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W. J. HAWKINS

ELECTRIC CAPSTAN

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Fig. 1.

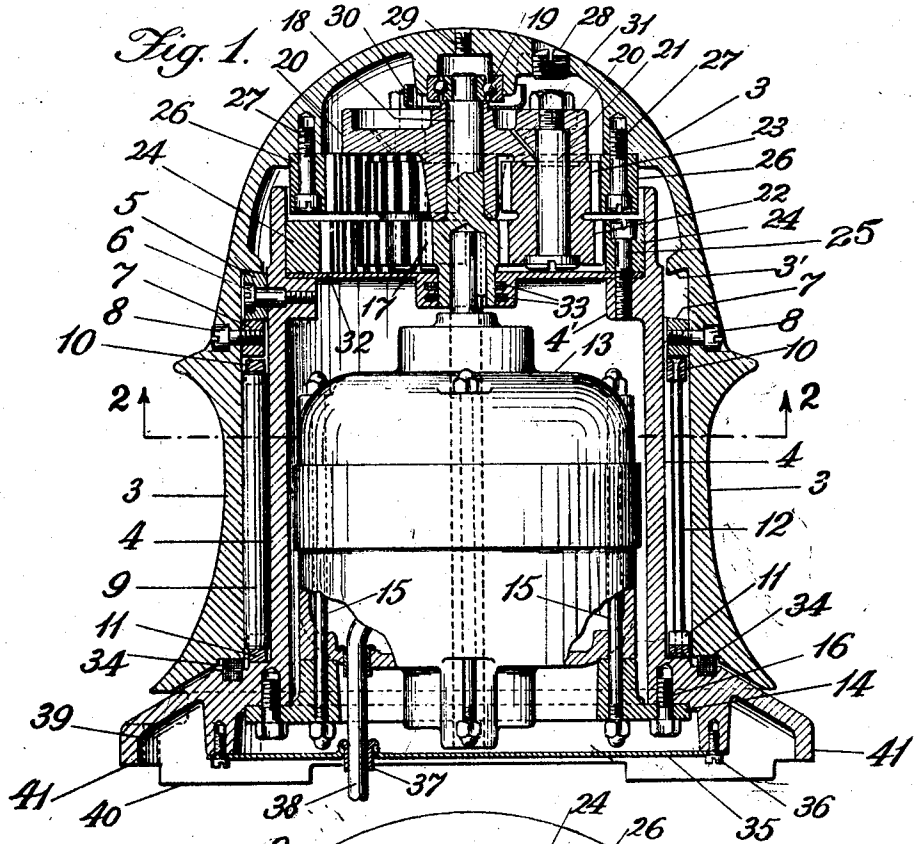
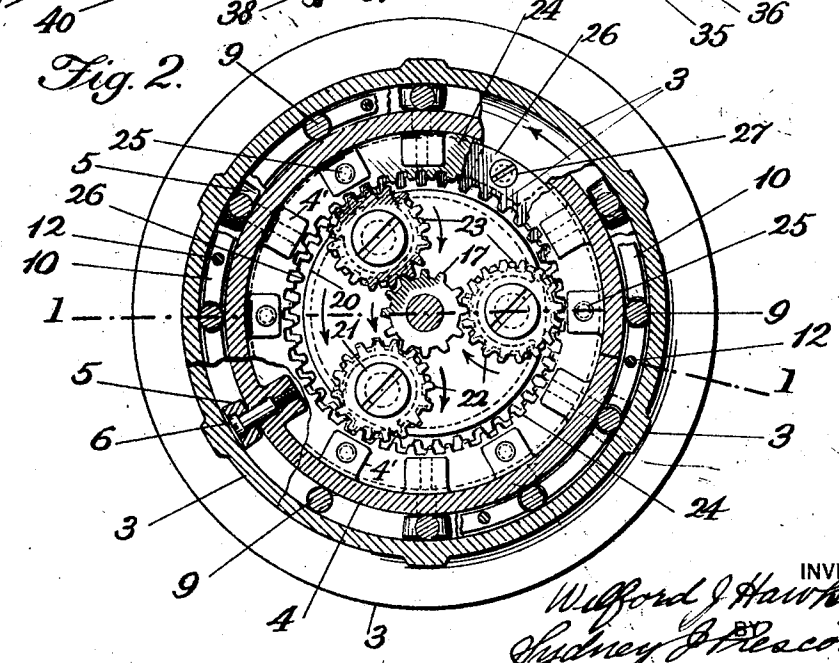


Fig. 2.



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ELECTRIC CAPSTAN.

Application filed December 21, 1925. Serial No. 76,926.

This invention relates to an improvement in electric capstans; and it has for its main object the production of a powerful and compact device of this character in which the standard, the motor, and the necessary reduction gearing, are all enclosed within the barrel and its head, the entire device being above deck, water-tight, and readily accessible. With this and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations which will be hereinafter fully described and then specifically set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification and in which like characters of reference indicate the same or like parts, Fig. 1 is a sectional elevation of a capstan constructed in accordance with the invention, the section being indicated by the line 1—1 in Fig. 2; and Fig. 2 is an inverted plan view taken on the line 2—2 in Fig. 1.

The specific capstan selected to illustrate the invention is but one of numerous possible concrete embodiments of the invention. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

In carrying the invention into effect, there is provided a rotative barrel, a stationary standard for and within said barrel, reduction gearing within and driving said barrel, and a motor within said standard and driving said gearing, the entire structure being above deck, readily accessible, extremely compact, yet powerful and durable. In the best constructions contemplated, all of the above mentioned parts have a common axis; radial and thrust bearings are interposed between the standard and barrel where they perform the additional function of holding these parts together; means for excluding water from, and for retaining lubricant within, the interior of the standard and barrel, are provided.

