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SHEAVE AND PRESSURE RIDER

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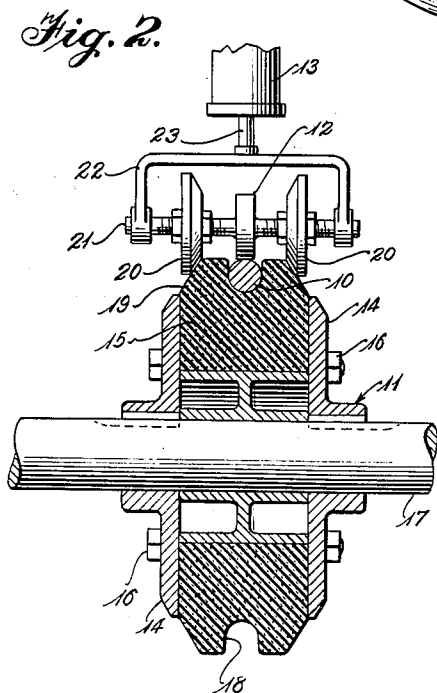
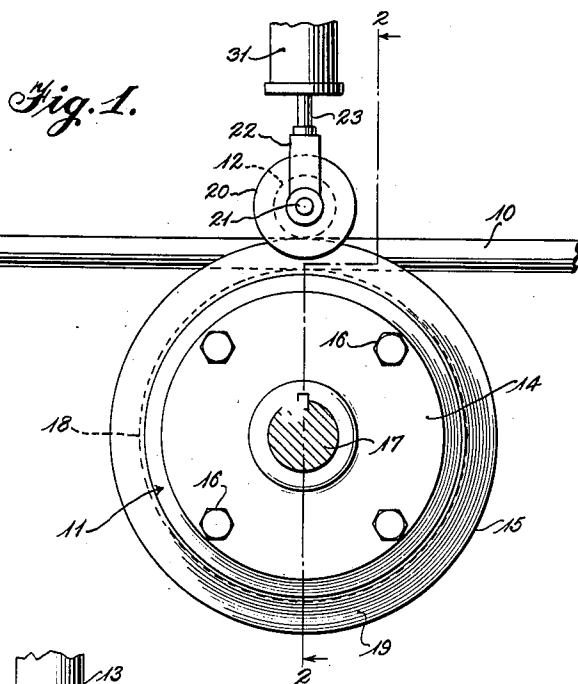
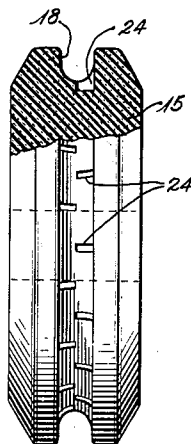


Fig. 3.



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SHEAVE AND PRESSURE RIDER

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6 Claims. (Cl. 254-176)

This invention relates to a combined sheave and pressure roller for handling a cable and more particularly it has reference to such combination wherein the sheave is driven and is of a novel structure adapted to grip the cable throughout a substantial proportion of the surface thereof.

This application is a continuation-in-part of application Serial Number 407,811, filed August 21, 1941.

Sheaves of the present type, although of wide adaptability to any number of hoisting problems, are of particular utility in conjunction with the paying out device on the outboard end of the boom of a crane employed for handling shipborne aircraft and the like. In hoisting aircraft aboard ships, it is customary to use a hoist having a paying out device acting upon and serving to drive the hoist cable so that the use of a weight in the hoisting whip may be avoided, the latter being a dangerous expedient because of the fact that the cable suspended weight may swing to and fro and in so doing damage the plane or injure the occupant thereof during the initial hook-on period. A paying out device of the type in question is disclosed in my Patent No. 2,042,431, issued June 2, 1936.

