

Feb. 27, 1945.

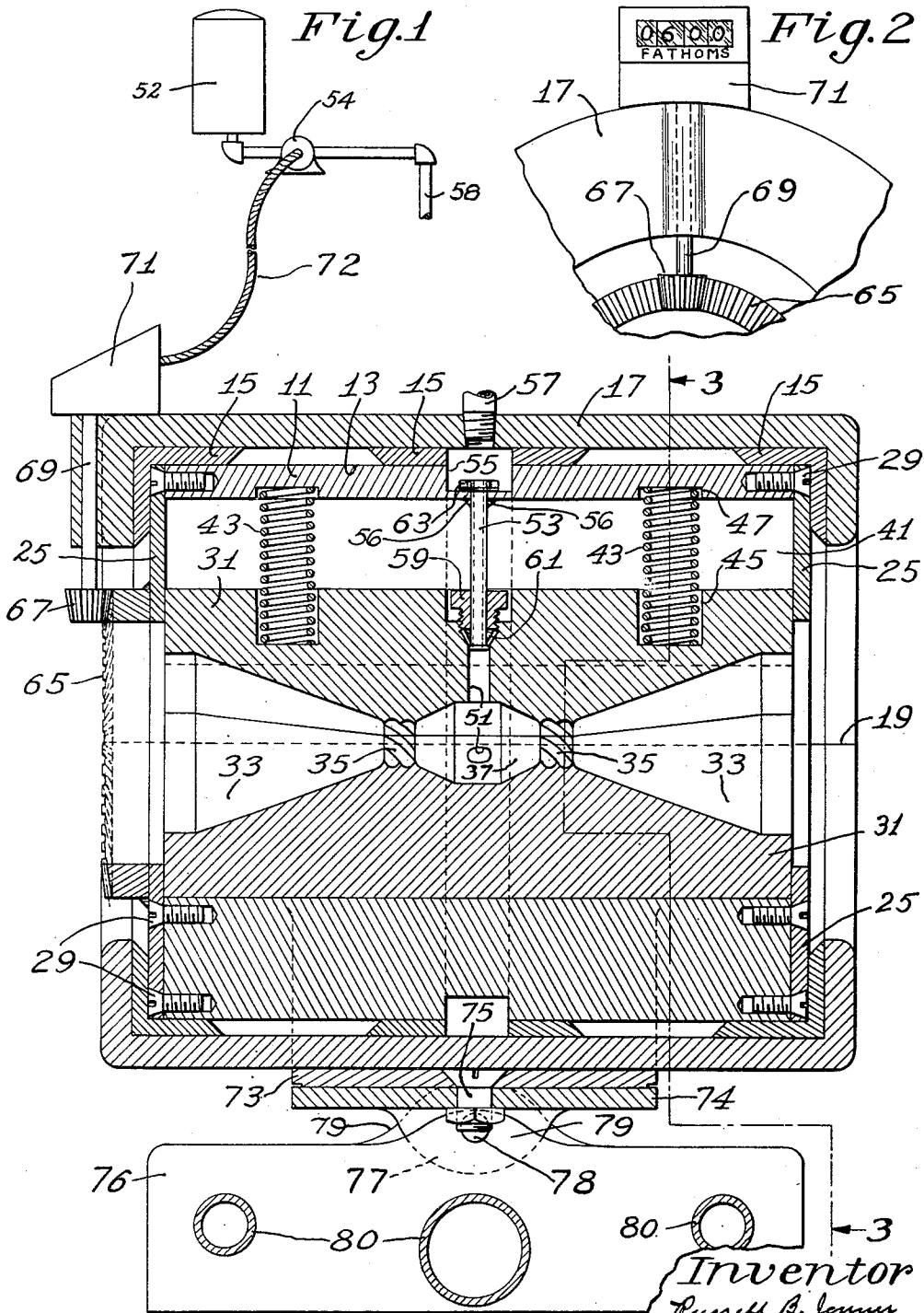
R. B. JENNER

2,370,314

ROPE LUBRICATING APPARATUS

Filed Jan. 24, 1942

4 Sheets-Sheet 1



Witness
Charles J. Olson

Inventor
Russell B. Jenner
by his attorney
Fish, Aldrich, Cary & Jenner

Feb. 27, 1945.

