Dec. 7, 1926. 1,609,455

H. J. BOE

STRAND TWISTING MACHINE

Filed Feb. 9, 1924 2 Sheets-Sheet 1

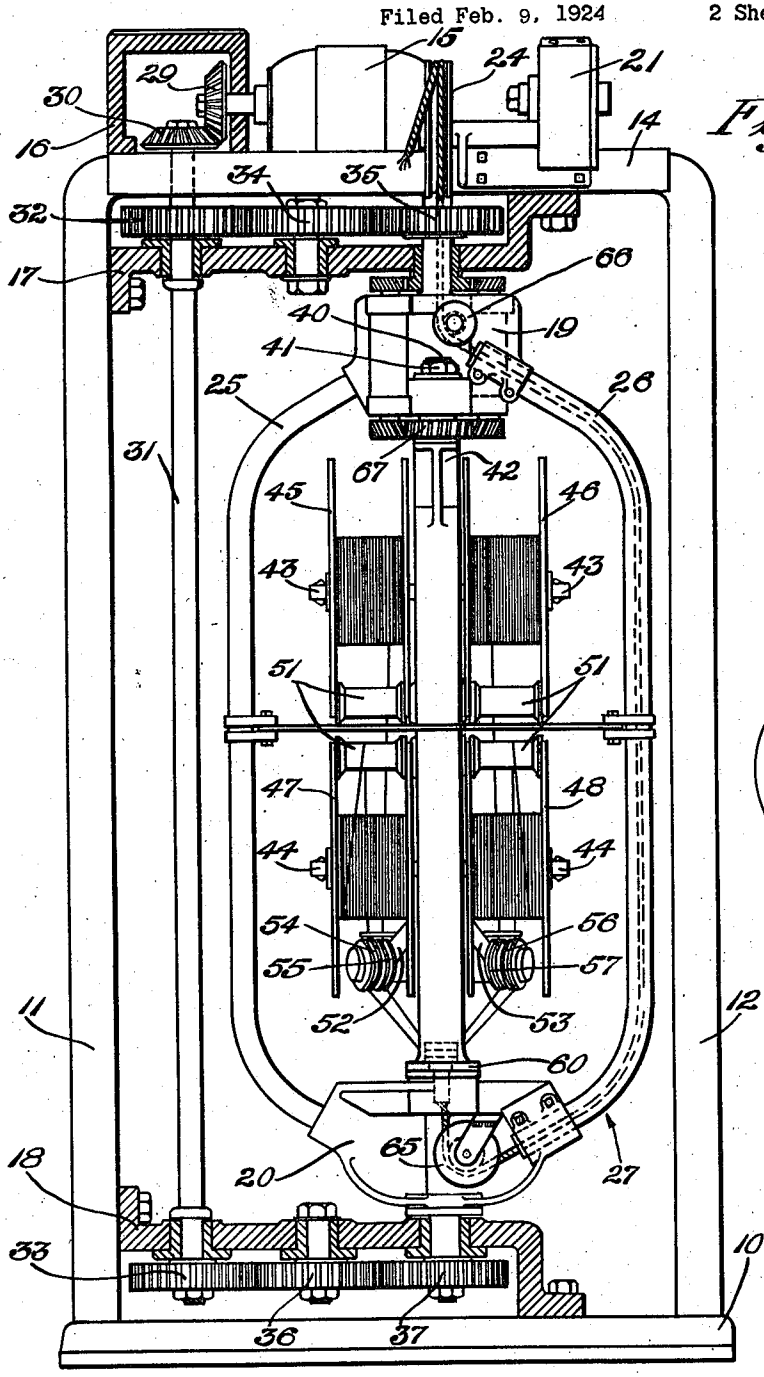
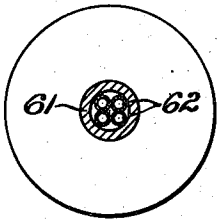


Fig. 1.

Fig. 5.



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Fig. 3.

