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HIGH SPEED STRANDING MACHINES

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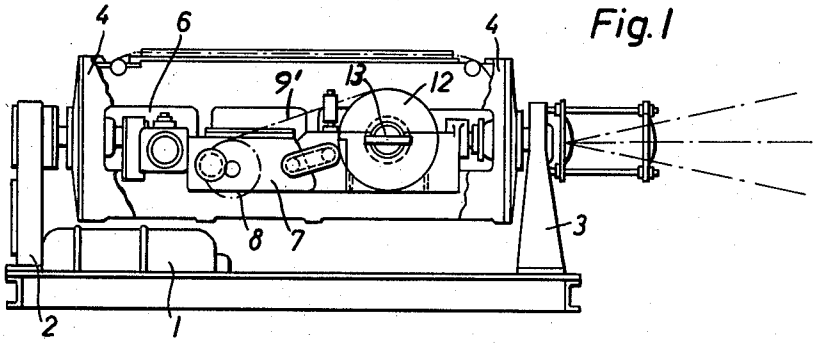

Fig. 1

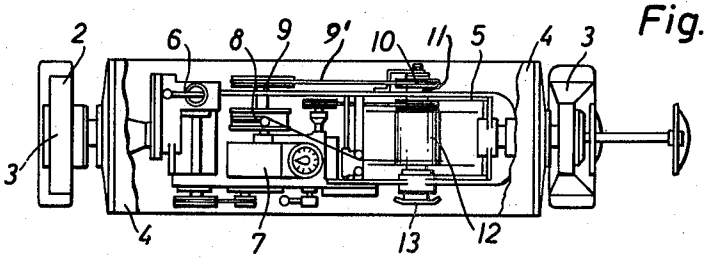

Fig. 2

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HIGH SPEED STRANDING MACHINES

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This invention relates to high speed stranding machines for single or double lay, of the kind comprising a rotating casing, the so-called rotor, within which is arranged a stationary frame, the so-called floating carrier, which carries a draw-off device and reeling device. By means of these machines a plurality of wires are drawn from a supply into the machine, stranded and the stranded product reeled up on the reeling device.

In a single lay machine the axis of the reeling device is either parallel or transverse to the axis of the rotor and the wires are twisted together one at each revolution of the rotor. The lay length is substantially equal to the length of wire drawn in at each revolution of the rotor.

In a double lay machine the axis of the reeling device is always transverse to the axis of the rotor. The wires coming from the supply upon the entry into the machine are given a first twist behind the lay plate while being led over rollers or roller guides. The stranded structure now runs along the outside wall of the rotor to the other end and while again being led over rollers or roller guides into the stationary floating carrier is twisted a second time. In double lay machines the lay length corresponds to the length of wire drawn in at each half revolution of the rotor.

In the known high speed stranding machines the lay length is thus determined by the dimensions of the draw-off device and the transmission ratio between the rotor drive and the drive of the draw-off device. The lay length in these machines either cannot be changed at all or can only be changed within certain limits by exchanging wheels in a train of change gears. Such exchange can however only be effected with the machine stationary. Accordingly it is necessary to stop the known stranding machines for the purpose of changing the lay length which naturally necessitates a dead period which constitutes lost time. The exchange is moreover a burdensome, lengthy operation.

In the course of modern developments of the art, it has become ever more necessary to make possible a rapid and simple change of the lay length in high speed stranding machines. These machines which at first were only used for twisting up bare strands when the maintenance of a predetermined lay length was not so important have been used more and more to strand individually insulated conductors. It has been found that in many cases the quality of the cable does not suffer if it is not exactly stranded in layers but is stranded simply by twisting up all the insulated conductors. In this method however the maintenance of a predetermined lay length corresponding to the conditions of the case is of essential importance. In order to be able to effect adjustment to such predetermined lay length in working with the known high speed stranding machines, the penalty of lengthy and complicated exchange of change wheels had to be accepted.

An object of the present invention is to make it possible to change the lay length in a high speed stranding machine simply and rapidly. A further object is to enable the lay length to be varied in a stepless fashion and a still further object is to enable these adjustments to be made even with the machine running.

According to the invention the rotor is coupled with the drive for the draw-off device through a variable speed gear, preferably a steplessly variable gear. According to a further development of the invention this variable speed gear can be adjusted by means of an auxiliary motor which forms a unit with the steplessly variable gear (so-called variators). This auxiliary motor can be regulatable or itself effect an adjustment according to a repeating cycle such as a sine law, whereby a lay length which changes cyclically is obtained.

The invention also provides for the rotor to be driven and braked by a braking motor, that is a motor which by change of connections can serve as a brake. In order to keep the weight of the rotor low so that adequate braking can be obtained in this way, the rotor is advantageously made of synthetic material.

Further features and advantages of the invention will appear from the following description of an embodiment of high speed stranding machine according to the invention, shown by way of example in the accompanying drawings.