R. B. JENNER

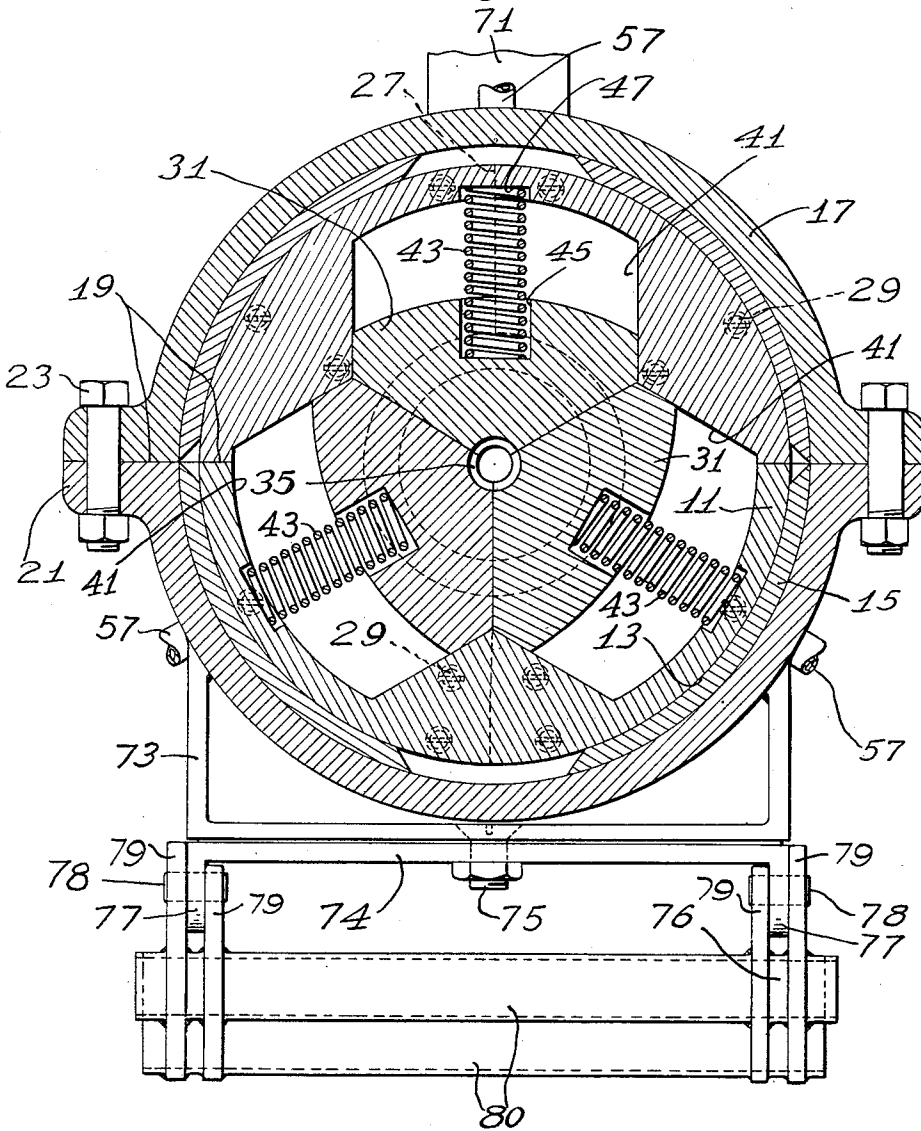
2,370,314

ROPE LUBRICATING APPARATUS

Filed Jan. 24, 1942

4 Sheets-Sheet 2

Fig. 3



Witness
Charles J. Olson

Inventor
Russell B. Jenner
by his attorneys
Fish, Hildreth, Cary & Jenner

Feb. 27, 1945.

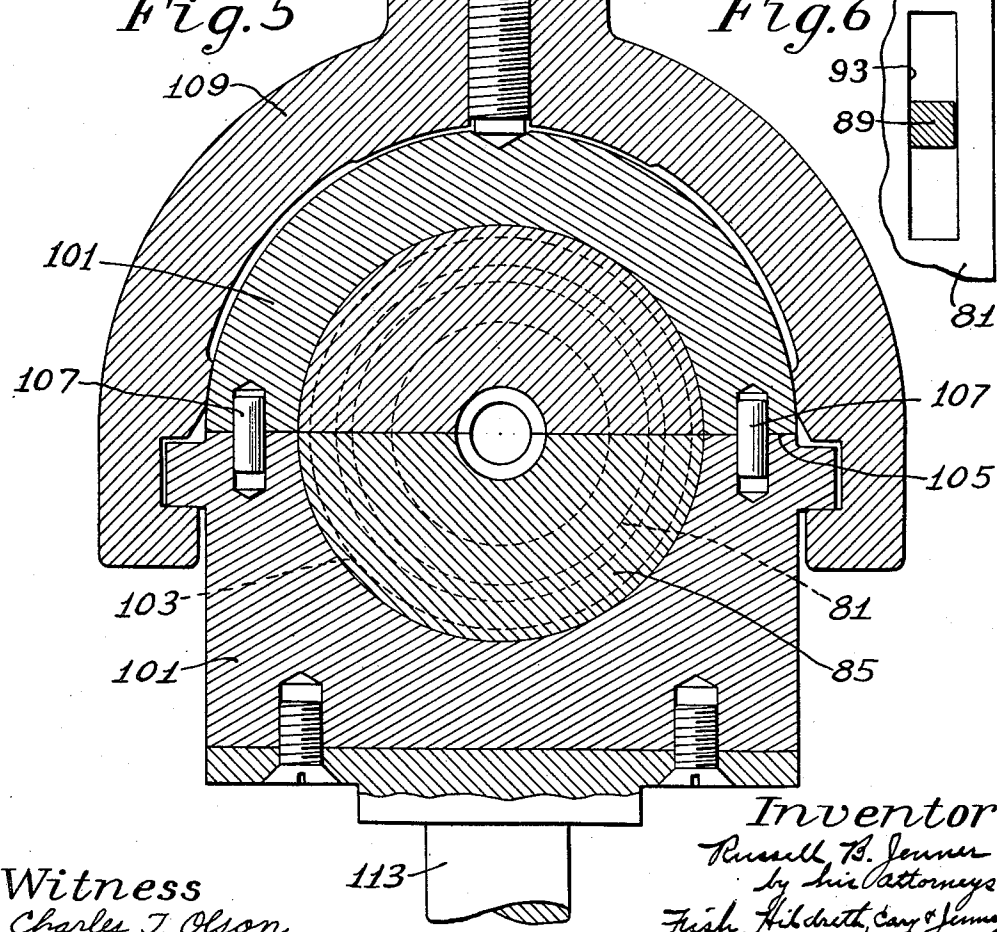
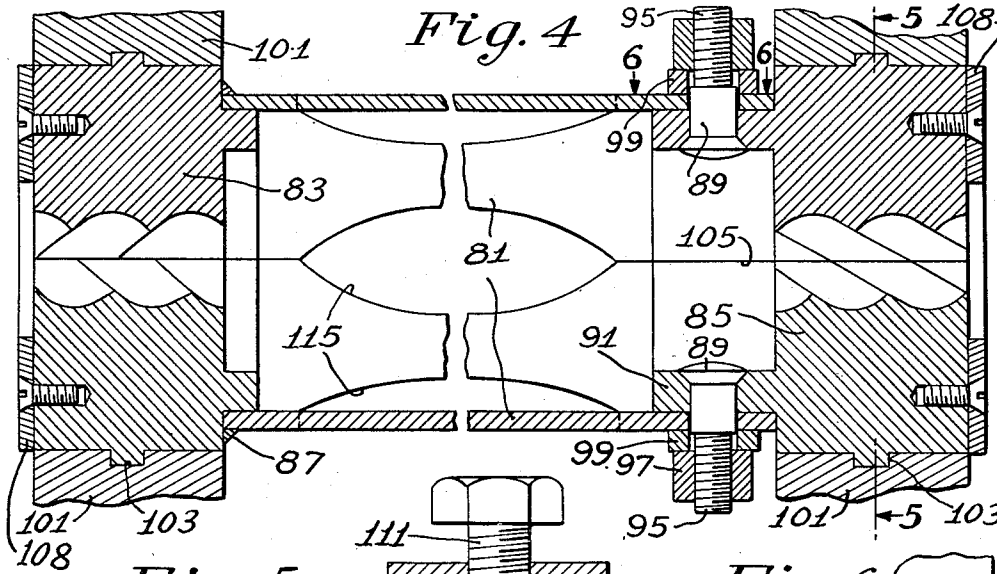
R. B. JENNER

