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Cook et al.

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[54] **STOP MOTION DEVICE WITH SELECTIVE INDICATOR**

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[52] **U.S. Cl.** **340/415**, 139/353, 307/258, 307/324, 340/259, 340/419

[51] **Int. Cl.**.....**G08b 21/00**

[58] **Field of Search** 340/415, 259; 307/258, 324; 139/353, 273; 66/163

[56] **References Cited**

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[57] **ABSTRACT**

A stop motion system for multi-thread textile machines includes a number of thread slack-detection switches disposed in parallel and each having an indicator lamp and a diode in series with the switch. A voltage source and a stop motion relay are in series with the switches and the voltage source produces a potential through any closed switch and its associated lamp and diode greater than the breakover voltage for the diode. Each diode, however, is a four layer diode so that its sustaining voltage is very much less than its breakover voltage. In this way, the first diode to conduct reduces the potential available across any of the other diodes to the sustaining voltage so that only the first detector circuit activated will be effective to provide an indication of malfunction.

5 Claims, 2 Drawing Figures

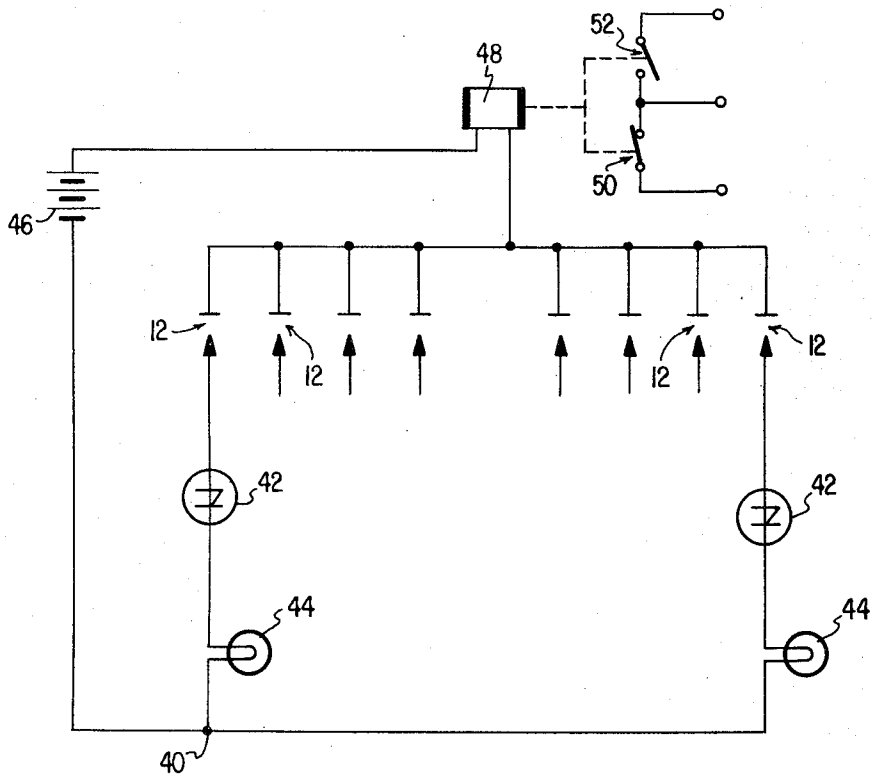


FIG. 1

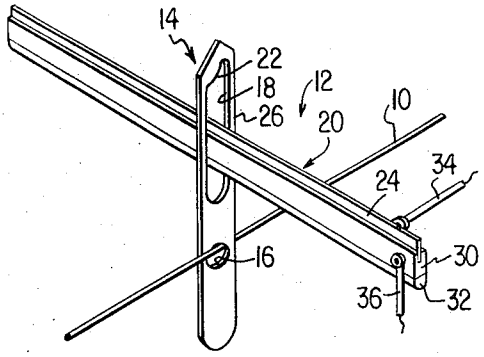
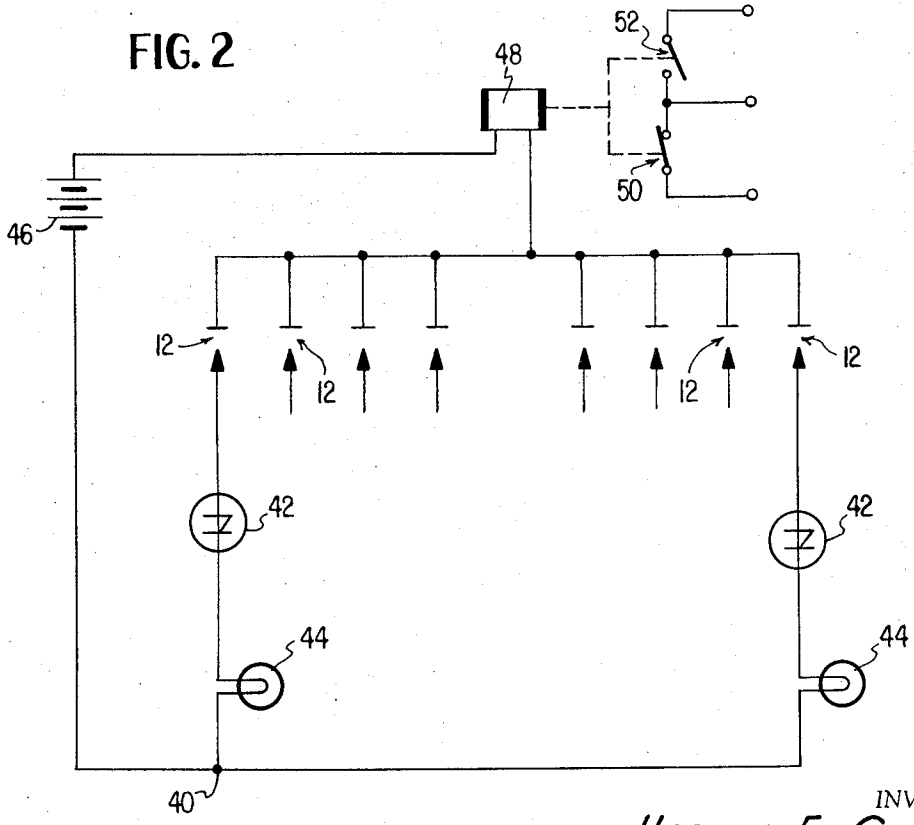


FIG. 2



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STOP MOTION DEVICE WITH SELECTIVE INDICATOR

BACKGROUND OF THE INVENTION

A great many arrangements for effecting stop motion of multi-thread textile machines have been proposed each of which is effective to stop the machine when a thread becomes slack. If no means is provided in the detector circuitry as to which of the threads has become slack, the operator must hunt to find which, if any, of the threads has caused the stop motion mechanism to become effective. In some instances, a malfunction arises at another portion of the machine and a thread is not at fault at all and for this reason it has become conventional to provide indicating lamps to indicate which, if any, of the threads have in fact become slack so as to cause stopping of the machine. However, in such systems, it often happens that more than one thread will become slack and it would be of interest for the purpose of taking the proper corrective action, to know which of the threads first became slack and thus activated the stop motion device. Prior devices make no such provision.

BRIEF SUMMARY OF THE INVENTION

Accordingly, it is of principal concern in connection with the present invention to provide an improved stop motion device for multi-thread textile machines wherein selective indication of the first thread to have become slack is made. More specifically, this arrangement in connection with the present invention is effected by disabling all other thread slack-detecting circuits once any one of them has been activated to stop the motion of the machine.

