Aug. 15, 1944. V. S. HARLIN 2,355,861

SPINNING LINE CATHEAD

Filed Feb. 20, 1942 4 Sheets-Sheet 1

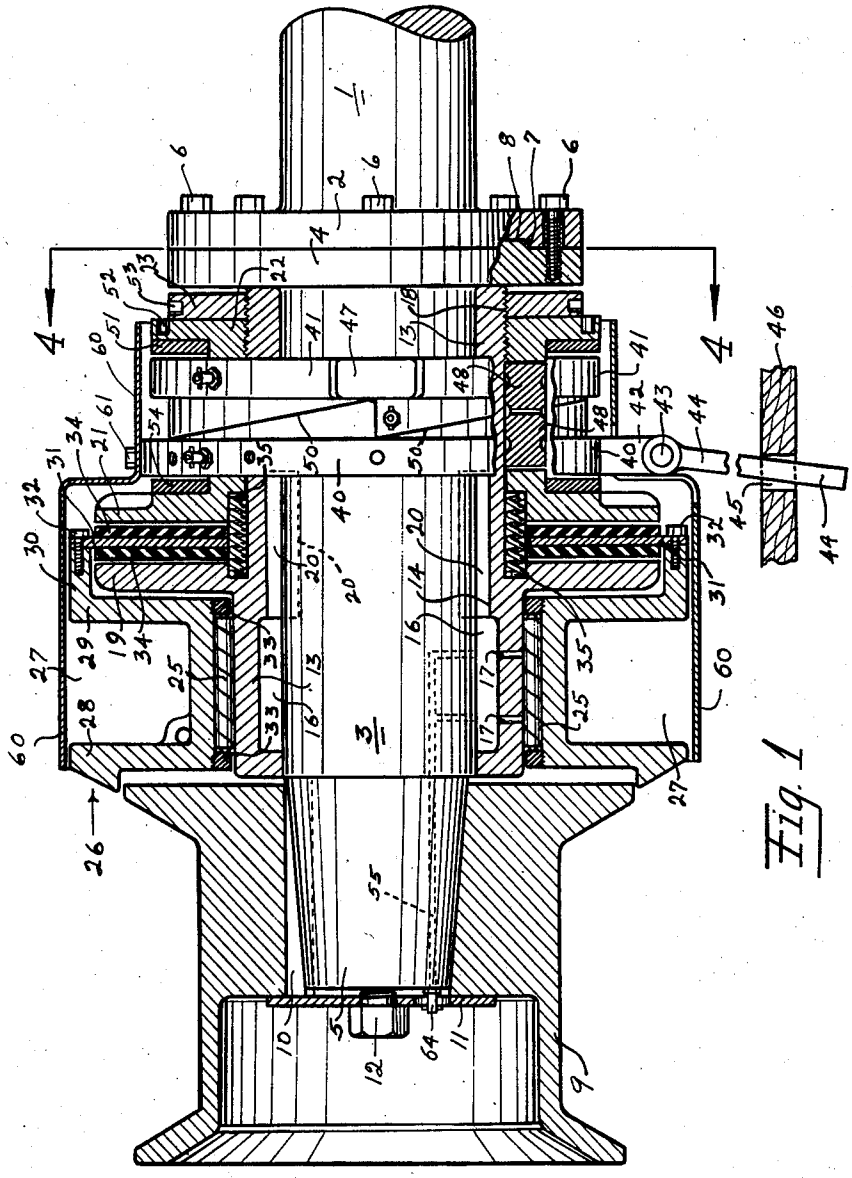


Fig. 1

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