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SAFETY RELAY FOR WIRE FEEDING

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Fig. 1

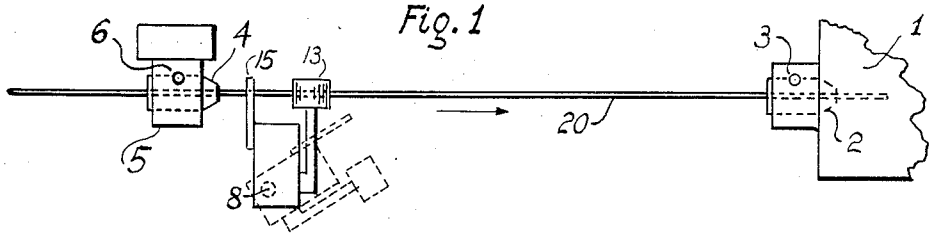


Fig. 2

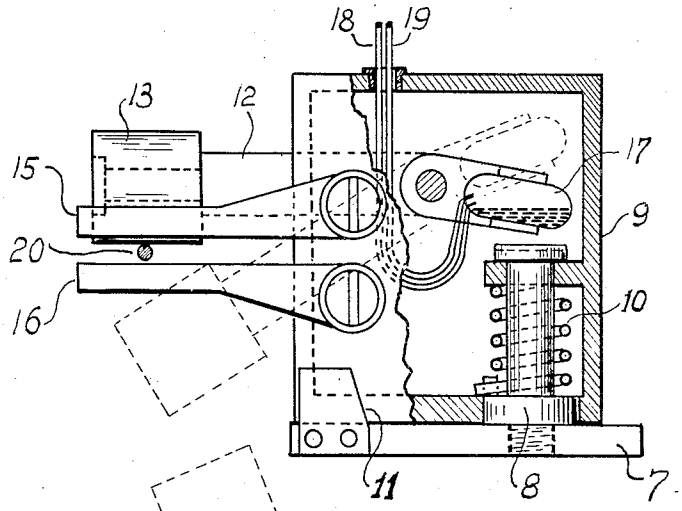
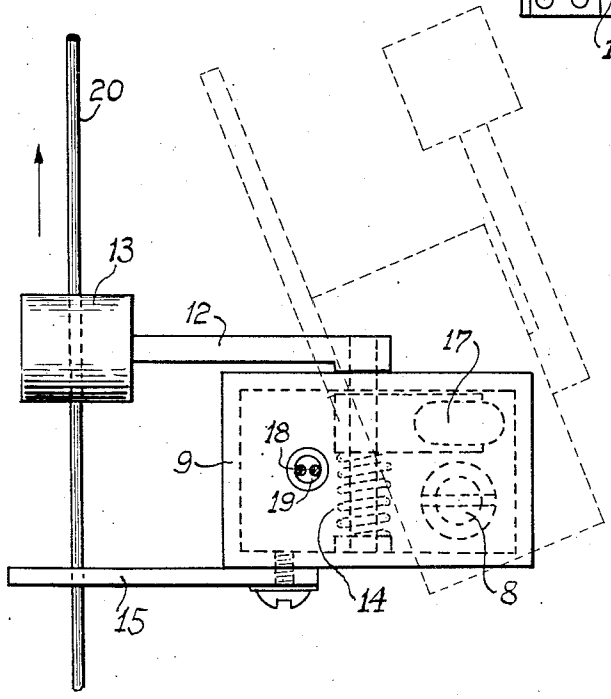


Fig. 3



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SAFETY RELAY FOR WIRE FEEDING

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2 Claims. (Cl. 200—61.14)

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My invention relates to improved means for feeding wire or other filamentary material into machines, and has particular utility in machines which insulate the wires used for the conduction of electricity. These machines deposit an insulating layer on the surface of the wire in a continuous operation by passing the wire through a chamber, containing rubber or other insulating compound, in a plastic consistency, and by the application of pressure, they extrude the insulating material, surrounding the wire, through the aperture of a die.

An essential element of these machines is the core-tube, through which the wire enters into the insulation chamber. This core-tube has an orifice which, in order to prevent the leakage of the compound, must conform closely to the cross-section of the uninsulated wire.

The advancing of the wire through the insulation chamber is accomplished by means of an electrically operated mechanism controlled by manual switches. The machine may include also vulcanizing, curing or cooling passages, often of considerable length, depending on the insulating material and process used.

Experience shows that these machines are subject to frequent and costly operational interruptions due to the following causes: One of the causes is that frequently enlargements occur in the wire which cannot pass through the orifice of the core-tube, as a result of which, the wire may be stopped in the core-tube and subsequently broken by the tension of the wire advancing mechanism. Another frequent cause is that, due to faulty manufacturing, the cross-section of the wire is reduced at some points so as to break under the normal tension of the wire. Another, possible cause is that, due to inattention, the spool of wire may run out before the wire-end is spliced. The usual effect of any of these causes is that the insulating compound, being under pressure, oozes out from the chamber through the aperture of the die, clogging the machine to such an extent that it can resume operation only after laborious and time consuming cleaning. As an additional damage, such tie-up may also spoil a considerable amount of wire processed in the vulcanizing and curing passages of the machine.

The principal object of my invention is to provide a safety relay which prevents these operational interruptions of the wire insulating machines by automatically stopping the advance of the wire before the defective point has reached the machines, thereby increasing the output capacity of these machines and reducing the labor required for their attendance.

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Another object of my invention is to provide a safety relay which is equally effective in automatically stopping the advance of the wire whether the defect consists of an enlarged cross-section or lack of continuity, thereby offering a complete protection against operational interruptions due to defective wire.

