Jan. 1, 1952 G. P. ADAMS 2,580,387

RUNOUT DETECTOR FOR FILAMENT HANDLING APPARATUS

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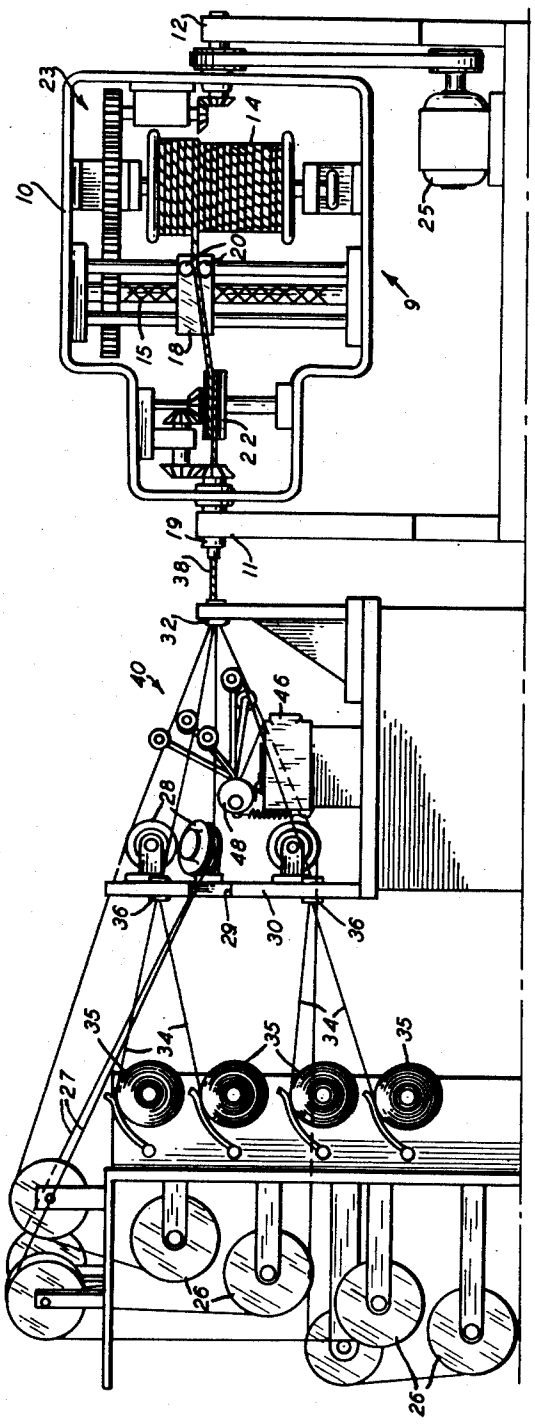


