

May 7, 1940.

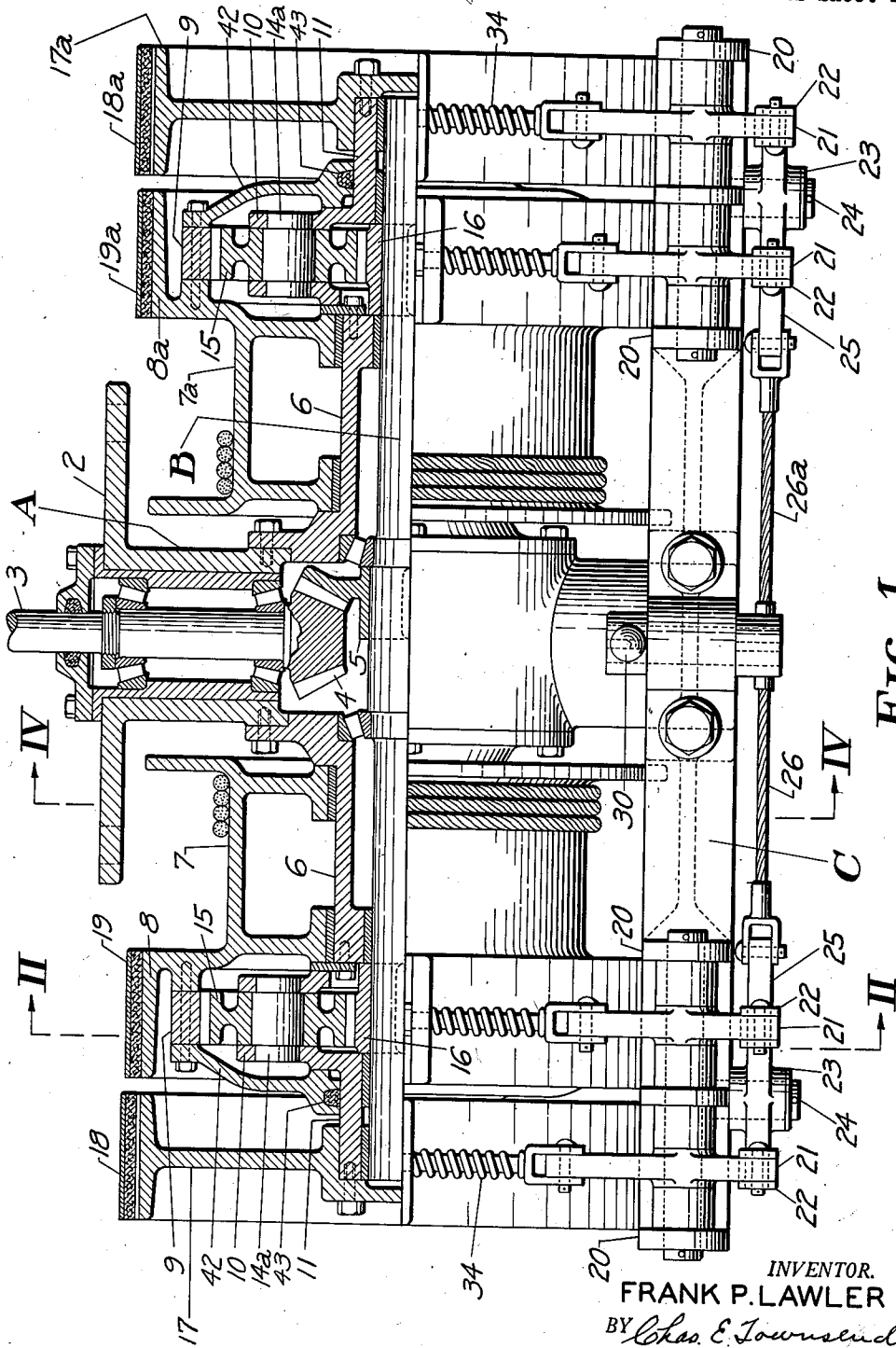
F. P. LAWLER

2,199,668

HOIST

Filed Aug. 4, 1937

4 Sheets-Sheet 1



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