Nov. 27, 1945. D. D. SYMMES 2,389,878

STRAND ENGAGING DRUM

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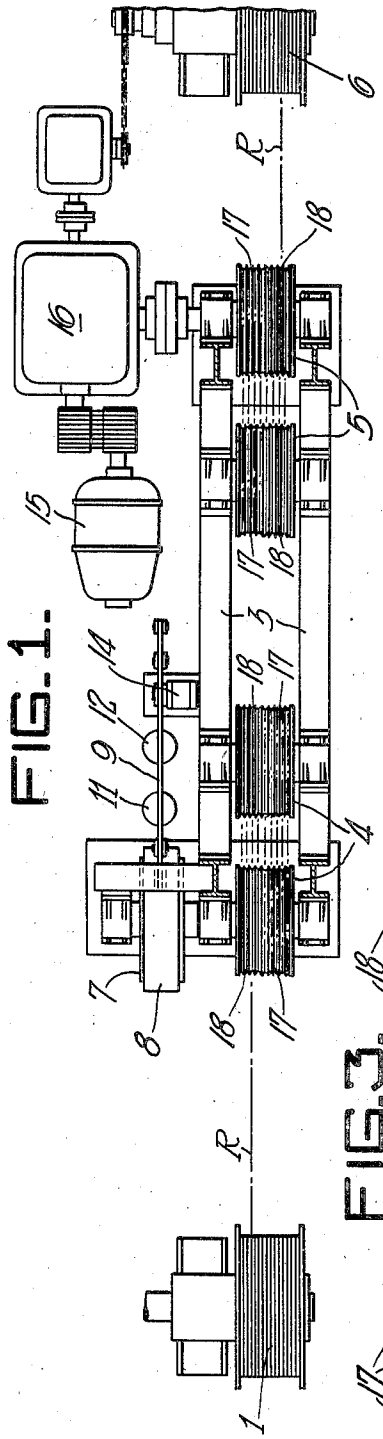


FIG. 1.

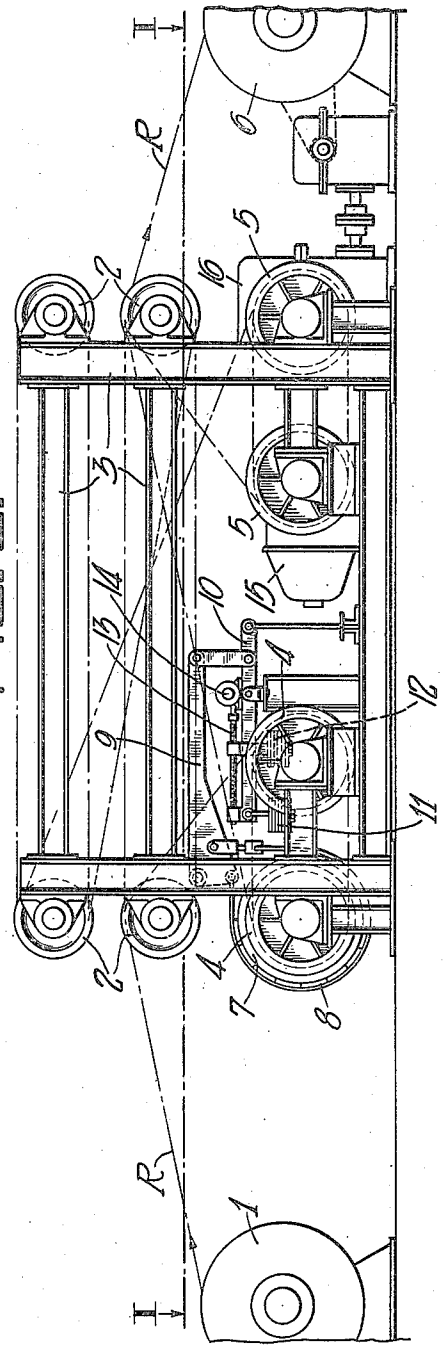


FIG. 2.

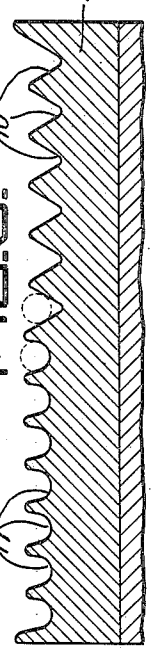


FIG. 3.