2,370,314

ROPE LUBRICATING APPARATUS

Filed Jan. 24, 1942

4 Sheets-Sheet 3



Witness
Charles J. Olson

Inventor
Russell B. Jenner
by his Attorneys
Fish, Hitchcock, Cary & Jenney

Feb. 27, 1945.

R. B. JENNER

2,370,314

ROPE LUBRICATING APPARATUS

Filed Jan. 24, 1942

4 Sheets-Sheet 4

Fig. 7

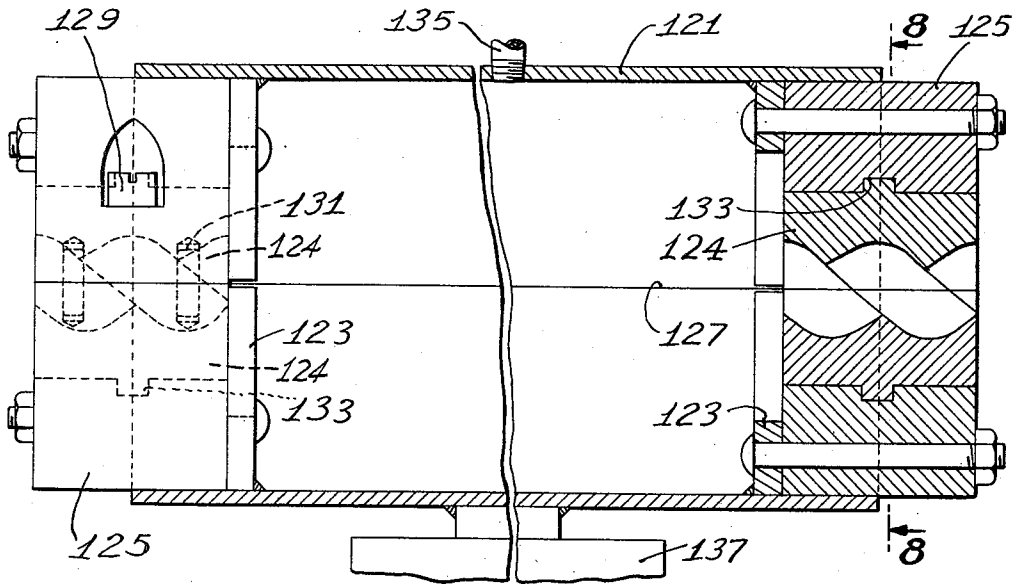
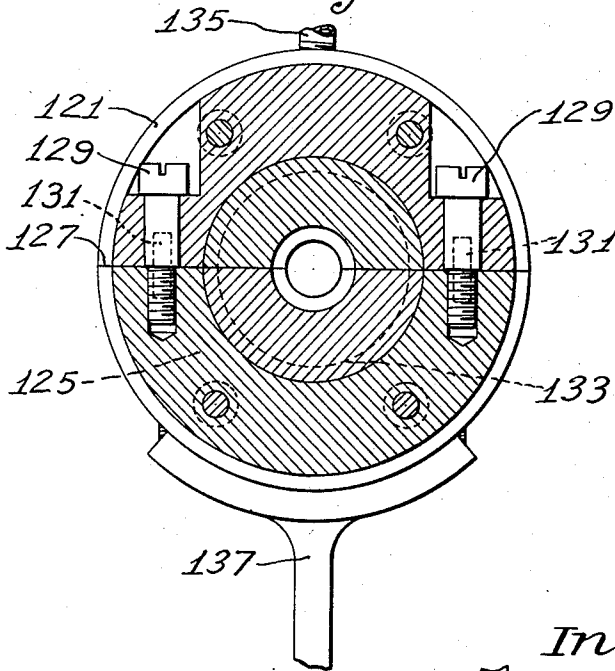


