July 2, 1968 H. FRISCH ET AL 3,390,517

ACCUMULATOR STRANDING MACHINE WITH ROTATING ACCUMULATOR

Filed Oct. 6, 1966

FIG. 1

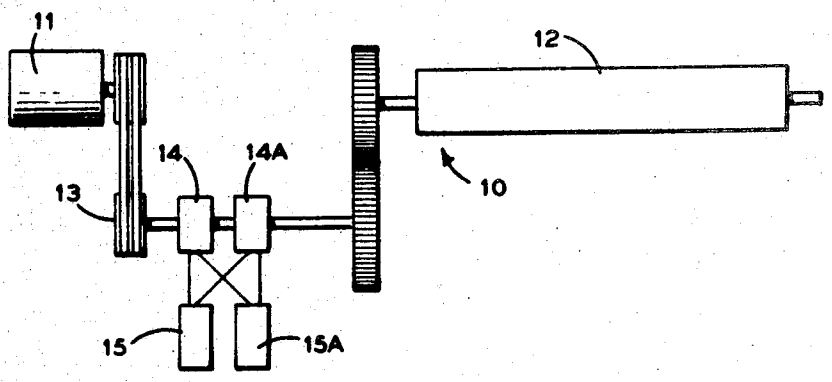


FIG. 2

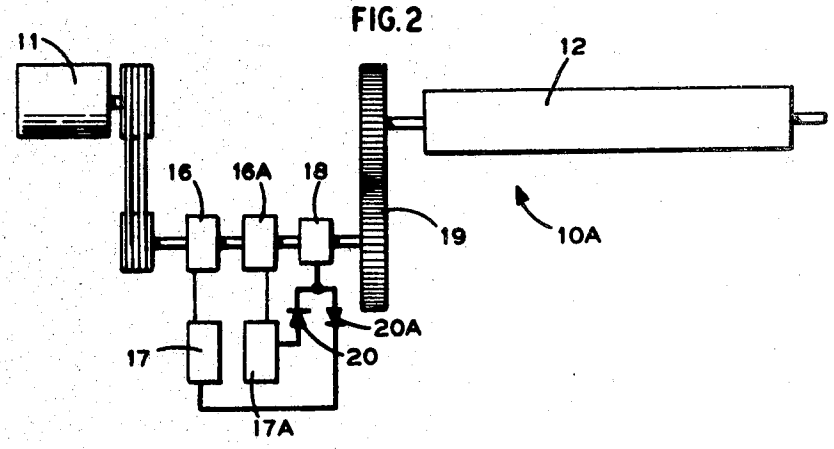
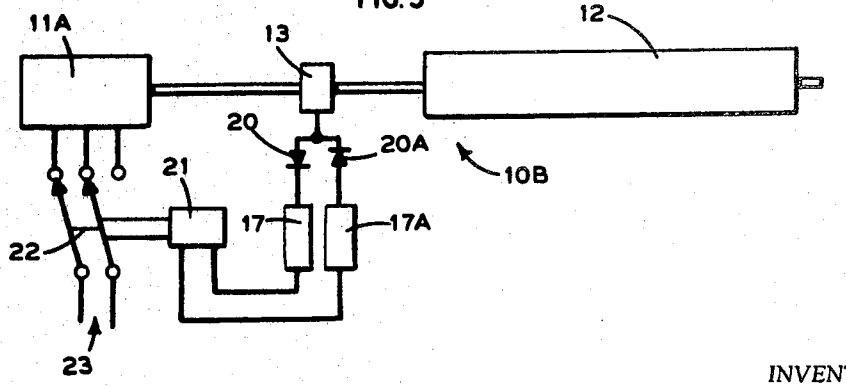


FIG. 3



INVENTORS
Hans Frisch
Joachim Meyer

BY Philip B. Hilbert

ATTORNEY

United States Patent Office 3,390,517 Patented July 2, 1968

3,390,517

ACCUMULATOR STRANDING MACHINE WITH ROTATING ACCUMULATOR

Hans Frisch, Dusseldorf, and Joachim Meyer, Lintorf, Germany, assignors to Frisch Kabel-und Verseilmaschinenbau GmbH, Ratingen, Germany, a corporation of Germany

Filed Oct. 6, 1966, Ser. No. 584,833
Claims priority, application Germany, Oct. 8, 1965, F 47,380
7 Claims. (Cl. 57—66)

ABSTRACT OF THE DISCLOSURE

A stranding machine of the accumulator type, the accumulator frame being rotatable in opposite directions, together with counter means operative to reverse the rotational direction of the frame after a given number of revolutions thereof.

