Jan. 10, 1950 H. H. MERWIN ET AL 2,494,483

CENTRIFUGAL FORCE COMPENSATING MECHANISM

Filed Nov. 12, 1947 2 Sheets-Sheet 1

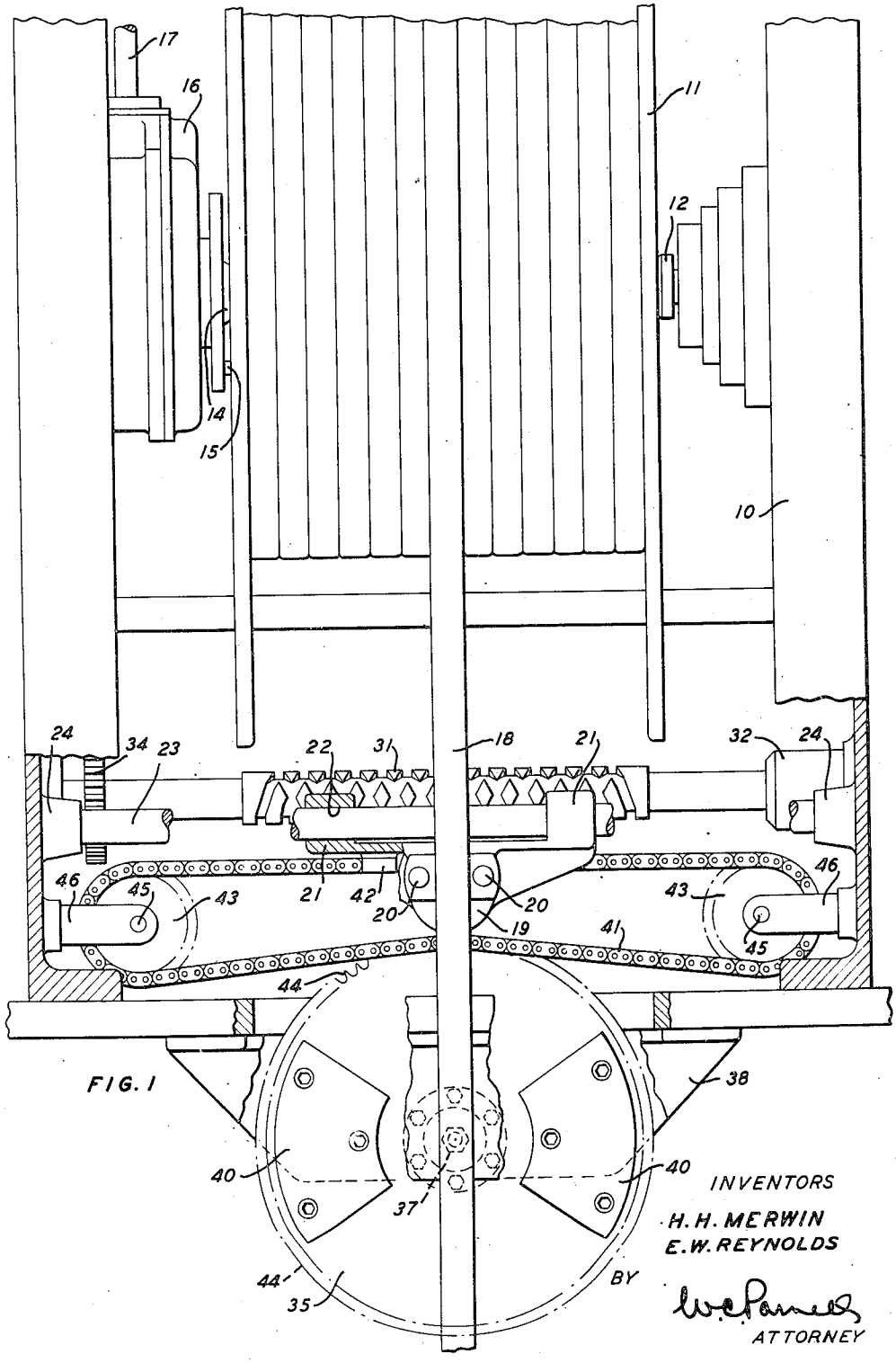


FIG. 1

INVENTORS
H. H. MERWIN
E. W. REYNOLDS

BY

