July 25, 1944. F. P. LAWLER 2,354,386

HOIST

Filed May 20, 1942

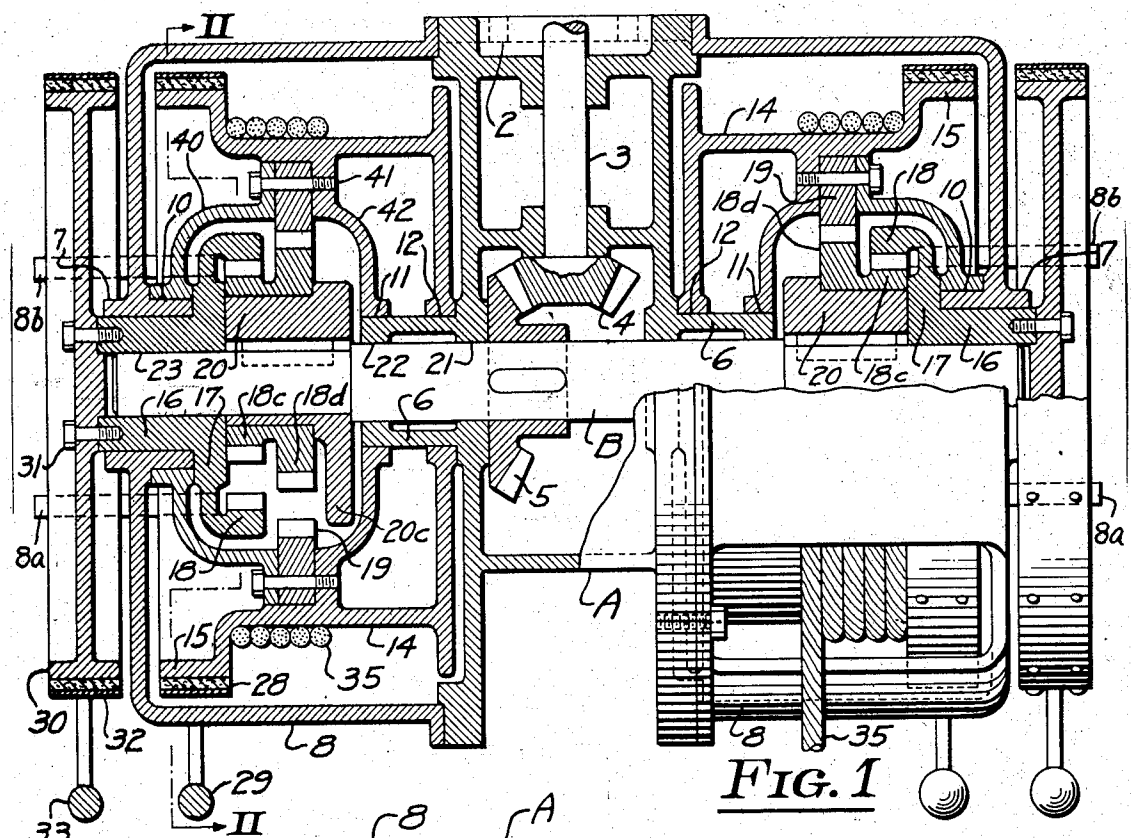


FIG. 1

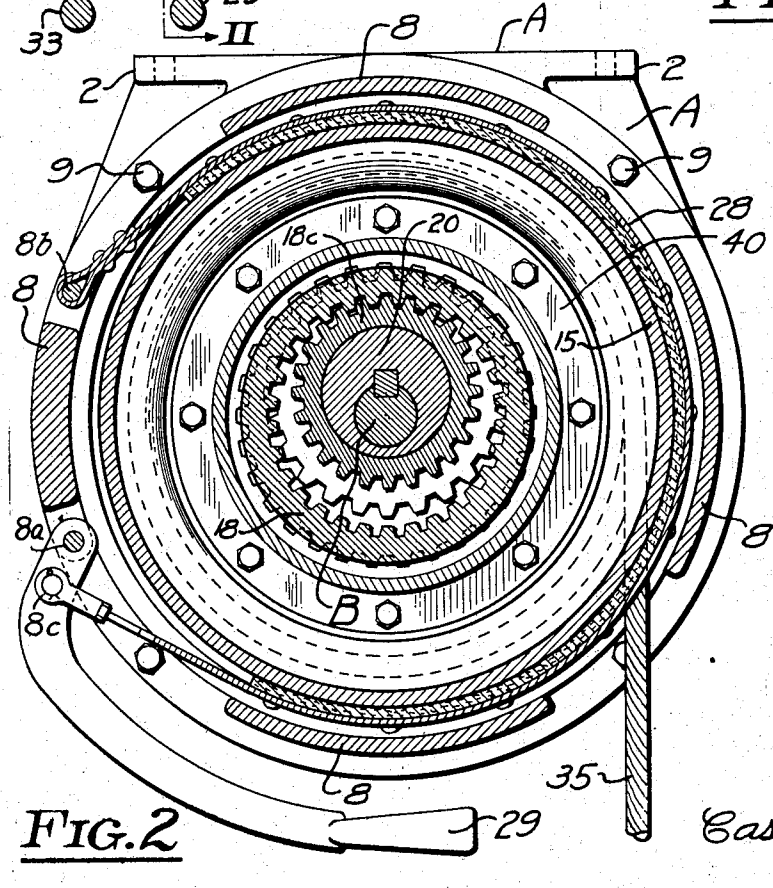


FIG. 2

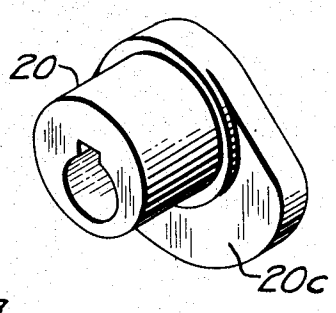


FIG. 3

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HOIST

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Application May 20, 1942, Serial No. 443,705

2 Claims. (Cl. 254—187)

This invention relates to a modification or improvement on the hoist disclosed in my former Patent No. 2,199,668, entitled "Hoist," issued May 7, 1940.

The object of the present invention is generally to improve and simplify the construction and operation of hoists which are especially designed for application to tractors and which are adapted to be driven by the power take-off shaft of the tractor; to provide a single drum or double drum type hoist in which each drum is controlled by a brake of the brake band type; to provide a hoist in which power is transmitted from a drive shaft to the drums through eccentric driven differential gears and in which the gears are fully enclosed to retain the lubricant and to exclude grit and other foreign matter; to provide a hoist in which the drums are journalled at one end by extensions formed on opposite sides of a central drive gear housing and at their opposite ends in outboard bearings which also are carried by the gear housing, whereby cable or line pull in the drums reacts on the housing only, and not on the drive shaft; to provide a reduction gear drive which permits extremely high gear reduction and a compact arrangement of the gears and placement of the same substantially within the drums; and further, to provide a structure in which the outboard bearings and their supports may be utilized to anchor and support the brake bands and the levers whereby they are actuated.

One form of my invention is illustrated in the accompanying drawing, in which—

Fig. 1 is a plan view of a hoist partially in section;

Fig. 2 is a cross section taken on line II—II of Fig. 1; and

