Dec. 14, 1943. W. SCHWEITER 2,336,963

CROSS WOUND COP WINDING MACHINE

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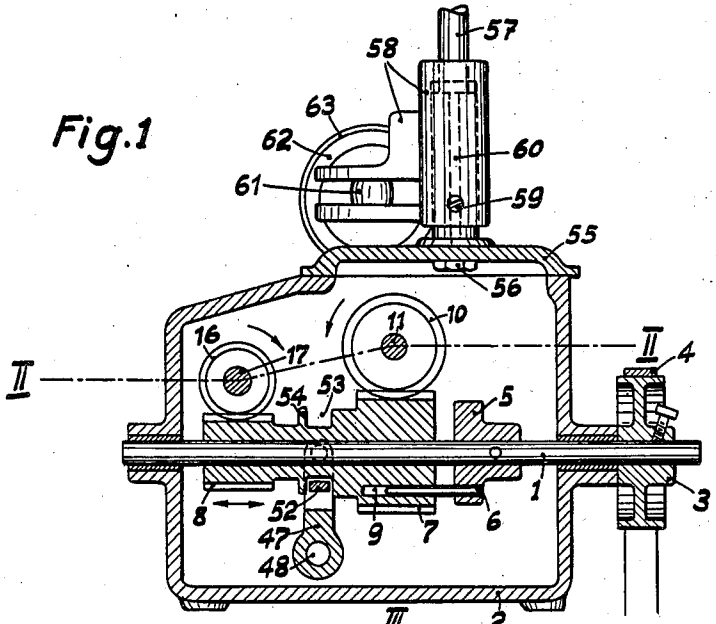
Fig.1



