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F. SCHATZ ETAL

3,365,871

ACCUMULATOR STRANDING MACHINE WITH TWO SETS OF WHEELS

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FIG. 5

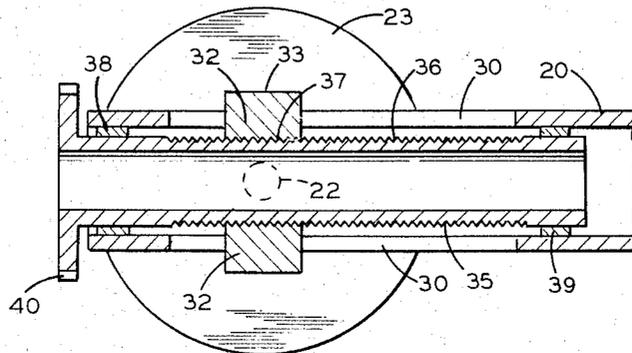


FIG. 7

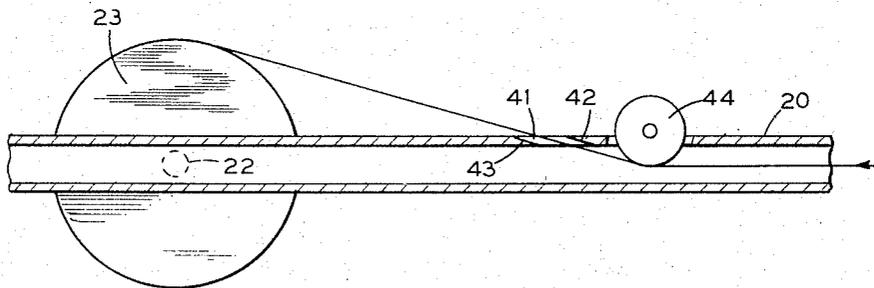
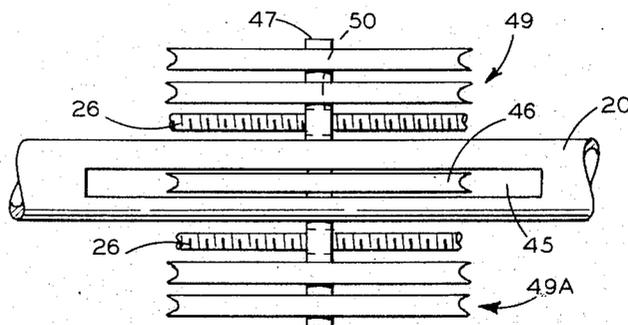


FIG. 8



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FIG. 6

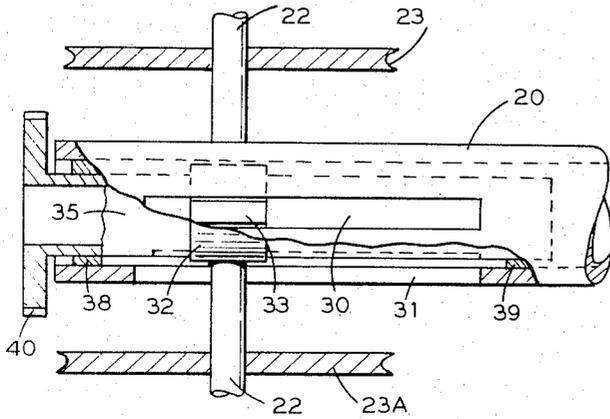


FIG. 9

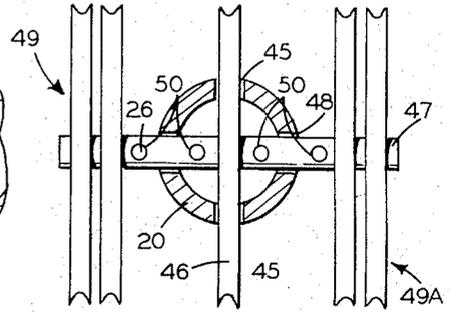


FIG. 10

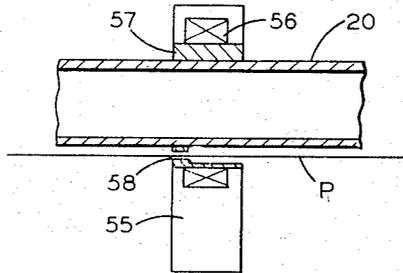
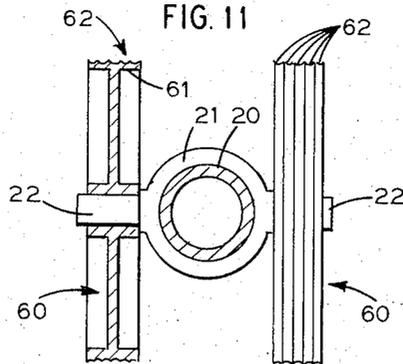


FIG. 11



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**ACCUMULATOR STRANDING MACHINE
WITH TWO SETS OF WHEELS**

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10 Claims. (Cl. 57—59)

ABSTRACT OF THE DISCLOSURE

The accumulator strander of this invention is a twisting machine comprising two sets of relatively movable accumulator wheels mounted on a longitudinally disposed shaft. As the twisted material is fed through the accumulator device the material is led over first one and then the other of said two sets of wheels to control the alternating twist reversal of said twisted material.