ATTORNEY

Jan. 10, 1950 H. H. MERWIN ET AL 2,494,483

CENTRIFUGAL FORCE COMPENSATING MECHANISM

Filed Nov. 12, 1947 2 Sheets-Sheet 2

FIG. 3

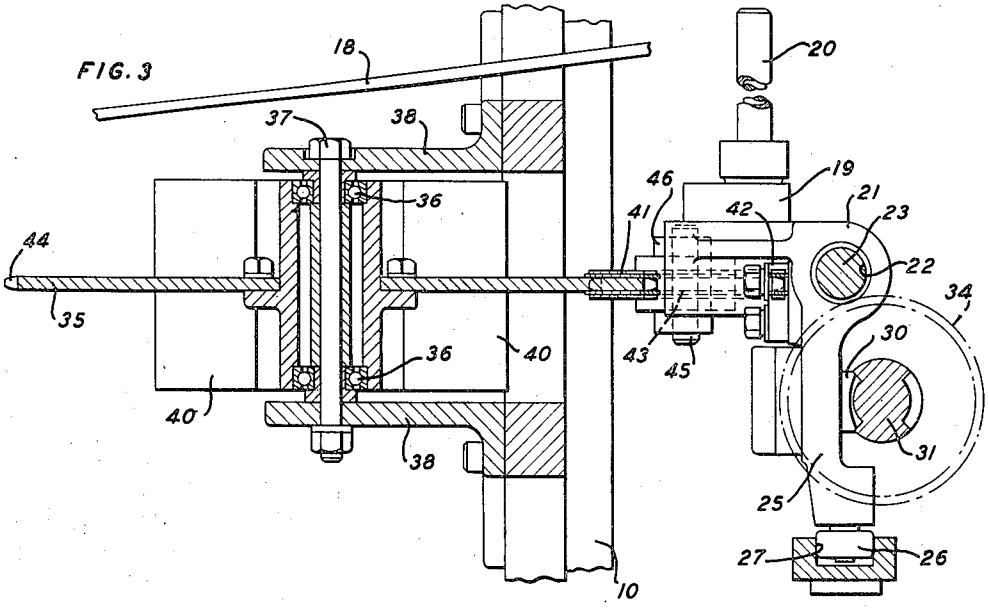
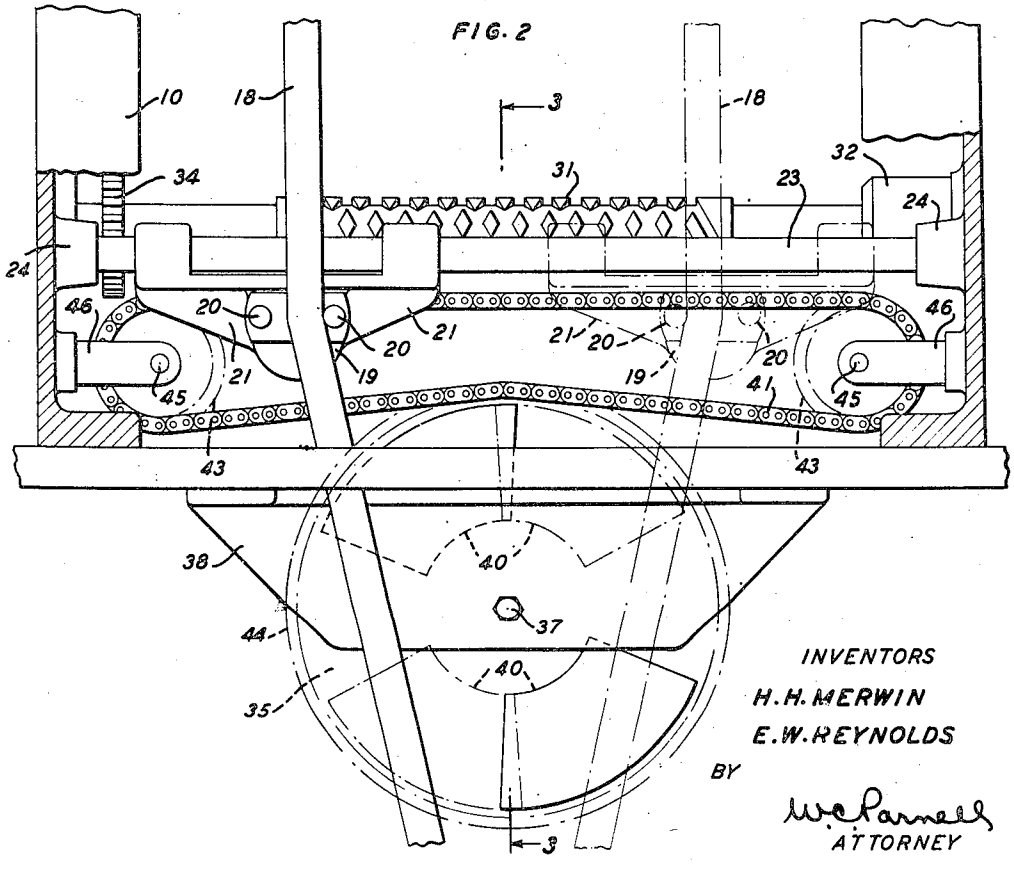