Fig. 3 is a perspective view of the eccentric and counter-weight attached thereto.

Referring to the drawing in detail, and particularly to Fig. 1, A indicates in general a drive gear housing, the inner end of which is provided with a flange 2 whereby it may be bolted or otherwise secured to a suitable support, for instance, the transmission gear housing of a tractor or the like.

Extending into the housing A and journalled in bearings mounted therein is a power take-off shaft 3, on which is secured a bevel gear 4. Extending through the housing in a direction transverse to the power take-off is a drive shaft B, and secured thereto is a bevel gear 5 which is in constant mesh with the gear 4. On each side of the drive gear housing A are sleeve-like extensions 6—6, and aligning therewith and spaced therefrom are outboard bearings 7—7 which are supported by the end walls or arms of a barrel-like housing extension 8 which is secured to the drive gear housing A by bolts 9.

Journalled on the outboard bearings 7—7 and on the sleeves 6—6 at the points indicated at 10—10, 11—11 and 12—12 are a pair of cable drums 14—14, and forming a part of each cable drum are brake drums 15—15.

Inasmuch as the cable drums are driven in an identical manner, and the same mechanism is employed, the description of one will suffice. Journalled within the outboard bearing 7 is a sleeve 16 on which is formed a flange 17 to support an internal ring gear 18. A similar ring gear 19 is secured to the cable drum 14 and both ring gears are in constant mesh with a pair of connected gears 18c and 18d, which are journalled on an eccentric 20 secured on the drive shaft B by a key or the like. The unbalanced load due to the eccentric 20 and the gears 18c and 18d mounted thereon is counterweighted by the mass 20c best shown in Fig. 3. The drive shaft B is supported throughout its length by bearings 21, 22 and 23, and is continuously driven through the power take-off shaft 3 and the bevel gears 4 and 5.

