June 23, 1953 J. O. HAMILTON 2,643,306

RUNOUT DETECTOR

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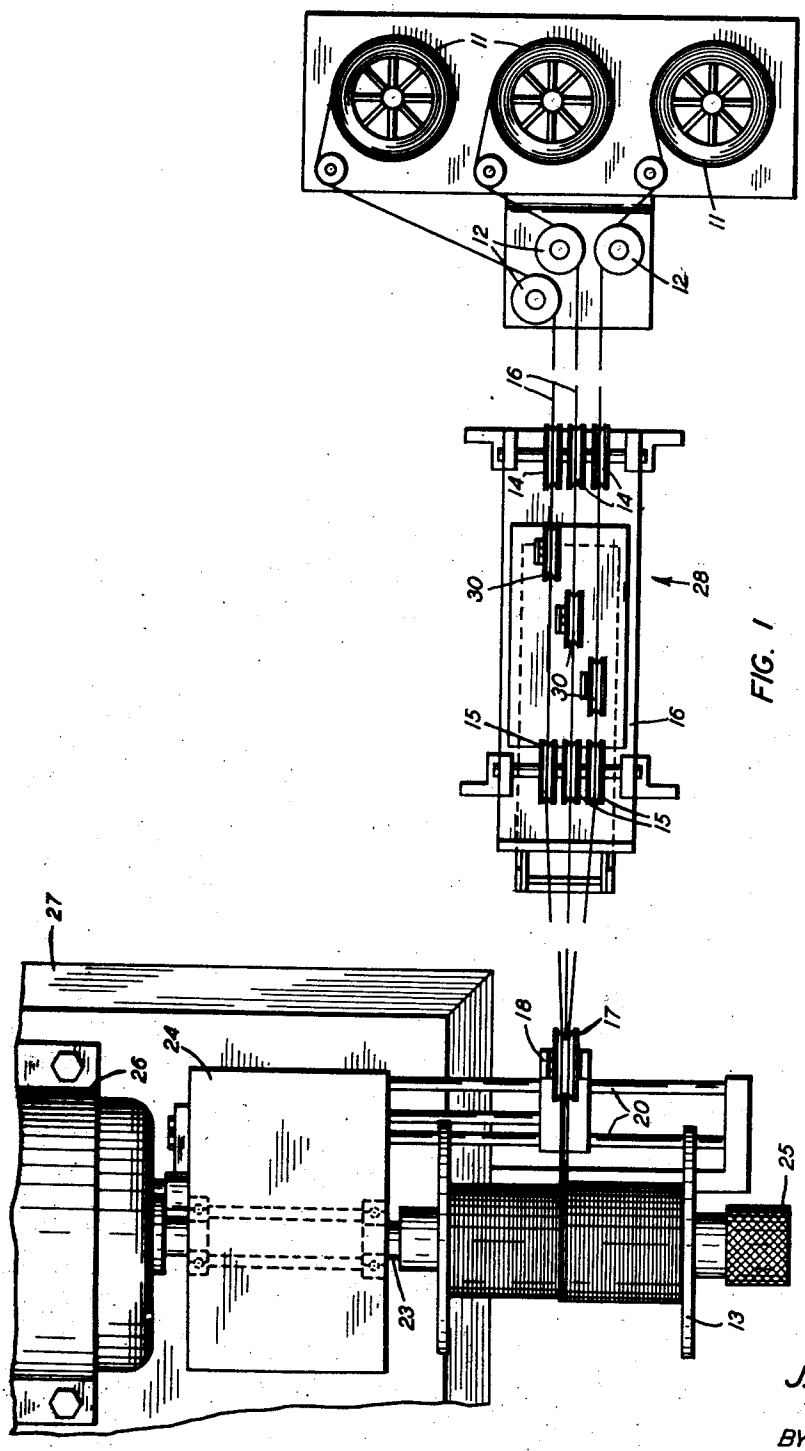