FIG. 1

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RUNOUT DETECTOR FOR FILAMENT HANDLING APPARATUS

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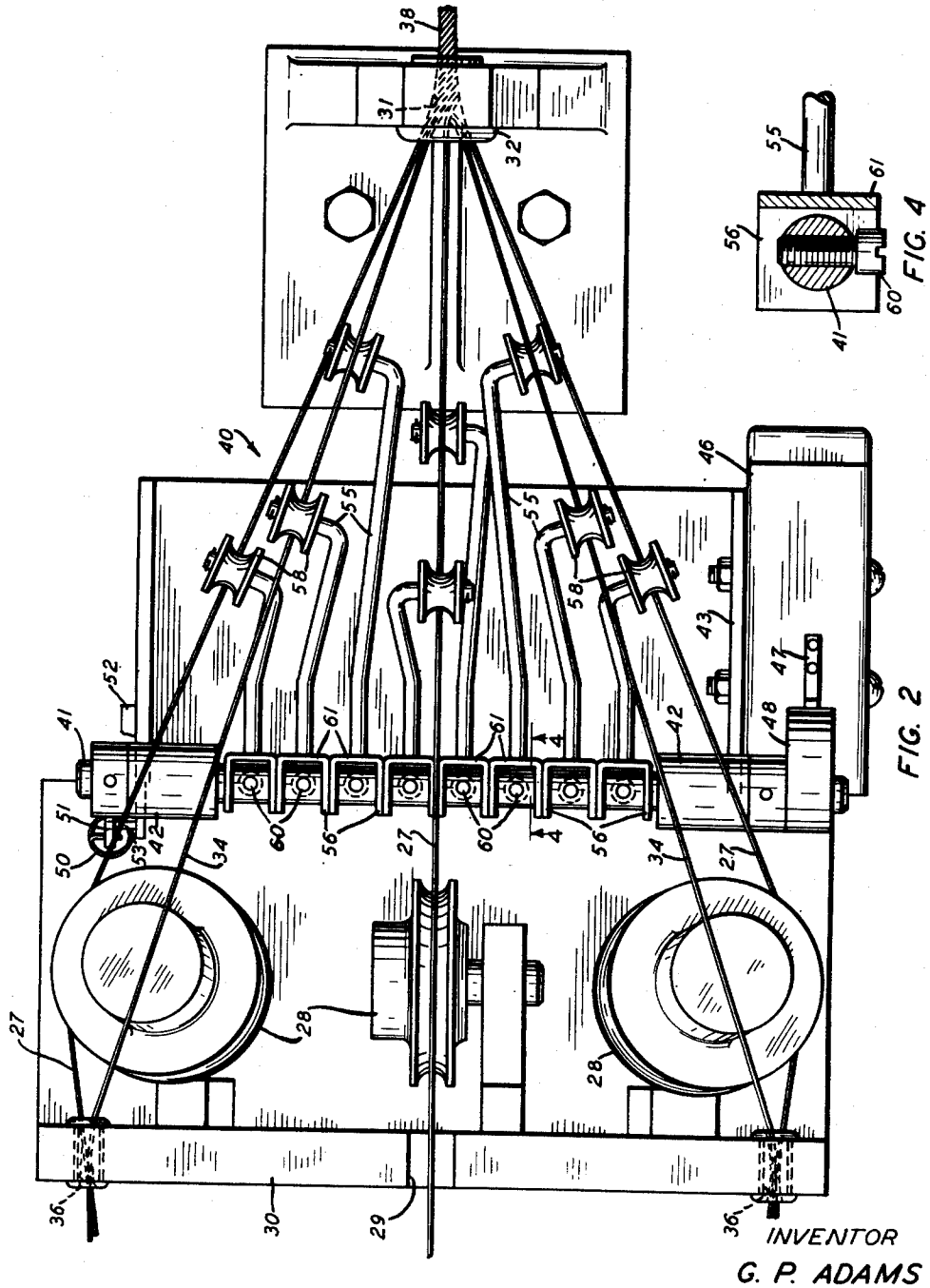


FIG. 2

FIG. 4

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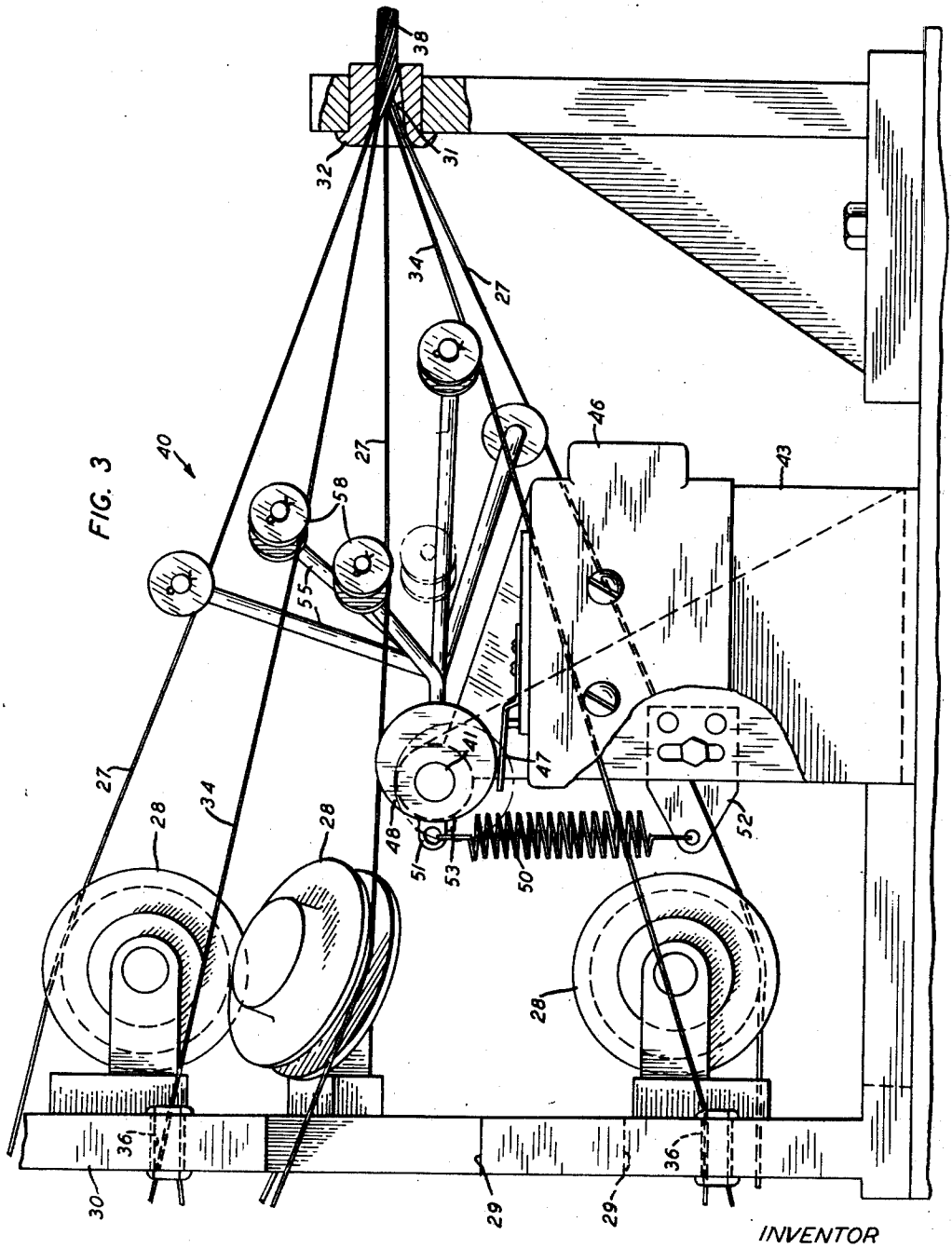
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FIG. 3



