Jan. 22, 1935. H. J. DEACON 1,988,586

QUAD STRANDING MACHINE

Filed May 7, 1931

FIG. 1

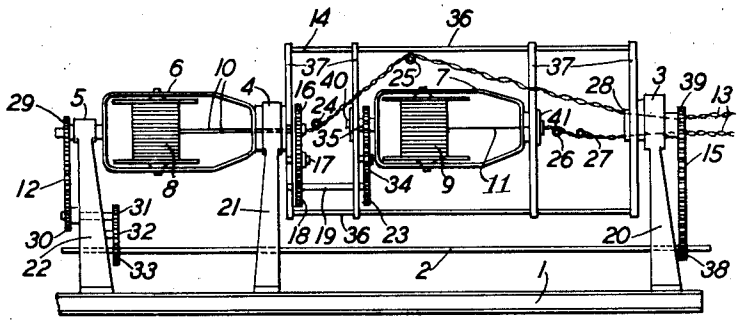


FIG. 2

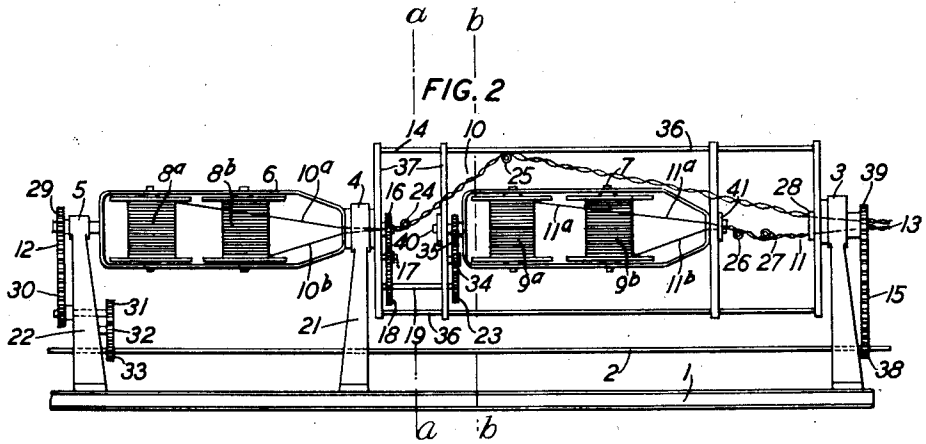
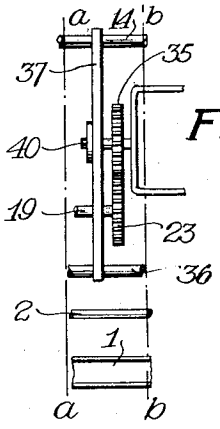


FIG. 3.



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QUAD STRANDING MACHINE

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8 Claims. (Cl. 117—20)

This invention relates to machines for twisting wires or groups of wires into units and more particularly to machines for forming cable units for communication cables.

Communication cables and more particularly telephone cables are usually made up of a plurality of units such as quads, each consisting of individual wires or strands appropriately twisted together. The most common unit is the quad which consists of two pairs of wires twisted together.

The machines at present used for producing units such as quads or pairs have several disadvantages. The bobbins carrying the wires or pairs of wires to be twisted together are mounted at points removed from the axis of rotation of the machine and consequently, as the machine rotates the bobbins are subjected to deleterious effects due to centrifugal or other unbalanced forces with the result that the speed of the machine has to be limited in order that the product shall be of the desired quality.

The present invention overcomes these disadvantages in that it provides a twisting machine in which bobbins or reels carrying the supply of wire or strand to be twisted into units are arranged on the same axis as the axis of rotation of the machine.

The invention will be more clearly understood from the following detailed description when read in conjunction with the accompanying drawing in which:

Fig. 1 shows one form of machine for twisting two wires or two pairs of wires into a unit; and

Fig. 2 shows another form of machine for twisting four wires into a quad.

Fig. 3 shows a modified form of a part of the gear train shown in Figs. 1 and 2, the modification being applicable to either of the gear trains of Fig. 1 or Fig. 2.

The machine illustrated in Fig. 1 may be used for twisting two wires into a pair, for twisting two pairs into a quad or for twisting any two units together to form a larger unit. For convenience the following description is with reference to the twisting of four conductors to form two pairs which are twisted together to form a quad. As illustrated the machine consists of a bed-plate 1 on which are mounted three bearing columns 20, 21 and 22 carrying bearings 3, 4 and 5 respectively. Between the bearing columns 21 and 22 is mounted a yoke 6 carrying a bobbin or reel 8 of paired wire 10. This yoke 6 is rotated by means of a chain 12 and sprockets 29 and 30 and variable train of gears 31, 32 and 33, the driving gear 33 of which is mounted on a main shaft 2 which is driven from a suitable source of power (not shown).

Between the bearing columns 20 and 21 is mounted a cage 14 consisting of a series of lateral members 36 and a series of radial or transverse members 37. In this cage 14 is rotatably mounted by means of bearings 40 and 41 a second yoke 7 carrying a reel 9 of paired wire 11. Cage 14 is rotated from the main shaft 2 through a chain 15 and sprockets 38 and 39. On the bearing column 21 and projecting inside the cage 14 is mounted a stationary gear wheel 16 with which engages an idler wheel 17 carried by the cage, there being another gear wheel 18 fixed on a shaft 19 which is also rotatably mounted in the cage. At the other extremity of the shaft 19 there is arranged a variable train of gears consisting of a driver 23, an idler 34 and a driven gear 35, the latter being mounted on the yoke 7. By this arrangement the rotary movement of the cage causes a rotary movement to be imparted to the yoke 7 arranged therein and the speed of the yoke can be varied by suitably varying the gear train arranged between the cage and the yoke (see Fig. 3).

