June 26, 1962 L. O. REICHELT 3,040,512

STRAND BREAK CONTROL MECHANISM

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FIG. 1

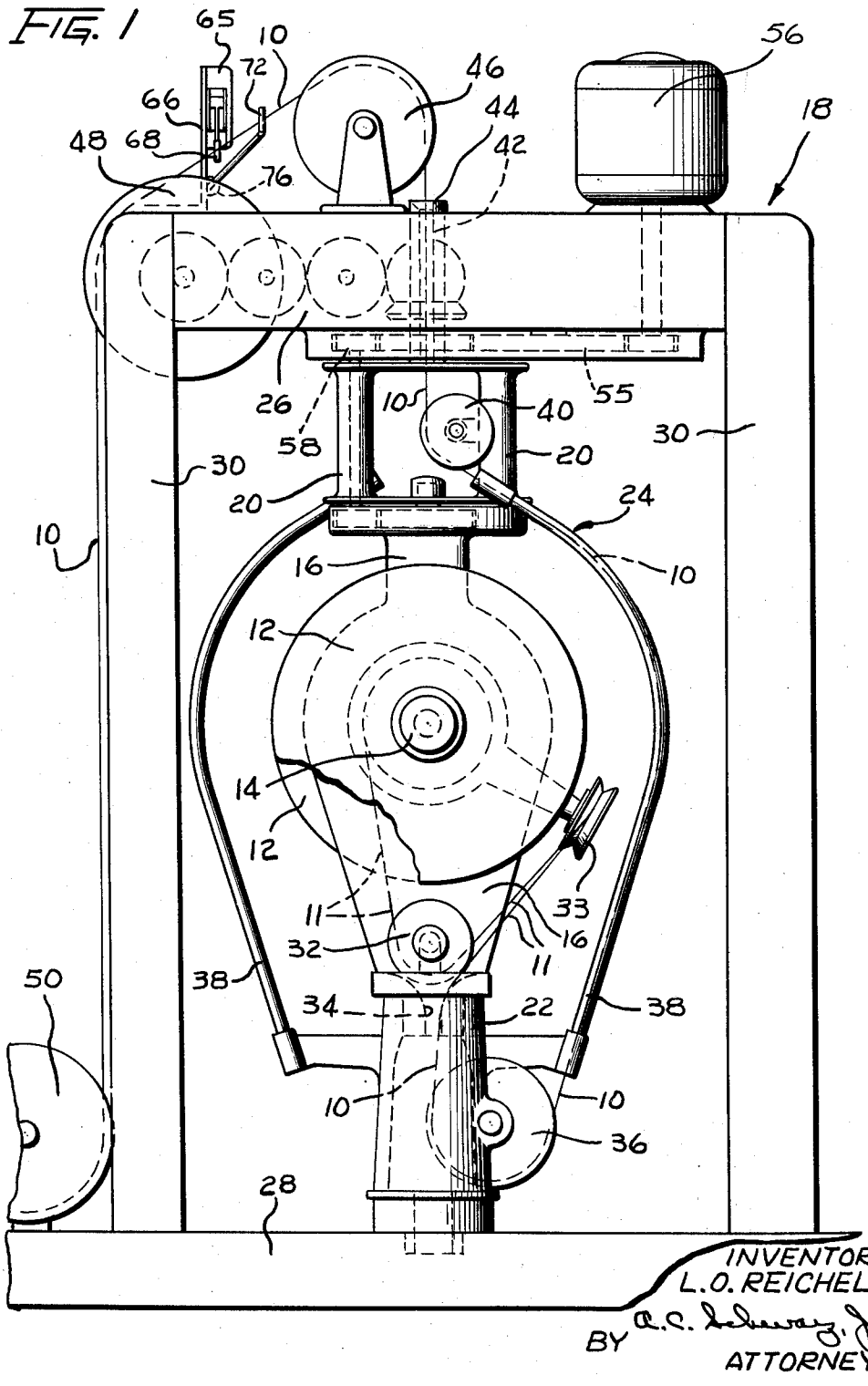

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FIG. 2

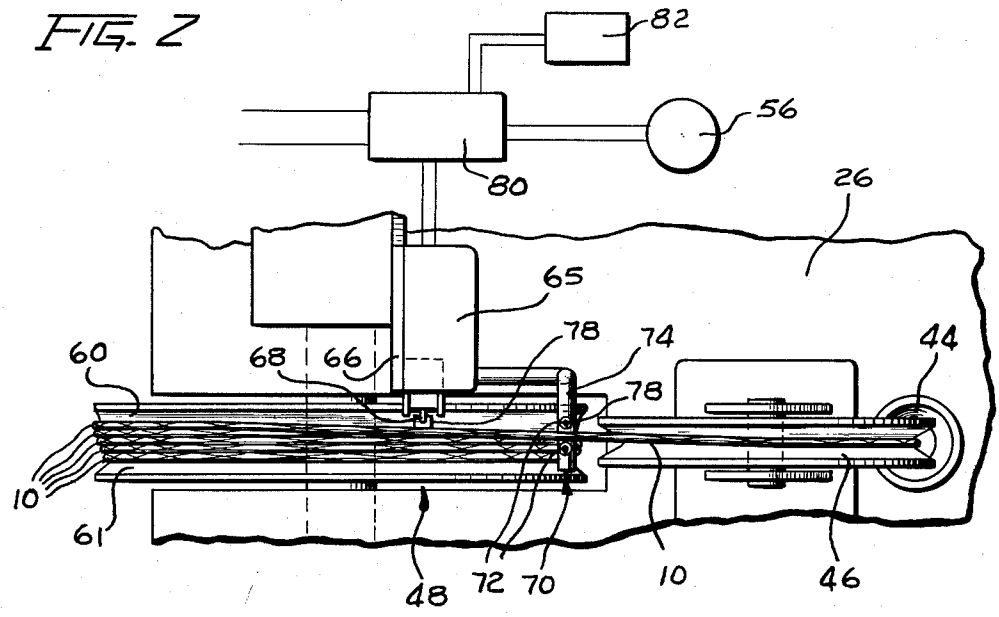
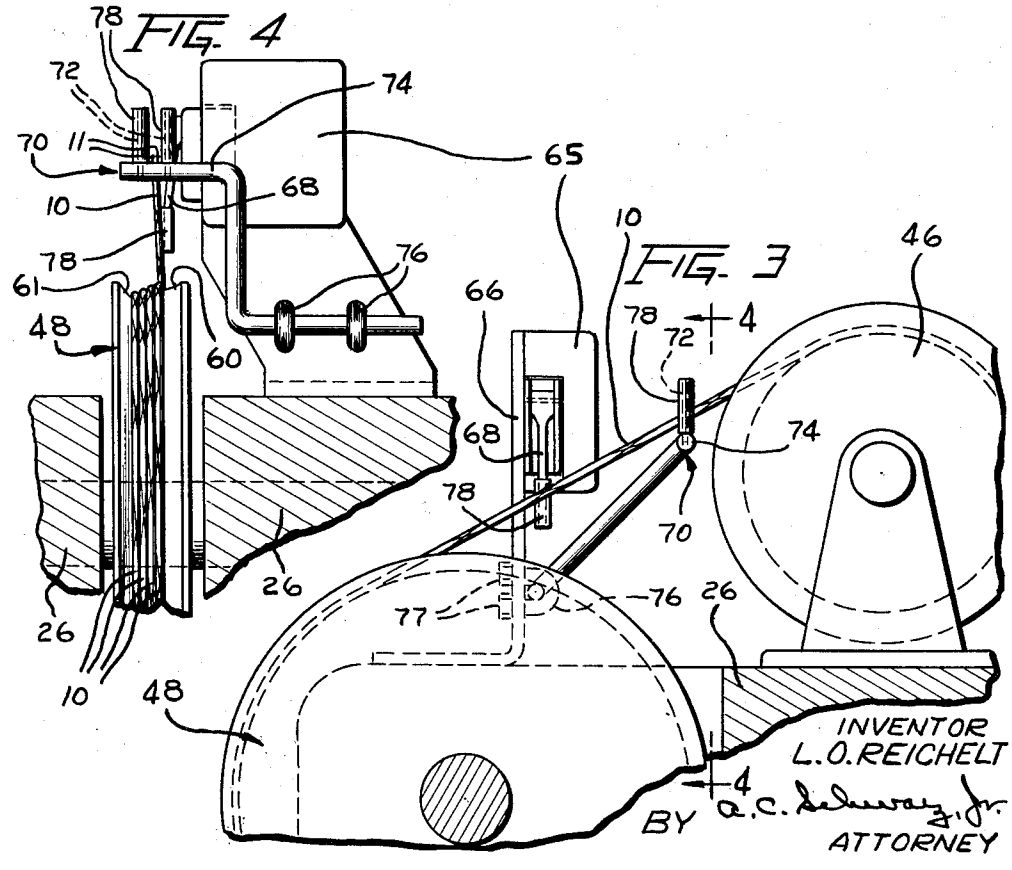


FIG. 4



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STRAND BREAK CONTROL MECHANISM

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This invention relates to strand break control mechanism, and more particularly to a mechanism for detecting the break of a wire of a pair of wires being twisted in a wire twisting machine and for stopping the machine when such a break occurs.

