Feb. 17, 1959 HANS-WERNER SCHINKE ET AL 2,873,569

STRANDING MACHINE ARRANGEMENT

Filed Nov. 28, 1956

Fig. 1

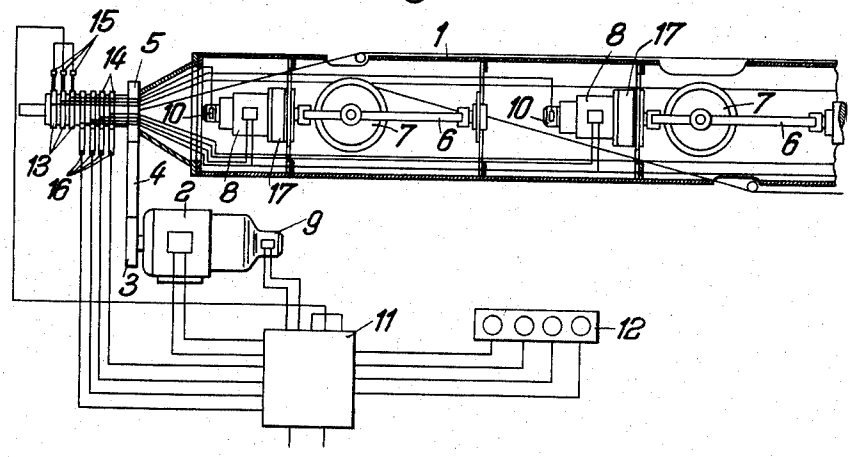
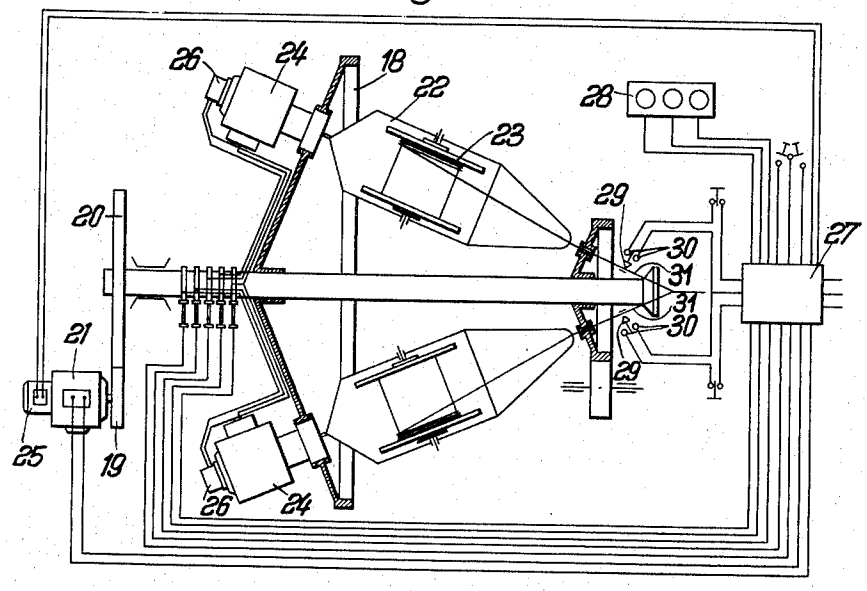


Fig. 2



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United States Patent Office 2,873,569 Patented Feb. 17, 1959

2,873,569

STRANDING MACHINE ARRANGEMENT

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Application November 28, 1956, Serial No. 624,837

Claims priority, application Germany December 6, 1955

6 Claims. (Cl. 57—58.32)

The present invention relates to stranding machines, particularly, for manufacturing electric cables.

Stranding machines have been known in which the bobbin cradles are turned in reverse direction during the rotation of a rotating body in which these cradles are mounted. Generally, a reverse rotation of 360° is used, whereby the bobbin cradles retain their position in space, so that the workpiece or cable is stranded without twisting. However, in many cases, it is desirable to subject the workpiece or cable, i. e., the strands, wires, conductors, etc., to be stranded, to a reverse rotation which is larger or smaller than 360°. Gears with adjustable transmission ratio built in the driving mechanism have been used for this purpose.

It is an object of the present invention to provide a stranding machine in which the reverse rotation of the bobbin cradles is obtained without gears being inserted between the driving mechanism of the stranding machine and the bobbin cradles. This has the great advantage of avoiding backlash always present in gears, such backlash resulting in inaccuracies in the reverse rotation and, thereby, in the relative position of the wires or conductors within the cable. Furthermore, the omission of the gears as such is an advantage in the design of the new stranding machine.

It is another object of the present invention to provide a stranding machine in which the bobbin cradles are driven individually or in groups by an electromotor, the housing of which is mounted on the rotating body of the stranding machine, while the rotor of the electromotor is associated with the bobbin cradle and while the cradle motors are electrically connected in synchronism to the driving motor of the rotating body, i. e., to the main driving motor.

It is a further object of this invention to provide a tacho-dynamometer for the main driving motor and for each of the bobbin cradle motors and to interconnect said tacho-dynamometers by means of a control unit which is manually controllable with the aid of potentiometers. By this or similar circuit arrangements, such as frequency control circuits, it is possible to act rapidly on the reverse rotation drive means of the bobbin cradles in positive or negative direction if a correction of the instantaneous position of a bobbin cradle should be necessary.