Fig. 8



Witness
Charles J. Olson

Inventor
Russell B. Jenner
by his Attorneys
Fish, Hildreth, Cary & Jenner

UNITED STATES PATENT OFFICE

2,370,314

ROPE LUBRICATING APPARATUS

Russell B. Jenner, Reading, Mass., assignor to
Cities Service Oil Company, New York, N. Y., a
corporation of Pennsylvania

Application January 24, 1942, Serial No. 428,075

17 Claims. (Cl. 184—15)

The present invention relates to apparatus for supplying lubricants or other substances to ropes, cables, and similar constructions formed of twisted strands.

Where a rope, and particularly a wire rope, is subjected to bending under heavy tension, it is highly desirable that proper lubrication be provided in order that the strands may move freely not only upon other parts with which they come in contact, but also upon one another, thus avoiding excessive wear and resulting damage to the rope. Furthermore, where such wire ropes are exposed to the weather or to water, they suffer deterioration from rust and corrosion unless protected by some suitable material applied to the surface thereof, such for example, as an oil or grease. When used on fishing boats, and particularly on trawlers where lengths of wire rope of one thousand fathoms or more are repeatedly fed outwardly under water from the side of the vessel and then drawn inboard by a power operated winch, these ropes suffer severely from wear and from rust and corrosion and require frequent replacement at heavy expense.

It is one of the objects of the present invention to provide an apparatus for supplying suitable substances to ropes in an expeditious and economical manner to lubricate and protectively cover the same, and particularly to apply a grease or oil lubricant to these long wire ropes on fishing trawlers, thereby to prevent, in whole or in part, the excessive wear and deterioration to which such equipment is subjected under the exacting conditions of use.

A further object of the present invention is to provide for a continuous supply of lubricant to the apparatus in accordance with the requirements, and preferably by lubricant supplying means actuated by the movement of the rope itself in normal regular use.

Still another object of the present invention is to provide a lubricating apparatus which will apply an untwisting action to the strands of a short section of the rope to loosen and open the same, thus permitting the penetration of the lubricant deeply into the rope and entirely around the strands.

A further object of the present invention is to provide a rope lubricating apparatus with a measuring device so that the length of rope passing through the apparatus for any given period of time may be easily determined and the supply of the lubricant regulated accordingly.

Other objects of the present invention are to

provide an apparatus including die members and which may be installed upon or applied to any desired portion of the rope intermediate its ends without the necessity of threading an end of the rope through the apparatus. Also, to provide for the separation or yielding of the die members to permit the passage of enlargements of the rope through the apparatus without damage to either the apparatus or the rope.

With these and other objects which will be apparent to those skilled in the art from a consideration of the following description, the present invention consists in a lubricating apparatus in which the rope passes through a container or chamber and in contact with the lubricant held therein, the rope entering and leaving the apparatus through dies having internal spiral grooves closely fitting the spiral strands of the rope to prevent the escape of lubricant from the container and to effect the removal of excess lubricant from the surface of the rope. Such dies may be either freely rotatable in the walls of the container under the movement of the rope as it passes therethrough, or may be fixedly mounted with respect to each other while the container or die mounting is rotatably supported in a suitable mounting. If desired, a pump or other lubricating supplying device may be driven from the rotating die or die mounting through suitable connections. Furthermore, by adjusting the dies in the die mounting so that they are somewhat out of alignment with respect to their spiral or pitch, the apparatus may be caused to operate with an untwisting or opening action upon the length of rope between the dies so that the lubricant through which it is passing penetrates deeply between and around the strands and thoroughly lubricates and coats the latter.

Preferably the parts which normally surround the rope will be of divided or split construction so that they may be applied or assembled around any desired section of the rope distant from the ends thereof. Also, the divided or split dies may be yieldingly mounted so that they may separate or open to permit the passage of any enlargement in the rope, such as a splice or broken strand.

In the accompanying drawings which illustrate several different embodiments of this invention, Figs. 1, 2 and 3 show the apparatus as particularly designed for lubrication of wire ropes in fishing trawlers, Fig. 1 being a vertical, axial, sectional view of the apparatus, including the lubricant supplying means actuated by the apparatus itself, Fig. 2 being an end view, looking from the

left, showing a portion of the apparatus, and particularly the indicating means for measuring the length of rope passed through the apparatus, and Fig. 3 being a transverse, vertical section on line 3—3 of Fig. 1, showing the three-part die and the yielding mounting thereof to permit enlargements in the rope to pass through the same without resulting damage.

A second embodiment of the present invention is illustrated in Figs. 4, 5 and 6, and is designed particularly for the deep and thorough treatment or lubrication of the strands of the rope by presenting the rope to the lubricant in a partially untwisted or loosened condition, Fig. 4 being a vertical, sectional view of the die mounting portion of the apparatus with one of the dies axially adjusted with respect to the other die so that the section of rope therebetween is untwisted and opened to permit the free access of the lubricant to the interior and around the strands of the rope, Fig. 5 being a transverse section on line 5—5 of Fig. 4, showing the method of mounting the die assembly, and Fig. 6 being a separate detail of the bolt and slot arrangement taken on the line 6—6 of Fig. 4, for securing the dies in the desired axial adjustment.