A further object of my invention is to provide a simple and inexpensive safety relay which performs the functions of two relays hitherto required to detect the enlarged cross-section and the break in the wire, thereby reducing the first cost of the installation.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawing, wherein for the purpose of illustration, is shown a preferred embodiment of my invention,

Figure 1 is a plan view showing the arrangement of my invention in relation to the wire insulating machine.

Figure 2 is a side view of the safety relay

Figure 3 is a plan view of same.

In the drawing, wherein like numerals are employed to designate like parts, in Fig. 1 the numeral 1 designates the receiving end of the wire insulating machine, carrying the core-tube 2, which is securely locked in position by a shear-pin 3. Disposed separately from the said machine is the pilot core-tube 4, identical in shape and size with the core-tube 2 and being secured to pilot holder 5 by the pilot shear-pin 6. This pilot shear-pin 6 is so designed that a tensile force of less than the breaking strength of the wire can detach the pilot core-tube 4 from the holder 5.

It is within the spirit of my invention to attach the pilot tube 4 to the holder 5 by other known means employing latches, springs, screws, pneumatic, hydraulic or magnetic means, provided the pilot core-tube can be detached from the holder by a tensile force smaller than the breaking strength of the wire.

Disposed between the machine 1 and the pilot core-tube 4 is the safety relay, which must be so located that the length of the wire between the machine 1 and the relay is greater than the stopping length of the wire. Under stopping length being meant the length of wire advance from the instant the stopping switch is actuated to the instant when the wire stops.

The safety relay, shown in detail in Figs. 2

and 3, has a base 7, adapted for being secured to a stationary support. Carried by said base is a stud 8, on which the body portion 9 is pivotally mounted, so as to permit the swinging of said body portion 9, against the pressure of the spring 10, from the normal position into the stopping position, shown by the dotted lines in Fig. 3. Secured to base 7 is the stop 11 which limits the rotation of the body portion 9 by the spring 10 and thereby determines its normal position.

Pivotally attached to the body portion 9 is the contact arm 12, carrying the contact roller 13, and having two positions: the normal position in which the contact roller 13 is supported by the wire 20, and the stopping position, shown by the dotted lines in Fig. 2, which the arm 12 assumes due to the action of the spring 14, whenever said roller 13 loses the support of the wire 20.

Secured to the body portion 9 are scanning fingers 15 and 16, the gap between which is adjustable so that any portion of the wire which has past through the pilot core-tube will pass through said gap. When, however, the wire 20, due to an enlargement in its cross-section, will detach the pilot core-tube 4 from its holder 5, the advancing core-tube 4 gripped by the wire 20, will engage said fingers 15 and 16 and will swing the body portion 9 into the stopping position, in which position said fingers will permit said pilot core tube 4 to pass by. Said fingers 15 and 16 are so located with respect to the contact arm 12 and roller 13 that when said fingers, and the connected body portion, swing into the stopping position said roller loses the support of the wire, hence, spring 14 will be effective to move the arm 12 into the stopping position.

Attached to the contact arm 12 is an electric switch 17, preferably of the sealed, mercury, type, arranged for connection into the control circuit of the wire advancing mechanism by means of conductors 18 and 19, and so adapted that in the stopping position of the arm 12 said switch 17 will effect the stopping of the wire advancing mechanism.

The operation of my invention is as follows:

In the function of my invention the basic idea is to simulate the behavior, which the defective wire at present has in the machine, by passing the wire through a duplicate core-tube well before it reaches the machine. As it is impossible to predict the nature of the defect and the resultant behavior of the wire, my invention provides a relay which in case of a defect in the wire will unfailingly stop the wire advancing mechanism regardless of the nature of the defect.

In case an enlargement occurs in the wire cross-section so that it cannot pass through the pilot core-tube, the advancing wire will detach the pilot core-tube from its holder and this will engage the scanning fingers and will swing the body portion of the relay into the stopping position. As a result of this, the contact roller will lose the support of the wire and, together with the contact arm, and the attached switch, will move into the stopping position, stopping the advance of the wire.

On the other hand, when a discontinuity occurs in the wire, due to a break of the running out of the wire supply, the contact roller will again lose the support of the wire and, will fall, together with the contact arm and the switch, into the stopping position and thereby stopping the advance of the wire.

It is to be understood that form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims. Particularly, springs 10 and 14 may be substituted for by equivalent weights, roller 13 by a sliding contact member, and the mercury switch 17 by a switch of other known type.

I claim:

1. In combination with an electrically controlled wire insulating machine, having a core-tube slidably engaging the incoming wire; a duplicate core-tube, detachably mounted so as to slidably engage the incoming wire at a remote point from said machine; a pivotally mounted relay, located between said machine and said duplicate core-tube, and comprising a spring-pressed contact member in association with an electric switch adapted to stop said machine by said electrical control when said contact member loses contact with the wire; scanning fingers, attached to said relay, and adapted to swing out from the path of the wire and to cause said contact member to lose contact with the wire when said fingers are engaged by said duplicate core-tube detached and carried by said incoming wire.

2. In combination with a wire insulating machine having an electrically controlled wire advancing means and a core-tube with an orifice slidably engaging the incoming, uninsulated, wire; a pilot core-tube, having identically dimensioned orifice, detachably mounted so as to slidably engage the incoming wire at a distance from said machine; a relay located adjacent to the incoming wire between said machine and said pilot core-tube and comprising a pivotally mounted body portion; a spring-pressed contact member, attached to said body portion, and being normally supported by said wire; an electric switch, associated with said contact member, and adapted to stop said wire advancing means by said electrical control when said contact member loses the support of the wire; scanning fingers, attached to said body portion, and adapted to swing away from the wire and to cause said contact member to lose the support of the wire when said fingers are engaged by the pilot core-tube detached and carried by said wire.

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