FIG. 1

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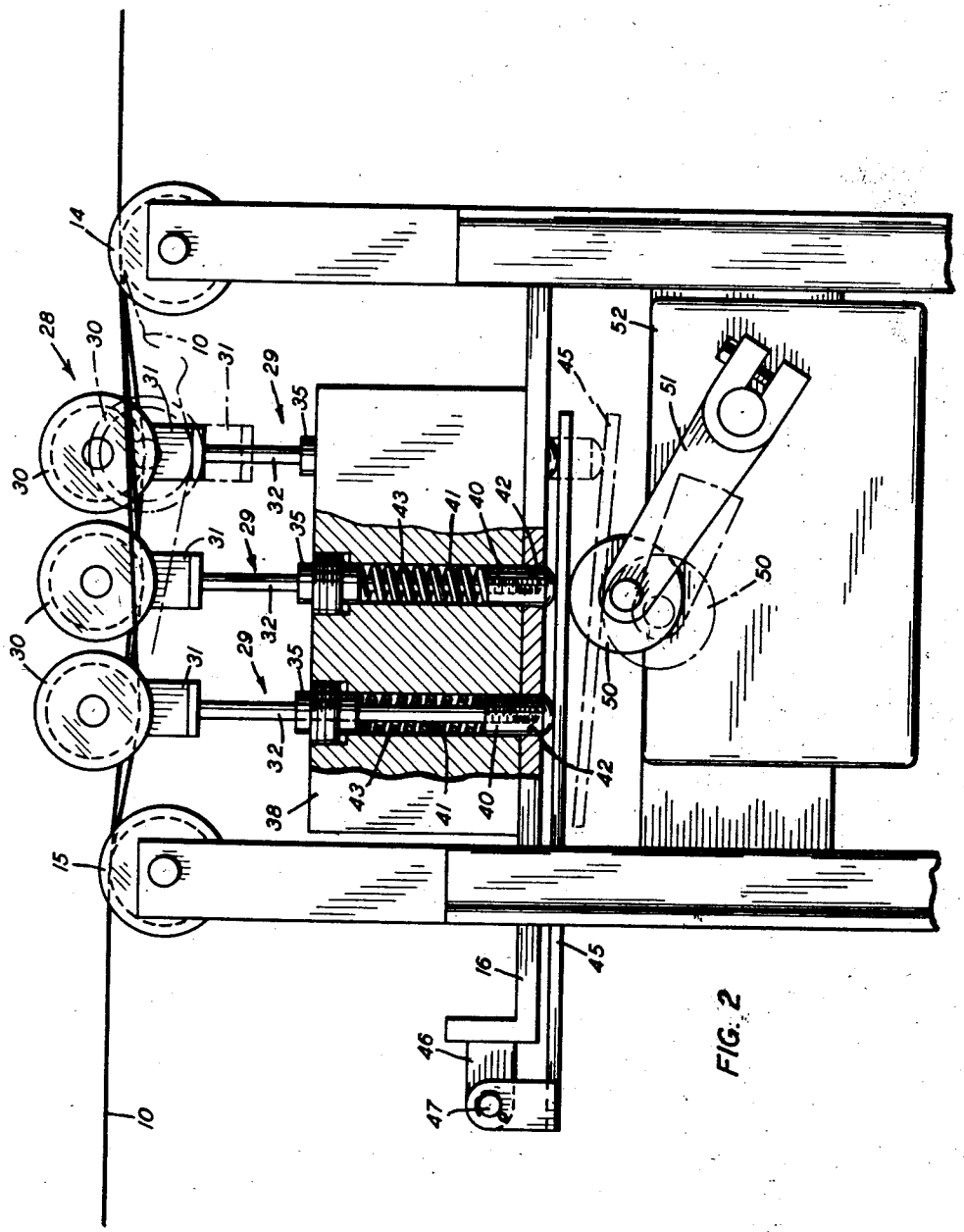


FIG. 2

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Patented June 23, 1953 2,643,306

UNITED STATES PATENT OFFICE

2,643,306

RUNOUT DETECTOR

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Application February 28, 1950, Serial No. 146,738

4 Claims. (Cl. 200—52)

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This invention relates to runout detectors, and more particularly to runout detectors for apparatus having means for winding a plurality of filaments on a reel.

In the operation of machines for winding a plurality of filaments on a reel, the filaments usually are advanced individually from their respective supply spools to a takeup device. It has been the practice in such machines to provide a plurality of runout detectors, one for each filament being wound on the reel for stopping the machine when any one of the filaments breaks or its supply is exhausted. This multiplicity of identical runout detectors complicates the installation of runout detectors on such machines.

An object of this invention is to provide new and improved runout detectors.