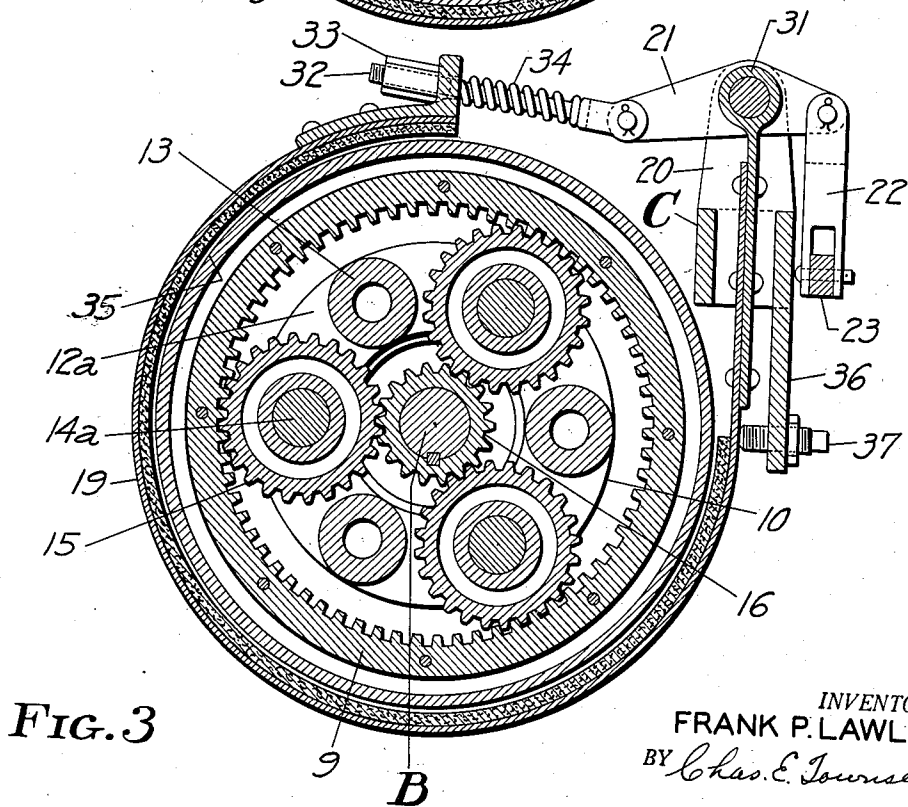
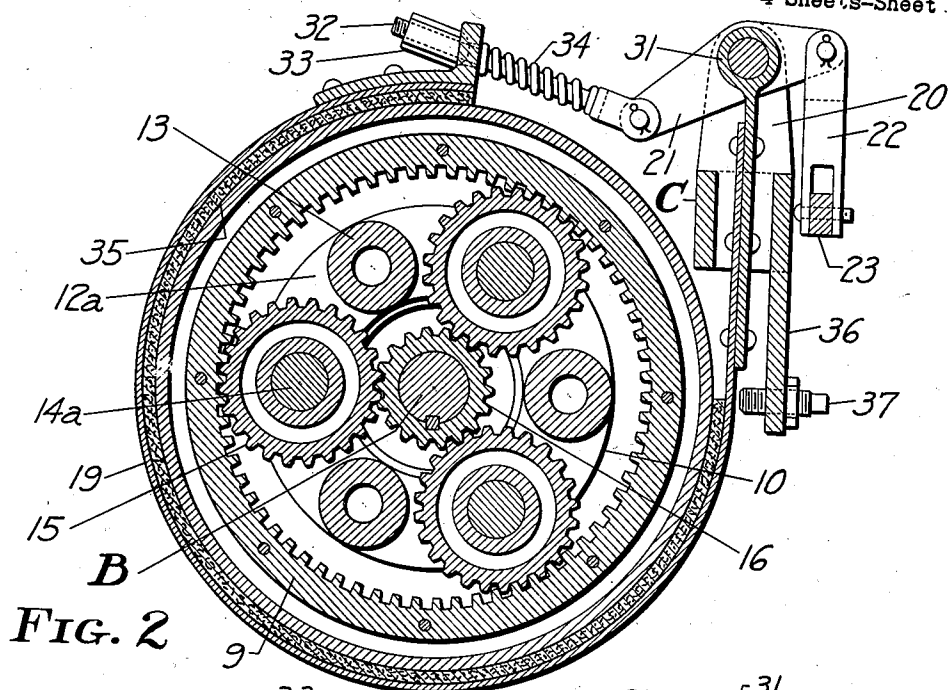
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HOIST