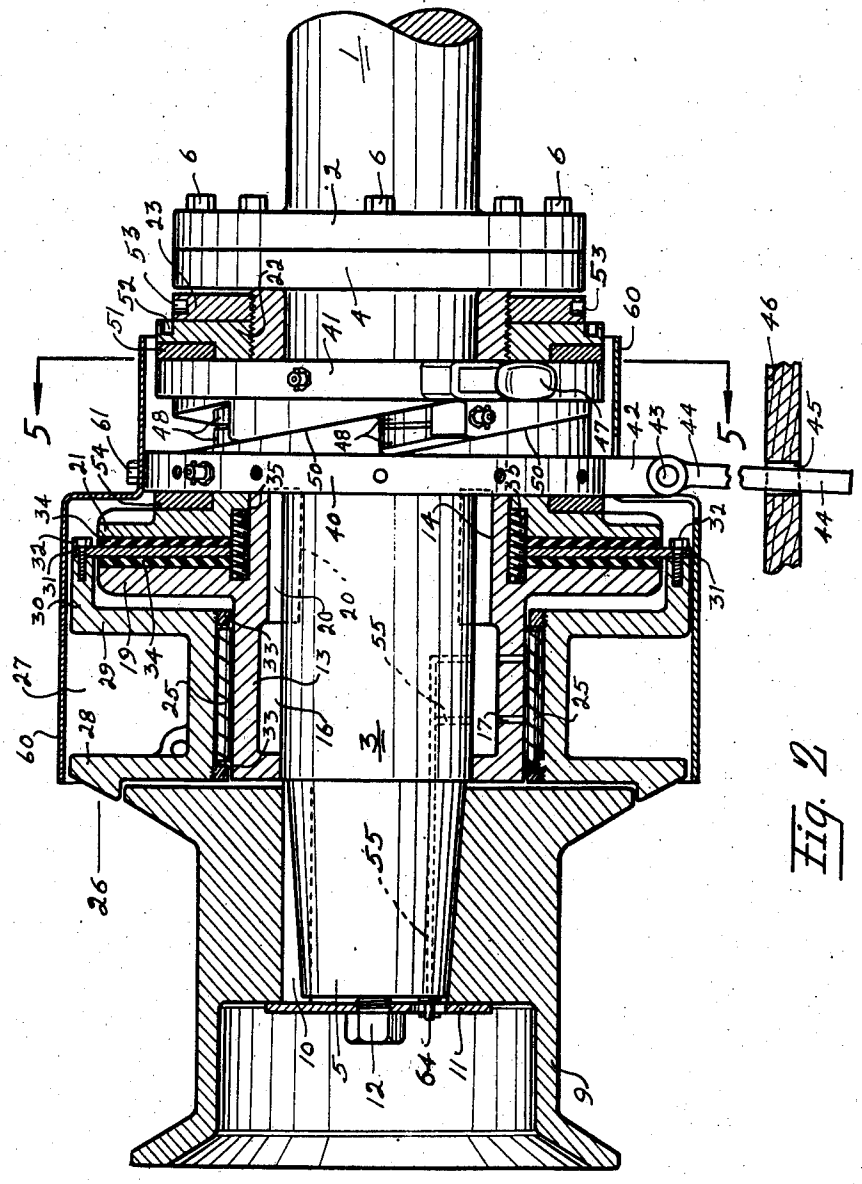


Fig. 2

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SPINNING LINE CATHEAD

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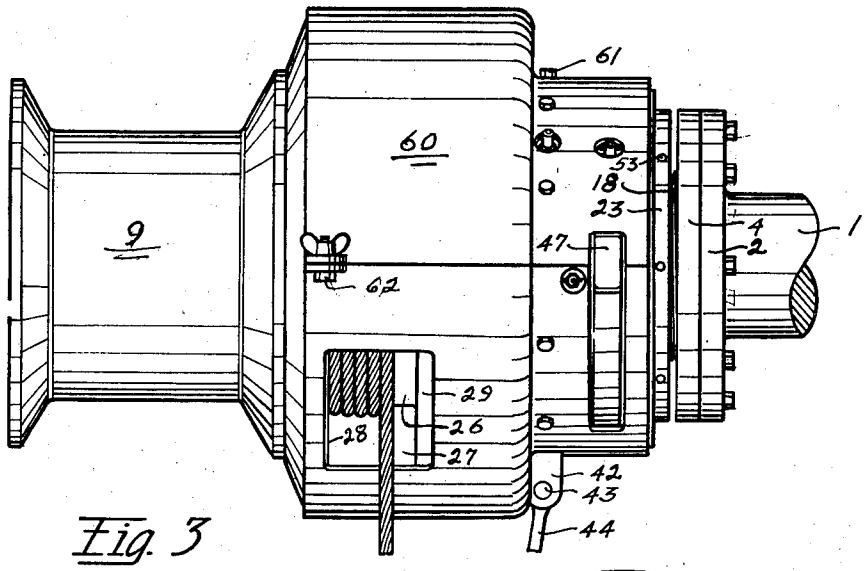