FIG. 2



INVENTORS
H. H. MERWIN
E. W. REYNOLDS
BY
W. C. Parmele
ATTORNEY

Patented Jan. 10, 1950

2,494,483

UNITED STATES PATENT OFFICE

2,494,483

CENTRIFUGAL FORCE COMPENSATING MECHANISM

Harry H. Merwin, Rutherford, and Ellwood W. Reynolds, Westfield, N. J., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application November 12, 1947, Serial No. 785,272

5 Claims. (Cl. 57—71)

1

This invention relates to a centrifugal force compensating mechanism, and more particularly to a centrifugal force compensator in a distributing apparatus for a cable stranding machine.

In cable stranding machines where selected numbers of insulated electrical conductors are grouped together in desired forms as they are advanced through the stranders they are, as a rule, rotated about the centerlines of their advancing paths whereby textile strands, paper tapes or other insulating materials may be served thereto in forming cables of desired structure. The rotating movements of these cable structures are usually incorporated in the takeup units of the stranders. Such takeup units are of the flyer type, rotating about the path of the cable being formed, and including a distributor mechanism for a takeup reel to receive the completed cable, the takeup reel being rotated on its own axis and about the axis of the flyer unit which is at right angles to its own axis.

This invention is more closely associated with the distributor mechanism for distributing the cable on the takeup reel. The conventional type of distributor mechanism employs a double threaded shaft for reciprocating a distributor element between given limits to distribute the cable uniformly on the takeup reel. The double threaded shaft or screw is positioned at right angles to the axis of rotation of the flyer, and the distributor element, in moving outwardly in both directions away from the unit axis during its back and forth movement controlled by the double threaded screw, is affected by centrifugal force which not only tends to alternately accelerate and retard the speed of movement of the distributor element to create an uneven lay in the cable convolutions on the takeup reel, but causes excess wear on the double threaded screw and the associated follower carried by the distributor element due to the varying forces applied to the distributor element as it travels in either direction beyond the center point or the axis of the flyer.

An object of the invention is to provide a centrifugal force compensating mechanism for an element rotatable about an axis and reciprocated at a constant speed transversely of the axis to counteract the effect of centrifugal force on the element to increase and retard its speed of movement away from or toward the axis.

With this and other objects in view, the invention comprises a centrifugal force compensating mechanism for an element which in the present embodiment of the invention is used in conjunction with a distributing apparatus in a takeup unit of a material handling machine. A threaded member, rotating about an axis at right angles to the axis of rotation of the takeup unit, causes reciprocation of a distributing element between given limits to distribute strand-like material on a takeup reel. The centrifugal force compensating mechanism comprises a member movable with the distributing element to counterbalance the affect of centrifugal force on the element in moving beyond the axis of the takeup unit. More specifically, the member is in the form of a sprocket wheel, mounted with its axis perpendicular to the axis of rotation of the takeup unit, and carrying diametrically opposed weights disposed at their neutral positions when the distributing element is positioned at the axis of rotation of the unit. An endless chain, connected to the distributing element, extending around idler sprockets disposed beyond the ends of the threaded member and engaging the weighted member, causes movement of the weighted member to move the weights thereon away from their normal positions as the distributing element moves toward either end of the threaded member, whereby the weighted member will be affected by centrifugal force to oppose the effect of centrifugal force on the distributing element.

2

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawings, wherein

Fig. 1 is a top plan view of a distributing apparatus embodying the invention shown in combination with a fragmentary portion of a takeup unit of a flyer strander;

Fig. 2 is a fragmentary top plan view of the structure shown in Fig. 1, illustrating the different positions of the compensating mechanism during the extreme outer positions of the distributing elements; and

Fig. 3 is a fragmentary sectional view taken substantially along the line 3—3 of Fig. 2.

The machine selected to illustrate the invention is a cable stranding machine, only a portion of which is shown in the drawing. Machines of this type are usually composed of several units, depending upon the number of insulating materials served to the electrical conductors during longitudinal advancement of the conductors toward the takeup unit. The takeup unit embodies a flyer 10, supported in a suitable frame structure (not shown), and rotated about an axis coincident with the centerline of the conductors or cable advancing through the machine. Only a portion

of the flyer 10 is shown in the drawings, and it has not been thought necessary to illustrate the supporting and driving means for the flyer, as such are common in the art. A takeup reel 11 is supported between a driven cone 12 and a drive cone 14, connected to the reel by a suitable gear reducing unit 16, the input shaft 17 therefor being connected to the conventional driving means.