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RUNOUT DETECTOR FOR FILAMENT HANDLING APPARATUS

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3 Claims. (Cl. 57—81)

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This invention relates to runout detectors for filament handling apparatus, and more particularly to runout detectors for use with apparatus designed to twist a plurality of filaments into a composite strand.

In the manufacture of electrical communication cables, a plurality of filaments and conductors are twisted together into a composite cable. In order to manufacture uniform cables, it is necessary to stop the twisting apparatus when any one of the filaments or conductors breaks or the supply thereof becomes exhausted. Generally, runout detectors are provided on such apparatus for stopping the machine when these conditions occur, but the detectors in the past have included a plurality of identical devices wherein a complete runout detector is provided for each filament formed into the composite cable. This arrangement results in a costly structure and complicates the problem of providing runout detectors on apparatus which twists a substantial number of filaments and conductors into a composite cable.

An object of the invention is to provide new and improved runout detectors for filament handling apparatus.

Another object of the invention is to provide new and improved runout detectors for use with apparatus designed to twist a plurality of filaments into a composite strand.

A runout detector embodying certain features of the invention, as applied to filament handling apparatus having means for advancing a plurality of filaments along predetermined paths, comprises means including a sensitive switch for selectively controlling the operation of the filament advancing means, a plurality of individually movable detector elements designed to be held in a given position by the filaments and biased toward another position, and means operable by movement of any one of the detector elements for actuating the control switch to stop the filament advancing means when the tension in the filament associated with that element falls below a predetermined value.

Other objects and advantages of the invention will more fully appear from the following detailed description of a runout detector forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a diagrammatic side elevation of a filament twisting machine including a run-out detector for stopping the machine in accordance with certain features of the invention;

Fig. 2 is an enlarged plan view of a portion of the apparatus shown in Fig. 1;

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Fig. 3 is an enlarged side elevation of the apparatus shown in Fig. 2, and

Fig. 4 is an enlarged sectional view taken along line 4—4 of Fig. 2.

Referring now in detail to the drawings, a detector forming one embodiment of the invention is illustrated as applied to a strand-twisting machine, which is designed to twist a plurality of filaments into a composite core. Since such machines are well known in the art, only as much of the twisting machine will be described herein as is necessary for a complete understanding of the invention.

Referring now to Fig. 1, there is shown diagrammatically a twisting machine comprising a flyer 9 including a frame 10 journalled in bearings 11 and 12, and having a takeup reel 14 rotatably mounted therein, a distributor shaft 15 designed to reciprocate a traversing nut 18 carrying guide rollers 20—20 with respect to the winding surface of the reel 14, and a capstan 22 mounted rotatably therein. The hollow journal 19 of the frame 10 fits into the bearing 11 to permit a strand to be advanced therethrough. A motor 25 rotates the flyer at a predetermined speed, and drives the takeup reel 14, the distributor shaft 15 and the capstan 22 through suitable interconnecting gearing 23. The motor 25 is connected electrically to suitable control apparatus (not shown) for selectively connecting the motor to a source of potential.