Fig. 3

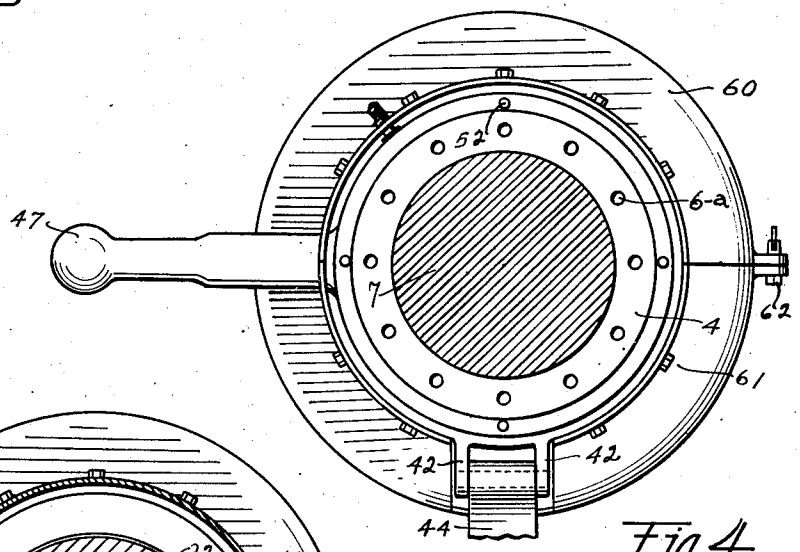


Fig. 4

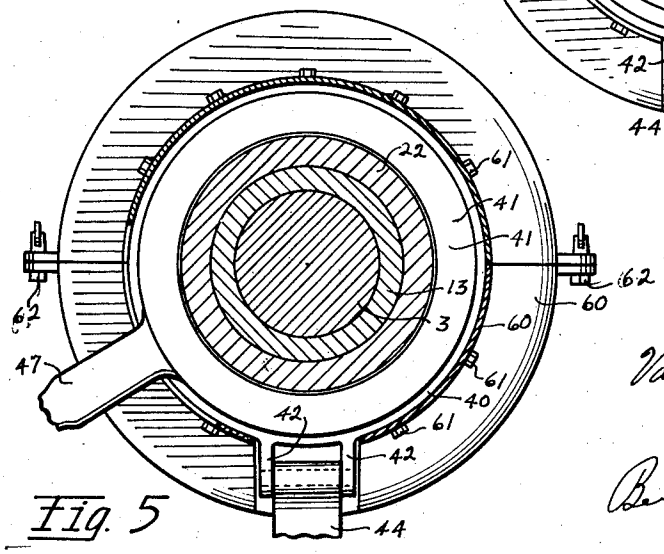


Fig. 5

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SPINNING LINE CATHEAD

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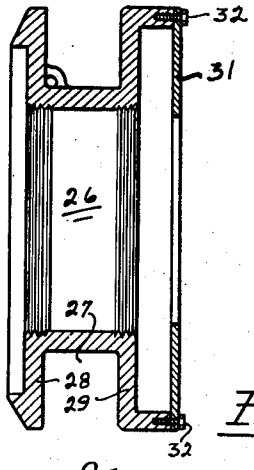