The distributing mechanism for distributing a completed cable 18 on the takeup reel 11 includes a distributing element 19, having parallel rollers 20 to control the path of the cable 18 as it advances toward the takeup reel. The distributing element 19 has lateral arms 21 with aligned apertures 22 therein through which a supporting rod 23 extends, the ends of the supporting rod being mounted in embossed portions 24 of the main frame of the flyer 10.

A vertical arm 25 is integral with the distributing element 19 and has a roller 26 mounted on its lower end to ride in a channel type track 27 positioned parallel with the rod 23 and supported in a suitable manner (not shown). A follower 30, of the conventional type employed in conjunction with double threaded distributor screws, is supported by the arm 25 and allowed to rock to reverse its position at each end of a distributor screw.

A double threaded distributor screw 31 of the conventional type is positioned parallel with the rod 23 and has its ends rotatably journalled in suitable bearings 32, only one of which is shown. The screw 21 carries a gear 34 which is driven from the shaft 17 in any suitable manner (not shown).

The centrifugal force compensating mechanism, which constitutes the salient feature of this invention, includes a rotatable member 35 in the form of a sprocket wheel mounted on bearings 36 supported by bushings on a bolt or shaft 37 which is perpendicular to the axis of the unit 10 or flyer and in a plane therewith. The shaft 37 is supported by brackets 38 mounted on the main frame of the flyer 10 to rotate therewith. The member 35 carries substantially pie-shaped weights 40 mounted at diametrically opposed positions, the center lines of which are parallel with the path of movement of the distributing element 19 when the distributing element is in its neutral or center position. A chain 41 has its ends secured at 42 to the arms 21 of the distributing element 19 to form substantially an endless chain, extending around idler sprockets 43, and interengaging teeth 44 on the periphery of the member 35. The sprocket wheels 43 are rotatably supported by shafts 45 carried by yokes 46 supported at diametrically opposed positions on the main frame 10 of the flyer unit.

During the operation of the machine, the takeup reel 11 is rotated about its axis to pull the cable through the machine, and in so doing, pull the initial insulated electrical conductors through the different units of the machine where insulating materials may be served thereto, and if desired, a final textile covering may be formed to complete the cable before it reaches the takeup unit. During rotation of the takeup reel 11, the flyer unit 10, including the reel, the distributor mechanism, and the centrifugal force compensating mechanism, are rotated about the axis of the unit. The driving means for the reel also drives the distributor screw 31 continuously in a given direction, causing the distributing element to reciprocate on the rod 23 through the

aid of a track 27 between the given limits to distribute the cable on the reel. The speed of rotation of the flyer unit 10 is such that the moment the distributor element 19 moves in either direction from its central position, shown in Fig. 1, centrifugal force will tend to cause it to move at a faster rate of speed in that direction. The centrifugal force applied to the distributing element 19 will increase as the element moves toward either end of the distributing screw. It is necessary that sufficient clearance be present between the threads of the distributor screw to allow for the follower 30 to move freely. The centrifugal force, however, causes the follower to press against the outermost thread and in time causes wear between the follower and the threads to increase the clearance between the threads. This results also in inaccurate distribution of the cable on the takeup reel. The varying force applied to the distributing element causes variation in the wear of the threads as follower 30 approaches the ends of the distributing screw. Furthermore, this force, applied to the follower through the distributor element, remains during reversing of the follower at the ends of the distributing screw and while the follower returns to the central position of the distributing element, as shown in Fig. 1.

The weights 40, through the action of the member 35, will compensate for the effect of the centrifugal force on the distributing element 19. When the distributing element 19 is in its central position, as shown in Fig. 1, the member 35 is in its inactive position with the weights 40 at the farthest position from the axis of the unit 10. As the distributing element 19 moves to the left, the member 35 will be rotated clockwise through the driving connection of the chain 41 therewith, moving the weights toward the axis of the unit 10 whereby they will be increasingly affected by centrifugal force during rotation of the flyer to apply a counteracting force to the distributing element 19 at varying rates proportionately to the increase in centrifugal force applied to the element. This condition will exist during movement of the distributor element from its central position, shown in Fig. 1, to the farthest position at the left, shown in solid lines in Fig. 2. The positions of the weights 40 at this time are also shown in solid lines in Fig. 2. The counteracting force of the member 35 with its weights 40 will be applied to the distributing element 19 through the chain 41 during both movements away from and back to the center position. At this moment, when the distributing element 19 continues moving to the right, to the broken line position shown in Fig. 2, the member 35 will continue its counterclockwise movement to the position where the weights 40 are shown in broken lines in Fig. 2. This action continues throughout the operation of the takeup unit and the continued operation of the distributing element in distributing the cable on the takeup reel. By applying a counteracting force to the distributing element, equal to the varying force created therein during rotation of the unit 10 and during its movement in opposite directions from the neutral or center position, the distributing element may be moved freely during rotation of the distributing screw to uniformly distribute the cable on the reel and to eliminate excess wear between the relatively moving parts.