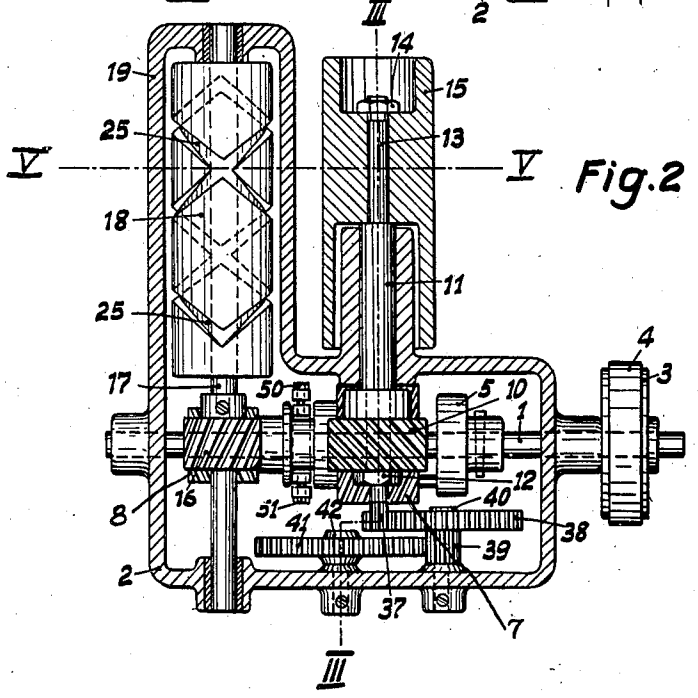


Fig.2

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Fig.3

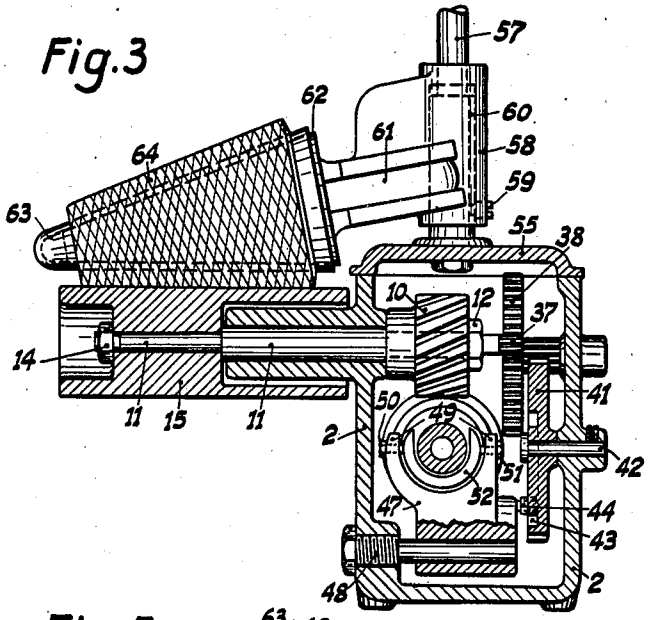


Fig.5

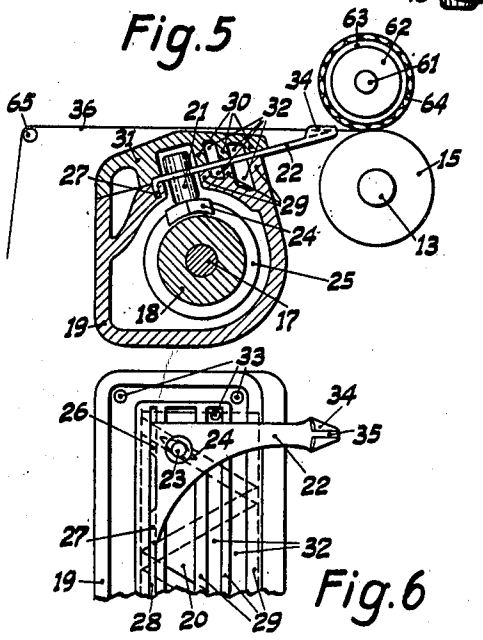
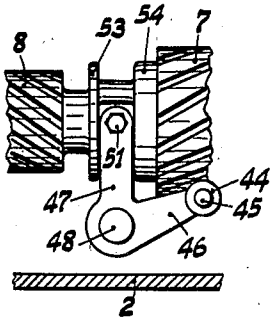


Fig.6

Fig.4



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CROSS WOUND COP WINDING MACHINE

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In Switzerland October 2, 1940

7 Claims. (Cl. 242—18)

This invention relates to improvements in cross wound cop winding machines. In cross wound cop winding machines, in which the cross wound cops are driven by friction rollers, and in which the yarns are delivered on to the cross wound cops by reciprocating yarn guides, definite relationships exist between the number of revolutions of the friction rollers and the number of strokes made by the yarn guides. The diameter of the cop being wound increases continually during the process of winding, with the result that the number of revolutions of the cop decreases in inverse proportion to the circumference and diameter thereof respectively. The relationship between the number of strokes made by the yarn guide and the number of revolutions of the cop being wound consequently varies constantly and goes on increasing, reaching sometimes even whole figures, e. g., 1:2, 1:3 and so on. At the times when such whole figure ratios exist, each successive turn of yarn is laid exactly on top of the preceding one, so that spiral ribs or other patterns are produced which not only result in non-circular cops, but even give rise to trouble when the yarn is unwound from the cop.

In order to avoid the formation of such ribs and patterns, various so-called "disturbance gearings" have already been proposed, the purpose of said gearings being to alter continually the ratio between the number of strokes made by the yarn guide and the number of revolutions of the friction roller in a rapid periodic cycle. It has been found that such disturbance gearings form a very important part of the machine, the reliable working of which must be ensured under all circumstances.

The chief object of the present invention is to provide an improved and efficient disturbance gearing for cross wound cop winding machines which will effectively prevent the formation of patterns and ribs on the cops being wound.

In order that this invention may be the more clearly understood and readily carried into effect, we will proceed to describe the same with reference to the accompanying drawings, which illustrate by way of example and not of limitation one convenient embodiment of the present invention, and in which:

Figure 1 is a section through the worm wheel drive of a cop winding apparatus.

Figure 2 is a section on the line II—II of Figure 1.

Figure 3 is a section on the line III—III of Figure 2.

Figure 4 shows details of components of the disturbance gearing.

Figure 5 is a section on the line V—V of Figure 2 through the yarn guide driving mechanism, and

Figure 6 is a plan view of the yarn guide and its sliding surface with the cover removed.

