Nov. 4, 1941. F. A. JIMERSON ET AL 2,261,382

HOIST

Filed May 12, 1938 2 Sheets-Sheet 1

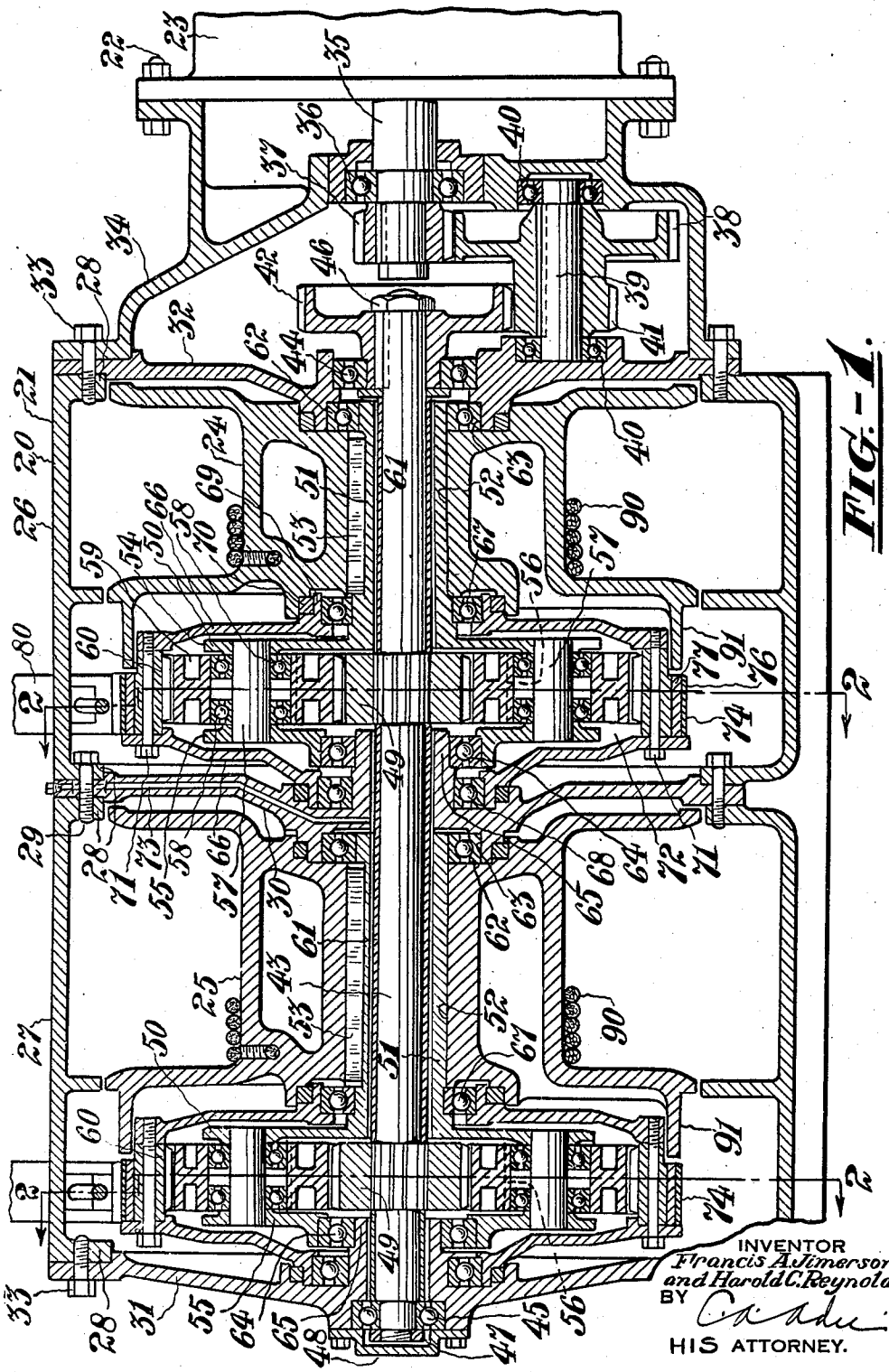


FIG. 1.