It is to be understood that the above described arrangements are simply illustrative of the ap-

plication of the principles of the 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. A centrifugal force compensating mechanism for an element rotatable about an axis and having means to simultaneously reciprocate the element transversely of the axis between given limits at each side of the axis, the element, as it moves in either direction toward or away from the axis, being affected by a varying centrifugal force tending to increase the speed of movement of the element outwardly from the axis and retard the speed of movement of the element toward the axis, the centrifugal force compensating mechanism comprising a member having spaced weight portions mounted adjacent the axis and rotatable about the axis with the element, and means connecting the member to the element and actuated thereby to cause movement of the member during reciprocation of the element whereby the weight portions of the member will be moved relative to the axis to counteract the centrifugal forces tending to increase and retard the speed of movement of the element.

2. A centrifugal force compensating mechanism for an element rotatable about an axis and having means to simultaneously reciprocate the element transversely of the axis between given limits at each side of the axis, the element, as it moves in either direction toward or away from the axis, being affected by a varying centrifugal force tending to increase the speed of movement of the element outwardly from the axis and retard the speed of movement of the element toward the axis, the centrifugal force compensating mechanism comprising a member having spaced weight portions mounted adjacent the axis and rotatable about the axis with the element, means to support the member for rotation about an axis perpendicular to the said first axis, and means connecting the member to the element and actuated thereby to cause movement of the member during reciprocation of the element whereby the weight portions of the member will be moved relative to the axis to counteract the centrifugal forces tending to increase and retard the speed of movement of the element.

3. A centrifugal force compensating mechanism for an element rotatable about an axis and having means to simultaneously reciprocate the element transversely of the axis between given limits at each side of the axis, the element, as it moves in either direction toward or away from the axis, being affected by a varying centrifugal force tending to increase the speed of movement of the element outwardly from the axis and retard the speed of movement of the element toward the axis, the centrifugal force compensating mechanism comprising a member having spaced weight portions mounted adjacent the axis and rotatable about the axis with the element, means to support the member for rotation about an axis perpendicular to the said first axis, and a flexible driving means connecting the member to the element and actuated by the element to cause rotation of the member about its axis during reciprocation of the element whereby the weight portions of the member will be moved relative to the first axis to counteract the centrifugal forces tending to increase and retard the speed of movement of the element.

4. A centrifugal force compensating mechanism for an element rotatable about an axis and having means to simultaneously reciprocate the element transversely of the axis between given limits at each side of the axis, the element, as it moves in either direction toward or away from the axis, being affected by a varying centrifugal force tending to increase the speed of movement of the element outwardly from the axis and retard the speed of movement of the element toward the axis, the centrifugal force compensating mechanism comprising a member having spaced weight portions mounted adjacent the axis and rotatable about the axis with the element, means to support the member for rotation about an axis perpendicular to the said first axis, and a driving means connecting the member to the element and actuated by the element to cause rotation of the member in either direction from its neutral position as the element moves in given directions from its neutral position adjacent the first axis whereby the weight portions of the member will be moved given distances from their neutral positions proportional to the distances the element moves beyond the first axis to counteract the effect of the centrifugal forces tending to increase and retard the speed of movement of the element.

5. A centrifugal force compensating mechanism for a distributing element in a takeup unit rotatable about a given axis at right angles to the axis of rotation of a takeup reel mounted in and rotatable with the unit about its axis, the distributing element being reciprocated between given limits upon each side of the unit axis by a driving screw to distribute a strand material on the takeup reel, the distributing element being affected by a varying centrifugal force as it moves in either direction toward or away from the unit axis tending to increase the speed of movement of the distributing element outwardly from the unit axis and retard the speed of movement of the distributing element toward the unit axis, the centrifugal force compensating mechanism comprising a member having spaced weight portions mounted adjacent the unit axis and means connecting the member to the distributing element and actuated thereby to cause movement of the member during reciprocation of the distributing element whereby the weight portions of the member will be moved relative to the unit axis to counteract the centrifugal forces tending to increase and retard the speed of movement of the distributing element.

HARRY H. MERWIN.
ELLWOOD W. REYNOLDS.

No references cited.