Specifically, the selective indication according to the present invention is effected by utilizing four layer diodes in each of the detector circuits, all the detector circuits being disposed electrically in parallel so that when any one of them is activated, the particular diode in question will effectively prevent conduction of any of the other diodes by reason of the fact that the sustaining voltage for the conducting diode is very much less than the breakover voltage for each of the diodes. An indicator lamp in each of the detector circuits thereby indicates which thread first became slack and the machine operator may immediately and more readily ascertain the nature and extent of the problem which caused stoppage of the machine.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a conventional detector switch which may be utilized in connection with the present invention; and

FIG. 2 is a circuit diagram illustrating the principles according to the present invention and utilizing the plurality of the switches shown in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

With reference more particularly to FIG. 1, one of the plurality of threads associated with a textile machine is indicated by the reference character **10** and a slack-detecting switch therefor is indicated generally by the reference character **12**. The detector switch comprises principally a drop wire indicated generally by the reference character **14** and provided with an opening **16** through which the thread **10** is passed. By means of the tension in the thread **10**, the drop wire **14** is held in the inoperative, elevated position shown in FIG. 1. The drop wire **14** includes a longitudinal slot **18** through which a detector bar indicated generally by the reference character **20** projects with the drop wire slot **18** normally centered generally with respect thereto when in the elevated position as shown in FIG. 1. The upper end of the slot **18** is provided with a cam surface **22** which is adapted to engage the upper contact member **24** of the detector bar **20** in the event that the thread **10** becomes slack and the drop wire **14** drops relative to the bar, the cam portion **22** assuring that the leg **26** of the drop wire will positively be engaged against one side of the detector bar **20**. The purpose for this is to assure that the normally open contact which exists between the electrically conducting portion **24** of the bar **20** and the electrically conducting portion **30** of the bar is bridged when the drop wire drops due to a slack condition of the thread **10**. It will be appreciated, then, that the conductive portion **24** is mounted in the body **30** of the bar **20** so as to be electrically insulated therefrom. As is conventional, the lower side of the detector bar **20** may be provided with a resilient bumper strip **32**, substantially as is shown.