In the employment of sheaves for paying out cable in the manner outlined above, it is, of course, necessary to provide some suitable means for driving the sheave and for imparting the movement thereof to the cable without slippage. It is the usual practice to insure sufficient driving friction between cable and sheave by applying pressure through a roller disposed to make tangential contact with the cable and being acted on by a force tending to urge it radially toward the axis of the sheave. The required pressures in the case of sheaves of known construction are rather high and consequently result in a severe squeezing action on the cable tending to force out the lubricating and corrosion inhibiting composition with which the hemp core thereof is customarily saturated. Both the loss of lubricant and the intense pressure contribute to excessive wear on both cable and sheave. Then too, the high pressure used has also been a source of difficulty in automatic tension hoists, the power required for merely pulling the cable through the sheaves being of a high order. In an attempt to avoid, at least in part, these difficulties, the pressure rider has been heretofore mounted in a complicated manner to release the cable at all times when the device is not actually paying out cable.

A further difficulty which has arisen in con-

nection with paying out sheaves of the type heretofore known is lack of adaptability for use with cables of differing diameters and consequently inability to compensate for wear of either the sheave groove or the cable. The result of the foregoing is, of course, frequent and costly replacements.

It is, therefore, an object of this invention to provide a paying out device in which adequate driving friction between cable and sheave is maintained at an optimum value while damage to and wear of both cable and sheave is minimized.

The present invention contemplates a driving sheave and cooperating pressure roller so constructed and arranged that satisfactory paying out is achieved with the use of moderate pressures. The invention further contemplates the provision of a sheave of such construction that the essential element in achieving the said result is formed of a substance which not only is peculiarly adapted for permitting reduced operation pressures, but also provides a cable contacting surface of high wear-resistant quality.

Concomitant to the advantages set out above is a wide adaptability to operation with cables of a size varying with respect to the riding surface of the sheave.

Other objects and advantages of the invention will be apparent from a consideration of the following detailed description in conjunction with the annexed drawing wherein:

Figure 1 is a view showing the relationship of drive sheave, cable and pressure rider according to the present invention;

Figure 2 is a partial section taken along the line 2-2 of Figure 1; and

Figure 3 is a partial plan view showing a modification wherein the cable-carrying surface of the sheave is provided with a tread.

In general, the invention contemplates the combination of a driver sheave and pressure rider wherein the sheave is constructed with a resilient body or spool mounted in position by rigid members but adapted to be deformed in a novel manner in its peripheral portion. The periphery of the resilient body is formed with a circumferential groove for carrying the cable. The provision for deformation of the resilient spool is such that the sides of the groove will be forced inwardly to bear against a substantial proportion of the surface of the cable upon pressure being applied to the cable through the medium of the pressure roller.

Referring specifically to Figures 1 and 2, a cable 10 is carried between a sheave 11 and a

pressure roller 12, provided with a suitable means for application of pressure, such as the hydraulic cylinder 13, illustrated in Figures 1 and 2. The sheave 11 comprises rigid flanges 14 and a resilient body portion 15 of a synthetic rubber material maintained in place between the flanges by a plurality of clamping bolts 16. The flanges are mounted on a shaft 17 by conventional means and the shaft 17 is provided with suitable driving means, not shown. Resilient body portion 15 is in the form of an annulus, as may be seen in Figure 2, and is provided with a peripheral groove 18 for the reception of cable 10. The flanges 14 are of lesser radius than the body portion 15 and the circumferential edges of the latter which extend beyond the flanges are beveled at 19.

In addition to pressure roller 12 hydraulic cylinder 13 actuates a pair of pressure riders 20 having beveled faces complementary to the beveled edges 19 of the resilient body 15. To this end, pressure riders 20 and roller 12 are mounted on a common shaft 21 pivotally mounted at its ends in a yoke 22. Yoke 22 is connected to the extensible portion 23 of hydraulic cylinder 13.

In Figure 2 it will be noted that the diameter of riders 20 is greater than the diameter of roller 12. Thus, when hydraulic cylinder 13 is actuated, shaft 21 is moved toward shaft 17 and roller 12 moves the cable radially inwardly tending to cause the resilient material to surround it, which tendency is augmented by the lateral force resolved from the radial movement of riders 20 acting on the respective beveled portions 19 of body portion 15. This being the case, the frictional force acting on the cable is considerably greater than it would be if roller 12 were urged under the same pressure and the contact area were not augmented by deformation of the body portion of the sheave.