This invention relates to strand twisting machines and more particularly concerns twisting machines of the accumulator type.

In known stranding machines, either the elements being stranded or 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 depend on each other reciprocally and can be changed above a maximum value only in individual cases with time consuming interruptions of the 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 therein is payed-off and at the same time and with the same speed, stranded product with an opposite direction of strand 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 ele-

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ments 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 set 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.

It has already been suggested that in such accumulator stranding machines, each set of wheels be mounted in a forked member which is journaled parallel to the stranding direction, with synchronous drives for such forked members. In such an arrangement, the disadvantage of a large mass for the cage or frame is avoided; however, much larger forces are required for the driving means in its normal and direction changing operations. Further, it has been suggested that the sets of wheels of the accumulator stranding machine be arranged for movement along the axis of rotation of the accumulator.

Accordingly, an object of this invention is to provide in an accumulator stranding machine having two sets of wheels, improved means for mounting the sets of wheels whereby the machine is freely accessible for introducing the strand elements therein without interfering with the cage or frame. Further, the mass of the device is kept minimal while retaining the benefits of a single, simple drive means. Also, the need for balancing the accumulator device is kept at a minimum.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

In the drawings:

FIG. 1 is a side elevational view of one embodiment of the invention;

FIG. 2 is a top plan view thereof;

FIG. 3 is a top plan view showing another embodiment of the invention;

FIG. 4 is an end elevational view thereof, with parts in section;

FIG. 5 is a longitudinal sectional view showing still another embodiment of the invention;

FIG. 6 is a top plan view thereof, with parts broken away;

FIG. 7 is a side elevational view with parts in section, showing the tubular portion of the device for passing the strand elements or the stranded product therethrough;

FIG. 8 is a top plan view of still another embodiment of the invention, utilizing an odd number of accumulator wheels;

FIG. 9 is an end elevational view thereof;
FIG. 10 is a longitudinal sectional view showing still a further embodiment of the invention; and

FIG. 11 is an end elevational view with parts in section, showing an alternative form of accumulator wheels.

As shown in the drawings, and particularly in FIGS. 1, 2, 10 designates an accumulator device embodying the invention wherein a pair of longitudinally displaced bearing brackets 11, 12 support an elongated member 13 arranged for rotation about the longitudinal axis thereof; a driving gear 14 fixed to one end of member 13 is adapted to be rotated by suitable motor means, not shown.

Member 13 is provided with shafts 15, 16 at opposite end portions thereof, extending at right angles thereto. Shafts 15 carry pairs of accumulator wheels 17, 17A, in symmetrical balanced relation, while shafts 16 carry pairs of accumulator wheels 18, 18A, also in balanced relation; said wheels being freely rotatable on their respective shafts.

The accumulator device may have readily adjusted capacity if the displaced sets of accumulator wheels may be located in adjusted longitudinal relation to each other, as by moving the sets of wheels to adjusted positions along the elongated member. Thus, as shown in FIGS. 3, 4; the tubular member 20 has slidably mounted thereon a ring shaped bracket 21 which has extending therefrom shafts 22, which in turn sets of accumulator wheels 23, 23A freely rotatable thereon.

The longitudinal movement of bracket 21 on member 20 is limited by slots 24 formed on diametrically opposed surface portions of said member 20; studs 25 on bracket 21 extending into slots 24. Bracket 21 is moved along member 20 by a lead screw 26 engaging a threaded bore portion 27 in bracket 21. One end of lead screw 26 is journaled in a bearing member 28 fixed on one side of member 20; the other end of said lead screw being coupled to a small motor drive 29, also fixed to said one side of member 20.

Thus, the spacing between the sets of accumulator wheels may be adjusted, before or during the operation of the device, in accordance with the desired length of lay, which can be an integer multiple of a given lay.

Alternative means for effecting movement of the sets of accumulator wheels to selected positions to vary the capacity of the device, is shown in FIGS. 5, 6. Here, the tubular member 20 is formed with opposed, vertically related slots 30 and opposed horizontally related slots 31. A ring shaped bracket member 32 is located within member 20 and has projecting therefrom shafts 22 extending through slots 31 and carrying accumulator wheels 23, 23A.

The bracket 32 is guided for limited longitudinal movement relative to member 20 by outwardly projecting radial stud portions 33 received in slots 30. Longitudinal movement of bracket 32 is effected by means of a tubular lead screw 35 having an external thread 36 which is engaged by internally threaded portions 37 of stud portions 33. Lead screw 35 is rotatably mounted within tubular member 20 with ring bearings as at 38, 39. The outer, projecting end of lead screw 35 is provided with a flange gear portion 40 for driving connection with suitable motor means, not shown.