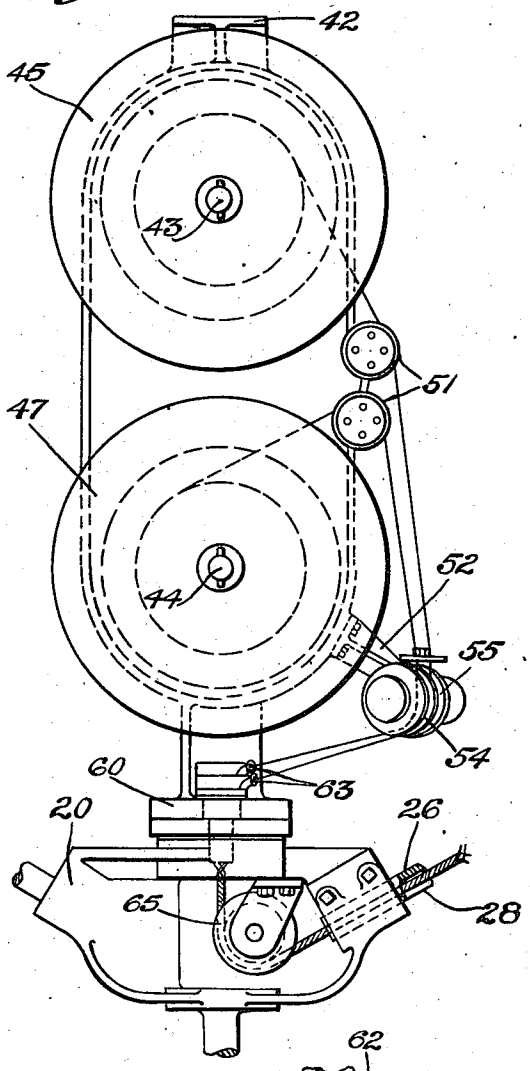


Fig. 2.

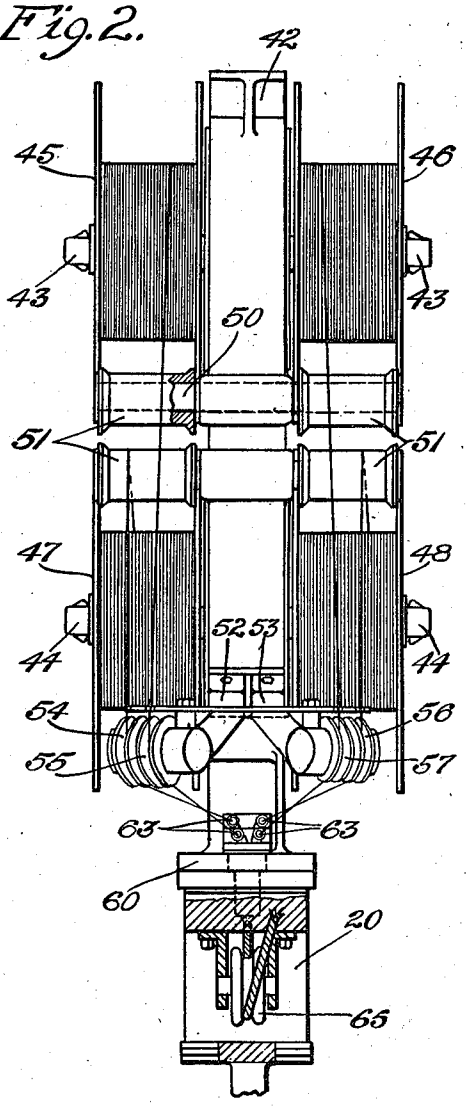
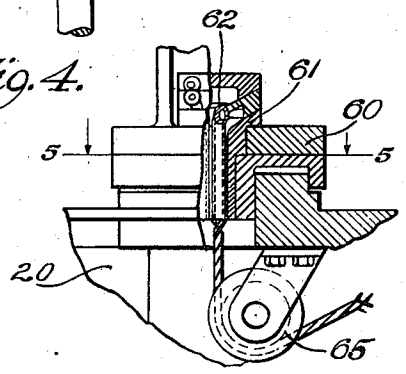


Fig. 4.



