

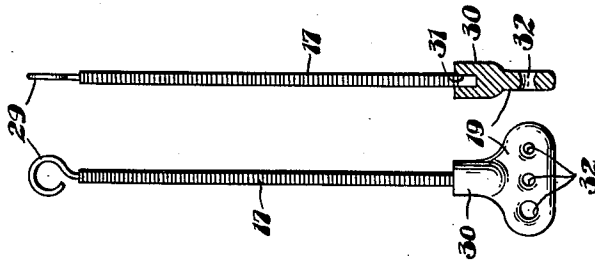
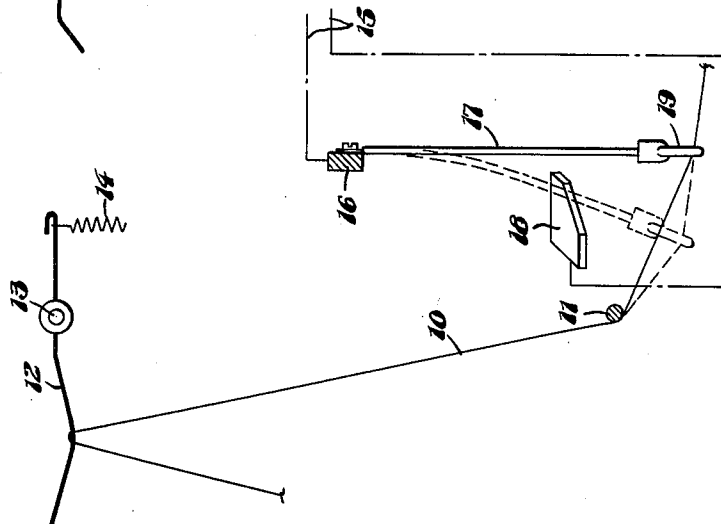
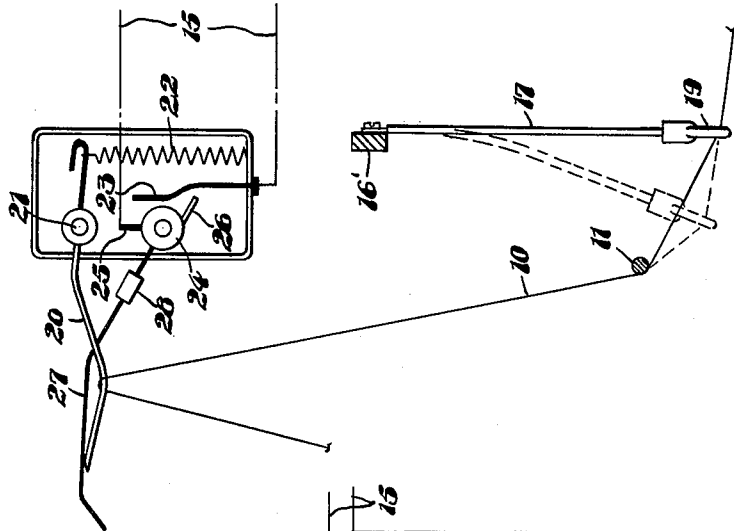
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YARN CLEARER FOR KNITTING MACHINES

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YARN CLEARER FOR KNITTING MACHINES

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It is conventional, in strand-handling machines such as, for instance, knitting machines, to provide various kinds of safety devices designed to detect abnormal variations in the operation of the machine, and, upon such detection, to stop the machine. One such safety device, commonly designated as a "yarn clearer," comprises a feeler, including a gauged perforation through which the yarn is caused to run; and that feeler is usually associated with mechanical or electro-mechanical means to cause stoppage of the machine. Thus, if a slub occurs in the yarn, creating an enlargement therein, the gauged perforation bars, or tends to bar, its passage, thus causing a sharp increase in the tension existing in the strand beyond the feeler; and this tension increase is utilized to control a device for stopping the machine. However, because of the construction of known feelers, the tension increase produced thereby is so sudden as to give rise to forces of inertia which, in many instances, cause breakage of the yarn, necessitating an unduly extended shut-down of the machine.

