Dec. 16, 1930. W. K. WESTON 1,784,859

TWISTING MACHINE

Filed Aug. 8, 1928

FIG. 1

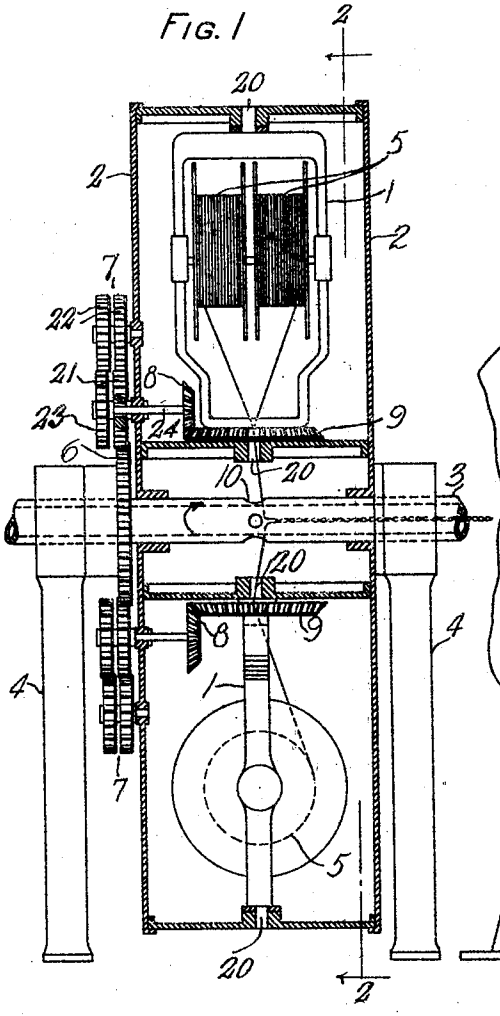
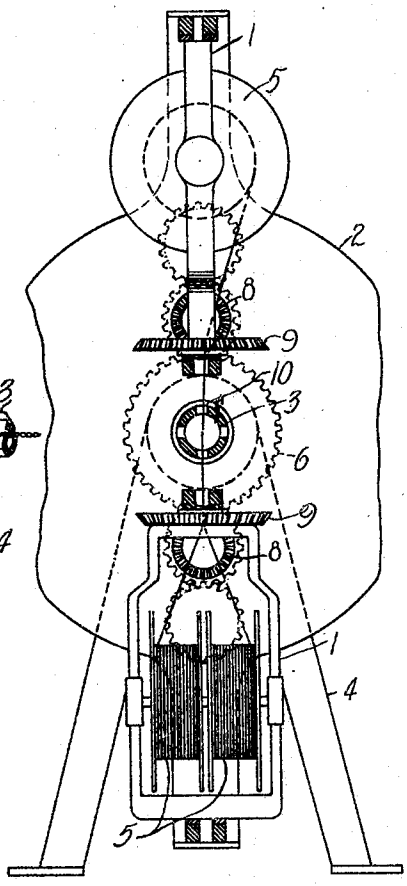


FIG. 2



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Patented Dec. 16, 1930

1,784,859

UNITED STATES PATENT OFFICE

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TWISTING MACHINE

Application filed August 8, 1928, Serial No. 298,250, and in Great Britain August 22, 1927.

This invention relates to twisting machines and is especially suitable for use in the twisting of wires or strands for use in the manufacture of electric cables.

In the machines heretofore used for the above purpose bobbins carrying the wires or strands which were to be twisted together were each mounted in a yoke fixed upon a spindle which was adapted to be rotated. Two yokes of this character were supported in a frame about a central spindle around which the whole frame rotated. The central spindle could either be horizontal or vertical. In the vertical type there occurred a saving in floor space, whilst on the other hand, in the horizontal type, the twisting head, that is to say, the die through which the twisted wires were drawn, was more easily accessible for purposes well known in the art, such as for wrapping or binding purposes.

