No. 843,154. PATENTED FEB. 5, 1907.

# A. LAMBERT.

## HOISTER DRUM WITH HOLLOW SHAFT.

APPLICATION FILED OCT. 2, 1906.

2 SHEETS—SHEET 1.

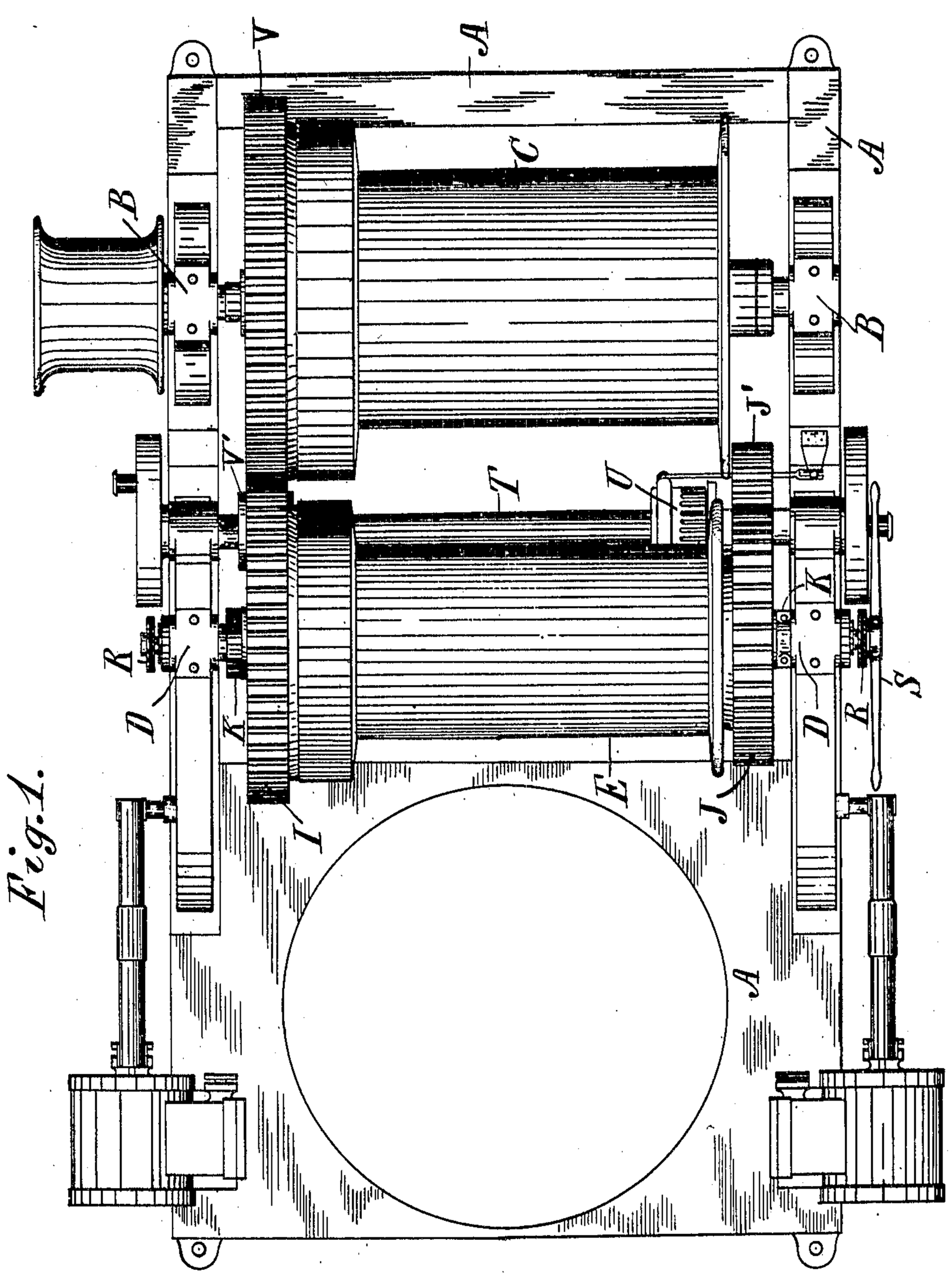


Fig. 1.

Witnesses:
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D. D. Purrington

Inventor.
Asher Lambert, per
Thomas S. Crane, atty.

