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SWITCH APPARATUS FOR MACHINE CONTROLS

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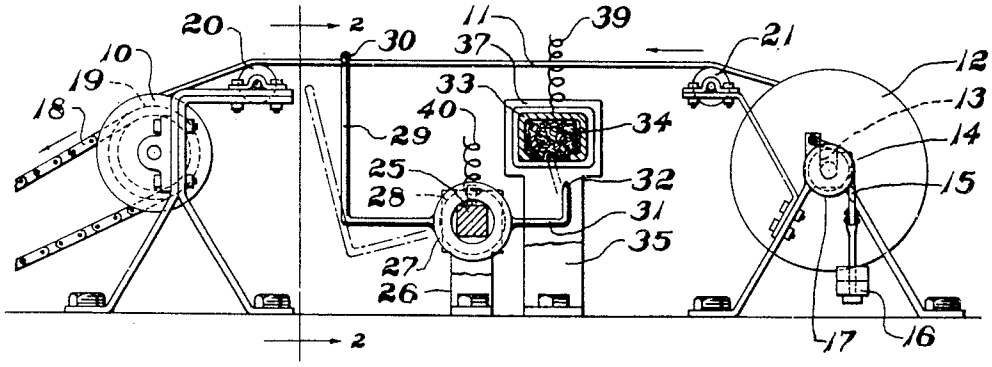


Fig-1

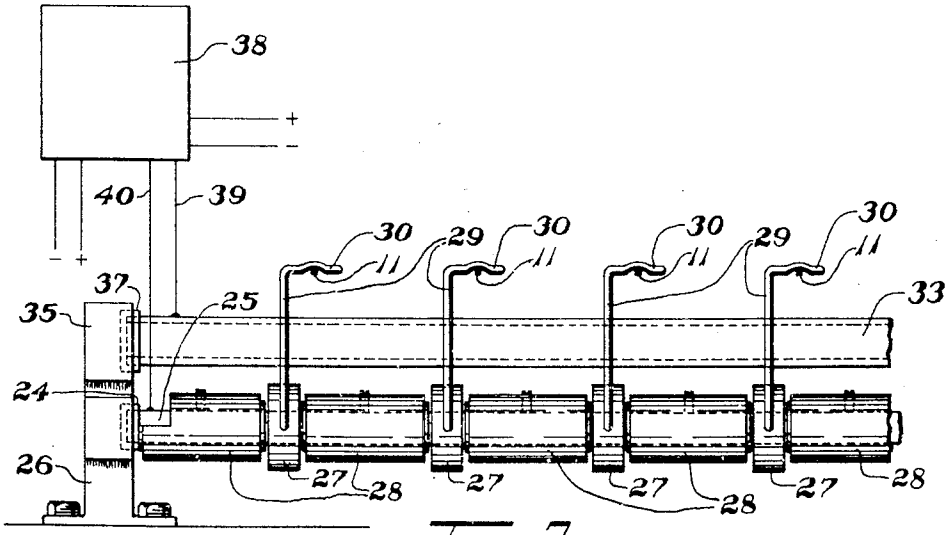


Fig-2

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SWITCH APPARATUS FOR MACHINE CONTROLS

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4 Claims. (Cl. 200—52)

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This invention relates to apparatus for controlling the operation of machines and is especially useful in detecting the presence of broken threads in thread handling machines and in stopping the machine upon the occurrence of broken threads.

Objects of the invention are to provide for positive closing of an electrical control circuit upon detection of a broken thread, to provide this result despite the presence of a dusty atmosphere, to provide self-cleaning electrical contacts, and to minimize drag on the thread.

These and other objects will appear from the following description and the accompanying drawings.

Of the drawings:

Fig. 1 is a side elevation, partly in section of apparatus constructed in accordance with and embodying the invention.

Fig. 2 is an end elevation thereof, parts being broken away.

Referring to the drawings, the numeral 10 designates a power-driven roll for winding a thread 11 of elastic rubber or other material from a reel 12. The reel 12 is rotatably mounted in notched bearings 13 to permit its placement and removal. A friction brake 14 is provided to prevent overrunning of the reel and may consist of a cord or strap 15 fixed to the bearing and having a weight 16 secured thereto for engaging a pulley 17 fixed to the reel and having a peripheral groove for receiving the cord or band.

The roll 10 is driven by an electric motor (not shown) through a chain 18 and sprocket 19 secured to the roll. Between the roll 10 and the reel 12, a pair of free-running guide rollers 20, 21 support a free reach of the thread.

