) corresponds to the sensor devices consisting of the metal ring (A) shown in fig. 2 fitted on the needle head and insulated from the sewing machine casing.

A screened connection cable (2) connects the sensor devices to the detection devices (block 3) consisting of a first high impedance input comparator (block 3A) and a device (block 3B) which regulates the sensitivity of the above comparator.

The electric data provided by the detection devices (block 3) are sent to the operating mechanisms (block 4) consisting of a second comparator (block 4A), a timer (block 4B) and a relay (block 4C).

When the sensor means are activated by contact with the body of the operator, the first comparator (3A) changes state, thereby activating the second comparator (4A) which controls relay (4C) that activates the brake and disengages the clutch of the sewing machine.

Said relay (block 4C) is in fact connected to the motor-clutch-brake unit by means of a special connection box (block SP) which is an integral part of the accident prevention device in question consisting of a plug (block 5) and a socket (block 6).

The plug of the electric connection cable of the motor-clutch-brake unit shown by block (MFF) is connected in socket (5), while plug (5) is connected to the computerised control unit of the machine and to its electric supply shown by block (7).

When the contact which activates the sensor devices ceases, the first comparator (3A) returns to rest position and timer (4B) which activates relay (4C) for several seconds, automatically starts.

Claims

1. An electronic accident prevention device for electric sewing machines characterised by:

- sensor devices (block 1) fitted on the needle head designed to detect the presence of the hand or other part of the body of the operator

- close to the needle;
 - detection devices (block 3) connected to the sensor devices by means of a screened cable (2) and designed to translate the signal received by the sensor devices into an electric signal; 5
 - operating mechanisms (block 4) designed to stop the needle;
 - special connection box (block SP) consisting of a plug (block 5) and a socket (block 6). 10
2. An electronic accident prevention device according to claim 1) characterised in that the sensor devices consist of a metal ring (A) fitted to the needle head and insulated from the sewing machine casing. 15
3. An electronic accident prevention device according to claim 1) characterised in that the sensor means consist of conventional infrared systems. 20
4. An electronic accident prevention device according to claim 1 characterised in that said sensor devices consist of conventional capacitive systems.
5. An electronic accident prevention device according to claim 1 characterised in that said detection devices (block 3) consist of a first high impedance input comparator (block 3A) and a device (block 3B) which regulates the sensitivity of the above comparator. 25 30
6. An electronic accident prevention device according to claim 1 characterised in that the operating mechanisms (block 4) consist of a second comparator (block 4A), a timer (block 4B) and a relay (block 4C) which is connected to the above special connection box (block SP). 35

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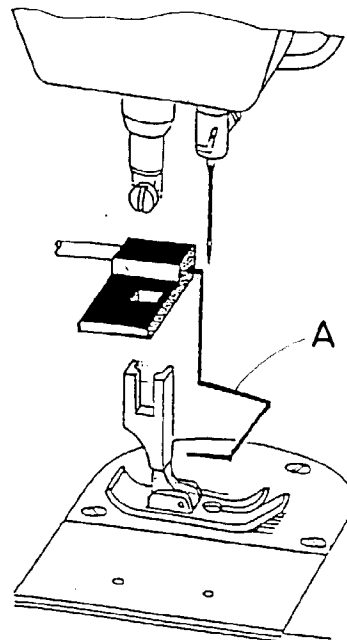
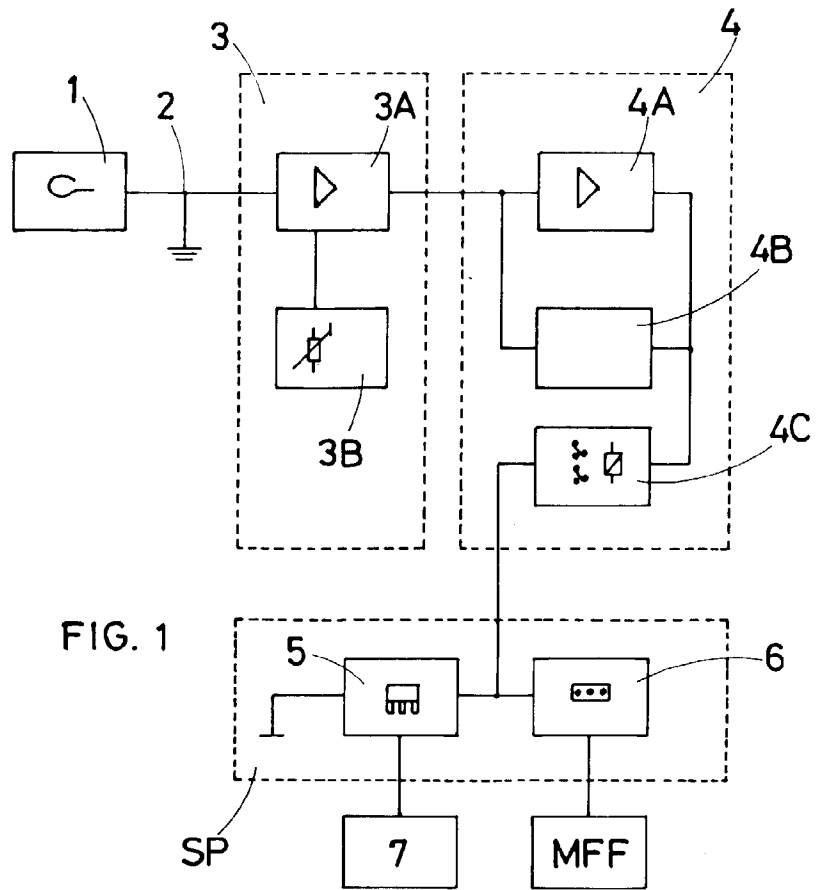


FIG. 2