In known stranding machines, either the elements being stranded are drawn from a rotating supply means and the stranded product is wound on a take-up roller whose rotational axis is fixed in space or the strand elements are drawn from a stationary, freely accessible supply means and the stranded product is wound on a reel by means of take-up and winding apparatus that rotates about the stranding apparatus. With such a reel the same rotates about its axis and also rotates in a plane at right angles to the stranding assembly.

With machines known as "yoke" or "double-lay" machines, one can, however, draw strands from fixed, freely accessible supply means and the axis of the take-up reel is fixed in space. However, such a reel is constantly encircled by the yoke and is therefore, not freely accessible; and further the dimensions thereof are quite limited. All such machines have a common disadvantage in that, the revolving masses, which are generally quite large, increase or decrease continuously during the stranding operation. Also, the supply of strand elements as well as the stranded product are not freely accessible during the operation. Consequently, take-up speeds, rotational speeds and the lengths of stranded product that can be produced in one run depend on each other reciprocally and can be changed above a maximum value only in individual cases with time consuming interruptions of operation.

There have, however become known stranding machines where the strand elements are drawn from, fixed, freely accessible supply means and where the stranded product with a given direction of stranding lay, is accumulated in a rotating accumulator device as it rotates. When the accumulator is filled, its direction of rotation is changed, the product contained therein is payed-off and at the same time and with the same speed stranded product with an opposite direction of stranding lay, is taken up.

With cables or cable rope produced in this manner, the direction of lay changes in fact at linear intervals that correspond to the storage capacity of the accumulator device and care must be taken that at the point where the lay changes direction, no kinking of the strand elements occurs. Nevertheless with such machines it is possible to draw without halt, arbitrary lengths and, by limiting the capacity of the accumulator device with correspondingly small rotating constant masses, to achieve very high speeds of operation.

In such machines, termed "accumulator-stranding machines," the accumulator device consists of an elongated cage or frame which rotates about an axis parallel to its longest edge. The device has sets of wheels, each consisting of one or more wheels closely spaced, which are located at the opposite ends thereof. Each set of wheels

rotate freely about an axis and their planes of rotation lie in a plane containing the axis of rotation of the frame.

In advance of the accumulator device is a nipple serving as a "stranding point" to which the strand elements are fed. After stranding, they enter the accumulator device and are fed, as by a set of pulleys, alternately on a wheel of the first set, then over a wheel of the second set, then again over a wheel of the first set, etc., until they pass from the last wheel of the second set to means located immediately adjacent the accumulator device for protecting the stranded elements from kinking at the point where the direction of lay changes. Such means can take the form of a belt spinner.

In order to suppress kinking in such accumulator stranding machines at the reversing points of the direction of lay, it is required that the reversal of the rotation of the machine take place after an exactly counted number of revolutions.

The instant invention is directed to an accumulator stranding machine having a rotating accumulator device whose direction of rotation can be reversed after a given number of revolutions. Accordingly, there is provided a counter for each direction of rotation. One counter activates a reversal of the drive and also engages the other counter for the other direction of rotation, after a preset number of revolutions. Thus, with the instant invention, it is possible to move long distances without a halt, since the counter in operation effects the reversal of the machine and automatically places the other counter in operation.

In one form of the invention, separate coupling means is provided for each direction of rotation. Further improvement is achieved by activating the couplings electrically and switching in simultaneously the counter for the corresponding direction of rotation; disconnecting after a given number of revolutions the corresponding coupling and switching in the coupling for the opposite direction of rotation. The couplings can take the form of electrodisc or magnetic powder clutch devices.

In another form of the invention, the reversal of the electric motor drive is accomplished by reversing the polarity of the motor. Simultaneously with such polarity reversal, the counter corresponding to the new direction of rotation is switched in. After a given number of revolutions, this counter is effective to change the polarity to the opposite direction of rotation. In this case, no couplings are required. However, braking of the armature of the motor is required to make possible the reversing action of the motor.

Pulse counters are used in the instant invention, with particular advantage. Such counters receive their inputs from a pulse source that is dependent on the speed of rotation; and whose polarity depends on the direction of rotation. Rectifier means is connected between the pulse source and each counting device so that the direction of transmission of the two rectifiers is opposite. After a given number of revolutions, the counter activates either a coupling for the opposite direction of rotation or the polarity reversal of the drive motor. Selected preselector counters are used in the system.