A machine of the above character when used in the manufacture of quadded cables had in each yoke two bobbin-wound strands. A quadded cable generally comprises a plurality of quads of conductors. Each quad is made up of four conductors which first are twisted together into separate pairs and then are quadded by twisting the pairs together. The expression "quad" designates a cable or a portion of a cable embodying four conductors twisted together as described. The rotation of each yoke caused the two strands withdrawn therefrom to be twisted one about the other. The rotation of the frame about the central axis or spindle brought about the twisting together of the two already twisted pairs so that a quad was formed. The arrangement was such that the twist in the pairs could be the same or the opposite to the quad twist.

The output of a machine of this character depends upon the speed at which the frame may be rotated about the central axis, since it has been found that above a certain speed breakage in the wire and uneven twisting takes place. This defect is largely due to the effect of centrifugal force. Thus the bobbins when revolved about the central axis are subjected to a considerable centrifugal force which tends to impel the convolutions on the bobbins to one end thereof and then to the other as the bobbins are rotated about their individual spindles. This often results in an entanglement of the strands with a resultant rupture of the strands or the strand coverings. Apart from this it is found that the bobbin in rotating within its yoke is subjected to a troublesome lateral vibratory motion along the axis of the bobbin due to the shifting of the position of the bobbin with respect to the direction of the centrifugal force.

It is the object of the present invention to obviate to a considerable extent the above defects.

In endeavoring to overcome this problem according to the present invention it has been observed that there are two kinds of forces which give rise to irregularities in the movement of the bobbins, these being centrifugal forces and gravitational forces, and one principle underlying the present invention is to apply these forces in such a way that for the desired speeds of revolution used in the machine the resultant of these forces substantially coincides with the axes of the yokes.

In designing a machine on this principle it was observed, that by inclining the yoke spindles about which the bobbins rotated so that the said spindle made an angle with the central spindle, the deleterious effects of centrifugal forces were partially compensated for by the effects of gravitational forces. It was found that the most satisfactory conditions were attained for normal speeds when the angle which the yoke spindles made with the central spindle was approximately 85°, but, of course this angle varies with the speed at which the machine is to be driven and also with the distance between the bobbins.

For mechanical purposes it was found that by making the spindle about which the bobbins rotated at right angles to the central spindle, the above conditions could be approximately attained without detracting from the mechanical efficiency of the machine.

To attain the said object therefore, the invention may be said broadly to comprise a twisting machine in which the bobbins each holding one or more strands, and each adapted to be rotated in yokes about an axis at right angles to and symmetrical with the longitudinal axis of the bobbin, are so mounted and disposed about the central axis that for normal speeds of revolution the deleterious effects of centrifugal forces are substantially eliminated by the effects of gravitational forces, whereby the bobbins and their contents are substantially free with respect to applied forces with the exception of those obtained from the suitably designed gears, or those acting in a line substantially coincident with the axes of the yoke.

According to another aspect, the invention may be said to comprise a twisting machine in which bobbins, each adapted to be rotated about an axis at right angles to and symmetrical with the longitudinal axis of the bobbin, are mounted so that their longitudinal axes lie parallel or substantially parallel to the axis about which all the bobbins revolve.

In order that the invention may be readily understood I have hereunto appended a sheet of drawings illustrative thereof, in which Fig. 1 is a sectional side view of a machine embodying features according to the present invention, and Fig. 2 is an end view partially in section, the section being taken along the line 2—2 in Fig. 1.