A plurality of conductors 27—27 drawn from supply reels 26—26 pass through slots 29—29 in a support 30 and partially around guide sheaves 28—28 mounted on the support 30, which direct the conductors to a bell-mouthed passage 31 provided in a die 32. A plurality of textile strands 34—34 are drawn from supply reels 35—35 and pass through bushings 36—36 provided in the support 30 to the die 32. The conductors 27—27 and the strands 34—34 are advanced from the passage 31 through the hollow journal 19, around the capstan 22 several times and between the rollers 20—20 positioned on the traversing nut 18. The ends of the group of conductors and strands are attached to the takeup reel so that when the frame 10, the takeup reel 14, the distributing shaft 15 and the capstan 22 are revolved by the motor 25, the flyer 9 twists the conductors and the strands together to form a composite cable 38, which is advanced through the die 32 by the capstan 22 and wound on the takeup reel 14.

With this general understanding of the twisting machine and what it accomplishes, and realizing the necessity of producing a cable having the required number of conductors and

strands throughout its length, attention now is directed to a runout detector 40 designed to stop the twisting machine when any one of the conductors 27—27 and the strands 34—34 breaks or the supply thereof becomes exhausted. The runout detector 40 includes a shaft 41 mounted in bearings 42—42 secured on opposite arms of a bracket 43. A sensitive switch 46 is mounted on the bracket 43 in such a position that an operating arm 47 thereof may be engaged by a cam 48 fastened rigidly to the shaft 41. A tension spring 50 connected to an arm 51 keyed to the shaft 41 also is attached to a plate 52 adjustably secured to the bracket 43. The plate 52 is positioned so that the spring 50 has sufficient tension to hold the arm 51 against a stop 53 with a force just sufficient to maintain the cam 48 normally in such a position that it does not actuate the arm 47 of the switch 46.

A plurality of detector arms 55—55, one for each conductor 27 and one for each filamentary strand 34, are mounted pivotally on the shaft 41. Each of the detector arms is secured to a yoke 56 mounted rotatably on the shaft, and mounts one of sheaves 58—58 on the free end thereof. A plurality of screws 60—60 are threaded into the shaft 41 along a common center line, one for each of the detector arms 55—55. The screws are threaded into the shaft until the heads of the screws rest against the periphery of the shaft (Fig. 4), and are spaced along the shaft so that the screw heads are located within the spaces included between the sides of each of the yokes 56—56. The diameter of the heads of the screws 60—60 is less than the space between the opposite sides of the yokes, as viewed in Fig. 2. When the yokes are in a horizontal position, as viewed in Fig. 4, a small clearance is provided between the heads of the screws and bases 61—61 of the yokes. When any one of the yokes is pivoted in a clockwise direction, as viewed in Fig. 3, from its horizontal position, the base 61 thereof engages the head of the screw associated therewith and turns the shaft 41 and the cam 48 in a clockwise direction.

Some of the detector arms 55—55 have the free ends thereof bent upwardly and some have their free ends bent downwardly to permit the respective sheaves 58—58 to rest on the conductors and strands advanced toward the die 32. The conductors 27—27 and strands 34—34 converge toward the passage 31 and the free ends of the detector arms are bent laterally so that the sides of the sheaves mounted thereon are parallel to the normal paths of the conductors or strands on which they rest. The arms 55—55 are of such length that their torque, in each case, when not supported by a strand, is sufficient to turn the shaft 41 against the action of the spring and cause the cam 48 to actuate the arm 47 of the switch 46.

The switch 46 has normally closed contacts electrically connected in a conventional manner in the control circuit of the apparatus connecting the motor 25 to a source of power. When the cam 48 is turned in a clockwise direction a sufficient distance to actuate the arm 47 of the switch 46, the normally closed contacts of the switch are opened, thereby disconnecting the motor 25 from its source of power and stopping the machine.

Operation

Let it be assumed that the conductors 27—27 and the strands 34—34 are advanced convergingly over the guide sheaves 28—28 and through

the bushings 36—36, respectively, to the passage 31 in the die 32 under substantially equal tension. The detector arms 55—55 rest on their respective conductors or strands, and the tension of the conductors and the strands is sufficient to hold the detector arms in positions such that the yoke 56 attached to each arm is in a substantially horizontal position. With each yoke in this position, the spring 50 maintains the arm 51 against the stop 53 and the shaft 41 in a position in which the screws 60—60 are in vertical positions, and holds the cam 48 out of actuating engagement with the arm 47 of the switch 46. When slight variations in the tension of the filamentary conductors or the strands occur due to the twisting of the conductors and the strands together by the frame 10, the resulting movement of the detector arms 55—55 is absorbed by the clearance provided between the bases 61—61 of the yokes and the heads of their associated screws 60—60. Therefore, slight movement of the detector arms will not cause the cam 48 to operate the switch 46 and stop the motor 25.