An object of the present invention is to provide a new and improved strand break control mechanism.

Another object of the invention is to provide an improved mechanism for detecting the break of a wire of a pair of wires being twisted in a wire twisting machine and for stopping of the wire twisting machine when such a break occurs.

In a wire twisting machine to which the invention is applied, a pair of wires are withdrawn from a pair of supply reels mounted on a stationary support and are advanced through a rotary flyer and twisted thereby around each other. The pair of twisted wires are directed around a guide pulley to a tapered capstan around the small end of which the twisted pair is wrapped a plurality of times and is directed therefrom onto a take-up reel. The wire twister, the capstan, and the take-up reel are driven by a suitable drive mechanism.

The improvement of a mechanism for detecting the wire break and stopping the wire twister when the break occurs includes a control mechanism having a switch actuated by the breaking of one of the wires being twisted. The switch is disposed adjacent the path of travel of the pair of twisted wires from the guide pulley onto the capstan and has a pivoted operating finger urged to open position and yieldably maintained in closed position by the pair of twisted wires. When a break occurs in one of the pair of wires and the other wire only is being advanced, the width of the plurality of turns of wire on the small end of the capstan is reduced and the path of the wire onto the capstan is changed resulting in the movement of the switch operating finger to open position and the actuation of the control mechanism to indicate the break and to stop the wire twisting machine.

Other objects, advantages and novel aspects of the invention will become apparent upon consideration of the following detailed description, in conjunction with the accompanying drawings, in which:

FIG. 1 is a front view of a wire twisting machine and showing a portion of the control mechanism therefor;

FIG. 2 is an enlarged fragmentary plan view of the wire twisting machine and the control mechanism with a portion of the control mechanism shown diagrammatically;

FIG. 3 is an enlarged front view of a portion of the wire twisting machine and the control mechanism therefor; and

FIG. 4 is a fragmentary vertical view of the machine taken on line 4—4 of FIG. 3.

Referring to the drawings, a pair 10 of wires 11 are withdrawn individually from wire supplies thereof on a pair of reels 12. The reels 12 are supported on a pair of horizontally disposed spindles 14 extending from opposite sides of a stationary supporting member 16 of a wire twisting machine 18. The upper and lower ends of the member 16 are supported in upper and lower heads 20 and 22, respectively, of a flyer 24. The heads of the flyer are rotatably supported in upper and lower horizontally disposed frame members 26 and 28 which are interconnected by vertical frame members 30.

The wires 11 from the supply reels 12 pass over stationary guide pulleys 32, 33 and are directed downwardly through a vertical passageway 34 of the machine and are twisted about each other as they advance into engagement with a pulley 36 rotatable with the flyer 24. From the pulley 36 the pair 10 of twisted wires passes through a guide tube 38 of the flyer and onto a guide pulley 40 carried by the upper head of the flyer. The twisted wires are advanced upwardly from the guide pulley 40 through a passageway 42 formed in a hollow member 44 of the flyer and are further twisted as they move upwardly into engagement with a guide pulley 46 rotatably supported on the upper frame member 26 of the twisting machine. From the guide pulley 46, the twisted pair 10 of wires are directed onto a tapered capstan 48 which advances them to a take-up reel 50 on which the twisted pairs of wires are wound.

The flyer 24 is driven through suitable gearing 55 from a motor 56 supported on the upper frame member 26 of the winding machine. Suitable gearing 58 connected to the supporting member 16 is also provided for maintaining the member 16 against rotation. The motor 56 through suitable gearing rotates the capstan 48 and also rotates the take-up reel 50 through a suitable drive connection including a slip clutch (not shown). The wire twisting machine thus far described is of conventional design.

As shown in FIGS. 2–4, the capstan 48 has a tapered or frustoconical surface 60 and a flange 61 at the small end thereof. The pair 10 of twisted wires 11 is wrapped around the small end of the capstan a plurality of times, as for example four times, to form four convolutions or turns of the twisted pair of wires which lie in side-by-side relation to each other along the tapered surface 60 of the capstan at the small end thereof and with the first convolution in engagement with the flange 61. The pair of twisted wires moves along a predetermined path from the guide pulley 46 onto the capstan 48 and engages the tapered surface 60 of the capstan at a point thereon a predetermined distance from the flange 61 equal to the width of the four convolutions of the pair of twisted wires on the capstan.

It will be appreciated that if one of the wires 11 of the pair 10 of wires being twisted is broken and the other wire only is being advanced by the capstan, the width of the four convolutions of single wire on the capstan will be less than the width of the four convolutions of the pairs of twisted wire and will be equal to substantially one-half of the latter. Thus in response to a break in one of the wires, the path of movement of the single remaining wire from the guide pulley 46 to the capstan will be shifted laterally with respect to the path of movement of the pair 10 of twisted wires from the guide pulley 46 onto the capstan.