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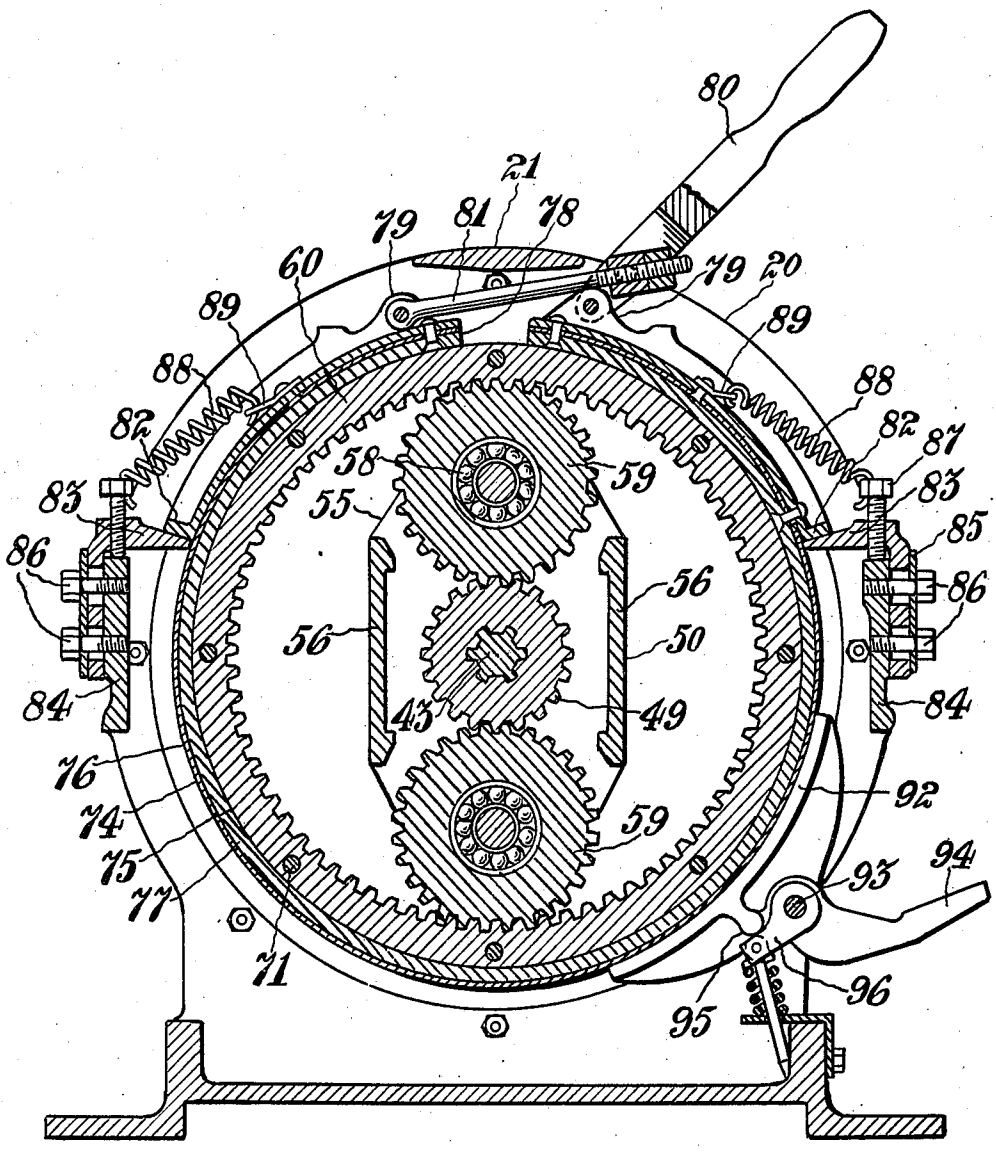


FIG.-2.

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UNITED STATES PATENT OFFICE

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HOIST

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Application May 12, 1938, Serial No. 207,553

3 Claims. (Cl. 254—184)

This invention relates to hoists, and more particularly to a power driven hoist of the multi-drum type in which the drums may be driven selectively from a common driving shaft.

One object of the invention is to enable the hoist to be conveniently lengthened or shortened by the addition or removal of a drum or drums and associated driving and casing elements.

Another object is to avoid subjecting the driving elements of the hoist to the strain of supporting the weight of the drums and the load carried by the drums.

Still another object is to assure adequate lubrication of the driving elements of the hoist.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a longitudinal elevation, partly broken away, of a multi-drum hoist constructed in accordance with the practice of the invention, and

Figure 2 is a transverse view taken through Figure 1 on the line 2—2.

Referring more particularly to the drawings, 20 designates a hoist comprising a casing 21 to an end of which is secured, as by means of bolts 22, a motor 23 for driving a pair of drums 24 and 25 arranged within the casing 21.

The casing 21 is of the assembled type, and comprises barrel-like sections for each drum, in this instance two designated 26 and 27, and encircling the drums 24 and 25, respectively. At the extremities of the casing sections 26 and 27 are introverted flanges 28 of which those at the confronting ends of the casing sections seat against and are secured, as by means of bolts 29, to a plate 30 extending transversely of the hoist.