The yokes 1 are mounted in a frame 2 which is fastened to a shaft 3 bearing in standards 4. The shaft 3 is arranged to be driven by any suitable means (not shown) in the direction indicated, thereby rotating the frame 2 and gear 7 around stationary gear 6. Within the frame 2 the yokes 1 are rotatable, each yoke being provided in the arrangement shown with two bobbins 5 containing the strands which it is desired to twist together. The rotation of the yokes 1 about their spindle axes 20, 20 is effected by means of the gear train 7 comprising the sun wheel 6 fastened to the left hand standard 4, pinions 23 and bevels 8 and 9. The rotation of the frame 2 on its axis due to the rotation of shaft 3 causes the revolution of the yokes. The idler 21 in traveling over the teeth of stationary sun wheel 6 rotates about the gearshaft 24 and in turn rotates gear pair 22 which drives the pinion 23 fastened to gearshaft 24. Power is thus transmitted through this gear train 7 to the bevel gears 8 and 9 for the rotation of the bobbin carrying yoke 1. Each yoke is driven by a gear train 7 such as here described and which cooperates with the stationary sun wheel 6. The centre shaft 3 is hollow and is provided with openings 10 through which pass the twisted pairs from the bobbins 5. In the arrangement shown there are two yokes; the twisted pairs from each yoke meet in the shaft 3 and are withdrawn in an axial direction. Instead of having two bobbins in each yoke other arrangements may be made. Also instead of using only two yokes more may be provided where necessary.

In making quadded cables of the above type, single conductors are contained on the bobbins 5, the pair withdrawn from each yoke is twisted together due to the rotation of said yoke and each twisted pair is carried forward to the central shaft 3 where the pairs are twisted together to form a quad by the rotation of frame 2.

The change wheels in gear trains 7 enable the amount of twist to be regulated as may be desired, and also the different types of twist may be given by suitably arranged gears to satisfy particular requirements. For example, the pair twist would usually be opposite to the quad twist, but if desired the pair twist may be made in the same direction as the quad twist.

In the machine above described the longitudinal axes of the yokes are perpendicular to the shaft 3, but if desired instead of being perpendicular they may make a slightly smaller angle therewith. This will, of course, involve a more difficult mechanical construction and for this reason the above form is preferred.

The description with reference to the drawings represents only one particular machine embodying the principles of the invention and must not be regarded as a limitation to the scope of the invention.

What is claimed is:

1. In a wire twisting machine individually rotatable yokes, bobbins for the wires mounted in said yokes and means for revolving said yokes about a central common axis, the axes of rotation of said yokes being at an angle with said common axis so that the deleterious effect of centrifugal forces due to the latter revolutional movement is substantially removed said angle being about 85°.

2. In a twisting machine for wires or the like, bobbins for said wires adapted to be rotated about an axis lying between said bobbins and at right angles to the longitudinal axes of said bobbins, yokes for carrying each a plurality of said bobbins and adapted to be revolved about a common central axis and being so disposed with respect to the common central axis that their axes describe a large angle therewith, whereby for the normal speeds of revolution the resultant of the gravitational and centrifugal forces acting upon said bobbins substantially coincides with the axes of the yokes.

3. A conductor strand twisting machine comprising a revoluble main twisting yoke, and a plurality of subordinate twisting yokes each carrying at least two supply reels and

each adapted to rotate about an axis forming a large angle with the axis of revolution of said main yoke the axes of said supply reels being substantially at right angles to the axes of their respective yokes.

4. A strand twisting machine for twisting and intertwisting signaling conductors comprising a main yoke mounted to rotate about a main axis, a plurality of supply carrying yokes each carrying separate supplies for a pair of conductors and adapted to rotate about its own axis and to revolve with said main yoke, and driving means between said main yoke and said supply carrying yokes, the axes of rotation of said supply carrying yokes being substantially perpendicular to said main axis.

5. In a twisting machine, individually rotatable yokes, a plurality of bobbins mounted upon each yoke and each carrying a signaling conductor to be embodied in a signaling cable, and gearing means for rotating said yokes about their individual axes and for revolving said yokes about a common axis, said yokes being disposed so that their axes of rotation forms an angle of about 85° with the common axis whereby the motion of the bobbins and their contents is substantially unaffected by applied forces with the exception of those obtained directly from said gearing means.

In witness whereof I hereunto subscribe my name this 13th day of July, 1928.

WILLIAM K. WESTON.