The third embodiment of the present invention is illustrated in Figs. 7 and 8 in which the container for the lubricant is held stationary, the dies rotating with respect thereto as the rope passes through the apparatus, Fig. 7 being a view partly in elevation and partly in vertical, longitudinal section of such an apparatus, while Fig. 8 is a transverse, vertical section on line 8—8 of Fig. 7.

In the type of apparatus illustrated in Figs. 1, 2 and 3, which is particularly designed for the treatment of wire rope on trawlers, the rope passes through the lubricant within a die mounting member which is rotatably mounted in a supporting member and provided with a pair of internally spirally grooved dies. These dies are formed in three parts, held from rotation with respect to the die mounting, but yielding radially outwardly against compression springs to permit the passage of enlarged portions of the rope. A continuous supply of lubricant to the rope as it passes through the apparatus from an outside source of supply is provided by means of a pump driven from the rotating assembly and suitable pipe connections.

The die mounting member 11, shown in Figs. 1 and 3, has an outer cylindrical bearing surface 13 rotatably engaging the bearing bushings 15 secured on the cylindrical interior of the support 17. In order that the apparatus may be applied to any desired portion of the rope intermediate its ends, both the member 11 and its support 17 are longitudinally divided or split on the line 19, the support being provided with suitable clamping flanges 21 and bolts 23 for securing the two parts of the support fixedly together. The two halves of the member 11 are secured together by the split end rings 25, diametrically split with the parting or separation line 27 at 90° to the separation line 19 between the two parts of the member 11. Countersunk screws 29 secure these split rings to the ends of the member 11.

Within the member 11 are mounted the dies through which the rope passes and which are provided with internal spiral grooves fitting the spiral grooves of the rope so that as the rope passes through the dies the latter and the member 11 will be rotated. While passing through the

apparatus the rope is in contact with the lubricant, preferably for trawler use a heavy semi-liquid grease. The dies fit the rope sufficiently closely to prevent leakage or escape of the grease, and also to remove the excess of lubricant from the rope.

The dies illustrated in Figs. 1 and 3 are made in three parts 31, which in their normal assembled position, as shown in these figures, provide tapering or funnel shaped openings 33 at each end of the apparatus which openings terminate at their small ends in internal, spirally grooved, rope engaging faces 35. Between these die faces is the lubricant chamber or container 37 through which the rope passes and into which the lubricant is continuously forced while the apparatus is in operation.

In order to provide for yielding movement of the die members 31 to permit passage of enlargements in the rope through the apparatus without difficulty or damage, the interior of the member 11 is formed with radial recesses 41 in each of which is received a die member 31, with a sliding fit. Compression springs 43, each seated at its inner end in a recess 45 in the die member and at its outer end in a recess 47 in the member 11, normally force the die members inwardly together under substantial pressure, but nevertheless yield sufficiently to permit the die members to move outwardly to provide a larger opening through the die assembly for the passage of an enlargement in the rope, the die members returning to their normal closed position when the enlargement leaves the second die face.

The lubricant is supplied to the lubricant chamber 37 through the passages 51, one in each die member. These passages communicate through hollow studs 53 with the peripheral groove 55 in the outer face of the member 11 midway its ends. These hollow studs are fixedly secured at their outer ends to the member 11 by means of shoulders or flanges 56 on the hollow studs 53 and clamping nuts 63. The inner ends of the hollow studs 53 are slidably mounted in the lubricant passages 51 and are guided therein by means of packing nuts 59 threaded into the respective die members 31. Thus, when the die member is forced outwardly by an enlargement in the rope, the hollow stud 53 extends further inwardly in the lubricant passage. A packing cup washer 61 beneath the nut 59 prevents the escape of lubricant around the hollow stud during normal operation of the machine.

While the lubricant pump may be operated in any suitable manner, it is preferred to drive it from the rotating die assembly, so that the delivery of lubricant will be contemporaneous with the movement of the rope through the device, starting when the rope begins to move and stopping when the rope stops. A convenient arrangement is shown in Figs. 1 and 2, where one end of the die assembly is provided with the split ring bevel gear 65 attached to a ring 25, and meshing with the pinion 67 upon the shaft 69 rotatably supported in the support 17. Through suitable connections at the upper end of the shaft 69 within a casing 71, a flexible shaft 72 drives a lubricant pump 54. Lubricant for the rope lubricating apparatus is drawn from a supply tank 52 and forced by means of the pump 54 through a line 58 into branch lines 57 by which it is distributed to the groove 55, from which the lubricant is conducted through the hollow studs 53 and passages 51 into the chamber 37.

In order that the operator of the winch may

be advised at all times of the length of the rope off the winch, a recording device has been provided, conveniently associated with the connections in the casing 71, which measures the passage of the rope in fathoms, this being the unit of measurement ordinarily employed for such trawler ropes. The indicator in Fig. 2 shows that there are approximately 600 fathoms of the rope outboard. Thus the indicator shows at all times the spread or extension of the outer end of the net, and guides the operator of the winch not only in spreading the net but also in reeling it in to the trawler. The indicator is of further assistance in determining the required amount of lubricant which must be in the supply tank to lubricate properly the length of rope to be reeled in.