The internal ring gears 18 and 19, together with the eccentric 20 and the connected gears 18c and 18d journalled on the eccentric, form a differential reduction gear drive, whereby power is transmitted from the drive shaft B to drive the cable drum, but inasmuch as the cable drum is only intermittently driven, and besides that, must be capable of running free to permit the cable to unreel and must also be capable of holding a load when applied to the cable brake drum 15 formed on the cable drum, it must be provided with a brake band 28 and a connected brake lever 29 to free or lock the cable drum. In addition to this brake drum, a second brake drum 30 is provided, which is secured to the sleeve 16 as at 31. This brake drum is also provided with a brake band 32 and an operating lever 33. The inner ends of the levers 29 and 33 are pivoted on a common pin 8a secured in the housing extension. One end of each brake band is anchored on a common pin 8b, secured in the housing extension 8, while the opposite end of each brake band is adjustably secured to the respective levers 29 and 33 by pins 8c. With this added mechanism the operation will be as follows:

With drive shaft B rotating, if it is desired to haul in on the cable indicated at 35, it is only necessary for the operator to tighten the brake band 32 by means of the lever 33 and to simul-

taneously release the brake band 28 by means of the lever 29. By so doing, brake drum 30, sleeve 16, and ring gear 18 become stationary, and the gear 18c will accordingly roll within the gear 18 in a direction reverse to the rotation of the eccentric, and the drive shaft B, upon which it is journalled, and as gear 18d is connected or formed integral with the gear 18c, it will rotate in unison therewith and as such will drive the ring gear 19 and the cable drum to which it is secured. The reduction in speed between the drive shaft B and the ring gear 19 will of course depend on the ratio between the gears 18 and 18c, and the gears 18d and 19. This reduction may readily be one to thirty or greater, and any drum or cable speed may thus be attained.

When hauling in on a load, if it is desired to hold a load, the brake band on the drum 15 is applied and the band on drum 30 is simultaneously released, and if it is desired to let the cable drum run free in order to pay out on the cable, both brake bands are released.

In the present application, four independently operated brake drum levers for controlling a two drum hoist are shown and described. I may, however, employ a single lever control for the four brake drums as illustrated in my former Patent No. 2,199,668, or employ two lever controls, as shown in my Patent No. 2,242,193.

In order to retain a plentiful supply of lubricant around the gears forming the reduction drive, a cover member 40 is secured to the cable drum, as indicated at 41. This encloses one side of the gears and eccentric, and the side wall 42 of the cable drum encloses the other, thus retaining the lubricant and at the same time excluding all foreign matter. The eccentric driven differential gear, here shown, is preferable, due to the high reduction ratio it is possible to obtain, and to the compactness of such a structure, but other types of reduction gearing, such as planetary gearing or the like, may be employed. The outboard bearing 7, with the barrel-like extension 8, supporting it, are important, as the outboard bearing relieves the drive shaft B of any cantilever action due to cable pull, thereby permitting the use of a smaller diameter drive shaft, as torque load will be substantially the only stress to which it is submitted; also the extension 8 supporting the outboard bearing may be utilized to anchor the brake bands and to support the brake band actuating levers.

While this and other features of my invention have been more or less specifically described and illustrated, I nevertheless wish it understood that changes may be resorted to within the scope of the appended claims, and that the materials and finish may be such as the experience of the manufacturer or varying conditions of use may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a hoist of the character described, a drive gear housing having a bearing extension on one side, an outboard bearing secured to the housing, a cable drum journalled on the bearing extension and on the outboard bearing, a drive shaft journalled in the bearing extension and the outboard bearing, a brake drum journalled in the outboard bearing, a brake drum secured to the cable drum, an internal ring gear secured to the brake drum which is journalled in the outboard bearing, an internal ring gear secured to the cable drum, an eccentric secured to the drive shaft, a pair of connected gears journalled on the eccentric and intermeshing with the respective ring gears, a brake band for each brake drum, means for anchoring one end of each brake band with relation to the outboard bearing and the drive gear housing, a pair of levers connected with the opposite ends of the brake bands, and means for pivotally supporting each lever with relation to the outboard bearing and the drive gear housing.

2. In a hoist of the character described, a drive gear housing having a bearing extension on one side, an outboard bearing secured to the housing, a cable drum journalled on the bearing extension and on the outboard bearing, a drive shaft journalled in the bearing extension and the outboard bearing, a brake drum journalled in the outboard bearing, a brake drum secured to the cable drum, an internal ring gear secured to the brake drum which is journalled in the outboard bearing, an internal ring gear secured to the cable drum, an eccentric secured to the drive shaft, a pair of connected gears journalled on the eccentric and intermeshing with the respective ring gears, a brake band for each brake drum, means for anchoring one end of each brake band with relation to the outboard bearing and the drive gear housing, a pair of levers connected with the opposite ends of the brake bands, means for pivotally supporting each lever with relation to the outboard bearing and the drive gear housing, and a cover member carried by the cable drum and forming a closure for one side of the gears and the eccentric, said cable drum forming a closure for the other side to retain a lubricant and to exclude foreign matter.

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