By means of the device discussed above, it is found that wear on the cable is greatly reduced by the coaction of two factors. Because of the adjustable gripping action of driving contact between sheave and cable, it is possible to use drastically reduced pressures. Further, the wear due to friction between the surface of a metal and a resilient substance is much less than the wear due to friction at a metal-to-metal contact. Although I may use rubber or any other resilient substance, I prefer to use the so-called "synthetic substances" because of their greater resistance to deterioration in the presence of oils such as are used for lubrication and corrosion inhibition of the cable. Such synthetic compositions as "Neoprene," "Thiokol," "Formica" and the like are found to be eminently satisfactory. I have also found that the use of the present device results in longer life of the cable because the tendency to squeeze out the oils used for lubrication and corrosion inhibition is greatly reduced.

By the use of a resilient body 15 disposed between rigid flanges 14 which may be drawn together by bolts 16 it is evident that the initial diameter of groove 18 can be adjusted to receive cables of different cross sectional areas. Furthermore, the size of the groove may be altered to compensate for wear by merely drawing flanges 14 together. This adjustment therefore renders installation less difficult and replacement less frequent. Along these same lines, it may be desirable to make a threaded connection between riders 20 and shaft 21 so that the former may be moved toward and away from one another to as-

sist in adjusting both the size of groove 18 and the side pressure exerted upon the resilient body portion.

I have found that efficiency of the sheave may be enhanced by providing a tread in the cable-carrying groove of the resilient body 15. Figure 3 illustrates a resilient body 15 having radial slots 24 extending from the surface of the groove 18 a substantial distance into the body 15. Preferably the depth of the slots 24 is substantially equal to the depth to which the groove 18 will be worn before replacement is advisable.

It will be apparent to those skilled in the art that various modifications and adaptations of my invention may be made without departing from the spirit thereof. For example, it is often advisable to incorporate friction enhancing materials such as metal wire, fibre, hemp, carbon, and other substances having suitable properties in the resilient body 15. It is to be understood that the invention is not limited to the specific forms illustrated and discussed, but is limited only by the scope of the appended claims.

What I claim is:

1. In the combination of a sheave having a peripheral groove to receive a cable, a rider co-operating with said groove and pressure means to apply pressure to said rider substantially radially of said sheave; a sheave comprising a resilient body portion in which the groove is formed, the peripheral edges of said body portion being beveled, a pair of riders having beveled faces adapted to cooperate with the beveled edges of said body portion and compress the periphery thereof longitudinally, and means to apply pressure to said last-named riders.

2. In the combination of a sheave having a peripheral groove to receive a cable, a rider co-operating with said groove and pressure means to apply pressure to said rider substantially radially of said sheave; a sheave comprising a resilient body portion in which the groove is formed, the peripheral edges of said body portion being beveled, a pair of riders having beveled faces adapted to cooperate with the beveled edges of said body portion and compress the periphery thereof longitudinally, and means connecting said last-named riders to the pressure means to be operated thereby, whereby upon operation of said pressure means all of the riders are actuated simultaneously.

3. A device as defined in claim 1 wherein said resilient body portion is provided with a plurality of radial slots extending inwardly from the bottom of the peripheral groove to afford improved cable gripping qualities.

4. A device as defined in claim 2 wherein said resilient body portion is provided with a plurality of radial slots extending inwardly from the bottom of the peripheral groove to afford improved cable gripping qualities.

5. A device as defined in claim 1 further comprising, means for drawing said flanges toward one another to reduce the diameter of the peripheral groove, whereby to render the sheave adaptable to use with cables of different diameters and to allow compensation for wear.

6. A device as defined in claim 2 further comprising, means for drawing said flanges toward one another to render the diameter of the peripheral groove, whereby to render the sheave adaptable to use with cables of different diameters and to allow compensation for wear.

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