Another object of this invention is to provide new and improved runout detectors for apparatus having means for winding a plurality of filaments on a reel.

A runout detector embodying certain features of the invention, as applied to apparatus having means for advancing a plurality of filaments along predetermined paths, comprises means including a sensitive switch for controlling the operation of the filament-advancing means, a plurality of individually slidable members, one for each filament, resilient means for urging the members in a given direction, one end of each of said members being designed to be engaged by one of the filaments so that they are held thereby in a given position against the action of their resilient means, and means operable by movement of any one of the members for actuating the switch to stop the filament-advancing means, whereby when any one of the filaments is disengaged from its respective member the advancement of the filaments is terminated.

A complete understanding of the invention may be had from the following detailed description of an apparatus forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a fragmentary, top plan view of a portion of a filament-rewinding apparatus provided with a runout detector embodying certain features of the invention, and

Fig. 2 is an enlarged, side elevation of the runout detector shown in Fig. 1 with a portion thereof broken away to illustrate the construction thereof.

Referring now in detail to the drawings, there is shown in Fig. 1 a portion of a filament rewinding apparatus designed to advance a plurality of filaments 10—10 from their respective individual supply spools 11—11 and wrap them around a takeup reel 13. The filaments may be textile threads, various types of plastic threads, or steel wires intended to be grouped together so that they may be applied around an electrical conductor by various types of apparatus to form

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a protective covering on the conductor. The filaments 10—10 are drawn from their individual supply spools 11—11 and pass around sheaves 12—12 and over sheaves 14—14 and 15—15 rotatably mounted at opposite ends of a support 16. One sheave 14 and one sheave 15 are provided for each of the filaments 10—10, and the sheaves 14—14 and 15—15 are mounted at the same level.

As the filaments 10—10 leave the sheaves 15—15, they are brought together as they pass around a portion of a sheave 17 rotatably mounted on an arm 18 slidably positioned on parallel guide bars 20—20 and are taken up on the reel 13. The reel 13 is positioned on a shaft 23 which is suitably journalled in a support 24 and coupled to a motor 26. The motor 26 is arranged to rotate the reel 13 at a predetermined rate of speed, and to drive a suitable distributing mechanism (not shown) provided for traversing the arm 18 so that the sheave 17 distributes the filaments evenly across the winding surface of the reel.

To prevent an imperfect winding of the filaments 10—10 on the reel 13, there is provided a runout detector 28 for stopping the motor 26 when one of the filaments 10—10 breaks or the supply thereof becomes exhausted. The runout detector 28 includes a plurality of plungers 29—29, one for each of the filaments 10—10, which comprise sheaves 30—30 mounted on brackets 31—31 secured to the upper ends of rods 32—32. Each rod 32 is positioned slidably in a bushing 35 threadedly mounted in a base 38 secured to the support 16 between the sheaves 14—14 and 15—15. Hardened steel knobs 40—40 adjustably secured on the opposite ends of the rods 32—32 slidably engage bores 41—41 provided in the base 38 and bores 42—42 provided in the suport 16.

Compression springs 43—43 mounted on the rods 32—32 between the knobs and the bushings urge the sheaves 30—30 downwardly, as viewed in Fig. 2, against the portions of the filaments 10—10 advancing over the sheaves 14—14 and 15—15. The strength of the springs 43—43 is such that the normal tension in the filaments is sufficient to hold the knobs 40—40 of the plungers away from an arm 45 pivotally mounted on the support 46 by a pin 47. The free end of the arm 45 rests on a roller 50 provided on the end of a spring-pressed operating arm 51 of a sensitive switch 52. The switch 52 is secured on the support 16 in a position in which the arm 51 of the switch tends to hold the arm 45 in a substantially horizontal position and in close proximity to the ends of the knobs 40—40. The sensitive switch 52 is connected electrically to close a control circuit (not shown) of the motor 26 when it is in its normal position, and the actuation of the arm 45 and the arm 51 to their broken-line positions actuates the switch to disconnect the motor from its source of power and thereby

terminate the rotation of the reel 13. The bushings 35—35 are threadedly mounted in the base 30 so that they may be adjusted to obtain an operating tension in the springs 43—43 to suit the tension in the filaments 10—10. The knobs are adjusted on their respective rods so that sufficient clearance is provided between the knobs and the arm 45 to prevent slight variations in the tension of the filaments and resulting movement of the plungers from causing the arm to actuate the switch 52 and stop the motor 26.