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4 Sheets-Sheet 3

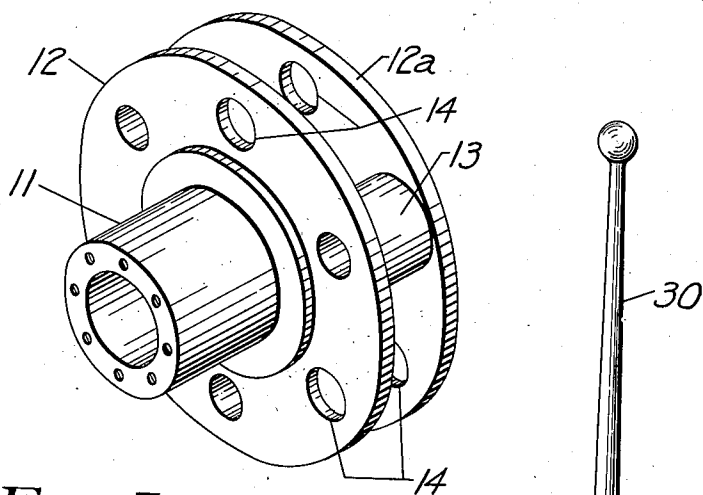


FIG. 5

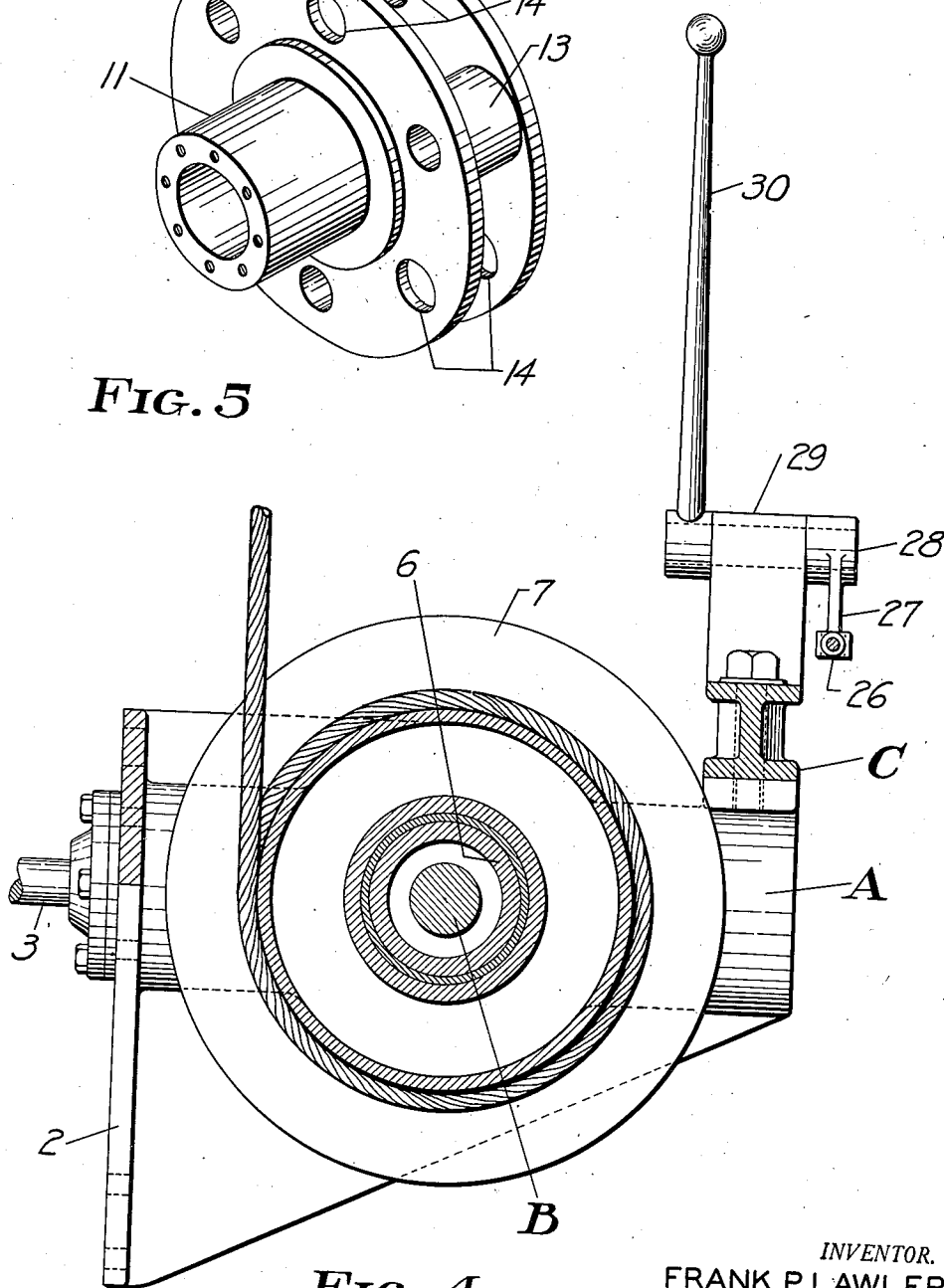