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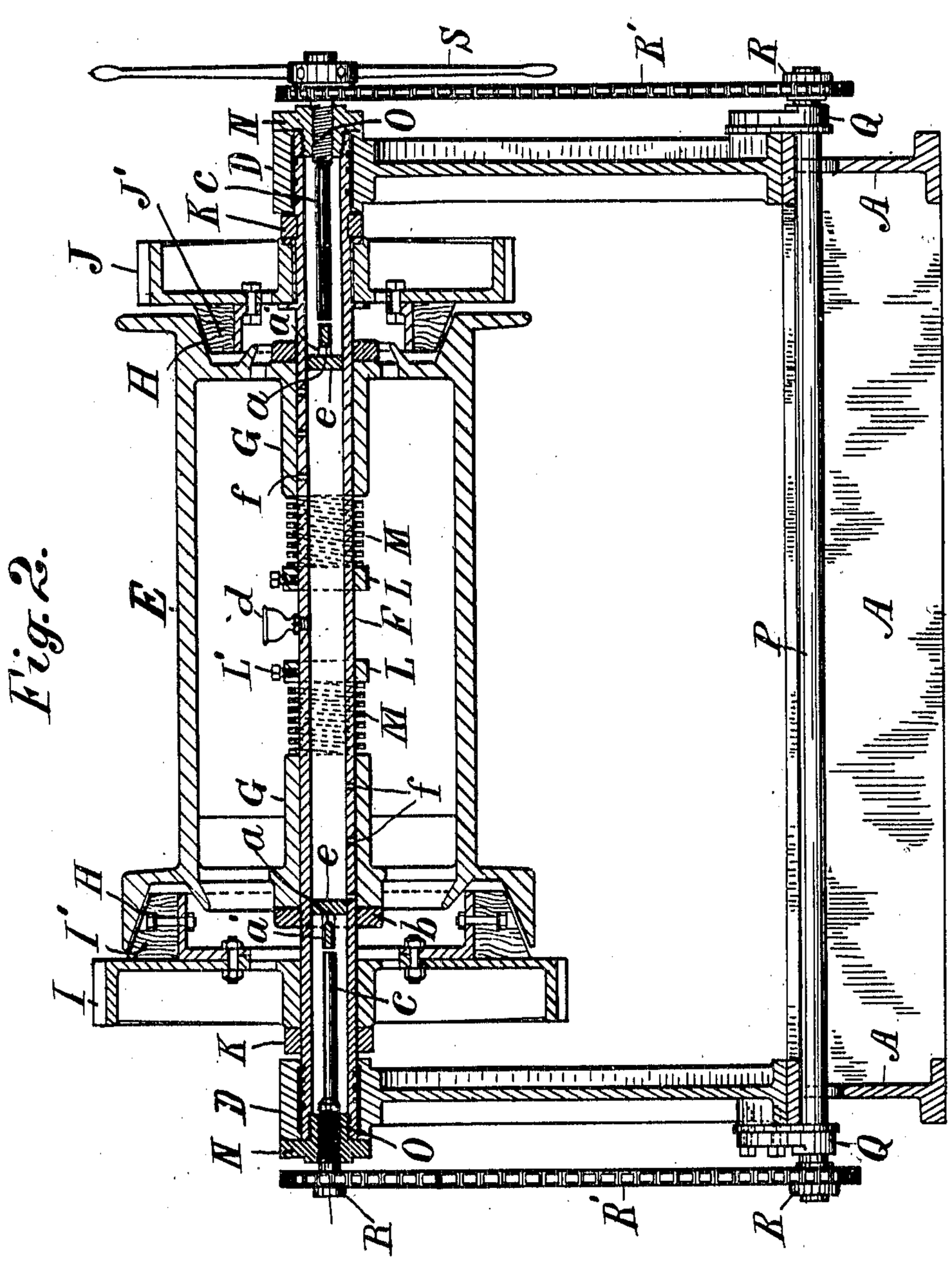


Fig. 2.

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# UNITED STATES PATENT OFFICE.

ASHER LAMBERT, OF NEWARK, NEW JERSEY.

## HOISTER-DRUM WITH HOLLOW SHAFTS.

No. 843,154. Specification of Letters Patent. Patented Feb. 5, 1907.

Application filed October 2, 1906. Serial No. 337,056.

*To all whom it may concern:*

Be it known that I, ASHER LAMBERT, a citizen of the United States, residing at 1 Johnson avenue, Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Hoister-Drums with Hollow Shafts, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to improve the construction and the operation of the drums and shafts used in hoisting-engines, and especially that class in which the drum-shaft is held stationary and the drum and the gears for operating the same are constructed to turn loosely thereon.

In the present invention I make the shaft hollow and am thus enabled to screw within its ends the nuts which are employed for the thrust-screws in operating the drum-clutch. I thus avoid the addition of clumsy additions to the shaft-bearings, such as have been heretofore employed to sustain the thrust-screws, and I wholly avoid the end thrust upon the bearings by confining it all to the interior of the shaft. The "cross-keys," which are used in such cases to press the drum and friction-driver together, is extended across the hollow interior of the shaft, and the thrust-screw may be formed with an integral extension which projects within the shaft to contact with the cross-key.