As used on a fishing trawler the lubricating apparatus may be preferably located in close proximity to the power driven winch, and in order that the dies may adjust themselves to the lead of the rope and permit the windings on the drum of the latter to be in regular and uniform layers, the lubricating device is mounted so that it is free not only to turn and tip but also to move laterally back and forth across the face of the drum. A convenient arrangement is shown in Figs. 1 and 3, where the support 17 is provided with the U-shaped base 73 welded to the support and pivotally mounted upon a tilting base 74 by means of the vertical pivot screw 75. The base 74 is in turn pivoted upon a sliding carriage 76 by means of the depending ears 77 on the base and horizontal pivot pins 78 passing through the ears and spaced pairs of end members 79 of the carriage. In these ends are secured, as by welding, the tubular guiding supports 80 which encircle with free sliding fit circular bars or guideways (not shown) supported in any suitable manner.

It is highly desirable when new rope is put into service that it be given a thorough and complete lubrication, not only on the surface of the rope, but also within the body of the rope itself, between and around the strands of which it is composed. Such a deep lubrication is also desirable where rope has been in storage or has been used for some time with no lubrication at all or with insufficient or improper lubrication.

To facilitate this deep or penetrating lubrication, the construction illustrated in Figs. 4, 5 and 6 has been provided, which imparts a loosening action to the strands of the rope as it is passing through the lubricant in the container, thus permitting access of the lubricant to all portions of the rope and its strands. Preferably this apparatus is applied to the rope when the latter is not in active service or under any tension, in order that the loosening or untwisting, which in itself is a difficult operation due to the setting of the strands in tight contact in the process of manufacture, may not have to be effected against the additional resistance to the loosening or opening of the strands resulting from the tension on the rope in normal use.

As shown in Fig. 4, the lubricating apparatus comprises a cylindrical member 81, having at its ends respectively die members 83 and 85. Die member 83 is permanently and rigidly secured to the member 81 in any convenient manner, as by welding, at 87. Die member 85, while normally held in fixed relation to the member 81, is arranged for rotary adjustment with respect thereto by bolt and slot connections comprising the square bodied bolts 89 passing through corre-

spondingly shaped openings in the inwardly extending flange 91 on the die member 85 and the peripheral slots 93 (Figure 6) in the cylindrical wall of the member 81. The outer ends of the bolts are threaded, as at 95, to receive the clamping nuts 97 and washers 99.

By loosening the clamping nuts 97, the die member 85 may be rotatably adjusted out of true pitch alignment with the fixed die member 83 and in the direction such that the internal spiral grooves of the dies engaging the spiral strands of the rope produce a loosening or untwisting action upon the section of the rope within the member 81 between the dies, so that the lubricant has free access to the interior of the rope and to all portions of the strands.

The member 81 with its dies is mounted for free rotation in yoke-shaped supports 101 having bearings for the die members. The bearings and die members are provided with cooperating peripheral ribs and grooves 103 respectively. In order that the apparatus may be positioned upon the rope anywhere along its length intermediate its ends, the die mounting member 81, dies and supports are divided on the line 105, dowel pins 107 being provided for positioning the upper portion of the support bearing upon the lower portion, the two halves of the die members 83 and 85 and member 81 being secured together by split end rings 108 arranged like the end rings 25 in Fig. 1. Clamping members 109, each with clamping bolt 111 clamp the upper and lower portions of the bearing supports rigidly together.

Preferably the apparatus is used with an external supply of lubricant, such as a tank, the apparatus being adapted to be raised above the lubricant for the purpose of positioning the rope therein and removing it therefrom, and for lowering the assembled apparatus and rope into the lubricant for treatment of the rope, and thereafter raising it. For this purpose, a spindle 113 is provided on the yoke-shaped support adapted to be engaged and actuated through any suitable raising and lowering mechanism.

The lubricant is supplied to the interior of the member 81 when the latter is submerged, the lubricant being supplied through the openings 115 extending longitudinally in the walls of the cylinder.

Where the rope is employed under less destructive conditions than those under which trawler ropes are used, as for example with elevator cables, power transmitting cables and the like, a simpler construction than that shown in Figs. 1 to 3 may be satisfactorily employed, and such a construction is shown in Figs. 7 and 8.

In this construction the lubricant container or chamber is held stationary and die members 124 are freely rotatable in bearings carried by the container. Such a lubricant container is conveniently formed of the cylinder 121, within which are welded the rings 123 spaced inwardly from the ends. Fitting within the open ends of the cylinder and bolted to the rings 123 are the bearing members 125. Both cylinder and bearings are split on the line 127 and are clamped rigidly together by means of the cap screws 129, positioning dowels 131 being provided to insure exact alignment of the opposed bearing surfaces. Axial movement of the dies is prevented by means of the cooperating peripheral ribs and grooves 133.

Where ropes are under cover and protected from the elements, it is obvious that lesser amounts of lubricant are required than where the rope is exposed to the elements, and especially

where it is submerged in sea water, as when used with trawlers. Accordingly, in the construction shown in Figs. 7 and 8, the dies will be designed to fit more closely the spiral strands of the rope, so that less lubricant is required in order to maintain the rope in proper condition. Accordingly, a continuous supply of lubricant may be dispensed with and the container may be from time to time replenished with lubricant through the common lubricant fitting 135 by means of a suitable lubricant "gun."