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UNITED STATES PATENT OFFICE.

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STRAND-TWISTING MACHINE.

Application filed February 9, 1924. Serial No. 691,554.

This invention relates to strand twisting machines, and more particularly to a machine for twisting insulated conductors to form a single closely interwoven unit.

A twisting machine of this general type is fully disclosed in Patent #1,263,405 of April 23, 1918, which comprises a frame or flier mounted to rotate around a relatively stationary center member, upon which is carried a plurality of reels of conductors to be twisted, the conductors being drawn therefrom and guided over rollers and through a mouthpiece to a pulley positioned at the axis of the rotating flier, drawn through the flier and withdrawn therefrom at a position diametrically opposite the point at which they enter and in a reverse direction from that at which they engage the pulley. For each revolution of the flier two twists will be put into the conductors one before they enter the flier and a second just after leaving the flier.

An object of the invention is to provide a machine of this type with an improved drive for the flier which permits the weight of the flier to be reduced to a minimum thereby providing with safety a greater speed of operation and consequently a greater output of twisted conductors in a given unit of time.

Another object of the invention is to provide an improved arrangement of and rollers for guiding the strands from the supply reels to the flier whereby the tension on the conductors is reduced and damage to the insulation thereon minimized.

A further object of the invention is to provide an improved mouthpiece through which the conductors pass after leaving the guide rollers to the point of the first twist to prevent entanglement of the conductors and to reduce the friction upon the insulation.

Other objects and advantages of the present invention will be set forth in the following description and particularly pointed out in the appended claims.

The invention is illustrated in the accompanying drawings in which:

Fig. 1 is a front elevation of a twisting machine partly in section embodying the features of the invention;

Fig. 2 is an enlarged fragmentary view thereof partly in section;

Fig. 3 is an enlarged fragmentary side view thereof;

Fig. 4 is an enlarged detail sectional view of a portion thereof; and

Fig. 5 is a plan section taken on the line 5—5 of Fig. 4 looking in the direction of the arrows.

The preferred embodiment of the invention herein illustrated consists of a machine for twisting insulated wires, but it will be quite evident that the invention is adaptable to practically any and all machines in which twisting operations are to be performed.

The operating elements of the machine in the specific embodiment are mounted in a frame consisting of a base 10, the uprights 11 and 12, and the upper cross rail 14. Any suitable driving means may be used such as an electric motor 15 which is mounted on the cross rail 14, the shaft of the motor 15 being connected to a train of gears enclosed within the housings 16, 17, and 18 whereby the movement of said shaft will be transmitted to upper and lower yoke brackets 19 and 20 respectively. The gears in the housing 17 are interconnected with suitable gears to the gears in a housing 21 which drive a shaft rigidly connected to the capstan 24. Secured to the upper yoke bracket 19 are the downwardly extending yoke arms 25 and 26 which with the brackets 19 and 20 comprise a flier 27. These arms are tubular in form, the wire to be twisted being carried in the tubular chamber of the arm 26, as illustrated in Fig. 3, which is fitted with a slot 28 by means of which the wire may be inserted within said tube without threading it therethrough. The arms 25 and 26 of the yoke are connected at the bottom of the machine to the lower yoke bracket 20 which is mounted in a suitable bearing secured to the housing 18.

Secured to the motor shaft is a bevel gear 29 which meshes with a similar gear 30 secured to a vertically disposed shaft 31 which extends through the housing 17 and downward into the lower housing 18 and suitably secured to the shaft 31 within the housings 17 and 18 respectively are spur gears 32 and 33. The gears 32 and 33 are identical and through similar gears indicated at 34 and 35 and 36 and 37 rotate the yoke brackets 19 and 20 respectively which carry

the arms 25 and 26 between them in the same direction in a manner well understood in the art of gearing. The simultaneous drive of the flier 27 at the top and bottom thereof eliminates the excessive torsional stress which occurs in the twisting machine of the before referred to patent wherein the flier is driven from the top only. By the simultaneous drive of the flier 27 at both ends the weight of the arms 25 and 26 may be reduced to a minimum and the speed of the machine increased, thereby resulting in a greater output.