FIG. 4

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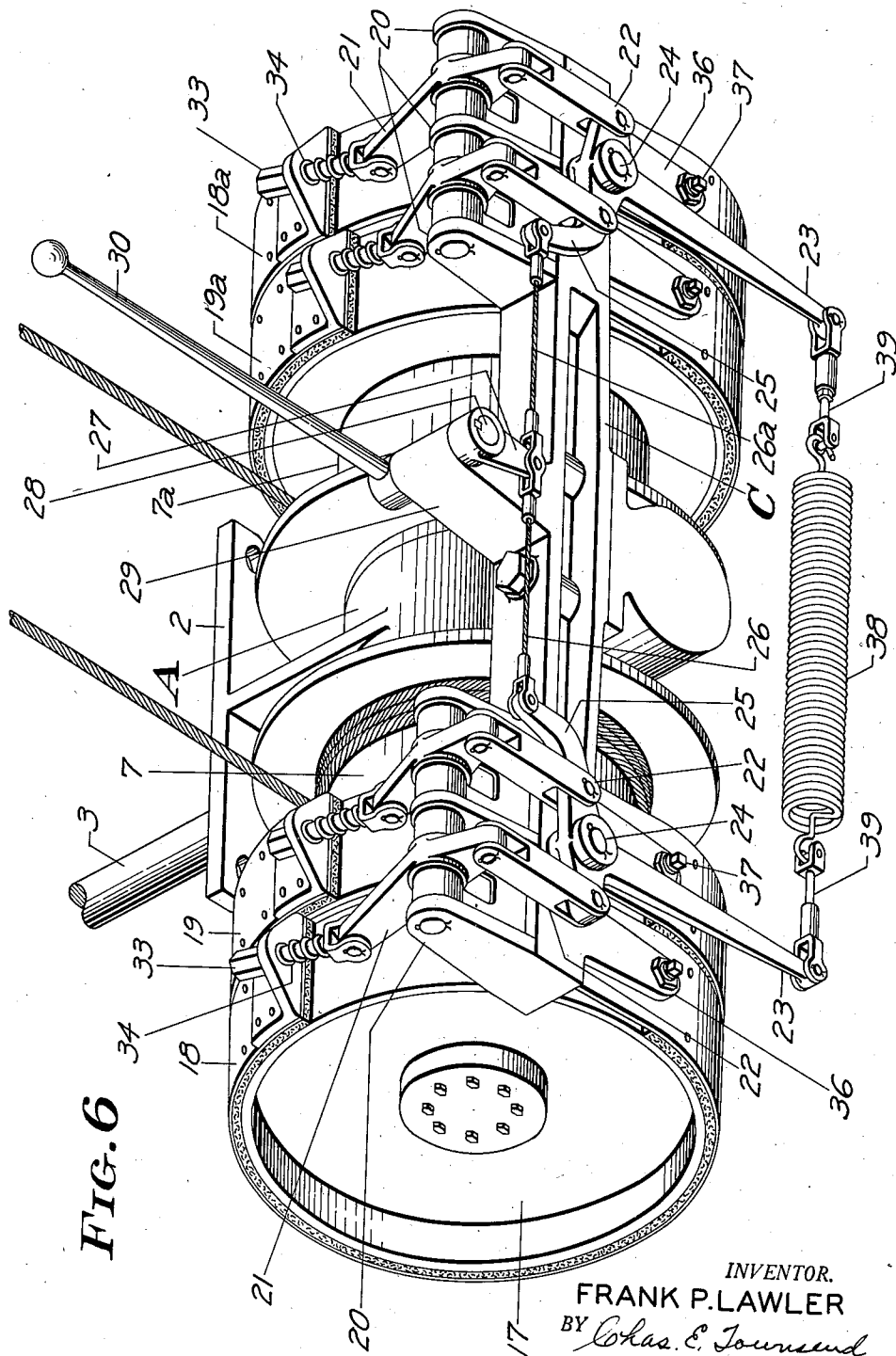
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,199,668

