Dec. 2, 1958 J. C. SMALTZ 2,862,673

MEANS FOR AUTOMATICALLY TENSIONING PAYING OUT OR HAULING IN ROPE ON A HOISTING DRUM

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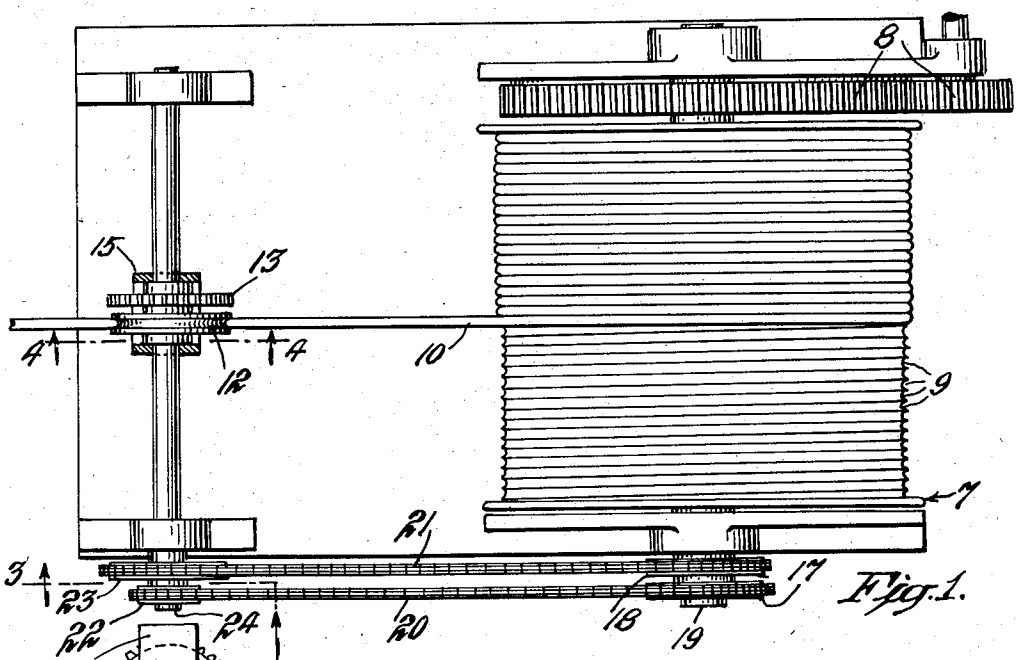


Fig. 1.

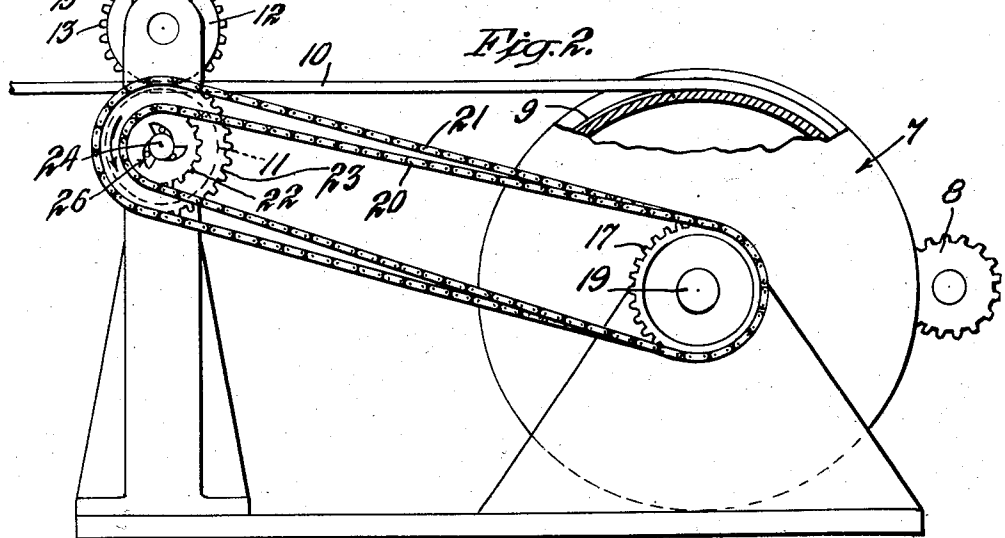


Fig. 2.

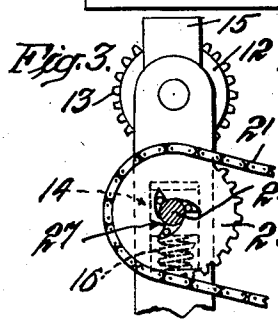


Fig. 3.

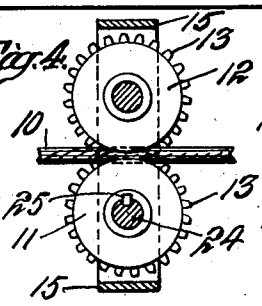


Fig. 4.

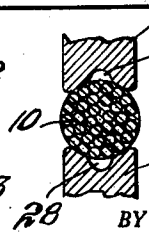


Fig. 5.

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MEANS FOR AUTOMATICALLY TENSIONING PAYING OUT OR HAULING IN ROPE ON A HOISTING DRUM

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2 Claims. (Cl. 242—54)

The invention here disclosed is concerned with the problem of holding rope properly engaged on a hoisting drum while paying out or hauling in when there is no load on the rope leaving or returning to the drum. Under such circumstances the tendency of the rope, particularly a heavy wire rope on a drum of normal diameter, is to spring away from the drum and to get out of the grooves in the drum, causing tangling and other difficulties.

Objects of the invention are to overcome these tendencies and to provide simple and effective means for automatically tensioning the rope on the drum during paying out and hauling in operations.