The object of the present invention is to provide an improved clearing device which overcomes these difficulties. While the device of the present application has been particularly designed for use in a knitting machine, and therefore has been illustrated and will be described in that environment, and while it finds its primary utility in combination with switching means controlling an electric or electronic circuit for stopping the machine with which it is associated, it will be recognized that the device of the present application may be utilized in any machine for handling a strand which is liable to effective diameter variations and that it may be useful when not combined with relatively extraneous control devices.

Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a more or less diagrammatic illustration of a yarn clearing device combined with one form of machine stopping control, all constructed in accordance with the present invention;

Fig. 2 is a similar diagrammatic illustration of the yarn clearing device associated with another form of safety control;

Fig. 3 is a front elevation of a preferred form of yarn clearer; and

Fig. 4 is a side elevation thereof, parts being shown in section.

In a tubular knitting machine, for instance, a strand of yarn 10, being propelled through the machine, passes under a guide 11 and then is led over a rocker arm 12 which, being pivoted at 13, is resiliently urged in a yarn-supporting direction as, for instance, by a spring 14. The

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rocker arm, of course, constitutes, in a sense, a tension-maintaining device which tends to compensate for variations in the ratio between the rate of supply of the yarn and the rate of its use.

Such a machine is customarily driven by an electric motor (not shown), or other suitable motive power, and will conventionally include a circuit suggested at 15 in Fig. 1 and arranged to dominate the driving means. As illustrated, the circuit 15 is arranged to be normally open, and to actuate suitable means, upon circuit-closure, to stop the machine. Upon a stationary element 16 of such a machine is supported a finger 17, and said finger is electrically connected to one side of the circuit 15. As illustrated, the finger 17 is electrically conductive; but it will be recognized that the finger might be formed of dielectric material and might carry a contact suitably connected in the circuit 15.

At a point spaced from the normal position of the finger 17, in the direction of strand travel, I provide a contact 18 which is electrically connected to the other side of the circuit 15. At its end remote from the point of its anchorage upon the element 16, the finger 17 carries a screen 19 formed to provide a gauged perforation through which the strand 10 runs on its way to the guide 11 and the rocker arm 12.

The finger 17 is so constructed as to support the screen 19 for resiliently-resisted movement in the direction of strand travel. As shown, the finger 17 comprises a coiled spring, but it will be understood that any other suitable construction, providing for resiliently-resisted movement of the screen 19 in the direction of strand travel under the influence of forces imparted thereto by the strand, would provide for many of the advantages attained by the specific structure illustrated. Thus, the finger 17 might be a resiliently flexible wire or blade; or it might even be a rigid element hingedly mounted for swinging movement in the direction of strand travel against the resistance of a suitable spring, counterweight or the like.

It will be perceived that, if a slub in the yarn encounters the screen 19, it will tend to entrain the screen. Since the screen is movable, in the direction of yarn travel, against a resistance which can be nicely calibrated in the construction of the finger 17, the tension in that portion of the strand beyond the screen will be increased, but much less sharply than would be the case if the screen were, in accordance with conventional practice, rigidly mounted. In the form of invention illustrated in Fig. 1, if the slub is sufficiently large, the screen will move with the strand until the finger 17 (or a contact carried thereon) engages the contact 18, whereby the circuit 15 will be closed to stop the machine. It will be noted, however, that it is possible so to calibrate the parts of the present invention as to permit a minor slub to pass through the control without closing the circuit 15, without excessively affecting the rocker arm 12, and without danger of yarn breakage. In this connection, advantage may be taken of the fact that the degree of resistance to movement of the screen 19 increases progressively as the degree of flexure of the finger 17 increases.

In Fig. 2, I have shown the same finger 17 and screen 19 associated with a different form of safety control. In this figure, the yarn passes over a rocker arm 20, after passing the screen 19 and the guide 11, said rocker arm being pivotally mounted as at 21 and resiliently supported against counter-clockwise movement by a spring 22. In this case, the finger 17 is anchored upon an element 16' of the machine, and is not connected in the control circuit.