It will be appreciated that suitable conductors **34** and **36** are electrically connected respectively to the detector bar contact **22** and the contact body **30** of the bar **20** so as to provide, for each thread detector switch assembly, suitable electrical connection for incorporation in the detector circuit hereinafter described.

It will be further understood that the detector switch assembly illustrated in FIG. 1 is of entirely conventional nature and the details thereof form no part of the present invention. It will also be understood that other and different types of detector switches may be utilized in connection with the present invention, the embodiment of FIG. 1 serving merely to illustrate a preferred and operative form of detector switch.

With reference to FIG. 2, the principles according to the present invention will be apparent therefrom and, in this Figure, a plurality of detector switches are diagrammatically illustrated and indicated by the reference characters **12** and will be seen to be connected electrically in parallel between the junctions **38** and **40** in FIG. 2. Thus, each detector switch **12** is provided in a separate detector circuit and each such circuit includes, in addition to the detector switch **12**, a multi-layer diode device **42** and an indicating lamp **44** all connected electrically in series between the junctions **38** and **40** previously mentioned.

A suitable electrical energy source for the system is indicated generally by the reference character **46** and is electrically connected in series with a relay **48** from the junction **40** to the junction **48** thereby to be in electrical series with the parallel array of detector circuits previously described. The relay **48** includes a pair of normally closed switch contacts **50** and a pair of normally open switch contacts **52** which, when the relay **48** is energized, are activated respectively to open and closed conditions. The relay **48** actuates the stop motion effect on the machines, as by opening the contacts **50** and closing the contacts **52**, the latter contacts **52**, when closed, preferably effecting the holding action such that the machine does not automatically restart

when the relay **48** is subsequently deenergized, but requires, instead, deliberate manipulation by the operator to disable the holding circuit so that the machine may be restarted. This, of course, is entirely conventional arrangement and is provided for safety purposes.

The electrical energy source **46** which may be either a voltage or current source, normally impresses a voltage between the junctions **38** and **40** which is sufficiently high to activate any one of the multi-layer diodes **42** so that when any switch **12** is closed, its associated diode **42** will conduct thereby to complete the circuit through the relay coil and stop the motion of the machine also to light the relevant indicator lamp **44**. As stated, the diodes **42** are multi-layer devices and are preferably four layer diodes but which in any event exhibit a breakover voltage which is significantly higher than their sustaining voltage so that once any one of the diodes commences conduction, the voltage across the junctions **38** and **40** is clamped to a voltage level very much less than the normal voltage level at the junction **38** and which is less than that required to permit conduction of any of the other diodes **42** even if the associated switches **12** therefor happen to close. In this way, only the diode **42** associated with the particular detector switch **12** at which a slack condition of the thread first occurred will conduct and, correspondingly, only that associated indicator lamp **44** thereof will be energized. Accordingly, the machine operator immediately is apprised of just exactly which thread effected the stoppage of the machine.

What is claimed is:

1. In a stop motion system for a multi-thread textile machine comprising in combination:

a plurality of normally open detector switches connected in parallel between a pair of common junctions, any one of which switches may be closed in response to slack in a thread associated therewith;

electrical energy source means for establishing a selected voltage across said common junctions when all of said detector switches are open;

a relay in series with said electrical energy source means and said junctions, said relay including switch means for stopping the machine when any of said detector switches is closed;

an indicator device in series with each of said detector switches; and

diode means in series with each detector switch and associated indicator device for activating the associated indicator device and decreasing said selected voltage across said junctions to a sustaining voltage value when any associated one of said detector switches is closed, each diode means being a multi-layer device providing a break over voltage substantially greater than said sustaining voltage but less than said selected value so that only that indicator device associated with the first-closed detector switch is activated.

2. In a stop motion system as defined in claim **1** wherein each diode means is a four layer diode.

3. In a stop motion system as defined in claim **2** wherein each indicator device is a light source.

4. In a stop motion system as defined in claim **1** wherein said relay includes first and second pairs of switch contacts, one for stopping motion of the associated machine and the other for holding the machine in stopped condition, whereby removal of the fault associated with said first-closed detector switch allows indication by another closed detector switch without restarting the machine.

5. A slack thread detector and stop motion circuit for multi-thread textile machines, comprising in combination:

a plurality of detector circuits connected in parallel; and

a stop motion circuit connected in series with said detector circuits, the stop motion circuit including an electrical energy source impressing a selected voltage across said detector circuits;

each detector circuit including a normally open detector switch and a multi-layer diode in series therewith so that when any detector switch is closed, said selected voltage is clamped to a lesser value ineffective to allow conduction of any diode in the remaining detector circuits.

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