Fig. 6

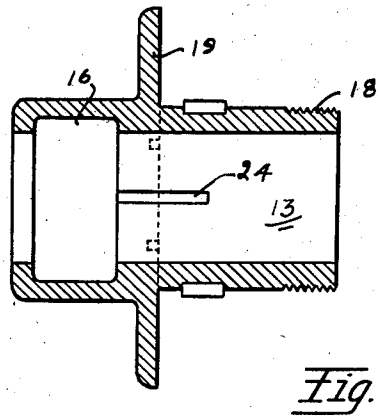


Fig. 7

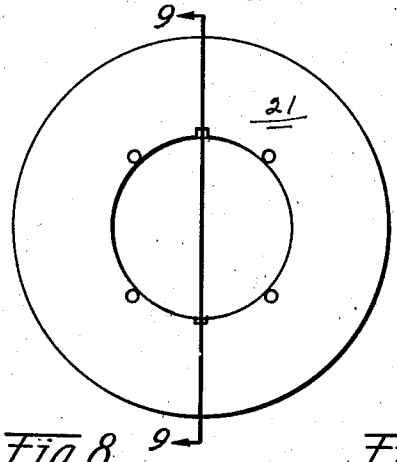


Fig. 8

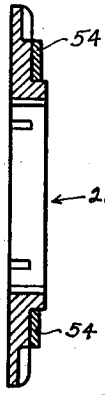


Fig. 9



Fig. 10

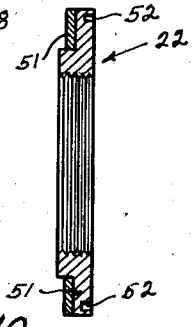


Fig. 11

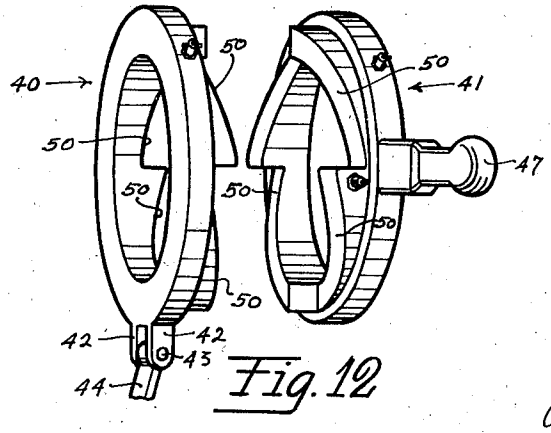


Fig. 12

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Patented Aug. 15, 1944 2,355,861

UNITED STATES PATENT OFFICE

2,355,861

SPINNING LINE CATHEAD

Varney S. Harlin, Wheatland, Okla.

Application February 20, 1942, Serial No. 431,721

1 Claim. (Cl. 254—187)

My invention relates to rope winding spools or catheads, and more particularly to clutch-operated catheads constituting a part of oil field draw-works and commonly known as "spinning line catheads."

Spinning line catheads are used extensively for making up drill stem and casing strings or otherwise operating pipe tongs for making and sometimes breaking threaded pipe connections. They are usually mounted upon the same draw-works shaft which carries, upon its outermost end, a winding spool used for light hoisting or pulling jobs in and about the derrick.

In utilizing a spinning line cathead for making up pipe joints, in order to be practical it is necessary that the structure be such that the operator may at all times retain perfect control of the rope winding drum. He must be able to obtain a short or long pull upon the line, and must be able to instantaneously connect the drum to or release it from its driving shaft. For this reason, usual jaw-type clutches are too slow in operation to reach the desired result.

One object of the present invention is the provision of a spinning line cathead clutch which may be instantaneously connected to and released from the driving shaft.

In order to obtain a sensitive as well as instantaneous clutch operation, friction discs have been utilized in the present cathead, and it is one object of the invention to provide a friction-type cathead clutch which will have sufficient friction surface to not only exert the tremendous power needed, but which will also withstand, over a long period of time, the wear and tear occasioned by the frequent clutching and de-clutching operation.