Instead, a contact finger 23 is connected to one side of the circuit 15 and is located adjacent a hub 24 mounted for oscillation and carrying two contact fingers 25 and

26, said hub being connected to the other side of the circuit 15. A drop wire 27 is carried upon the hub 24 and normally rests upon the rocker arm 20 under the influence of a weight 28.

Under normal conditions of operation, the spring 22 holds the arm 20 in such a position as to sustain the drop wire 27 in its indicated attitude, in which the fingers 25 and 26 are spaced from the finger 23. However, if a slub encounters the screen 19, the tension in that portion of the strand 10 beyond the screen will be increased, in the manner above described, whereby the arm 20 will be rocked in a counter-clockwise direction, against the tendency of the spring 22, to cause the finger 26 to engage the finger 23, thus closing the circuit 15 and stopping the machine. In case of strand breakage, the yarn's resistance to the tendency of the spring 22 will be removed, whereby the arm 20 will be rocked in a clockwise direction to swing the hub 24 in the same direction, bringing the finger 25 into engagement with the finger 23 to close the circuit 15 and stop the machine.

In Figs. 3 and 4 I have illustrated, in specific detail, a preferred form of feeler. As suggested above, I presently believe that a tightly wrapped, coiled spring 17 is an optimum construction. As shown, the upper end of such a spring may be extended and bent to form a hook or eye 29 whereby the finger may be conveniently anchored to the machine element. The screen 19 may be formed with an extended neck 30 provided with a socket 31 in which the distal end of the spring 17 may be received and suitably anchored as, for instance, by soldering or welding. Preferably, the screen itself will be laterally extended and will be provided with a plurality of gauged perforations 32 of suitably calibrated diameters.

I claim as my invention:

1. In a strand-handling machine including means for propelling a strand through the machine, an electric circuit dominating the operation of said propelling means, a strand clearing device comprising a screen formed with a gauging perforation through which said strand runs, a finger constituting the sole support for said screen, means supporting said finger on said machine, said finger being resiliently flexible in the direction of strand travel, and means connected in said circuit and affected, upon flexure of said finger to a predetermined degree in said direction, to modify the condition of said circuit to stop the machine.

2. In a strand handling machine including means for propelling a strand through the machine, a strand clearing device comprising a screen formed with a gauging perforation through which the strand runs, means fixed to said

screen and to said machine for supporting said screen on said machine for limited movement in the direction of strand travel, said supporting means resiliently resisting such screen movement, an electric circuit dominating said propelling means, and means connected in said circuit and operable, as a result of movement of said screen to a predetermined degree in the direction of strand travel, to modify the condition of said circuit to stop the machine.

3. In a strand handling machine including means for propelling a strand through the machine, a strand clearing device comprising a screen formed with a gauging perforation through which the strand runs, means fixed to said screen and to said machine for supporting said screen on said machine for limited movement in the direction of strand travel, said supporting means resiliently resisting such screen movement, an electric circuit dominating said propelling means and effective, when closed, to stop the machine, said screen-supporting means being connected in said circuit, and a contact connected in said circuit and normally spaced from said screen in the direction of strand travel, said screen-supporting means engaging said contact upon movement of said screen to a predetermined degree in the direction of strand travel to close said circuit.

4. In a strand handling machine including means for propelling a strand through the machine, a strand clearing device comprising a screen formed with a gauging perforation through which the strand runs, means fixed to said screen and to said machine for supporting said screen on said machine for limited movement in the direction of strand travel, said supporting means resiliently resisting such screen movement, an electric circuit dominating said propelling means and effective, when closed, to stop the machine, a yielding rocker arm supporting said strand, a switch connected in said circuit and including a movable element dominated by said rocker arm and normally held thereby in circuit-open position, and means acting, upon movement of said screen to a predetermined degree in the direction of strand travel, to shift said switch movable element to circuit-closing position.

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