

MANUFACTURING WIRE ROPEDescription

This invention relates to manufacturing wire rope and in particular those ropes known as cable laid ropes wherein a plurality of ropes can be spun over a central core which can itself be another rope.

The conventional method of manufacturing wire rope is firstly the winding of wire from a coil onto bobbins which are then loaded on a stranding machine. Secondly, a number of wires is laid up into a single strand, the stranding machine rotating the wires round a central wire. The strand passes through a die, over a draw-off wheel and onto a large bobbin ready for transfer to a closing machine. Thirdly, in the closing machine a number of strands is spun or laid up round a central core which can itself be another strand to form the finished rope. A number of bobbins of strands is placed in cradles which revolve about a central axis, and the strands are threaded through individual holes spaced apart about the central axis, and to a die and draw-off wheel, the core passing through a central shaft of the machine. Fourthly and finally, a number of bobbins of ropes is placed in cradles which revolve about a central axis and the unit ropes are threaded through individual holes spaced apart about the central axis, and to a die and draw-off wheel, the core passing through a central shaft of the machine.

Such ropes, usually referred to as cable laid ropes, are used mainly as slings for the lifting of heavy loads, particularly in the off-shore industry, with diameters normally ranging between 4 inches and 12 inches which is rather near the limit of present day wire rope making machinery. With a rising commercial demand for the production of larger diameter wire rope slings, beyond the capacity of

known standard wire rope making machinery, the objects of the invention include:

- a) eliminating the need for conventional wire rope making machinery;
- b) more effectively and less expensively manufacturing cable laid wire rope;
- c) imposing no restriction on the maximum diameter of the cable laid wire rope which can be produced; and
- d) allowing the manufacturer of cable laid wire rope *in situ* or in any riggers yard, as opposed to the premises of wire rope manufacturers.

According to one aspect of the invention there is provided a cable laid wire rope manufacturing apparatus comprising a twisting device comprising a housing which can be removably mounted at a suitable site, the twisting device also comprising a twist plate rotatable within the housing and having a central orifice for a core and a plurality of orifices equally spaced apart circumferentially about the central orifice for the unit ropes and a motor and gearing for driving the twist plate, a tensioning device which can be removably mounted at a distance from the twisting device on the same site, the tensioning device comprising a swivel for allowing the cable laid wire rope to turn bodily with the twist plate, and removable follower means movable from the twisting device towards the tensioning device for laying the unit ropes at a desired helix angle relative to the core.

According to another aspect of the invention, there is provided a method of manufacturing cable laid wire rope using the above apparatus, in which method one or more unit ropes are laid at a desired helix angle relative to the core by means of the follower and then bound to the core at the tensioning end and thereafter the remaining unit ropes are

laid about the core using the unit rope or ropes already laid as a guide and then bound to the core at the tensioning end.

According to a further aspect of the invention there is provided a cable laid wire rope manufactured in the above apparatus and/or by the above method.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawings in which:

Fig.1 shows a twisting device;

Fig.2 shows a single unit rope being laid about the core; and

Fig.3 shows the twisting device and a tensioning device and the finished cable laid wire rope bound at the ends.

A twisting device is shown in Fig.1 and comprises a housing 1 which can be removably mounted at a suitable site, eg, it can be bolted on a mounting plate recessed into a rigger's yard. Within the housing there is rotatably journaled a twist plate 2 having a central orifice 3 and a plurality of, as shown six, orifices 4 equally spaced apart circumferentially about the central orifice. A motor 5 and gearing (not shown) drive the plate 2.

A tensioning device is shown in Fig. 3 and comprises a plinth 6 which, like the housing 1, can be bolted on a mounting plate recessed into a rigger's yard at a desired spacing from the twisting device depending on the length of rope to be produced. On the plinth 6 there is mounted a hydraulic ram 7, the piston rod of which has on its free end, a swivelling connector 8 for one end of the core.

In manufacturing a cable laid wire rope, a core 9 has one end fitted with a suitable termination and positively connected to the swivelling connector 8. The other end of the

core 9 is passed through the central orifice in the twist plate 2 and is suitably glanded for holding under tension. A short length of core 9 is left to hang freely for later splicing. The core 9 is now placed under tension by applying hydraulic pressure in the ram 7. It will be noted that rotation of the twist plate 2 will cause bodily rotation of the core 9 as permitted by the swivelling connection 8.

A single unit rope 10 is passed through one of the orifices 4, again leaving a short length free for later splicing and laid on a rope guide. The inserted unit rope 10 is free in the orifice 4 and all six unit ropes lie alongside the apparatus substantially parallel to the core to allow for combinations of ropes to be laid onto the core simultaneously. When the twist plate 2 is rotated the inserted unit rope 10 helically wraps itself about the core 9. A desired helix angle can be maintained by firstly marking the core 9 at intervals spaced apart at the pitch or lay length corresponding to the desired helix angle at the given diameter of the core 9 and the unit rope 10 and moving a rope guide 12, as shown in Figure 2, over which the unit rope is laid, at an appropriate speed alongside the core 9 from the twisting device towards the tensioning device, so that the unit rope 10 is seen to cross the core 9 at the top at each mark in turn. This can be achieved easily by using a truck as the rope guide and observing the unit rope 10 from the truck. On reaching the tensioning device the unit rope 10 is bound to the core.

In laying further unit ropes 10 the rope guide is not used to control a constant pitch or lay length but merely to guide the newly-applied unit rope 10 which will follow the initially-laid unit rope 10. These are also bound to the core 9 adjacent the tensioning device. A convenient programme for laying the six unit ropes 10 is 1, 2, 2, 1 although they could be laid in pairs.

In the final laying up to the unit ropes 10 a split sleeve or die 11 as shown in Figure 2 may be pulled along the rope. (The split sleeve or die 11 is illustrated in Figure 2 with only a single unit rope 10 for clarity). The rope is then bound at the twisting device end, the tension removed and the finished rope removed from the apparatus.



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Claims

1. A cable laid wire rope manufacturing apparatus comprising a twisting device comprising a housing which can be removably mounted at a suitable site, the twisting device also comprising a twist plate rotatable within the housing and having a central orifice for a core and a plurality of orifices equally spaced apart circumferentially about the central orifice for the unit ropes and a motor and gearing for driving the twist plate, a tensioning device which can be removably mounted at a distance from the twisting device on the same site, the tensioning device comprising a swivel for allowing the cable laid wire rope to turn bodily with the twist plate, and a removable rope guide movable from the twisting device towards the tensioning device for guiding the unit ropes and laying them at a desired helix angle relative to the core.
 2. A method of manufacturing cable laid wire rope using the above apparatus of claim 1, in which method one or more unit ropes are laid at a desired helix angle relative to the core by means of the rope guide and then bound to the core adjacent the tensioning end and thereafter the remaining unit ropes are laid about the core using the unit rope or ropes already laid as a guide and then bound to the core adjacent the tensioning end.
 3. A cable laid wire rope manufactured in the apparatus of claim 1 and/or by the method of claim 2.
 4. A cable laid wire rope manufacturing apparatus as shown in the accompanying drawings.
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