When running pipe into a well, a make-up or spinning line cathead clutch is connected and disconnected several times for each pipe joint, and each connection is made from a dead stop on the part of the rope winding drum. It may therefore be seen that the friction elements must withstand an enormous amount of abuse.

Another object is to provide a cathead clutching mechanism so designed that the friction discs may be easily and quickly removed and replaced.

A still further object is to provide a friction-type clutch which may be easily and quickly adjusted to compensate for wear in the friction discs.

Since the draw-works shaft upon which spinning line catheads are mounted is usually also used to drive mechanical units other than the cathead, the shaft in most cases constantly rotates when the draw-works is in operation. For this reason there is an almost continuous frictional wear between the stationary and the rotating portions of the cathead.

It is therefore an object of the present invention to provide a clutch structure which is so designed that this wear is reduced as much as possible.

Another object is the provision of a friction-type cathead clutch in which all of the end thrust, occasioned by engaging the friction discs, is absorbed in the clutch mechanism without any portion thereof being exerted upon the shaft.

Other objects will be apparent from the following description when taken in connection with the accompanying four-sheet drawings.

In the drawings:

Figure 1 is a vertical sectional view of the cathead operatively mounted upon a driving shaft, the clutch mechanism being depicted in a declutched position;

Figure 2 is a similar view showing the clutch parts in their clutched positions;

Figure 3 is a front elevational view of the cathead mounted upon its drive shaft;

Figure 4 is a vertical sectional view taken substantially along the line 4—4 of Figure 1;

Figure 5 is a similar view taken substantially along the line 5—5 of Figure 2;

Figure 6 is a vertical sectional view detailing the rope winding drum;

Figure 7 is a similar view detailing the clutch sleeve;

Figure 8 is an end view of a movable flange constituting a part of the device;

Figure 9 is a vertical sectional view taken substantially along the line 9—9 of Fig. 8;

Figure 10 is a similar view of two bearings which are part of the device;

Figure 11 is a vertical sectional view detailing an adjustable flange forming a part of the device; and,

Figure 12 is a perspective view of two co-acting clutch engaging rings used in connection with the device.

Like characters of reference designate like parts in all of the figures wherein they occur.

The reference numeral 1 indicates the outer, or free end portion, of a usual draw-works shaft which is adapted to be driven to rotation by a draw-works power unit, not shown.

As one means for mounting the present cathead upon the outer end of the shaft 1, the shaft is threaded to receive a suitable coupling flange 2. A short extension shaft or stub-shaft 3 hav-

ing an integral coupling flange 4 at one end and a reduced taper 5 at its other end, is attached in axial alignment with the shaft 1 by a plurality of stud-bolts 6 engaged in threaded bores 6—a in the flange 4 (Fig. 4). A boss 7 (Fig. 1) is provided upon the face of the flange 4 to seat snugly within a similarly shaped indenture 8 in the outer face of the flange 2. The boss 7 and indenture 8 assist in insuring the stub-shaft 3 against racking movement with relation to the shaft 1.

Pressed firmly in place upon the tapered portion 5 of the stub-shaft 3 is a usual rope spool 9 which is held against independent rotation thereon by a key 10 and against longitudinal removal therefrom by a disc or plate 11 and a stud-bolt 12 (Figs. 1 and 2).

The spinning line cathead mechanism of the present invention is carried by the stub-shaft 3 between the inner end of the spool 9 and the outer face of the flange 4, and consists substantially of the following described structure:

Over the stub-shaft 3 is pressed a substantially tubular clutch sleeve 13, best seen in Figs. 1 and 2. The sleeve 13 has an axial through bore 14 which is enlarged as shown at 15 to form, with the shaft 3, an annular reservoir 16 for a lubricant as will be more fully described hereinbelow: Passages 17 extend laterally through the wall of the sleeve and act as outlets for the lubricant. The sleeve 13 is provided at its inner end (the right hand end of Figs. 1 and 2), with exterior threads 18, and intermediate its ends has an integral outwardly extending annular flange 19. A pair of oppositely disposed keys 20 act in a usual manner to prevent independent radial movement of the sleeve 13 with relation to the stub-shaft 3.