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STRAND ENGAGING DRUM

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1 Claim. (Cl. 28—71.3)

This invention relates to strand engaging drums of the type around which a traveling strand is wrapped a number of times to obtain a snubbing action with the drum rotating, whereby to effect a power exchange between the strand and the drum without relative slippage. Capstans and windlasses are examples of such drums.

An example of the invention is illustrated by the accompanying drawing, the various figures being as follows:

Figure 1 is a top view of a machine embodying the invention;

Figure 2 is a side view of Figure 1; and

Figure 3 is an enlarged detail sectional view showing the invention.

More specifically, rope R, from a pay-off reel 1, carrying the rope, is bent around a system of sheaves 2 journaled by a frame 3 in such a fashion that the rope first passes around a capstan 4 and is then formed in a large number of horizontal loops storing a relatively large length of the rope, the latter then going to a capstan 5 and, from there, to a powered take-up reel 6.

The capstan 4 is provided with a brake drum 7 having a frictionally engaging brake band 8 to which braking force is applied by a force-multiplying lever system 9 receiving its force by way of a balancing beam 10 provided with fixed weights 11 and, also, an adjustable weight 12 in screw threaded engagement with a threaded shaft 13 powered by a reversing electric motor 14.

The capstan 5 is powered by a constant speed motor 15, through a gear reduction unit 16, to pull the rope from the capstan 4 rotatively restrained by the brake. When the capstan 5 pulls the rope it causes it to continuously travel through a relatively large length, stored in loop form by the sheaves 2, so the rope is stressed throughout this length, high speed operation being permissible because the large size of this length causes each portion of the rope to remain under stress for the proper time period even though the rope is traveling at high speed.

The rope R has the characteristic cylindrical shape and this, in conjunction with the high rope tensions, introduces the problem of the rope deforming as it passes around the various capstan drums. This may be avoided by forming a plurality of grooves in the peripheries of these drums with the grooves shaped to fit and support the rope, which is a conventional practice in the case of the single grooves in sheaves, but in that event it is very difficult to obtain good frictional engagement between the rope and the capstan drums. If the grooves are made V-shaped good frictional engagement is possible, because the rope wedges into the grooves, but in that event there is again introduced the problem of the high tension deforming the rope.

According to the present invention, the capstan drum, in each instance, has a series of grooves in its surface with a portion of the grooves contoured to fit the rope and support it against deformation, as is indicated at 17, and a portion contoured to cause the strand to wedge therein, as indicated at 18 where a V-shape is used. Since the rope is round, the shape at 17 is U-shaped, but in case a flexible strand of another shape is involved, the groove should be formed to fit this shape. The portion of the grooves which fit the rope is the portion which the rope encounters where it is under sufficient tension to introduce the problem of it deforming in shape, the next or last portion having the shape 18 producing the wedging action where the tension is to a lesser degree not involving this problem, whereby to enhance the frictional engagement between the rope and the groove sides where the rope is in the groove under the lesser tension. Where two or more drums are used in tandem, as in the case of the capstans 4 and 5, each drum has a series of grooves carrying the rope with the grooves of each drum having a portion thereof shaped to fit the rope while it is under the higher tension introducing the deforming problem, and then a portion having a shape causing the rope to wedge against the groove sides.

With this arrangement, the rope R leaves the pay-off reel 1 under a relatively light tension just sufficient to properly snub the rope in the grooves in the peripheries of the drum of the capstan 4, it wrapping around these drums a number of convolutions in the grooves and the latter being V-shaped to exert the wedging action at that time. The tension is progressively increasing and ultimately reaches a degree where it might cause deformation of the rope, and at that point the grooves change in shape to one which fits the rope so as to support it against deformation, such as the U-shape shown. Since the tension has increased, this shape provides about as much frictional engagement between the rope and the drum as does the shape producing the wedging action under the lesser rope tension. The rope then leaves the grooves and goes into the tensioned length without deformation, the various sheaves being shaped to support the rope and the capstan 5 having drums embodying the same principle although, of neces-

sity, in the reverse order from that just described. If a single drum is involved there must be but one groove extending helically along the drum and changing gradually from the wedging shape to the supporting shape or vice versa as required to have the supporting shape at the higher strand-tension position.

I claim:

A capstan drum for shaped, flexible strand and characterized by having multiple, circumferential grooves in its periphery with a portion of these grooves at its high-tension end shaped to fit the strand and support it against deformation due to its pressure against the sides of these grooves and a portion of these grooves at its low-tension end V-shaped so the strand wedges therein due to its pressure against the sides thereof to obtain enhanced frictional engagement with these sides.

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