Similarly, plates 31 and 32 serving, among others, the functions of cover plates and extending transversely of the hoist, are arranged at the outer ends of the casing sections 27 and 26, respectively. The plates 31 and 32 are fastened to the casing by bolts 33, and the bolts 33 associated with the plate 32 also secure in position a distance piece 34 which overlies the plate 32 and supports the motor 23.

Any suitable motor, either electrically or pressure actuated, may be employed for driving the hoist and the overhanging portion of its shaft 35 is supported by an anti-friction bearing 36 in the distance piece.

On the end of the shaft 35 is a pinion 37 which meshes with a gear 38 keyed to a shaft 39 supported by anti-friction bearings 40 in the distance piece 34 and the plate 32. The shaft 39 also carries a pinion 41 which meshes with a gear 42 keyed to the overhanging end of a drive shaft 43 which extends axially of the drums and is supported by bearings 44 and 45, arranged in the outer surfaces of plates 32 and 31, respectively.

On the end of the drive shaft carrying the gear 42 is a nut 46 which seats against the gear to press it against the inner race of the bearing 44, and on the opposite end of the drive shaft is a nut 47 which seats against the inner race of the bearing 45 and assists in maintaining the shaft bearings securely in position and to avoid endwise movement of the shaft with respect to its bearings. A suitable cover 48 is arranged over the end of the shaft 43 to exclude dirt from the bearing 45.

Each drum is provided with separate driving mechanism controllable independently of other driving mechanisms in the organization and the shaft 43 is accordingly provided with a series of pinions 49 which are in splined engagement with the shaft 43 and located adjacent corresponding ends of the drums, preferably at the ends remote from the motor 23. In the same transverse planes as the pinions 49 are carriers 50 having integral sleeves 51 that fit into the bores 52 of the drums to which they may be secured as by keys 53.

Each carrier is in the form of a box, comprising a pair of flanges 54 and 55 of which the flange 54 is located on the end of the sleeve 51 and the flange 55 is held in spaced relation with respect to the flange 54 by webs 56. The flanges 54 and 55 extend outwardly beyond the ends of the webs 56 and carry stub shafts 57 upon which are arranged anti-friction bearings 58 inserted in planetary gears 59 meshing with the pinions 49 and with an internal gear 60 encircling the carriers.

To the end that neither the weight of the drums nor the load applied to them will be borne by the shaft a slight clearance 61 is provided between the sleeve 51 and the shaft and the weight of the drum is supported directly by the main frame, more particularly by the transverse plates 30, 31 and 32. The drum 24 is accordingly provided with an anti-friction bearing 62 disposed about the end of the sleeve 51 and seated in a recess 63 in the plate 32, and in the flange 55 of the carrier is an anti-friction bearing 64 which is disposed upon a boss 65 of

the plate 30 and through which the shaft 43 extends. The drum 25 is likewise provided with a bearing 62 disposed in a recess 63 in the plate 30, and on the boss 65 of the plate 31 is the anti-friction bearing 64 carried by the flange 55 of the carrier associated with the drum 25.

With further reference to the internal gears, each gear 60 is held in assembled relationship with the planetary gears 59 by webs 66 of disk-shape mounted upon anti-friction bearings 67 and 68, arranged on the sleeve 51 and the boss 65, respectively. The portion of the webs 66 encircling the anti-friction bearings are in the form of flanges 69 upon which are arranged packing members 70 to effect a seal between the webs and the adjacent elements.

The webs 66 are imperforate and seat with the outermost portion of their inner surfaces against the side of the internal gear 60 to which they are secured, in fluid tight relationship, by bolts 71. Thus, the webs combine with the internal gear to define a chamber 72 for lubricant which may be introduced into the chamber 72 through a hole 73 in the plate 30 and opening into the adjacent clearance space 61. Other lubricant filling openings (not shown) may be provided wherever required to assure a plentiful supply of lubricant within the chamber 72 and in the spaces communicating the lubricant chambers with the various bearings located more remotely from the lubricant chambers, as for example the drive shaft bearings and those arranged on the free ends of the sleeves 51.

Suitable means are provided to enable the internal gear 60 of each driving connection to be held stationary whenever it is desired to cause rotation of the drum. To this end a braking element 74 is disposed about the internal gear 60 of which the periphery serves as a friction surface 75. The braking element 74 comprises the usual flexible band 76 carrying a lining 77 to frictionally engage the surface 75. The brake band and its lining are split and on opposite sides of the gap 78 thus formed are lugs 79 to one of which is pivotally connected a lever 80 and to the other a link 81 which is also pivotally connected to the lever 80.