Suspended by a shaft 40 and a holding nut 41 from the upper yoke bracket 19 is a supply reel holder 42 to which are secured spindles 43 and 44 upon which are suitably mounted supply reels 45, 46, 47, and 48. Mounted upon studs 50 suitably secured in bosses formed on the supply reel holder 42 are guide rollers 51 having a guide surface substantially the width of the reels. Carried upon the supply reel holder 42 below the spindle 44 are brackets 52 and 53. Angularly disposed upon each of the brackets 52 and 53 is a pair of guide rollers 54 and 55 and 56 and 57 respectively.

Suitably mounted in the base 60 of the reel holder 42 is a shouldered sleeve 61 which as clearly illustrated in Figs. 4 and 5 has mounted therein a plurality of tubes 62. As clearly illustrated in Figs. 2 and 3 the mouths 63 of the tubes 62 face toward the front of the machine and looking from the front two of the tubes are inclined slightly toward each set of spools set in vertical arrangement.

The conductors from the supply reels are threaded over the pulleys 51 as clearly shown in Figs. 2 and 3 the conductors from the reels 45 and 47 being led over the rollers 51 and then over the angularly disposed rollers 54 and 55 to the mouths 63 of the pair of the tubes which are inclined toward the reels 45 and 47. The angular relation between each set of rollers 54 and 55 and 56 and 57 and the mouths 63 of each pair of tubes is such that the conductors pass over the rollers and through the tubes with a minimum amount of tension upon the conductor and of friction upon the insulation thereon. From the tubes 62 the conductors pass around a pulley 65 positioned in line with the axis of the rotatable flier 27 and suitably mounted upon the lower yoke bracket 20, the pulley 65 being positioned at the lower end of the tubular arm 26 through which the conductors pass. A pulley 66 similar to the pulley 65 is mounted in the upper yoke bracket 19, the pulleys 65 and 66 being so mounted that the inner guiding surfaces thereof lie in substantially the same vertical plane, this plane being also common to the rotating axis of the flier 27.

The supply reel holder 42 is held stationary during the rotation of the flier 27 by a train of gears indicated at 67, which with the means for allowing the flier to be rotated when desired is similar to the means disclosed in detail in the before mentioned patent to which reference may be had for a detailed description.

In the operation of the machine the reels which carry the conductors to be twisted are first suitably mounted upon the spindles 43 and 44 carried on the supply reel holder 42 in a manner fully disclosed in the before mentioned patent. Upon the placing of the reels in their proper position upon the holder 42, the conductors are threaded over the guide rollers 51, the conductors from the reels 45 and 47 being then guided over the guide pulleys 54 and 55 and then to the mouths 63 of one pair of tubes 62; similarly the conductors from the reels 46 and 47 are threaded after passing over the guide rollers 51 over the guide pulleys 56 and 57 and then to the mouths 63 of the other pair of tubes 62.

By providing guide rollers 51 with guide surfaces which are substantially the width of the face of the reels the angle of deflection of the conductors from the point of leaving the reels to the guide pulleys 54, 55, 56, and 57 while traveling toward the tubes 62 is reduced to a minimum and consequently the tension upon the conductors and resulting damage to the insulation thereon while being drawn from the reels is minimized. The four tubes 62 combined, provide a multi-orificed member whereby each conductor after leaving its respective guide pulley 54, 55, 56, or 57 is brought into close relationship with the other conductors passing through the other tubes 62 preparatory to the twisting operation. This arrangement places the conductors in proper relation one to the other preventing entanglement and reduces friction between the conductors since the conductors are held separated up to the point of twisting, the first twist occuring between the lower end of the tubes and the guiding surface of the pulley 65.

From the guide pulley 65 the conductors are threaded through the tubular arm 26 and then over the guide pulley 66 from whence several turns are taken around the capstan 24 after which the ends of the conductors are carried to any suitable form of take-up mechanism (not shown).