In the drawing, FIG. 1 is a schematic showing of one embodiment of the invention;

FIG. 2 is a schematic showing of another embodiment of the invention; and

FIG. 3 is a schematic showing of still another form of the invention.

As shown in FIG. 1, the accumulator stranding system generally indicated at **10**, comprises a motor drive **11** for operating the accumulator stranding machine **12**. The drive **11** acts through a transmission **13** on a coupling means **14** having one direction of rotation, and a coupling

means 14A having the opposite direction of rotation; thus permitting machine 12 to be driven in either direction.

Each of the couplings 14, 14A has associated therewith a counter, as at 15, 15A. The connections between the couplings 14, 14A and counters 15, 15A is such that the coupling is under control of its associated counter and after a given number of revolutions, preset in the counters, the associated coupling is inactivated and automatically, the other counter is activated to control its associated coupling.

In FIG. 2, the system 10A is similar to the system 10 shown in FIG. 1, except that counters 17, 17A are pulse operated from a pulse source 18 which is operated from drive element 19. Source 18 delivers pulses at a frequency depending on the rotational speed and with a polarity in accordance with the direction of rotation. Unidirectional rectifiers 20, 20A in circuit with source 18 and counters 17, 17A provide for automatic connection and disconnection of the couplings 16, 16A after a given number of revolutions preset on the counters.

In FIG. 3, the system 10B a motor 11A drives the machine 12 directly. A pulse generator 18 is driven by motor 11A and pulses counters 17, 17A selectively through the unidirectional rectifiers 20, 20A, as set forth above. The counters 17, 17A operates suitable means 21 such as solenoids or the like, to in turn operate a reversing switch 22 in circuit with motor 11A and current source 23. Thus, the polarity condition of motor 11A is under control of the preset counters 17, 17A to reverse the rotation of machine 12 at the appropriate time.

It is understood that couplings 16, 16A are electrically operable and may be of either the electromagnetic disc or powdered metal types, well known in the art. The connections between the counter means and the couplings which allows for automatic connection and disconnection of the counters so as to allow for operation of but one counter and associated coupling at any given time, are well known in the art.

As various changes might be made in the embodiments of the invention herein disclosed without departing from the spirit of the invention, it is understood that all matter herein shown or described shall be deemed illustrative and not limiting except as set forth in the appended claims.

What is claimed is:

1. In an accumulator stranding machine having a rotatable accumulator device operable in either direction, counter means operable for each direction of rotation,

and means controlled by said counter means for rotating said accumulator device for a predetermined number of revolutions, each counter device being operative to activate the other counter device at the end of said predetermined number of revolutions.

2. In a machine as in claim 1, wherein said rotating means comprises a pair of coupling means respectively rotatable in opposite directions.

3. In a machine as in claim 2, wherein said couplings are electrically operable, and means for selectively controlling the operation of said couplings in response to the rotational speed and direction of rotation of said stranding machine.

4. In a machine as in claim 3 wherein said couplings comprise electromagnetically operated elements.

5. In a machine as in claim 1, and including a motor of reversible polarity for driving said accumulator device, and means responsive to the operation of said counter means for reversing the polarity of said motor at the end of said predetermined number of revolutions.

6. In a machine as in claim 1, wherein said counter means are pulse operated, pulsing means in circuit with said counter means, said pulsing means being responsive to the speed of rotation of said accumulator device with a polarity dependent on the direction of rotation thereof, a pair of unidirectional rectifier means arranged for energy flow in opposite directions respectively in circuit with said pulsing means and said counters.

7. In a machine as in claim 6, and means operative after operation of one counter means for a given number of revolutions to drive said accumulator device in one direction, to automatically activate the other counter means whereby the accumulator device is driven in the other direction.

References Cited

UNITED STATES PATENTS

1,920,182	8/1933	Boe	57—66 XR
1,956,730	5/1934	Reichelt	57—58.52 XR
3,025,656	3/1962	Cook	57—34
3,052,079	9/1962	Henning	57—34
3,067,568	12/1962	Haugwitz	57—166 XR
3,169,360	2/1965	Corrall et al.	57—77.3 XR
3,187,495	6/1965	Cristian	57—34
3,253,397	5/1966	Gillis	57—34

STANLEY N. GILREATH, *Primary Examiner.*

DONALD WATKINS, *Assistant Examiner.*