Referring to the drawings, the barrel 3 is suspended from the stationary hollow standard 4 by means of a series of tapered rollers 5 which are attached to the standard by, and rotatable on, screw studs 6, and is secured in position or held to the standard by the gib ring 7 which is fastened to the barrel 3 by screws 8. These rollers are engaged by the ledge 3′ of the barrel, the ledge acting as a roller raceway. Between the barrel 3 and the standard 4 are the rollers 9 which are mounted in a cage consisting of an upper retaining ring 10 and a lower retaining ring 11, these rings being fastened together by distance rods 12 riveted to them. The lower face of the upper ring 10, and the upper face of the lower ring 11, are counterbored to receive the rollers, so that, after riveting the distance rods 12, the rollers are permanently held in the retaining rings, and with the latter they form a radial roller bearing of well-known construction and operation. The tapered rollers 5, with the ring 7 below it and the barrel ledge 3′ above it, form a roller thrust bearing which prevents vertical displacement of the barrel but permits its rotation. To remove the barrel from the standard, it is only necessary to back out the screws 8 which will release the ring 7 and permit lifting of the barrel off the standard and radial bearing.

The driving motor 13 is provided with a flanged adapter-ring 14 which is attached to it by means of through-bolts 15, and is fastened to the base of the standard 4 by means of screws 16. To the upper end of the motor shaft is keyed a pinion 17 which has an integral shaft 18 journaled at its upper end in a ball-bearing 19 attached to the head of the barrel 3. On the shaft 18 is rotatably mounted a disc 20 which carries three bolts 21 on which three double hunting-tooth planetary gears 22—23 are mounted to freely rotate. Each gear 22 has one more tooth than the integral gear 23, and it meshes with the pinion 17 and with an internal gear 24 which is secured to the standard 4 by means of screws 25. Each gear 23 meshes with an internal gear 26 which is secured to the barrel 3 by means of screws 27. These internal gears are also of the hunting-tooth type, the gear 24 having one tooth more than the gear 26. Rotation of the pinion 17 causes the planetary gears 22—23 to rotate, and, since the internal gear 24 is stationary, the disc 20 will rotate, its turning direction being identical with that of the motor pinion 17. The planetary gears 23, being integral with the planetary gears 22, are thus caused to rotate, both around their own axes and around the motor axis, thereby causing the internal gear 26 to follow the disc 20, the desired gear reduction being obtained by the differential action of the gears having

the proper number of teeth. The reduction ratio may be so great that overhauling is practically impossible and no pawls are required, in small capstans of this type. For larger capstans, however, pawls of the usual type may be employed.

To lubricate the gearing, a grease-plug 28 and an oil-plug 29 are provided. The disc 20 carries an oil pan 30 which supplies lubricant to the ball-bearing 19 and to the shaft 18. The overflow from this pan is caught in recesses in the top of the disc 20, from which the oil, through holes 31, passes to the bolts 21 on which the planetary gears 22—23 are mounted, the holes 31 being placed at the trailing sides of the recesses and being drilled in such directions that the inertia due to the motion of the disc 20 assists gravity in feeding the oil to the bolts. The oil running through the holes 31 is finally caught by the plate 32 which is clamped between the lower internal gear and the radial lugs 4′ of the standard 4 to which said gear is secured. This plate retains lubricant in the gearing, but excludes it from the motor below. It carries packing-rings 33 in its central boss which surrounds the hub of the pinion 17 and forms a seal thereon. The oil and grease running down to the rollers 9 is sealed in by the water-tight ring 34 which is inserted in a groove in the base of the standard 4 and projects upwardly into contact with the barrel 3.

The base of the standard 4 is closed by a plate 35 which is fastened to it by screws 36, the plate 35 having openings lined with insulating and water-tight bushes 37 for the admission of the motor terminal wires 38. The base of the standard 4 is provided with bolt holes 39 so that the capstan may be bolted to the deck of a vessel. At each of these bolt holes, the standard 4 has a downward extension 40 which serves to hold its bottom ring 41 high enough from the deck to allow for the camber of the latter.

What is claimed is:

1. An electric capstan comprising a rotative barrel, a stationary hollow standard for and within said barrel, hunting-tooth planetary reduction gearing within and driving said barrel, and a water and oil tight motor within said standard and driving said gearing, said barrel having an operating section concentric with the lower part of said standard and said motor and having a head surmounting said section and enclosing said gearing.

2. An electric capstan comprising a rotative barrel, a stationary hollow standard for and within said barrel, reduction gearing within and driving said barrel, and a motor within said standard and driving said gearing, said gearing including a pinion driven by said motor, two hunting-tooth internal gears respectively secured to said standard and to said barrel, and a series of double hunting-tooth planetary gears meshing with said pinion and with both internal gears.

3. An electric capstan comprising a rotative barrel, a stationary hollow standard for and within said barrel, reduction gearing within and driving said barrel, and a motor within said standard and driving said gearing, said gearing including a pinion fast on the shaft of said motor and having an integral shaft, a disc rotative on said shaft, a series of studs carried by said disc, two hunting-tooth internal gears respectively secured to said standard and to said barrel, and a series of double hunting-tooth planetary gears on said studs and meshing with said pinion and with both internal gears.

4. An electric capstan comprising a rotative barrel, a stationary hollow standard for and within said barrel, hunting-tooth planetary reduction gearing within and driving said barrel, a motor within said standard and driving said gearing, and a series of thrust rollers and studs supported by said standard, and a ledge and thrust ring acting as roller raceways and carried by said barrel and engaging said rollers to hold said barrel and said standard together.

In testimony whereof, I have signed my name to this specification.

WILFORD J. HAWKINS.