The machine is now ready to be started providing the rate of rotation of the yoke has been properly adjusted with reference to the speed of rotation of the capstan 24 so that the proper number of twists per unit length of conductor will be introduced into the conductors that are to be twisted. The number of twists per unit length may obviously be readily adjusted by either reducing or increasing the speed of the rotating

flier 27 by means of the gearing interconnecting the shaft of the motor and the upper and lower yoke brackets 19 and 20, or by changing the gear ratio in the housing 21 which controls the rate of rotation of the capstan 24.

When the speed of rotation of the flier and capstan has been properly determined and the gearing adjusted so as to obtain the desired length of twist; the main switch of the motor is actuated to start the rotation of the flier and capstan. As the capstan rotates, the conductors are drawn from the reels over the various guiding rollers and pulleys through the multi-orificed member over the pulley 65 through the tubular arm 26 of the flier, the twisted conductors from the capstan 24 being fed to a suitable take-up mechanism which is started at the same time and the movement of which may be conveniently controlled by the motor 15 which also drives the twisting machine. The conductors leaving the reels are guided by the respective pulleys so that they converge and are in effect nested as they leave the multi-orificed member.

Between the point of leaving the mouthpiece and their engagement with the pulley 65 the four conductors will be given a complete twist for each rotation of the flier since the pulley 65 is rotated with the flier and the conductors held stationary as they emerge from the multi-orificed member. At the same time that this twist is introduced into the conductors, a second twist is being introduced into the conductors between that portion of the conductors contained between the guiding pulley 66 mounted on and revolving with the upper yoke bracket 19 and the point of contact between the conductors and the capstan 24. It will, therefore, be evident that as the flier 27 is rotated and the conductors are drawn from the supply reels and fed over the several guiding rollers and pulleys through the tubular arm 26 to the capstan they are subjected to two complete twists for each rotation of the flier. Further, it will be evident that since the top and lower yoke brackets 19 and 20 respectively are simultaneously rotated through the before described gearing that substantially no torsional stress will be imparted to the arms 25 and 26 during such rotation and as a consequence the strength and weight thereof may be reduced to a minimum; also due to the lack of torsional stress upon the flier the machine may be run at a much greater speed than machines of this type have been run heretofore thereby resulting in a greater output from the machine in a given unit of time.

What is claimed is:

1. In a strand twisting machine, a strand supply reel holder, a pair of supply reels mounted thereon, a rotatable twisting element, means for drawing strands from said reels about said twisting element, means applied at opposite ends for rotating said twisting element, means associated with said last mentioned means for maintaining the reel holder stationary, and means operated to place a double twist in said strands for each complete rotation of said twisting element.

2. In a strand twisting machine, a strand supply reel holder, a pair of supply reels mounted thereon, a rotatable twisting element, means for drawing strands from said reels about said twisting element, gears mounted at opposite ends of said twisting element, a gear train connecting said gears with a source of power, differential gears driven from said gear train for maintaining the reel holder stationary, and means operated to place a double twist in said strands for each complete rotation of said twisting element.

3. In a strand twisting machine, a stationary supply reel holder, a pair of supply reels mounted thereon, a rotatable twisting element pivoted to describe a surface of revolution about the stationary reels and holder upon rotation of the element, and means to eliminate the torsional stresses in the twisting element.

4. In a strand twisting machine, a stationary supply reel holder, means for rotatably mounting strand carrying reels on said holder, strand guiding means associated with said holder having guide surfaces substantially the width of said reels, a second guiding means spaced therefrom and having a guiding surface substantially of the diameter of the strand to which the strands are led from said first mentioned guiding means, a third guiding means comprising a tube with an opening in direct alignment with the direction of the strand at that point adapted to prepare the strands for twisting, means for drawing the strand from said reels, a rotatable twisting member, and means whereby the strands from the supply reels will be given two complete twists during each rotation of said member.

In witness whereof, I hereunto subscribe my name this 29 day of January A. D., 1924.

HELMER JOHN BOE.