HOIST

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7 Claims. (Cl. 254—184)

This invention relates to hoists, and especially to a hoist which is designed for application to tractors, and which is adapted to be driven by the power take-off shaft of the tractor.

The object of the present invention is to generally improve and simplify the construction and operation of hoists of the character described; to provide a double drum type hoist, in which each drum is controlled by a brake of the brake-band type; to provide a hoist in which the brakes, drums and bands are interchangeable; to provide a hoist in which power is transmitted from a drive shaft to the drums through planetary transmission gears, and in which the gears are enclosed to permit ample lubrication and at the same time exclude dust and grit; to provide a hoist in which the drums are journaled on and supported by extensions formed in opposite sides of a central drive gear housing in such a way that the cable or line pull reacts on the housing and not on the drive shaft; to provide a structure in which outboard bearings are entirely eliminated, so as to facilitate disassembly or renewal of the operating parts; to provide a double drum hoist which is controlled by two brakes and two secondary cooperating brakes, and in which the two brakes are normally held in applied position by a single helical tension spring; and further, to provide a single control lever whereby the brake and secondary brake of either drum may be selectively released or applied.

The hoist is shown by way of illustration in the accompanying drawings, in which

Fig. 1 is a plan view of the same, partially in section;

Fig. 2 is a cross section taken on line II—II of Fig. 1; said view showing the brake band in applied position;

Fig. 3 is a similar section showing the brake band in released position;

Fig. 4 is a cross section taken on line IV—IV, Fig. 1;

Fig. 5 is a perspective view of the planetary gear carrier; and

Fig. 6 is a perspective view of the complete hoist.

Referring to the drawings 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 journaled 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 shaft is a drive shaft B, and secured thereon is a gear 5 which is in constant mesh with the gear 4. Formed on each side of the drive gear housing are hub-like extensions 6—6, and journaled thereon are cable drums 7—7a. Formed on each drum is an annular brake flange 8—8a, and secured to each drum is an internal ring gear 9. Journaled on each end of the drive shaft, as at 10—10, is a planetary gear carrier, consisting of a hub portion 11, and annular flanges 12 and 12a, said flanges being provided with spaced bearing bosses 13, as clearly shown in Fig. 5. Intermediate of the bearing bosses are journals 14 and journal pins 14a, and rotatable thereon are a plurality of planetary gears 15, which intermesh with the internal ring gears 9, and with sun pinions 16 secured adjacent opposite ends of the drive shaft. Bolted, keyed, or otherwise secured on the outer end of the hub members 11 are secondary brake drums 17—17a, and surrounding said drums 17—17a and also the brake flanges 8—8a of the respective hoist drums are brake bands 18—18a and 19—19a.