Since under cover ropes, as used for elevators and power transmission, maintain the same axial positioning in the greater portion if not the entire paths of their movement, the apparatus of Figs. 7 and 8 may be mounted in fixed position by means of the supporting member 137, secured as by welding to the lower half of the cylindrical container. If desired, however, a mounting similar to that shown in Figs. 1 and 3 may be provided and the apparatus be permitted to turn and tip and slide back and forth on the circular guideways to follow the path of the rope.

The operation of the construction illustrated in Figs. 1, 2 and 3 is as follows: The apparatus having been mounted adjacent the power winch, and the casing, die mounting and dies separated on their parting lines, the rope is laid across the parts held in the support with the spiral strands of the rope positioned in the spiral grooves of the die members. The removed portions are then assembled and secured in position with the rope entering the apparatus through the tapering opening at one end, fitting closely in the adjacent die, extending through the lubrication chamber, and then through the other die and tapered opening. If the lubricant supply ducts and the lubricant chamber at this time contain no lubricant, it is desirable to fill these conveniently by a hand pump or gun.

The apparatus is now ready for use, and when the rope is run outwardly in spreading the net or drawn inwardly by the winch, the passage of the rope through the lubricant in the chamber results in the thorough lubrication of the strands of the rope. The close fitting of the rope within the dies prevents leakage of the lubricant and also the retention on the surface of the rope of no more than the desired amount of lubricant. Since the rope does not rotate in its axial movement the dies and mounting are rotatively driven and in turn actuate the lubricant pump and the fathom indicator. Lubricant is thus supplied only when needed and the operator is enabled to tell at a glance the length of rope unwound from the winch. During the unreeling and reeling operations, the apparatus, being freely movable transversely of the path of the movement of the rope, adjusts itself in the line of the draft, thereby permitting the rope to unwind freely from the drum or be wound up in regular turns and layers.

Inasmuch as the lubricant is applied to the rope in the unreeling operation just before it enters the water, it is most effectively coated by the preserving lubricant to protect it from the action of the sea water. Again, as it is wound on the winch it receives another coating just before reaching the winch drum, so that it is most effectively protected and may stand for long periods of time without damage or deterioration.

In the operation of the construction shown in Figs. 4, 5 and 6, the lubricant is applied to the rope in the same general manner as above described with the adjustable die in true pitch alignment with the fixed die. After the rope has been

positioned in the dies and these have been clamped together, the adjustable die is rotated to give the desired untwisting or loosening action on the strands of the rope, and then is locked in position. The apparatus with the section of rope is then submerged in the lubricant and as the rope is drawn through the device the strands of the rope are thoroughly lubricated. As the rope leaves the exit die the natural set or spring of the strands brings these parts into their original close contact, but now entirely surrounded and encased in lubricant.

In the operation of the construction shown in Figs. 7 and 8, the device, permanently mounted in fixed position, is opened or split, the section of rope laid in the dies and the top section replaced and clamped in position. The cylindrical container or chamber is filled with lubricant by means of a gun through the fitting, and thereafter, as the rope travels back and forth through the apparatus, its surface is lubricated and coated, the dies turning in their bearings with the movement of the rope. From time to time additional lubricant is supplied as required.

It will be obvious to those skilled in the art that mechanism such as the split gear 65, pinion 67, shaft 69, counter 71, flexible shaft 72, pump 54, lubricant supply tank 52 and pipe 58 as shown in Fig. 1, may be connected with the left hand die 124 of the apparatus shown in Fig. 7, for measuring the length of rope being lubricated and for pumping lubricant from a tank into the lubricating chamber 121.

While in the specification and claims the apparatus is described primarily as a rope lubricating device and the material supplied to the rope is designated as a lubricant, it is obvious that other substances and materials besides lubricants may be used, and therefore these terms are understood to include such other substances and materials as it may be desired to apply to the rope and with which the apparatus is adapted for use.

Nor is the invention to be limited to the particular constructions and arrangements shown and described, except where so specifically recited in the claims, as the invention contemplates other forms and constructions and arrangements coming within the language and scope of the claims.

Having thus described my invention, what I claim is:

1. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a rotatable internally spirally-grooved die mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass after contact with the lubricant, the spiral grooves of the die fitting the spiral strands of the rope to prevent escape of lubricant from the apparatus, the die being adapted to remove excess lubricant from the rope as it passes through the apparatus, said die being rotatable by the movement of the rope through the apparatus.

2. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a supporting casing having therein a rotatable mounting member, an internally spirally-grooved die set in said mounting member rotatable therewith and through which the rope to be lubricated is adapted to pass after contact with the lubricant, the spiral grooves of the die fitting the spiral strands of the rope to prevent escape of lubricant from the apparatus and to remove excess lubricant from

the rope, the die and rotatable mounting being rotatable by the movement of the rope through the apparatus.

3. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a supporting casing having therein a rotatable mounting member, a pair of spaced internally spirally-grooved dies set in said mounting member rotatable therewith and through which the rope to be lubricated is adapted to pass, said mounting and dies being rotatable by the movement of the rope through the apparatus, and means operative to supply lubricant to the space between the dies during the rotation thereof and inoperative when the dies and rope are stationary.

4. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a supporting casing having therein a rotatable mounting member, a pair of spaced internally spirally-grooved dies set in said mounting member rotatable therewith and through which the rope to be lubricated is adapted to pass, said mounting member and dies being rotatable by the movement of the rope through the apparatus, and means actuated by the rotation of the rotatable mounting member and dies when the rope is passed therethrough for supplying lubricant to the space between the dies for the lubrication of the rope.

5. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a supporting casing having therein a rotatable die mounting member provided with a cylindrical outer bearing surface, a pair of spaced internally spirally-grooved dies set in said mounting member rotatable therewith and through which the rope to be lubricated is adapted to pass, said mounting member and dies being rotatable by the movement of the rope through the apparatus, a peripheral groove in the cylindrical outer bearing surface of the mounting member communicating through a passage with the space between the dies, a lubricant passage through the casing communicating with said peripheral groove for conducting lubricant to said groove and through said passage to the space between the dies for lubricating the rope as it passes therethrough.

6. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a supporting casing having herein a rotatable die mounting member provided with a cylindrical outer bearing surface, a pair of spaced internally spirally-grooved dies set in said mounting member rotatable therewith and through which the rope to be lubricated is adapted to pass, said mounting member and dies being rotatable by the movement of the rope through the apparatus, a peripheral groove in the cylindrical outer bearing surface of the mounting member communicating through a passage with the space between the dies, and a pump driven by the rotation of the rotatable mounting member and dies for delivering lubricant to the passage through said casing into said peripheral groove and into the space between said dies.

7. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a pair of spaced internally spirally-grooved dies mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass in contact with a lubricant between the dies, the

spiral grooves of the die fitting the spiral strands of the rope whereby said die is rotated by the movement of the rope therethrough.

8. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising an internally spirally-grooved die mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass, the spiral grooves of the die fitting the spiral strands of the rope whereby said die is rotated by the movement of the rope therethrough, and a pump actuated by the rotation of the die for feeding lubricant to the apparatus to lubricate the rope passing therethrough.

9. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a rotatable internally spirally-grooved multi-part die mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass, the spiral grooves of the die fitting the spiral strands of the rope whereby the die is rotated by the passage of the rope therethrough, the parts of the die being mounted to yield radially outward from the rope to permit the passage through the die of enlarged portions of the rope.

10. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a pair of spaced internally spirally-grooved dies mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass, the rope being contacted with the lubricant in the space between the dies, the spiral grooves of the dies fitting the spiral strands of the rope said dies being mounted in fixed position with respect to each other with the grooves of one die out of pitch-alignment with respect to the grooves of the other die whereby the rope passing in succession through the dies is untwisted in the intervening space between the dies to subject the strands of the rope to the lubricant.

11. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a pair of spaced rotatable internally spirally-grooved dies each mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass in contact with lubricant in the space between the dies, the spiral grooves of the dies fitting the spiral strands of the rope whereby movement of the rope therethrough causes rotation of the dies, a mounting member extending between the dies for holding them in fixed relation with respect to each other, said mounting member including means for rotatably adjusting and setting one die with respect to the other to throw the dies out of alignment so that they have an untwisted action on the section of rope passing between the dies.

12. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a pair of spaced rotatable internally spirally-grooved dies mounted for rotation in the apparatus and through which the rope to be lubricated is adapted to pass, the rope being contacted with the lubricant in the space between the dies, the spiral grooves of the dies fitting the spiral strands of the rope whereby the dies are rotated by the movement of the rope therethrough.

13. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a rotatable internally spirally-grooved die mounted in a rotatable mounting member, said die including a plurality of radially movable die members slidably mounted in recesses in said rotatable mounting member, springs for yieldingly forcing the die members in contact with one another to form said internally spirally-grooved die, said die member being movable outwardly against said springs to permit the passage of an enlarged portion of the rope, the spiral grooves of the die fitting the spiral strands of the rope whereby said die and mounting member are rotatable by the movement of the rope through the die.

14. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a pair of spaced multi-part rotatable internally spirally-grooved dies mounted for rotation in the apparatus, and through which the rope to be lubricated is adapted to pass and be lubricated in the space between the dies, said dies being set in a split cylindrical mounting member rotatable with the dies, a pair of semi-circular rings secured to each end of the mounting member, each semi-ring being secured to two adjacent parts of the mounting member whereby the apparatus may be applied to and removed from a rope intermediate its ends.

15. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a sup-

porting casing having a rotatable die mounting member therein, an internally spirally-grooved die mounted in said mounting member and through which a rope is adapted to pass, the spiral grooves of the die fitting the spiral strands of the rope whereby the die and die mounting are rotated by the movement of the rope there-through, and means including transverse guides on the supporting casing for mounting the apparatus for lateral movement with the rope being lubricated.

16. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a supporting casing having a rotatable die mounting member therein, an internally spirally-grooved die mounted in said mounting member and through which a rope is adapted to pass, the spiral grooves of the die fitting the spiral strands of the rope whereby the die and die mounting are rotated by the movement of the rope there-through, and means including a pivotal mounting for the supporting casing having its axis at a right angle to the axis of the rope passing through the apparatus.

17. A rope lubricating apparatus through which the rope to be lubricated is adapted to pass in contact with a lubricant, comprising a rotatable internally spirally-grooved die mounted for rotation in the apparatus and through which the rope is adapted to pass, the spiral grooves of the die fitting the spiral strands of the rope, whereby the die is rotated with respect to the rope as the rope passes therethrough.

RUSSELL B. JENNER.