FIGURE 1 shows the high speed stranding machine in plan view, parts of the rotor being broken away.

FIGURE 2 is a plan view of the machine, again with parts of the rotor broken away.

The driving motor **1**, FIGURE 1, is located below the machine. The motor shaft through a V belt **2** drives the rotor **4** which is journalled in pedestals **3**, the rotor consisting of a cylindrical casing. Within the casing **4** is arranged a floating carrier **5** which is supported non-rotatably in the pedestals **3** and consists essentially of a forked frame. The carrier **5** carries a reversing gear **6** which is driven from the rotating rotor **4** and from which the drive is taken to a steplessly variable speed gear **7** which transmits the drive to the draw-off drum **8**. The reversing gear enables the draw-off drum to be rotated always in the same direction while allowing the direction of rotation of the rotor **4** to be reversed to change the hand of the lay.

From the shaft **9** of the drum **8** the drive is conveyed by a chain **9'** through a slipping clutch **10** to trunnions **11** which receive and drive the reel **12**. The engagement and disengagement of the trunnions with the reel can be effected by the handle **13**.

The variable speed gear **7**, the draw-off drum **8** and the reel **12** are all mounted in the frame **5** similarly to the reversing gear **6**.

Differing from the known high speed stranding machines in which to obtain rapid braking of the machine the rotor must be brought to rest by a special brake in the high speed stranding machine according to the preferred form of the invention, the motor **1** is a braking motor used both for driving and braking the machine. In order to enable the braking time to be held to the desired low value it is desirable to make the rotor light which can be done very simply by making it of synthetic material, i.e. plastic such as glass fibre reinforced thermosetting plastics.

The machine illustrated is a double lay machine. The separate strands enter over a lay plate at the right hand end and while being led over a roller guide not shown are given their first twist. The twisted structure then runs through a tunnel along the outside of the rotor **4** and at the left hand end is led inward over another roller guide not shown so that it is given a second twist. Thence the stranded structure is lapped around the draw-in drum **8** by the action of which the strands are drawn into the machine, the length drawn in per revolution of the rotor depending on the diameter of the drum **8** and the adjustment of the gear **7**. Accordingly the lay length can be varied by varying the adjustment of the gear **7**. From the drum **8** the stranded structure passes between vertical guides and on to the reel **12**, the guides being transversely reciprocated at a speed which lays the structure evenly on the reel. The drive to the reel is proportional to that of

the shaft 9 and such that if there is no slip, the reel rotates at a speed appropriate to its core diameter. As the diameter of the wound stranded structure builds up, slip takes place at the clutch 10.

If changes of lay length are only to be made with the machine at rest, a hand adjustment on the gear 7 suffices. Even if this is not stepless, changes are made much more simply and rapidly than exchanging change gears. By carrying the control out axially through the left hand pedestal in FIGURE 1 it would be possible to effect adjustment with the machine running by a purely mechanical control. Preferably however the adjustment is effected by an auxiliary motor which forms a unit with the steplessly variable speed gear 7, which can more conveniently be remotely controlled with the machine running. Remote controls by which such a motor can be caused to effect a definite number of revolutions and thus a definite adjustment are in themselves well-known. Further such a remote control can be arranged to follow a predetermined law of repetition for example an adjustment varying sinusoidally with time.

Alternatively, a repeating cycle may be obtained by coupling a continuously running auxiliary motor to the gear control by a mechanism having the desired law, for example a crank and connecting rod, and the throw of such a mechanism may be adjustable, thus enabling the amplitude of the cycle to be adjusted, and its mid point may be adjustable to enable the mean lay length to be adjusted.

The invention is not limited to the example of embodiment illustrated and described. On the contrary many modifications are possible without departing from the scope of the invention.

What I claim is:

1. A high speed stranding machine comprising a rotatable casing, a stationary carrier located within said casing, draw-off means on said carrier, an adjustable steplessly variable speed gear assembly adapted to be driven from said casing, means for coupling said draw-off means to said steplessly variable speed gear assembly, reeling means on said carrier, a drive connection between said draw-off means and said reeling means, and an auxiliary motor operably associated with said steplessly variable speed gear assembly for adjusting said assembly.

2. The stranding machine as claimed in claim 1 in which said reeling means includes a reel and trunnions in which said reel is drivingly but removably supported.

3. The stranding machine as claimed in claim 2, including a braking motor and a drive connection between the braking motor and casing.

4. The stranding machine as claimed in claim 3 wherein said casing is of synthetic material.

5. A high speed stranding machine comprising a casing, means journaling said casing for rotation, a stationary carrier within said casing, a motor operably connected to said casing for rotating said casing, a reversing gear supported by said carrier and adapted to be driven by said casing, a steplessly variable speed gear on said carrier driven by said reversing gear, a draw-off drum on said carrier, means coupling said drum to said variable speed gear, a reel on said carrier, a drive connection between said drum and reel, and an auxiliary motor operably associated with said variable speed gear for adjusting said variable speed gear.

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