Around the exterior surface of that portion of the sleeve 13 which lies between the flange 19 and the flange 4 of the stub-shaft 3, there are provided two spaced outwardly extending flanges or rings 21 and 22 (Figs. 9 and 11). The ring 22 is interiorly threaded to engage the threads 18 on the sleeve 13, and a lock-nut 23, also engaging the threads 18 acts to adjustably lock the ring 22 in stationary position. The ring 21 is in fact a follower, and is adapted to be moved along the sleeve 13 longitudinally thereof for a purpose which will be more fully described hereinbelow. The follower 21 and sleeve 13 have radially spaced keys, the key-way 24 for one of which is shown in Fig. 7, and which keys permit the follower 21 to slide along the sleeve 13 but prevent its independent rotation with relation thereto.

Between the inner or right hand end of the spool 9 (as shown in Figs. 1 and 2) and the outer or left hand face of the flange 19 of the sleeve 13, and preferably mounted upon suitable roller bearings 25, is a rope winding drum 26. The drum 26 has an annular rope receiving or winding channel 27 bounded by two outwardly extending annular end walls 28 and 29. The wall 29 has an integral hollow cylindrical flange 30 extending toward and beyond the flange 19 of the sleeve 13, and the end of the flange 30 supports an annular metal disc 31 which is attached rigidly thereto by a plurality of stud-bolts 32. The disc 31 is made in two half circular sections and is located between the adjacent faces of the flange 19 and the follower 21. The central bore of the disc 31 is sufficiently great in diameter to clear the outer surface of the sleeve 13. The bearings 25 are assembled entirely around the sleeve 13 and are held against longitudinal movement by two rings 33 which are threaded into the ends of the bore of the drum 26. The drum 26 is free to slide longitudinally a slight distance upon the roller bearings as will be more fully described hereinbelow.

As above-stated, the disc 31 is located between the adjacent faces of the flange 19 and the follower 21, and at each side of the disc 31 there is provided one of two identical friction discs 34. The discs 34 are formed of any suitable material such as asbestos composition, a metal-fiber plastic combination, or the like.

The adjacent faces of the flange 19 and the follower 21 have a series of equidistantly and radially spaced superficial bores which receive the opposite ends of a plurality of compression springs 35. The springs 35 act to force the follower away from the flange 19.

As a means for moving the ring or follower 21 toward the flange 19 in order to compress the friction discs 34, there is provided around the exterior surface of the sleeve 13 a pair of coacting thrust rings 40 and 41. These rings are detailed best in Fig. 12. The ring 40 consists of an annular body having downwardly extending spaced ears 42 between which is pivoted upon a pivot pin 43 an anchor arm 44. The anchor arm acts to prevent rotation of the ring 40 about the sleeve 13 by extending through an opening 45 in the derrick floor 46.

The ring 41 has an outwardly extending handle 47 by which it may be manually rotated about the sleeve 13. A pair of anti-friction bearings 48 form riding surfaces for the rings 40 and 41. It will be noted that when the sleeve 13 is rotating with the shaft 3, the ring 40 stands still while the ring 41 might be partially rotated about the sleeve.