This is accomplished in the invention by the provision of grip sheaves mounted to engage the rope free of the drum and driven from the drum at a linear rate greater than that of the drum during paying out and at a linear rate less than that of the drum during hauling in rotation of the drum.

Other novel features of the invention and further desirable objects accomplished by the invention are set forth and will appear in the course of the following specification.

The drawing accompanying and forming part of the specification illustrates a present practical embodiment of the invention but structure may be modified and changed as regards this illustration, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Figure 1 in the drawing is a plan view of a hoisting drum having the invention applied thereto.

Figure 2 is a side elevation of the same with parts broken away and appearing in section.

Figure 3 is a broken part sectional detail as on substantially the plane of line 3—3 of Figure 1 of one of the one-way drive clutches.

Figure 4 is a broken sectional view on substantially the plane of line 4—4 of Figure 1 of the companion grip sheaves.

Figure 5 is an enlarged broken sectional view showing how the sheaves may be specially grooved to grip the rope.

In the drawing, a hoisting drum is shown at 7 driven by gearing 8 and grooved at 9 for a wire hoisting rope 10.

At a point near the drum and where the rope is free and clear, companion grip sheaves 11 and 12 are located, geared together at 13 and yieldingly engaged with the rope, as by means of spring pressure.

For the latter purpose, one of the sheaves, 11, is shiftably mounted at 14 in the yoke frame 15 in which the sheaves are journaled and pressed toward the other sheave by spring 16.

Means for regulating the rope gripping pressure and allowing for slippage may be provided if found necessary or desirable and means for separating or holding the sheaves separated from the rope may be provided. Such means may be in the form of a cam positioned between

the bearings for the sheaves arranged when turned to force the sheaves more or less apart against the tension of the grip closing spring or springs.

The grip sheaves are driven in the same direction as the rope travel toward or away from the drum; in other words, in the direction of rotation of the drum.

This is accomplished in the present disclosure by sprockets 17, 18 on the shaft 19 of the drum, carrying chains 20, 21 to sprockets 22, 23 on shaft 24 which constitutes the drive shaft for the sheaves.

To allow traverse of the grip sheaves to the rope laying groove in the drum, the frame carrying the sheaves is mounted for free lateral travel over the drive shaft and the latter is shown as splined at 25, in sliding driving engagement with sheave 11.

The rope is tensioned on the drum by driving the grip sheaves in the same direction but at greater linear speed than the drum in the paying out direction of rotation and in the same direction but at lesser linear speed in the hauling in direction of rotation of the drum.

Accordingly, the first set of sprocket drive connections 17, 20, 22 is shown proportioned to drive the spline shaft at a faster rate and the second set of drive connections 18, 21, 23 proportioned to drive the spline shaft at a lesser rate of speed than the drum shaft and over-running one-way drive clutches 26, 27 are incorporated in the hubs of sprockets 22, 23, faced respectively to drive the sheaves only in the paying out and hauling in directions of rotation.

These one-way drive clutches may be ball or roller clutches, such as indicated, or other forms of such devices may be utilized.

To assure good traction the grip sheaves may have a profile such as shown in Figure 5 with a relief groove 28 at the center for effecting a compressive engagement of the sheaves with the rope.

The sheaves in gripping engagement with the rope and driven in the same direction but at greater speed in paying out and at lesser speed in hauling in, apply sufficient traction to maintain the rope in the groove in the drum even though the rope is free of load. While this is of great advantage in hoisting operations generally, it is of particular benefit in winch equipment used for towing purposes where the rope is often paid out or hauled in prior to or after release from attachment to the towed object, at which time there is no load on the rope to hold it in engagement in the drum groove.

While shown applied to a single layer drum, it is contemplated that the invention may be used in a multiple layer operation by establishing a mean or average slippage between the grip sheaves and the rope which would vary with variable drum diameter produced by multiple layers.

It is also considered that in some instances the grip sheaves may be propelled faster to create tension in the paying out direction and then be automatically braked to put a retarding pull on the rope in the rewinding direction of rotation of the drum.

An adjustable friction clutch may be used to provide the necessary restraining force on the inhaul and allow slipping on the outhaul when surface speed of the sheave is greater than the surface speed of the rope as generated by the rotation of the drum. This combination has advantages in that it eliminates one pair of sprockets, one chain and two free wheeling clutches.

What is claimed is:

1. The combination with a hoisting drum driven at different times in opposite directions and rope spooling on and off said drum in said periods of reverse rotation, of means for automatically keeping the rope tight on the drum in both the winding on and unwinding operations, comprising companion rolls mounted in yielding grip engagement with the rope winding on and unwinding

from the drum and means controlled by direction of drum rotation for automatically synchronously driving said rolls in the winding on direction at lesser linear speed than the drum rotation in the winding on periods of rotation and in the paying out, unwinding direction but at greater linear speed than the drum rotation in the unwinding, paying out periods of drum rotation.

2. The combination with a hoisting drum driven at different times in opposite directions and rope spooling on and off said drum in said periods of reverse rotation, of means for automatically keeping the rope tight on the drum in both the winding on and unwinding operations, comprising companion rolls mounted in yielding grip engagement with the rope winding on and unwinding from the drum and means controlled by direction of drum rotation for automatically synchronously driving said rolls in the winding on direction at lesser linear speed than the drum rotation in the winding on periods of rotation

and in the paying out, unwinding direction but at greater linear speed than the drum rotation in the unwinding, paying out periods of drum rotation, including one way drive connections between the drum and said rolls geared to drive said rolls slower than linear speed of the drum in the periods of winding on direction of drum rotation and faster than drum linear speed in the periods of unwinding direction of drum rotation.

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