In the annexed drawings I have shown a drum with a direct-driving gear adjacent to one end and a reversing-gear adjacent to the opposite end, the said gears being turned in opposite directions by suitable connections with the motor-shaft and the adjacent faces of the drum, and such gears being provided with complementary friction-clutch surfaces, so that when the drum is pressed in one direction it engages the direct-driving gear and is rotated backwardly and when pressed in the opposite direction it engages the reversing-gear and is turned forwardly. The drum is held stationary from contact with either of the friction-surfaces by a spring or springs applied to the shaft within the drum, which holds it in a central position. Such a drum requires two thrust-screws operating upon cross-keys at its opposite ends to press the drum in opposite directions, as desired, and I furnish a means of operating such thrust-screws from a single crank or hand wheel by extending a gear-shaft across the hoister-frame at one side of the drum and coupling the ends of the shaft by suitable gearing to the two thrust-screws, so that when the gearing is rotated or either of the thrust-screws is rotated it operates to turn both simultaneously, but screwing in opposite directions, so that either one is moved out of action when the other is moved into action.

The advantages of using the stationary hollow shaft with a stationary nut in its end for the thrust-screw are obviously secured with the use of a drum and a single friction-driver of any kind rotated upon the shaft continuously in one direction.

The construction will be understood by reference to the annexed drawings, in which—

Figure 1 is a plan of a hoister, illustrating my invention; and Fig. 2 is a vertical elevation where hatched at the center of the reversing-drum.

The frame A of the hoister is shown with bearings B for a hauling-drum C and bearings D for a reversing-drum E. The shaft of the reversing-drum is shown hollow and formed with circular grooves on its ends, which are locked in the bearings D and entirely prevent end movement, and the caps of the bearings D are clamped upon the shaft to prevent rotation.

The drum is shown with hubs G, which are fitted to turn loosely upon the shaft, and is fitted at opposite ends with hollow friction-cones H and H′ to form a clutch. A driving-gear I is fitted to turn upon the shaft adjacent to the hollow cone H and is provided with a friction-cone I′, adapted to engage the same when pressed thereto. A reversing-gear J is fitted to turn upon the shaft near the opposite end of the drum and is provided with a friction-cone J′ to engage the hollow cone H′ when pressed thereto. The gears I and J are held from end movement upon the shaft by collars K, which are secured thereon between such gears and the bearings; but it is obvious that their hubs may be fitted into contact with the bearings, which would effectually resist end movement, as the shaft is held rigidly in the bearings.

Collars L are secured adjustably upon the shaft by screws L′ between the hubs G of the drum, and springs M are fitted loosely around the shaft between the said collars and hubs and are adjusted to hold the friction-surfaces upon the drum intermediate to and clear from the friction-surfaces upon the gears I and J, as is indicated in Fig. 2.

A nut N is shown with an external thread screwed into each end of the hollow shaft and with an intermediate thread fitting a thrust-screw O.

A cross-key *a* is shown extended through a slot *a'* in the shaft just outside each hub of the drum, pressing upon a notched collar *b*, which contacts with the drum, and thrust-pins *c* are shown integral with the thrust-screws O and extended nearly into contact with the cross-keys, so that the advance of either one of the thrust-screws would speedily press the adjacent cross-key toward the drum and force the drum against the opposite friction-surfaces I' or J'. A gear-shaft P is extended at one side of the drum E through bearings Q upon the frame A, and the opposite ends of the shaft are coupled to the thrust-screws O by gears R upon the shaft and screws, which gears are connected by chains R'. A hand-wheel S is shown upon one of the screws to turn the gearing, and the connection between the shaft and the two thrust-screws thus turns them both simultaneously. The rotation of the screws produces an advance of one toward the adjacent cross-key *a* and the retraction of the other thrust-screw from its corresponding cross-key, thus shifting the drum from its neutral or intermediate position into contact with one of the friction-surfaces I' or J'.

The gears I and J are rotated continuously in opposite directions by any usual connections to a motor-shaft T, and the turning of the hand-wheel S thus operates to shift the drum in opposition to one or the other of the springs M into contact with either of the gear-wheels, so as to rotate the drum in either direction desired.

When the thrust-screws are set by the hand-wheel in their intermediate position, as represented in Fig. 2, they produce no pressure upon the cross-keys, and the springs M hold the friction-surfaces upon the drum entirely clear from those upon the gears, thus avoiding wear.

The hollow shaft may also serve to hold a considerable reserve of oil for lubricating the hub of any revolving part.