The manner of anchoring, supporting, and actuating the brake bands is important. Reference will be made to Figs. 2, 3 and 6. First of all, it will be noted that the drive gear housing does not only serve as a support for the drive shaft B, the cable drums 7—7a, and the transmission gears together with their brakes and drums, but it also serves as a support for a bar C which functions not only as a support for the several brake bands and their operating mechanism, but also as a reaction and anchor member therefor. Bearing lugs are formed at opposite ends of the bar, as indicated at 20, and between them are journaled rocker arms 21. The rear ends of the rocker arms are connected through links 22 with common levers 23 which are pivoted as at 24 to opposite ends of the anchor bar. The common levers might be referred to as T-shaped levers, as each lever is provided with a main downwardly-extending portion 23 and an extension at the upper end which is disposed at right angles thereto, the links being pivotally attached to the latter. This right-angle extension is extended as shown at 25 and is connected by cables 26—26a or other flexible means to an arm 27 secured on the shaft 28 journaled on the bearing 29 secured or formed centrally of the anchor bar, said shaft being provided with a main control lever 30 hereinafter to be referred to.

The bearing lugs 20 not only function as supports for the rocker arms 21 but they also serve to support and anchor one end of each brake and secondary brake band, as indicated at 31 in Figs. 2 and 3. The brake and secondary brake bands extend from their point of anchorage substantially around their respective drums, and their free ends are connected through links 32 with the forward ends of the rocker arms 21. An adjusting nut 33 is mounted on the outer end of each rod or link, to permit adjustment and to compensate for wear, and a spring 34 is interposed between the free end of the band and a shoulder on the link, to force the bands away from the brakes and secondary brakes when they are released. The brake bands are pivoted at the anchor points, and when they are released, gravitational movement would tend to cause the brake bands as a whole to settle against the faces of the drums indicated at 35. But this is prevented in the present instance by providing downwardly-extending lugs 36 on the anchor bar, which are provided with adjusting screws 37 which limit such movement and maintain uniform spacing and clearance between the bands and the drums when in released position as shown in Fig. 3.

By referring to Fig. 6 it will be noted that the downwardly extending arms 23 of the common levers are connected by a helical pull spring such as shown at 38, and that the tension applied may be adjusted by turn-buckles as shown at 39. This spring serves one purpose, to wit, that of normally maintaining the common levers in the position shown in Fig. 6, that is, with the bands 19-19a applied and the bands 18-18a released. The position of the bands may however be reversed by operation of the common control lever 30. This is in neutral position in Fig. 6, but by swinging it to the left, a pull will be exerted on the cable or flexible connection 26, causing the links 22 to reverse their position, thereby releasing the band 19 and applying the band 18. It should be noted that when the common control lever 30 is moved to the left the bands 18 and 19 only are actuated, as a pull is exerted on the flexible connection 26 and no pull is exerted on the flexible cable 26a on the opposite side of the crank arm 27. On the other hand, if the lever 30 is swung to the right, the flexible connection 26 will remain inoperative, while a pull will be exerted on the flexible cable 26a, thus actuating the links 21 at the opposite ends of the anchor bar, and causing release of the band 19a and application of the band 18a.

In actual practice, power will be transmitted to the power take-off shaft 3 in any suitable manner, and from this shaft it is transmitted through the gears 4 and 5 to the drive shaft B. If the common control lever 30 is swung to the left, the left-hand cable drum 7 will be driven. This is accomplished as follows: as power is being transmitted to the shaft B, and the planetary gear carrier 10 is being held by the brake band 18, power will be transmitted through the sun pinions 16 thence through the planetary gears 15, from them to the internal ring gear 9 which is secured to the side of the left-hand drum 7, thus rotating the same, as the band 19 is free. On the other hand, if the common control lever is swung back to neutral position, band 19 will grip, due to the action of the spring 38, while the band 18 will be released, hence even though power is being transmitted through the shaft B, no power will be transmitted to the drum, as the planetary gears will run free within the ring

gear, and the drum 17 will dissipate the driving power in free movement. If the right hand drum is to be driven, the operation will be the same, with the exception that the common control lever will be swung to the right.