When the tension in any one of the conductors or in the strands falls below a predetermined value, or when any one of the conductors or strands breaks or the supply thereof becomes exhausted, the detector arm engaging that conductor or strand falls downwardly in a clockwise direction, as viewed in Fig. 3, due to its own weight. This movement of the detector arm causes the base 61 of its yoke to engage the head of its respective screw 60 and turn the shaft 41 and the cam 48 secured thereto, in a clockwise direction against the action of the spring 50. This movement of the cam brings the lobe portion of the cam into engagement with the operating arm 47 of the switch 46 and actuates the arm 47 to open the contacts of the switch 46, whereupon the motor 25, driving the flyer 9 is deenergized. As a result, the advancement of the conductors and strands and the twisting operation performed by the flyer 9 is terminated so that an imperfect cables 38 is not formed.

It is to be understood that the above-described arrangements are merely illustrative of the application of the principles of the invention and that other arrangements and modifications may be devised by those of ordinary skill in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A runout detector for filament handling apparatus having means for advancing a plurality of filaments along predetermined paths, which comprises means including a sensitive switch electrically connected to control the operation of the filament advancing means, a rotatable shaft, a plurality of individually movable detector arms mounted pivotally on the shaft, one for each filament, said detector arms having sheaves mounted on their free ends under which the filaments advance, whereby the arms rest on the filaments with a force corresponding to their respective weights, the tension in the filaments normally being sufficient to hold the arms in given positions, means provided on the shaft for locking the detector arms against relative movement with respect to the shaft, and a cam provided on the shaft for actuating the control switch to stop the filament advancing means when the shaft is turned, whereby when any one of the filaments breaks or the supply thereof becomes exhausted the movement of its respective detector arm causes the cam to actuate the con-

trol switch and stop the filament advancing means.

2. A runout detector for filament handling apparatus having means for advancing a plurality of filaments along predetermined paths, which comprises means including a sensitive switch electrically connected to control the operation of the filament advancing means, a rotatable shaft, a plurality of individually movable detector arms mounted pivotally on the shaft, one for each filament, said detector arms having sheaves mounted on their free ends under which the filaments advance, said arms being positioned to rest on their respective filaments with a force corresponding to their respective weight, the tension in the filaments being sufficient to hold the arms in given positions, means provided on the shaft for causing movement of the shaft upon a predetermined movement of any one of the detector arms from its normal operating position, a cam provided on the shaft for actuating the control switch to stop the filament advancing means when the shaft is turned, and resilient means for normally holding the shaft in such a position that the cam does not actuate the control switch, each of the detector arms having sufficient weight to turn the shaft against the acion of the resilient means, whereby when any one of the filaments breaks or the supply thereof becomes exhausted the movement of its respective detector arm turns the shaft and the cam and actuates the control switch to stop the filament advancing means.

3. A runout detector for filament handling apparatus having means for advancing a plurality of filaments along predetermined paths, which comprises means including a sensitive switch electrically connected to control the operation of the filament advancing means, a rotatable shaft, a plurality of individually movable detector arms pivotally mounted on the shaft, one for each filament, said detector arms having sheaves mounted on the free ends thereof under which the filaments advance, whereby the arms rest on the filaments with a force corresponding to their respective weights, the tension in the filaments being sufficient to hold the arms in given positions, means provided on the shaft for locking the detector arms against relative movement with respect to the shaft, a cam provided on the shaft for actuating the control switch and stop the filament advancing means when the cam is turned a predetermined amount, a spring for biasing the shaft against movement in the one direction, said detector arms having sufficient weight to turn the shaft against the action of the spring, and means for adjusting the tension of the spring so that it exerts sufficient force on the shaft to hold the cam out of engagement with the control switch only when all of the arms are supported by the filaments, whereby when any one of the filaments breaks or the supply thereof becomes exhausted the movement of the arm associated with that filament turns the cam and actuates the control switch to stop the filament advancing means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,113,698	Larmuth	Apr. 12, 1938
2,389,625	Lambach et al.	Nov. 27, 1945
2,436,021	Sepavich et al.	Feb. 17, 1948

FOREIGN PATENTS

Number	Country	Date
436,835	Great Britain	Oct. 18, 1935
798,361	France	Mar. 10, 1936