Arranged below the reach of the thread 11 and parallel to the axes of the roll 10 and reel 12 is a bar 25 of bronze, copper, silver or other highly conductive metal, preferably of polygonal cross-section, which presents substantially live contacts at the intersections of its sides, thereby presenting clean contact surfaces. In the apparatus illustrated, the bar is of square cross section and is supported by brackets 26, there being caps 24 of insulation about the ends of the bar to insulate it from the brackets. About the bar 25 a number of collars 27 of conductive material such as bronze are rotatably mounted and retained by spacing collars 28. Each collar 27 has an arm 29 secured thereto. Each arm has a finger 30 overlying a reach of thread 11, the arrangement being such that should the thread be broken, the arm 29 will drop, rotating the collar

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about the bar 25. The arrangement is such that good contact is made between the corners of the bar 25 and the collars 27 even in the presence of dust.

A contact arm 31 of conductive material such as copper is conductively attached to each collar 27 and has an upwardly turned contact point 32. Disposed above the point and normally out of contact therewith is a downwardly open channel 33 of conductive material such as brass filled with penetrable conductive material 34, such as copper wool. The downwardly open channel shields the copper wool from settling dust. The point 32 is preferably plated with silver so that it maintains a conductive surface even when oxidized by sulfur in the air. The arrangement is such that upon breaking of a thread, the cam 29 drops, rotating collar 27 and raising arm 31, so that point 32 makes wiping engagement with the copper wool 34, insuring good electrical contact.

The collar 27 with its finger arm 29 and its contact arm 31 is substantially balanced so that it presents little drag on the thread but will rotate the collar about the poygonal bar 25 upon breakage of a thread. The collar assembly also has sufficient inertia to make positive contact. The copper wool provides sufficient drag against the contact arm to dampen vibration of the arm while the conductive wool presents a multiplicity of contact surfaces. The arrangement of the conductive wool in the inverted channel tends to prevent dust from settling in the wool while the channel also shields the contact arm from dust.

The channel 33 is insulated from its supporting brackets 35 by insulating caps 37 about its ends.

In use, the channel 33 and bar 25 are included in a pick-up circuit of an electronic relay 38 to which they are connected by wires 39, 40 respectively. The relay is connected to the control circuit of the motor which drives roll 10. With the fingers 30 each supported by a thread, the relay circuit is interrupted by points 32 being out of contact with the copper wool 34. When a thread breaks, however, the finger 30 drops and its point 32 engages the copper wool, completing the circuit and operating the relay to stop the motor. As the collars 27 engage the corners of the polygonal bar 25 the bearing pressure is concentrated at the corners which insures a good clean contact at each movement.

Variations may be made without departing from the scope of the invention as it is defined by the following claims.

We claim:

1. Apparatus for controlling movement of a travelling thread, said apparatus comprising means normally engaging the thread and movable upon breakage thereof, a contact member movable upward in response to movement of said means, and a second contact member in the path of movement of said first contact member, said second contact member comprising a downwardly open protective cover and a body of penetrable conductive material therein having its lower face exposed for contact by the first said contact member upon the upward movement of the latter.

2. Apparatus for controlling operation of a machine handling a travelling thread, said apparatus comprising a movable finger normally supported by the thread, contact means including a movable member controlled by said finger and a second contact means comprising downwardly open protective covering and a body of metal wool positioned therein for contact by said movable member in wiping contact therewith upon breakage of said thread and movement of said finger, said covering providing protection of said metal wool from dust.

3. Apparatus for controlling operation of a machine handling a travelling thread, said apparatus comprising a movable finger normally supported by the thread, a movable contact member mounted on a collar connected to said finger and having an upstanding contact point, said collar being pivotally supported by a bar of polygonal cross section to provide wiping contact of

said collar with the corners of said bar, and a second contact member positioned for contact by said point upon breakage of the thread, said second contact member comprising a downwardly open conductive shield and a body of conductive metal wool therein in contact therewith, and the first said contact member being positioned therebelow for wiping contact with said metal wool.

4. Apparatus for controlling movement of a travelling thread, said apparatus comprising means normally engaging the thread and moveable upon breakage thereof, a contact member comprising a downwardly open roofed container, a body of penetrable conductive material within said container, and a second contact member moveable upwardly through the open bottom of said container into wiping contact with said body in response to movement of said means upon breakage of the thread.

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