Thus, lead screw 35 may be rotated in the desired direction to advance or retract accumulator wheels 23, 23A to selected positions along member 20.

The tubular member 20 may be used to accommodate the take-up or pay-off of the product of the accumulator device, as shown in FIG. 7. Here the wall of member 20 is formed with an axially extending slot 41 located adjacent wheel shaft 22; said slot 41 having inclined edges 42, 43, whereby the product P moving toward or from accumulator wheel 23 passes smoothly through the bore of member 20. A guide roller 44 mounted on member 20 adjacent slot edge 42, locates the moving product P in an axial path within member 20; as well medial relation to slot edges 42, 43.

The accumulator device of the instant invention may include displaced sets of accumulator wheels, wherein each set of wheels consists of an odd number of wheels, as shown in FIGS. 8, 9. Thus, tubular member 20, is formed with opposed, vertically related slots 45 for receiving a single accumulator wheel 46 rotatable on a shaft 47 having opposite end portions projecting through a pair of opposed, horizontally related slots 48 formed in tubular member 20; pairs of accumulator wheels 49, 49A being rotatably mounted thereon. The length of vertical slots 45 determine the extent of the longitudinal movement of the accumulator wheels 49, 49A; 45.

The accumulator wheels on shaft 47 may be moved to selected positions by lead screws 26 passing through threaded bores 50 formed in shaft 47 at points interiorly and exteriorly of member 20. Said lead screws may be rotated by small motor means, not shown, as described in connection with FIGS. 3, 4.

Rather, then passing product interiorly of the tubular member 20, requiring slotting the wall thereof; the product P may be carried exteriorly of said tubular member 20, as shown in FIG. 10. Thus, member 20 may be rotatably mounted in a bearing block 55 with bearings 56. A bushing 57 fixed to member 20 and rotating in bearings 56, is formed with a longitudinal passage 58, to pass product P exteriorly of member 20.

To further reduce mass in the accumulator devices, the accumulator wheels may be of modified construction, as shown in FIG. 11, wherein, tubular member 20 carries ring bracket 21 with projecting shafts 22. A single wheel 60 is rotatably mounted on each of the projecting shafts 22; said wheel having a rim portion 61 formed with a plurality of lead grooves 62.

As various changes might be made in the herein disclosed embodiments of the invention without departing from the spirit thereof, 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 apparatus, an elongated member, longitudinally displaced for mounting opposite end portions of said member for rotation about the longitudinal axis thereof, a pair of shafts projecting from one end portion of said member and at right angles thereto, a second pair of shafts projecting from the other end portion of said member and at right angles thereto, sets of accumulator wheels mounted on said shafts on opposite sides of said member for free rotation, said sets of wheels being in balanced and uniformly distributed relation to said member.

2. In an accumulator apparatus as in claim 1, and further including means for mounting at least one of said pairs of shafts for movement longitudinally of said elongated member.

3. In an accumulator apparatus as in claim 2, and further including means on said elongated member for moving said pairs of shafts along said elongated member.

4. In an accumulator apparatus as in claim 2, wherein said shaft mounting means comprises a bracket member slidably mounted on said elongated member for longitudinal movement thereon, said pair of shafts respectively projecting from opposite sides of said bracket member, and coacting means on said bracket member and elongated member for guiding and limiting the longitudinal movement of said bracket member relative to said elongated member.

5. In an accumulator apparatus as in claim 4, wherein said coacting means comprises a lead screw rotatably mounted on said elongated member, said bracket member having a threaded bore therethrough for threaded engagement with said lead screw, and motor means on said elongated member for rotating said lead screw.

6. In an accumulator apparatus as in claim 1, wherein said elongated member is tubular, the wall portion of

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said tubular member being formed with an elongated slot located adjacent the wheels of one of said sets of accumulator wheels, whereby product may pass between the bore of said elongated member and said accumulator wheels.

7. In an accumulator apparatus as in claim 6, and further including guide roller means mounted on said tubular elongated member adjacent the slot therein for guiding the product within said tubular member in a substantially axial path therein.

8. In an accumulator apparatus as in claim 1, wherein said elongated member is formed with an elongated through slot, shaft means passing transversely of said elongated member and through the slot therein, a single accumulator wheel rotatably mounted within said slot on a medial portion of said shaft means, and an equal number of accumulator wheels rotatably mounted on the opposite end portions of said shaft means on the respective opposite sides of said elongated member.

9. In an accumulator apparatus as in claim 1 wherein said elongated member is tubular, and passage means on exterior portions of said tubular member for passing product along said tubular member and exteriorly thereof.

10. In an accumulator apparatus as in claim 1 wherein each set of accumulator wheels comprises a single hub,

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web means extending from said hub and an annular rim on the outer portion of said web means, said rim being formed with a plurality of lead grooves in side by side relation.

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