It is a still further object of the present invention to insert a transmission gear between the bobbin cradle and the bobbin cradle motor, whereby said transmission gear is designed in such a manner, that any undesirable turning of the bobbin cradle is prevented when the bobbin cradle motor does not carry current. For example, a worm gear, a shifting armature motor, a magnetic clutch or another suitable device or brake may be used for this purpose.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific

examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

In the drawings:

Figure 1 shows schematically a side view, partially in section, of a first embodiment of a high speed stranding machine according to the invention with its electric control circuit diagram;

Figure 2 is a second embodiment and illustrates schematically in the same way as Figure 1 a stranding machine of the basket type.

In the high-speed stranding machine according to Figure 1, a rotating body **1** is rotated by means of a main driving motor **2** via a train of gears **3**, **4** and **5**. A number of bobbin cradles **6** with bobbins **7** are arranged on a common axis one behind the other within the rotating body **1** in a manner known per se. Each of the bobbin cradles **6** is driven by a cradle motor **8**, the housing of which is mounted on the rotating body **1** while its rotor is operatively connected to the bobbin cradle **6**. Instead of this, it is possible to mount the housing of the cradle motor on the bobbin cradle and the rotor of the cradle motor on the rotating body. In order to retain the proper position of the bobbin cradles in space, the latter have to be turned in reverse direction 360° during each revolution of the rotating body **1**. This is obtained by providing the main driving motor **2**, as well as each of the bobbin cradle motors **8**, with tacho-dynamometers **9** and **10**, respectively. While these tacho-dynamometers rotate, they supply a control current to an electric control unit **11**, in which the measured value of the number of revolutions given by this control current is compared with a rated or fixed value. As a result of this, a control impulse is obtained by means of which the number of revolutions is kept constant. The control unit **11** can be manually adjusted by means of a potentiometer **12** to change the rated value of the number of revolutions for each of the bobbin cradle motors **8**, whereby the reverse rotation of each of the bobbin cradles **6** can be varied in positive or negative direction. The bobbin cradle motors **8** and their tacho-dynamometers **10** are connected to the control unit **11** in the usual manner via circuit means including slip rings **13** and **14** and brushes **15** and **16**, respectively, engaging these slip rings. Transmission gears **17** may be inserted between the rotors of the bobbin cradle motors **8** and the bobbin cradles **6**, said transmission gears being equipped with a known brake or a self-locking device (not shown), such as a worm gear, to prevent unintended rotation of the bobbin cradle **6**.

In the basket-type stranding machine according to Figure 2, the rotating body **18** is driven by means of a main driving motor **21** with the aid of gears **19** and **20**. In the rotating body, designed as stranding basket **18**, the bobbin cradles **22** with their bobbins **23** are mounted. Each of the bobbin cradles **22** is driven by a cradle motor **24**, the housing of which is secured to the stranding basket **18**, and the rotor of which is connected to the bobbin cradle **22**. The main driving motor **21** is provided with a tacho-dynamometer **25** and each bobbin cradle motor **24** has its own tacho-dynamometer **26** in order to turn the bobbin cradles **22** in reverse direction. The tacho-dynamometers **25** and **26** cooperate via an electric control unit **27** to maintain constant the number of revolutions in principally the same manner as it has been explained in connection with the embodiment of Figure 1. The adjustable potentiometer for determining the rated value of the number of revolutions is denoted by **28**.

Any other suitable electric device, such as a frequency control circuit, an electric shaft arrangement, or the like,

may be employed in place of the control system described in the foregoing.

In many instances, it will be sufficient to provide in high speed stranding machines a common driving motor for several bobbin cradles.

We claim:

1. In a stranding machine for stranding cables and the like from a plurality of individual strands, a rotating body, a plurality of bobbins corresponding substantially to the number of strands to be used, cradle means supporting said bobbins and rotatably mounted in said rotating body, respective drive means for said rotating body and said cradle means, separate tacho-dynamometer means associated with each of said respective drive means, an electric control unit in circuit with said tacho-dynamometer means and said respective drive means, whereby rotation of said tacho-dynamometer means supplies a control current to said control unit wherein the measured value of the number of revolutions of the drive means corresponding to said control current is compared with a rated value to thereby indicate the speed ratio between the rotating body and the bobbins.

2. In a stranding machine according to claim 1, wherein said rotating body is constructed to define a stranding basket for said bobbins.

3. In a machine arrangement according to claim 1,

wherein said drive means for said cradle means is provided with a relatively stationary housing and a rotor rotating therein, said housings being mounted on said rotating body and each of said rotors being operatively connected to one of said cradles.

4. In a machine arrangement for stranding cables according to claim 1, wherein a transmission gear is provided between each of said cradles and its associated drive means, and wherein a braking means is operatively connected with each of said transmission gears.

5. In a machine arrangement for stranding cables according to claim 1, wherein a transmission gear is provided between each of said cradles and each of said electromotors, and wherein a self-locking means is operatively connected with each of said transmission gears.

6. In a machine arrangement for stranding cables according to claim 1, wherein said electric control unit is adapted to individually vary the speed of said respective drive means.

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