Referring now to the drawings, a driving shaft 1 is mounted in suitable bearings in a gear box 2 and is driven in any desired manner, for example, by means of a belt pulley 3 and a driving belt 4. A collar 5 is mounted on the driving shaft 1 within the gear box, being provided with an elongated drive pin 6. Also mounted on the driving shaft 1 are two worm wheels 7 and 8 which are rigidly connected together so as to form a unitary structure, the arrangement being such that the said unitary structure is axially slidable on the driving shaft as a sleeve. Such sleeve is splined to the shaft by having a bore 9 parallel with the driving shaft 1 into which the pin 6 takes so as to transmit the rotation of the driving shaft to the two worm wheels. The threads on the two worm wheels 7 and 8 are of opposite hand, that is to say, if the threads of the worm wheel 7 are left-handed, the threads of the worm wheel 8 are right-handed, and vice versa.

The worm wheel 7 engages with a worm wheel 10 mounted on a shaft 11 carried in bearings in the gear box, the gear wheel 10 being secured to the shaft 11 by means of a nut 12. On that portion 13 of the shaft 11 which projects outside the gear box 2 is mounted the means for rotating the cop so as to wind the yarn on it, and which in this case is a winding roller 15 secured to the shaft by means of a nut 14. The worm wheel 8 engages with a worm wheel 16 mounted on a shaft 17 carried in bearings in the gear box, the said shaft 17 having secured thereto the yarn guide traverse mechanism which is represented by a cam cylinder 18 which is housed in an extension 19 of the gear box 2. The extension 19 is provided in its top with an elongated slot 20 (Figure 6) in which a hub 21 on a yarn guide plate 22 is guided. In this hub 21 is mounted the pin 23 of a sliding block 24 which is guided in grooves 25 in the cam cylinder 18 and so derives a backward and forward movement therefrom. Thus the cop-rotating mechanism and the yarn guide traverse mechanism are each driven by a worm or spiral gear couple, that is to say, the couple 7—10 and the couple 8—16, and the driving members of these couples

are adapted for longitudinal or axial movement on the shaft which drives them.

The yarn guide plate 22 is guided laterally by two ends 26 and 27 which are bent down at right angles and slide in a slot 28 in the part 19. The yarn guide plate 22 is also guided at the bottom and top by means of runways 29 and 30 in the extension 19, and the cover 31 thereof respectively. The spaces 32 between the runways 29 and 30 serve to trap the jets of oil which, under certain circumstances, are ejected from the gear box and the oil which collects in these spaces is returned to the gear box through holes 33. The cover 31 thus seals the extension 19 against the escape of oil. The outer end of the yarn guide plate 22 is provided with a tapering yarn guide 34 having a slot 35 in its upper surface through which the yarn 36 may be passed.

The inner end of the shaft 11, inside the gear box 2, is formed as a toothed pinion 37 which engages with a toothed wheel 38. This toothed wheel 38 is compounded with a smaller toothed wheel 39 and is mounted on a stud 40 fixed in the gear box 2. The toothed wheel 39 gears with a toothed wheel 41 which is likewise mounted on a stud 42 fixed in the gear box 2. The toothed wheel 41 has on its interior face an eccentric circular groove 43 in which runs a guide roller 44 mounted on a pin 45 carried by one arm 46 of a rock lever 47 (Figures 3 and 4). This rock lever 47 is mounted on a partially screw-threaded bolt 48 fixed in the gear box 2 and has a forked upper end 49. In this forked upper end 49 and on partially screw-threaded bolts 50, 51 is fulcrumed a yoke 52 which engages in an annular groove 53 in the hub 54 of the unitary structure formed by the two worm wheels 7 and 8. When the toothed wheel 41 rotates, the eccentric circular groove 43 imparts a rocking movement to the rock lever 47 and this is transmitted by the yoke 52 to the hub 54 and so causes the unitary structure formed by the worm wheels 7 and 8 to be oscillated backwards and forwards on the driving shaft 1. Since the threads on the two worm wheels 7 and 8 are of opposite hand, the axial movement of the said worm wheels produces either a retardation of the worm wheel 16 and an acceleration of the worm wheel 10, or conversely an acceleration of the worm wheel 16 and a retardation of the worm wheel 10. The ratio of the drive transmissions to the cam cylinder and to the winding roller thus varies continuously and fluctuates between a maximum and minimum value.