In Fig. 2 an oil-cup *d* is shown upon the middle of the shaft, and the space inside the same extending to the ends of the hubs G is inclosed by plugs *e*, fitted tightly in the bore. Oil-holes *f* are shown in the shaft leading to the interior of each hub G, and any unusual supply of oil introduced into the space between the plugs or any oil supplied from the oil-cup *d* serves as continuous lubrication for the hubs. The plugs *e* prevent the escape of the oil from the slots *a'*, which are adjacent to the ends of the drum. Other applications of the hollow shaft for oiling the hubs may obviously be made. The use of the hollow shaft F not only affords a means of lubricating the hubs of the drum, but also obviates the necessity of boring into the ends of a solid shaft for the reception of thrust-pins, and by its admission of the thrust-screws and their nuts into the ends of the shaft it avoids the unsightly projections which are required when the nuts for the thrust-screws are built upon the shaft-bearings outside the ends of the shaft.

Hollow shafts can be readily obtained in the market and involve no special expense, and the use of such hollow shaft thus not only cheapens the construction, but secures positive advantages in the appearance and operation of the device.

It should be understood that the gear I is driven by the motor-shaft T in a reverse direction to the gear J, which is effected in the usual manner by a direct connection of the gear J with the crank-shaft through a pinion J' and an indirect connection of the gear I with the motor-shaft through the gear V upon the hauling-drum C, which meshes with a pinion V' upon the motor-shaft.

The several gears rotate continuously in the same direction unless the motor-shaft be reversed.

I do not claim herein this method of arranging the gearings, as I have claimed the same in my copending application, Serial No. 331,955, filed August 25, 1906, entitled "Hoister with loose reversible drum," the improvement in the present case consisting of the mounting of the parts upon a hollow stationary shaft in the manner I have set forth.

Having thus set forth the nature of the invention, what is claimed herein is—

1. In a hoisting-engine, the combination, with a hollow drum-shaft and a friction-driver fitted to turn thereon and supported against end movement, with means for rotating the same continuously upon the shaft, of a drum fitted to turn upon the shaft and having a friction-surface to engage the friction-driver, a nut screwed inside the end of the shaft, a thrust-screw extended through the said nut, and connections from said screw for pressing the drum toward the friction-driver to couple them together.

2. In a hoisting-engine, the combination, with a hollow drum-shaft held stationary in bearings, of a driving-gear and reversing-gear fitted to turn near the opposite ends of the shaft and held from end movements thereon, a drum fitted to turn upon the shaft between the said gears, complementary friction-surfaces upon the opposite ends of the drum and adjacent gears, and means operated through the interior of the shaft for pressing the drum toward either of the gears, to rotate it at pleasure in opposite directions.

3. In a hoisting-engine, the combination, with a hollow drum-shaft and a driving-gear fitted to turn thereon and supported against end movement, of a drum fitted to turn upon

the shaft, complementary friction-surfaces upon the gear and drum, a nut screwed inside the end of the shaft, a thrust-screw extended through the said nut, and connection from said screw for pressing the drum toward the driving-gear to couple them together.

4. In a hoisting-engine, the combination, with a hollow shaft and bearings for holding the same stationary, of a driving-gear and reversing-gear fitted each to turn upon the shaft near one end of the same, a drum fitted to turn upon the shaft between the said gears, complementary friction-surfaces upon the ends of the drum and adjacent gears, means operated through the interior of the shaft to press the drum toward either of the gears, and springs fitted to the shaft within the drum and adjusted to hold the same intermediate to the gears so as to normally clear all the friction-surfaces.

5. In a hoisting-engine, the combination, with a hollow shaft and bearings for holding the same stationary, of a driving-gear and reversing-gear fitted each to turn upon the shaft near one end of the same, a drum fitted to turn upon the shaft between the said gears, complementary friction-surfaces upon the ends of the drum and adjacent gears, nuts screwed in the ends of the shaft, thrut-screws extended through the nuts with connections from the same to the opposite ends of the drum for pressing it in opposite directions, a gear-shaft extended at the side of the drum with gearing coupling the ends of the shaft to both of the said thrust-screws, and means for rotating the gearing to turn the thrust-screws.

6. In a hoisting-engine, the combination, with a hollow shaft and bearings for holding the same stationary, of a drum and gear fitted each with hub to turn upon the shaft, complementary friction-surfaces upon the drum and gear, means operating through the interior of the shaft for pressing the drum and gear together to couple them when desired, an oil-hole extending from the interior of the shaft to the hub of the drum, and means for supplying oil to the interior of the shaft to lubricate the said hub.

7. In a hoisting-engine, the combination, with a hollow shaft having a drum fitted to rotate upon the same, the shaft having slots $a'$ with cross-keys $a$ at the ends of the drum, of the plug $e$ fitted tightly within the shaft adjacent to such cross-keys, means for supplying oil to the interior of the shaft between the plugs, and the shaft having oil-holes $f$ within the hubs of the drum for supplying oil to the same.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ASHER LAMBERT.

Witnesses:
J. G. DELANEY,
M. G. BENFER.