It has previously been stated that the hoist here disclosed is particularly intended for application to tractors. This may or may not be the case, as it obviously may have other applications and uses. However, where it is applied to a tractor, it has certain structural and operating advantages; for instance, in tractors of the so-called caterpillar type, brake bands of the type shown at 18-18a and 19-19a are employed for steering purposes. In this instance, the brake and secondary brake bands indicated at 18-18a and 19-19a are identical to those employed in the tractor, and for this reason are interchangeable therewith, this being an obvious advantage as spare parts carried for the tractor may be employed in the hoist. Thus they are not only interchangeable with the brake bands on the tractor but they are interchangeable in the hoist, that is, they may be moved from one drum to another with alacrity. The two drums indicated at 17-17a are identical in construction, and as such are interchangeable, and so are the planetary gear carriers, the ring gear, the planetary gears, the sun pinions and the cable drums. A cover plate 42 is secured to each ring gear, and is provided with a felt or other type of oil seal 43, and as such encloses the transmission gears, thereby permitting retention of lubrication about the planetary gears, at the same time excluding dust and grit therefrom. The wear and tear in a hoist of this character is reduced to a minimum, as the planetary mechanism which operates and drives the cable drums is in torque balance at all times, and furthermore there are no direct bending loads on the shaft B, as the entire load on the cable drums is taken up by the extensions 6 of the gear drive housing.

The operation of the hoist is exceedingly simple, as it is controlled from a single lever 30. By throwing it to one side one cable drum will be driven; by throwing it to the opposite side the other cable drum will be driven. By releasing it, it automatically assumes neutral position, in which both drums become locked, while the cooperating secondary brakes simultaneously become released. Last but not least, the entire hoist is quickly applied to a tractor as it is secured on the flange 2, and when secured the entire hoist, together with the anchor bar, becomes an integral part of the tractor and is a self-contained unit for mounting thereon. This permits of the entire hoist unit to be assembled at the factory and adjusted, without further adjustment being necessary in assembly upon the tractor unit. In addition thereto, it will be noted that the entire mechanism of the hoist, including the cable drums, the cooperating brakes, gears, brake bands, anchor bar and actuating mechanism, are all supported by the drive gear housing and all loads and strains are taken up thereby.

For the sake of simplicity, no provision is shown on the drawings for the introduction of lubrication to the bevel drive gear case, the planetary gear cases or the drums, it being clear that any standard provision can be made for this. Similarly, no type of cable anchorage to the drums has been indicated as any of the well known types of cable anchorage may be employed.

While certain features of the 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 finish and materials of the several parts employed may be such as the manufacturer may decide, or varying uses or conditions may dictate.