A pillar 57 is mounted on the cover 55 of the gear box 2 by means of a nut 56, said pillar acting as a guide for a cop holder 58 which is held against rotation by means of a set screw 59 engaging in a groove 60. The cop holder 58 carries a cop spindle 61 on which is freely mounted a conical holder 62 for the conical cardboard cop tube 63 which rests on the winding roll 15 and is rotated thereby.

During the winding operation, the yarn 36 which is drawn from a source package, not shown, and runs over a guide rod 65, is wound on to the cardboard tube 63. The cop 64 increases in diameter continually as it is being wound and in so doing pushes the cop holder 58 upwardly on the pillar 57. The angular speed of rotation of the cop 64 being wound fluctuates continually between a maximum and a minimum value, whilst the number of strokes made by the yarn guide 34 varies inversely. It is, therefore, not possible for a whole number ratio to exist between the number of strokes made by the yarn guide and the number of revolutions of the cop being wound even for a short time and hence there is no chance of successive turns of the yarn piling themselves up on top of one another. On the contrary, the turns of yarn on a cop produced with the aid of the gearing according to the present invention are uniformly disposed and the cops are free from patterns and ribs.

I claim:

1. In a cross wound cop winding machine, a driving shaft, a friction roller for driving the cop to be wound, a yarn guide, a cam cylinder controlling the movement of the yarn guide, a first worm wheel operatively connected to said friction roller to drive the same, a second worm wheel operatively connected to said cam cylinder to drive the same, said first and second worm wheels having threads of opposite hands, two further worm wheels forming a unitary structure axially slidable on said driving shaft and engaging one with the first worm wheel and the other with the second worm wheel to drive the same, means for rotating said unitary structure from said driving shaft whilst leaving the same free to move axially thereon and means for oscillating said unitary structure backwards and forwards on said driving shaft so that the drive to the friction roller and the drive to the cam cylinder are continuously modified in respectively opposite directions whereby the ratio between the number of strokes of the yarn guide and the number of revolutions of the friction roller is continuously varied.

2. In a cross wound cop winding machine according to claim 1, means for driving said unitary structure from the driving shaft whilst leaving the same free to move axially thereon, comprising a collar secured to said driving shaft and a pin carried by said collar and extending into a bore in said unitary structure parallel with the axis of the driving shaft.

3. In a cross wound cop winding machine according to claim 1, means for oscillating said unitary structure on the driving shaft comprising a double-armed rock lever, a guide roller on one arm of said lever, a driven toothed wheel having an eccentric circular groove therein actuating said guide roller and a forked end to the other arm of said lever engaging in an annular groove in said unitary structure.

4. In a cross wound cop winding machine according to claim 1, a gear box, an extension to said gear box housing the cam cylinder and having an elongated slot in its upper surface, a yarn guide driving element co-operating with said cam cylinder and projecting through said slot and a cover to said extension co-operating therewith to form guides and runways for the yarn guide and to seal the extension so as to prevent the escape of oil therefrom.

5. In a cross-wind yarn winding machine having cop-rotating and yarn-traverse mechanisms driven from a common drive shaft, the improvement which comprises a spiral gear couple in the power line from said shaft to each said mechanism and means for continually and simultaneously, axially reciprocating one gear of each couple in directions to accelerate and decelerate respectively the operating speeds of said mechanisms.

6. In a cross-wind yarn winding machine having cop-rotating and yarn-traverse mechanisms driven by a common drive shaft, the improvement which consists in a spiral gear couple in the power line from said shaft to each mechanism, the driv-

ing members of such couples being splined on such shaft and having opposite hands of pitch, and means driven by such shaft for jointly reciprocating such members in the same direction on said shaft, while in rotary operation, thereby respectively accelerating and decelerating the operating speeds of said mechanisms in alternation.

7. In a cross-wind yarn winding machine having cop-winding and yarn-guide traverse mechanisms and a common drive shaft therefor, of disturbance gearing connecting such shaft to such mechanisms comprising a sleeve splined on the shaft and bearing spiral gears of opposite pitch, said mechanisms having spiral gears respectively meshing therewith, and means driven by said drive shaft for reciprocating said sleeve while it is driving said mechanisms.

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