In order to prevent rotary movement of the brake band when contracted upon the surface 75 said band 76 is provided, on opposite sides of the gap 78, with lugs 82 to abut brackets 83 mounted upon beams 84 carried by the casing sections 26 and 27. The brackets 83 are adjustable on the beams, being locked thereto by clamp plates 85 and screws 86 threaded into the beams.

Suitable adjusting screws 87 are threaded through the brackets and seat upon the upper surface of the beams 84 for raising and lowering the brackets as required to assure the correct degree of clearance between the braking element and the surface 75. The screws 87 also serve as anchors for tension springs 88 connected to links 89 on the brake band and on opposite sides of the gap 78.

The springs act constantly to expand the brake band so that, in the absence of pressure against the lever 80, the internal gear 60 will be free to rotate with the drive shaft from which motion is transmitted to the internal gear by the planetary gears 59. However, when it is desired to cause rotary movement of the drum the brake band is contracted, by means of the lever 80, to hold the internal gear stationary and the pinion 49 will then cause the planetary gears 59 to rotate along the internal gear, in a well understood manner, and cause the associated drum to rotate.

The levers 80 of the several drums may be manipulated separately or simultaneously in the same or in opposite directions to cause rotation of the drums in the directions required for reeling in and paying out the cable 90 wound upon the drums.

In order that the drums may be conveniently held against spinning during the time that the associated driving element is rendered non-effective each drum is provided with a braking flange 91 for cooperation with a brake shoe 92 mounted upon a pivot 93 seated in the casing sections. The brake shoe 92 has a treadle 94 against which the operator may step to press the brake shoe into frictional engagement with the brake flange 91. The brake shoe 92 is preferably pressed lightly against the flange 91 at all times in order to prevent spinning of the drums and to this end is provided with a lug 95 against which acts a spring-pressed pawl 96 mounted upon the pivot 93.

As will be readily apparent from the foregoing description, the drums are supported entirely by the main frame of the hoist and any load applied to them will be carried exclusively by the main frame rather than by the movable elements of the hoist.

A further highly desirable feature of the invention is that, owing to the unique design of the hoist, each drum and its driving and casing elements may be assembled as a complete unit. Thus, if the work requires only a single drum the other drum or drums together with their driving and casing elements may be removed and a drive shaft suitable for connection with only one driving element be substituted for that shown.

On the other hand if the work for which the hoist is intended be of such a nature as to require three drums an additional unit may be attached to the end of the casing section 27 and a drive shaft suitable for driving all the drums substituted for the shorter shaft. In adding a new unit to the hoist a replica of the plate 30 is substituted for the plate 31 and the latter plate is positioned to perform its usual functions as a closure for the end of the hoist and as a support for the drive shaft and the bearings 68 and 64 of the newly attached unit.

We claim:

1. A hoist, comprising a main frame having a plurality of transverse plates spaced with respect to each other, carriers within the main frame having tubular extensions, a drum on each tubular extension, means for securing each drum to each tubular extension, bearings in one transverse plate for one carrier and for the tubular extension of another carrier, a bearing in another transverse plate for the tubular extension of said one carrier, a bearing in still another transverse plate for such other carrier, a rotary drive shaft extending through the tubular extensions and the carriers, and driving connections for transmitting motion from the drive shaft to the carriers.

2. A hoist, comprising a main frame having transverse plates, a carrier within the main frame between the transverse plates having a tubular extension, a drum on the tubular extension, means for securing the drum to the tubular extension, bearings in the transverse plates for the carrier and the tubular extension, a rotary drive shaft extending through the tubular

extension and the carrier, a driving connection for transmitting motion from the drive shaft to the carrier, and a fluid tight casing enclosing the driving connection and being supported by a transverse plate and the tubular member.

3. A hoist, comprising a main frame having transverse plates, a carrier within the main frame between the transverse plates having a tubular extension, a drum on the tubular extension, means for securing the drum to the tubular extension, bearings in the transverse plates for the carrier and the tubular extension, a rotary drive shaft extending through the tubular extension and the carrier, a sun pinion on the drive shaft, an internal gear encircling the sun pinion, a planetary gear on the carrier intermeshing with the sun pinion and the internal gear, webs to support the internal gear and cooperating therewith to form a fluid tight enclosure for the gears and the pinion, bearings on a transverse plate and the tubular extension for the webs, and braking means cooperating with the internal gear to control the movement of the drum.

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