Having thus described and illustrated 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 an extension on one side thereof, a cable drum journaled and entirely supported on the extension, a drive shaft extending through and journaled within the housing, a planetary gear carrier surrounding said shaft, a plurality of planet gears carried by the carrier, a ring gear on the cable drum with which the planet gears intermesh, a driving pinion on the drive shaft also intermeshing with the planet gears, a band-actuated brake drum for securing the cable drum against rotation, a second band-actuated brake drum for securing the planetary gear carrier against rotation and means for applying one brake band and releasing the other to drive or lock the cable drum, and a cover member carried by the cable drum and forming a closure for one side of the gears, said drum forming a closure for the other side of the gears to retain a lubricant and to exclude dust.
2. In a hoist of the character described, a pair of cable drums, a brake and a secondary cooperating brake for each drum, a common spring normally holding both brakes in locked position to prevent rotation of the drums and simultaneously holding both secondary brakes in disengaged position, a pivoted control lever adapted to be swung from a neutral inoperative position to one side or the other, a lever connecting each brake and its cooperating secondary brake, said levers being connected with the common spring and being normally held in a position where both brakes are applied and the secondary brakes held in disengaged position; and a flexible connection between each of the last-named levers and the control lever whereby when the control lever is swung to one side, one brake and cooperating clutch is actuated, and when swung to the other side the other brake and cooperating clutch is actuated.
3. In a hoist of the character described, a drive gear housing having a bearing extension on each side thereof, a cable drum journaled and entirely supported by each bearing, a drive shaft extending through the housing and bearings, a planetary gear transmission for each drum whereby power is transmitted from the drive shaft to each drum, a brake and a secondary cooperating brake for each cable drum whereby the transmission of power is controlled, said brakes and secondary brakes being band-actuated, an anchor bar secured to the drive gear housing, and means on said bar for securing one end of each brake band and for supporting the bands, said anchor bar absorbing the operating reaction of the bands.
4. In a hoist of the character described, a pair of cable drums, a brake drum secured to each cable drum, a brake band for each brake drum, a planetary gear transmission for each cable drum, a brake drum secured to each planetary gear transmission, a brake band for each of said last named drums, a common spring normally applying the brake bands to the brake drums which cooperate with the cable drums to prevent

rotation of said cable drums, said spring simultaneously maintaining the brake bands on the drums which cooperate with the planetary gear transmissions in released position, a pivoted control lever adapted to be swung from a neutral inoperative position to one side or another, a pair of levers, one lever being connected with the respective brake bands whereby one cable drum and planetary gear transmission is actuated, and the other lever being connected to the respective brake bands whereby the other cable drum and planetary gear transmission is actuated, and said levers being connected with said common spring and being normally held in a position where both the brake bands holding the cable drums against rotation are applied, and the brake bands actuating the planetary gear transmissions are released, and a flexible connection between the control lever and the pair of levers, whereby when the control lever is swung to one side or the other the brake band securing the cable drum on that side is released, and the cooperating planetary gear transmission brake is applied, and when the control lever is returned to neutral, the normal position of the brake bands is restored by the common spring.

5. In a hoist of the character described, a pair of cable drums, a brake and a secondary cooperating brake for each drum, a common spring normally holding both brakes in locked position to prevent rotation of the drums and simultaneously holding both secondary brakes in disengaged position, a pivoted control lever, a connection between said lever and the respective brakes and secondary brakes, said lever adapted to be swung from a neutral inoperative position to one side or the other, said movement from neutral position in one direction first causing release of one brake, and further movement in the same direction engagement of the cooperating secondary brake, and movement from neutral position in the opposite direction causing the same actuation of the other brake and secondary brake.

6. In a hoist of the character described, a drive gear housing having an extension on one side thereof, a cable drum journaled and entirely supported on the extension, a drive shaft extending through and journaled within the housing, a planetary gear carrier surrounding said shaft, a plurality of planetary gears carried by the carrier, a ring gear on the cable drum with which the planetary gears intermesh, a driving pinion on the drive shaft also intermeshing with the planetary gears, a band-actuated brake drum for securing the planetary gear carrier against rotation, a cooperating brake band and means for applying one brake band and releasing the other to drive or lock the cable drum, and means on said carrier forming a closure for one side of the planetary gears, said drum forming a closure for the other side of the gears to retain a lubricant and to exclude dust.

7. In a hoist of the character described, a drive gear housing having an extension on one side thereof, a cable drum journaled and entirely supported on the extension, a drive shaft extending through and journaled within the housing, a planetary gear carrier surrounding said shaft, a plurality of planetary gears carried by the carrier, a ring gear on the cable drum with which the planetary gears intermesh, a driving pinion on the drive shaft also intermeshing with the planetary gears, a band-actuated brake drum for securing the planetary gear carrier against rotation

tation, a cooperating brake band and means for applying one brake band and releasing the other to drive or lock the cable drum, means on said carrier forming a closure for one side of the planetary gears, said drum forming a closure for the other side of the gears to retain a lubricant

and to exclude dust, an anchor member secured to the drive gear housing, and means on said anchor member for anchoring and supporting the bands and for absorbing the operating reaction of the bands.

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