The bearing 4 is hollow and may contain a forming or twisting die the pair 10 from the reel 8 is led through it and twisted. The pair then passes over grooved guide wheels 24 and 25 past and around the yoke 7 to the forming die or lay plate 28 fixed to the cage and then through the bearing 3 which is also hollow where it meets the pair 11 from the other reel 9.

The pair 11 from the reel 9 is passed through the hollow bearing 41 which may contain a forming or twisting die; the pair is twisted and passed over grooved guide wheels 26 and 27 to the forming die or lay plate 28 and through the hollow bearing 3 where it is formed into quads 13 with the other pair 10 from reel 8. The speeds at which the yokes 6 and 7 rotate can be varied by changing one of the gear wheels of the train 31, 32 and 33 or 23, 34 and 35, and the direction of rotation of either or both of the yokes may be changed by the removal of one or both of the idler wheels 32 or 34. In this case the corresponding gear wheels 31 and 33 or 23 and 35, respectively, are replaced by gear wheels of correspondingly greater diameter, as is shown in detail in Fig. 3, which shows a suitable modified form of the invention as applied to that part of Fig. 1 or Fig. 2 which is comprised between the dotted lines *a* and *b*. Although applied to the gear train comprising gears 23, 34 and 35 the

modified form shown in Fig. 3 may equally be well applied to the gear trains comprising gear wheels 31, 32 and 33 or to that comprising gear wheels 16, 17 and 18.

In operation, the rotation of the yoke 6 puts a twist into pair 10 and the rotation of yoke 7 puts a twist into the pair 11 whereas the rotation of the cage 14 causes the pairs 10 and 11 to be twisted together. The relative length of twist of pair 10 is determined by the constitution of the train of gears 31, 32, 33 and the length of twist of pair 11 by that of train 23, 34, 35. The length of twist of the quad is determined by the rate of rotation of the cage 14.

The pairs forming the quad may be pulled through the machine by any suitable capstan unit from which the finished quads pass to a suitable take-up unit.

Fig. 2 shows another form of machine embodying the invention and in which a multiple twist quad is formed direct from the individual wires. Parts corresponding with those of the machine illustrated in Fig. 1 are illustrated by corresponding references and it will be seen that the machine differs from that shown in Fig. 1 mainly in that each of the yokes 6 and 7 carries two reels. In the yoke 6 these reels are indicated at 8*a* and 8*b* and in the yoke 7 at 9*a* and 9*b*. The reels are arranged axially one behind the other, and the wires 10*a* and 10*b* are twisted together as they leave the yoke 6, the wires 11*a* and 11*b* are twisted together as they leave the yoke 7 and the twisted pairs are twisted together to form a quad, at the exit end of the cage 14. As previously described the twists or lays of the wires or pairs can be varied by varying the relative speeds of the yokes or of one or more yokes in relation to the cage.

What is claimed is:

1. A cable forming machine comprising a rotary cage and a plurality of rotary yokes each equipped with at least one rotatably mounted reel, said reel carrying a pair of wires to be twisted together to form a twisted pair, means for rotating said yokes, said yokes being arranged horizontally so that their horizontal axes of rotation substantially coincide with the axis of rotation of said cage, and means including said rotary cage for twisting said twisted pairs of wires together to form a twisted quad.

2. A cable forming machine comprising a rotary cage, a plurality of rotary yokes, means for supporting coiled wires on each of said yokes with the center of mass of said coiled wires approximately on the axis of rotation of said yokes, and means for supporting and individually rotating said yokes and cage about a common axis.

3. A cable forming machine as defined in claim 2 characterized in that said means for supporting coiled wires comprises two reels whose individual axes of rotation are parallel and are perpendicularly bisected by the axis of rotation of said yoke, each of said reels carrying a single wire, whereby the rotation of each of said yokes causes the wires to be laid into twisted pairs.

4. A cable forming machine as defined in claim 2, characterized in that said means for supporting coiled wires comprises a single reel carrying a pair of wires wound thereon whereby the rotation of each of said yokes causes the wires on each reel to be twisted together.

5. A machine for twisting signaling conductors into cables comprising a driving element, a plurality of rotary driven elements carrying signaling conductors to be laid up in pairs and having coinciding axes of rotation, a cage rotatable around an axis which substantially coincides with the axes of rotation of said driven elements, said rotary cage being adapted to twist said pairs into a cable, and means intermediate said driving and driven elements and cage for transmitting motion to said driven elements and cage at different rates of speed, whereby said pairs and cable are laid up with different angles of lay and the transmission characteristics of said cable for signaling currents are improved.

6. A cable forming machine comprising a rotary cage, a plurality of rotary yokes, means for supporting and individually rotating said cage and yokes about a common axis, and at least one wire carrying reel supported on each of said yokes with the axis of said reels substantially perpendicularly bisected by said common axis.

7. A communication cable forming machine comprising a plurality of rotatable yokes, a plurality of wire carrying reels supported by said yokes with their axes approximately perpendicularly bisected by the axis of rotation of said supporting yokes, means for individually rotating said yokes to twist said wires from said reels together, a rotatable cage, means for rotating said cage to twist the twisted wire from said yokes into a cable, and supporting means for supporting said yokes and cage with their axes of rotation substantially colinear.

8. A quad twisting machine comprising two rotatable yokes, means for supporting two coiled wires on each of said yokes with the center of mass of said coiled wires approximately on the axis of rotation of said supporting yokes, means for individually rotating said yokes to form a twisted pair of wires from said two wires supported thereon, a rotatable cage, means for rotating said cage to form a twisted quad from said twisted pairs of wires and means for rotatably supporting said cage and yokes with their axes substantially colinear.

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