Operation

The filaments 10—10 are threaded over the sheaves 14—14 and 15—15, and over the sheave 17 provided on the traversing arm 18, and the ends thereof are secured to the takeup reel 13. The plungers 29—29 of the detector 28 are raised so that their respective sheaves 30—30 rest on top of the filaments 10—10. When the motor 26 is energized to rotate the reel and take up the filaments, there is sufficient tension in the filaments between their individual supply spools 11—11 and the takeup reel 13 to hold the plungers in their uppermost position against the action of their respective springs 43—43. This tension in the filaments keeps the knobs 40—40 of the plungers 29—29 in such positions that the arm 45 remains horizontal and the switch 52 remains in its normal operating position.

When the tension in any one of the filaments decreases due to breaking, exhaustion of the supply thereof or any other cause, the plunger 29 operating on that filament is urged downwardly by its respective spring 43. The corresponding movement of its knob 40 turns the arm 45, and moves the arm 51 of the switch 52 to its broken line position (Fig. 2), which actuates the switch to deenergize the motor 26. This terminates rotation of the reel 13, thereby preventing an imperfect winding of the filaments on the reel.

The above-described arrangement is merely illustrative of the application of the principles of the invention, and numerous other arrangements embodying the principles of the invention and falling within the spirit and scope thereof may be provided by those of ordinary skill in the winding art.

What is claimed is:

1. In apparatus for advancing a plurality of spaced filaments along predetermined paths, a runout detector which comprises a base having a plurality of spaced vertical bores formed therein, a plurality of individually movable plungers slidably mounted in said bores, resilient means for urging the plungers in one direction, means provided on one end of each of said plungers for engaging one of said filaments whereby the filaments normally support the plungers against the action of their respective resilient means, a normally closed switch for controlling the continuity of an electric circuit, and means actuated by the movement of any one of the plungers when its supporting filament breaks to open the switch so as to interrupt the circuit.

2. In apparatus for advancing a plurality of spaced filaments along predetermined paths, a runout detector which comprises a base having a plurality of spaced vertical bores formed therein, a plurality of individually movable plungers slidably mounted in said bores, resilient means for urging the plungers downwardly, a sheave mounted on the upper end of each of said plungers under which a filament advances, the filaments normally supporting the plungers against the action of their respective resilient means, an actuator movably secured to the base and positioned so as to be moved by the downward movement of any one of the plungers when its supporting filament breaks, and a normally closed switch for controlling the continuity of an electric circuit, said switch being positioned so as to be engaged by the actuator whereby the switch is opened when any one of the filaments breaks.

3. In apparatus for advancing a plurality of spaced filamentary strands along predetermined paths, a runout detector which comprises a base designed to be positioned beneath the strands and having a plurality of spaced vertical bores extending therethrough and aligned with the strands, a plurality of plungers mounted slidably in said bores one plunger being provided for each bore, resilient means mounted on each plunger for urging the plungers downwardly, means mounted on the upper end of each plunger for engaging its adjacent filament whereby the filaments normally support the plungers against the action of their respective resilient means, a normally closed sensitive switch for controlling the continuity of an electric circuit, and a pivotally mounted arm movable to open the switch by downward movement of any one of the plungers when its associated filament breaks or the supply thereof is exhausted.

4. In apparatus for advancing a plurality of spaced filaments along predetermined paths, a runout detector which comprises a base having a plurality of spaced vertical bores extending therethrough in alignment with the filaments, a plurality of plungers mounted slidably in the bores provided in the base, resilient means positioned in each bore for urging the plungers downwardly, a sheave mounted on the upper end of each plunger and designed to rest on the filaments and normally to support the plungers against the action of their respective resilient means, means for adjusting the force exerted on the plungers by the resilient means, a sensitive switch electrically connected to control the continuity of an electrical circuit, a spring-biased, pivotally mounted lever for operating the switch, said lever being normally urged into a position wherein the switch is closed, and an actuator plate movably secured to the base and normally supported in a generally horizontal position by the spring-biased lever, said plate being positioned beneath the plungers so as to be moved by the downward movement of any one of the plungers when its supporting strand breaks whereby the spring-biased lever is pivoted to actuate the switch to open the electrical circuit.

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