The control mechanism for the wire twisting machine includes a switch 65 supported on a bracket 66 secured to the upper frame member 26 of the wire twisting machine. The switch 65 has a vertically disposed operating finger 68 which is pivotally mounted at its upper end and is urged to a normal first or open position. The switch 65 is located in a predetermined position relative to the path of travel of the pair of twisted wires from the guide pulley 46 to the capstan 48 so that the switch operating finger 68 is held in a second or closed position by the pair of twisted wires.

To more accurately control the path of movement of the wires onto the capstan 48, a guide member 70 is provided which comprises a pair of vertical guide pins 72 fixedly secured to a rod 74 in laterally spaced relation to each other to provide a narrow guideway therebetween for the movement of the wires and thereby prevent lateral shifting of the wires as they travel from the guide

pulley 46 to the capstan 48. The rod 74 is irregularly shaped and is secured to the bracket 66 by a pair of U-bolts 76 and lock nuts 77 by means of which the guide 70 can be adjusted to the proper position. If desired, the pins 72 on the guide 70 and a portion of the switch operating finger 68 may be provided with a coating of wear resistant ceramic material 78 for engaging the wires.

Referring to FIG. 2, the switch 65 is connected to a control device 80 for rendering the motor drive for the wire twisting machine operative when the control finger 68 of the switch 65 is maintained in its second or closed position by the pair 10 of twisted wires and for rendering the motor drive unoperative in response to movement of the switch operating finger 68 to its first or open position. Operation of the switch finger 68 to its open position also effects the actuation of a device 82 for indicating that a break has occurred in one of the wires of the twisted pair. The indicating device 82 may be of a conventional type and give either a visual or audible signal.

Although in the present embodiment of the invention the guide 70 is provided for forming a predetermined relatively narrow guideway for the movement of the pair of twisted wires therethrough and for forming a pivotal point about which the path of movement of the wire may swing when one of the wires 11 is broken, it will be understood that under some circumstances the wire guide 70 may be dispensed with where the guide pulley 46 is so positioned and designed as to serve the same purpose as that of the guide 70.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a wire twisting apparatus having a tapered capstan for advancing a pair of twisted wires, and drive means for rotating the capstan, the combination therewith of guide means mounted in a fixed position relative to the capstan for guiding the pair of wires therefrom along a normal first path onto said capstan at a point thereon spaced a predetermined distance from the small end of said capstan by a plurality of turns of the pair of twisted wires wound around the small end of the capstan, the arrangement being such that when a wire is broken and one wire only is being advanced by the capstan the path of movement of the wire from said guide means is shifted to a second path directed closer to the small end of the capstan, and control means including a control element mounted intermediate said capstan and said guide means and adjacent to said first path of movement of said twisted pair of wires and actuated by the shifting of said wire to said second path for rendering said drive means inoperative.

2. Apparatus as defined in claim 1 and including the provisions of means actuated by said control means for indicating when a wire has broken.

3. In an apparatus for twisting a pair of wires and having a tapered capstan for advancing the wires and drive means for rotating the capstan, the combination therewith of a member mounted in a fixed position relative to the capstan for guiding the pair of twisted wires therefrom along a normal first path onto said capstan at a point thereon spaced a predetermined distance from the small end of said capstan by a plurality of convolutions of the pair of twisted wires wound around the small end of the capstan, the arrangement being such that when a wire is broken and one wire only is advanced by the capstan the wire is shifted for movement from said member along a second path directed closer to the small end of the capstan, a switch mounted intermediate said capstan and said member and adjacent to said first path of movement of said twisted pair of wires and actuated by said wire in response to shifting of said wire to said second path, and means under control of said switch for rendering said drive means inoperative.

4. In an apparatus for twisting a pair of wires and having a tapered capstan for advancing the wires and drive means for rotating the capstan, the combination therewith of guide means mounted in a fixed position relative to the capstan for guiding the pair of twisted wires therefrom along a normal first path onto said capstan at a point thereon spaced a predetermined distance from the small end of said capstan by a plurality of convolutions of the pair of twisted wires wound around the small end of the capstan, the arrangement being such that when a wire is broken and one wire only is advanced by the capstan the wire is shifted for movement from said guide means along a second path directed closer to the small end of the capstan, a switch mounted intermediate the capstan and said guide means and adjacent to said first path of movement of said twisted pair of wires and actuated by said wire in response to shifting of said wire to said second path, and means under control of said switch for indicating when a wire has broken.

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