The two rings 40 and 41 have complemental beveled surfaces 50, each of which extends only partially around the rings. A slight manual rotation of the ring 41 causes the beveled surface 50 of that ring to ride upon the co-acting beveled surface of the ring 40 which acts to force the ring 40 toward the follower 21. This action, as may best be seen in Fig. 2, moves the follower 21 toward the flange 19 and causes the friction discs 34 to be impinged between the same. This action causes rotation of the rope drum 26 due to the fact that the disc 31 is caused to rotate. In Fig. 1, the rings 40 and 41 are shown in such position that the friction discs 34 are not impinged, while in Fig. 2 the ring 41 has been slightly rotated, the handle 47 having been pushed downwardly, and the follower 21 has therefore been moved to cause impingement of the friction discs 34. When the parts are in this position, the rope drum 26 will rotate with the stub-shaft 3 and the sleeve 13. An annular thrust bearing 51 may be provided between the ring 22 and the right hand surface of the ring 41. Radially spaced indentures 52 are provided in the right hand face of the ring 22 to receive a spanner wrench, and similar indentures 53 are provided in the periphery of the lock nut 23 for a similar purpose. An annular thrust bearing 54 may also be provided between the adjacent faces of the ring 40 and the follower 21 for an obvious purpose.

From the foregoing description, it may readily be seen that a slight movement of the handle 47 will cause a lesser longitudinal movement of the follower 21 along the exterior surface of the sleeve 13, and therefore the clutching action of the friction discs 34 may be very sensitively controlled. It is also pointed out that any longi-

tudinal stress exerted by slight rotation of the ring 41 is withstood by the sleeve 13 and not by the stub-shaft 3. A suitable lubricating fitting 64 may be provided for furnishing a lubricant to the reservoir 16 through a passage 55 in order to lubricate the roller bearings 25. Other lubricant fittings may be provided to lubricate the bearings 48 and any moving parts where desired.

It is pointed out that when the friction discs 34 become worn thin by usage, the slack may be taken up by rotating the thrust nut 22 upon the threads 18 and then re-setting the lock-nut 23. The right hand face of the spool 9 will act to limit the extent to which the rope drum 26 may be moved toward the left hand upon the sleeve 13. It is pointed out that the friction discs may be replaced when worn by merely loosening or backing off the ring 22 and lock-nut 23, removing the stud bolts 32 and taking out the two sections of the disc 31.

A suitable sheet metal housing 60 extends across the winding channel 27 of the rope drum 26 and is bolted to the periphery of the ring 40 by suitable stud-bolts 61. This housing is preferably split longitudinally to form two body halves which are held together along their meeting edges by bolts 62.

It is thought that the above description is sufficiently specific to disclose the operation of the device without a further detailed description.

While the preferred embodiment of the invention has been illustrated in the drawings and has been described hereinabove, it is obvious that minor changes could well be made.

I claim:

A clutch mechanism including the combination with a driven shaft, of: a stub shaft removably attached to the driven shaft in axial alignment therewith; a substantially tubular elongated sleeve surrounding the stub shaft and keyed thereto; an outwardly extending rigid annular flange carried by the sleeve intermediate the ends thereof: a rope winding drum surrounding the sleeve at one side of said flange, and adapted for independent rotation upon the sleeve, said drum having a tubular extension projecting longitudinally beyond said flange; bearings interposed between the drum and the sleeve; an annular friction disc surrounding the sleeve adjacent the other side of the flange, but attached to neither; an annular metal plate beside said friction disc and rigidly carried by the extension of the drum; a second friction disc around the sleeve and located beside the annular plate; a follower ring surrounding the sleeve and adapted to slide thereon to impinge the two friction discs and the annular plate into frictionally locked relation to the annular flange on the sleeve; spring means for normally urging the follower away from the adjacent friction disc; a pair of clutch rings around the sleeve but not anchored thereto, said rings having adjacent inter-engaging tapered faces whereby rotation of one ring will cause the other to slide along the sleeve for urging the follower into friction disc impinging position; a nut threaded upon the sleeve adjacent the rings for limiting the longitudinal movement of one ring away from the other; a lock-nut threaded upon the sleeve for preventing inadvertent rotation of the first nut; means for holding one of said clutch rings against rotation; means for lubricating said bearings; and means for lubricating the inter-engaging surfaces of said clutch rings.

VARNEY S. HARLIN.