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HOIST DRIVING GEAR

Filed July 6, 1925

2 Sheets-Sheet 1

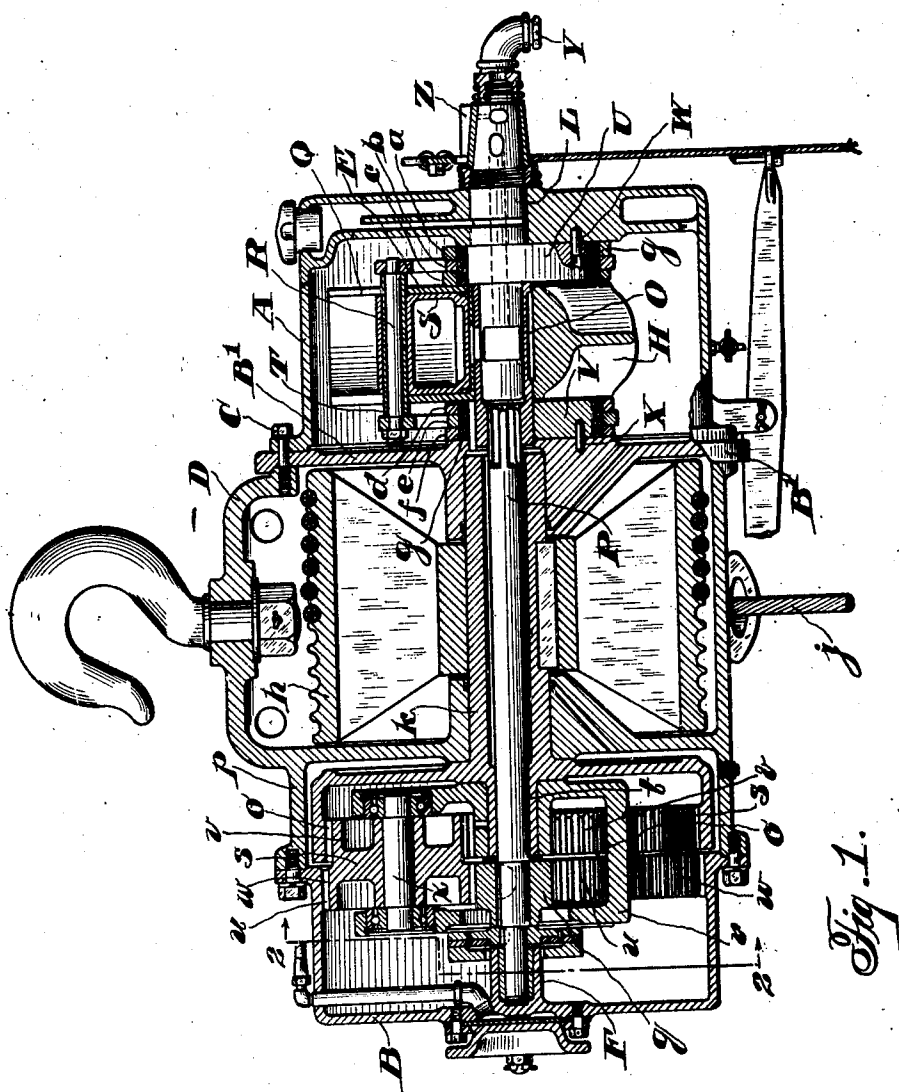


Fig. 1.

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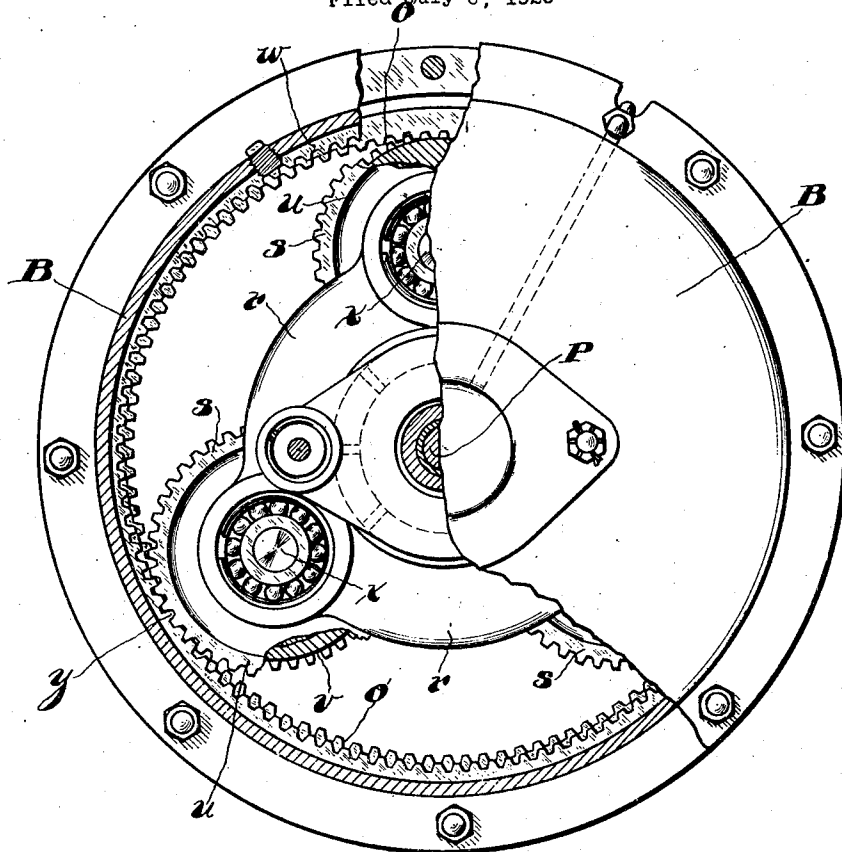


Fig. 2

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HOIST-DRIVING GEAR.

Application filed July 6, 1925. Serial No. 41,590.

This invention relates to hoists, but more particularly to a fluid actuated hoist capable of comparatively heavy duty in which the motor shaft is geared to the drum by reduction gearing.

The objects of the invention are to secure a simple, strong, unitary hoist construction including compact and durable reduction gearing capable of being subjected to considerable strain without derangement or breakage.

The invention is shown in one of its preferred forms in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation, and

Figure 2 is a transverse sectional view partly broken away on the line 2—2 of Figure 1 looking in the direction of the arrows.

Referring to the drawings only so much of a hoist is illustrated as will serve to make the invention clear and it is to be understood that the fluid pressure motor shown within the motor casing A, to indicate a suitable motor for the hoist, is like that disclosed in U. S. Patent No. 1,484,960, granted February 26, 1924, to C. H. Peck for rotary cylinder motor. Likewise, the automatic pressure fluid brake mechanism illustrated in connection with the hoist driving gear contained in the gear case B is like that disclosed in United States Patent, No. 1,561,722, granted November 17, 1925, for motor, but as the fluid pressure motor and brake form no specific part of the invention they will not be shown or described in detail since any suitable motor whether a fluid pressure motor or an electric motor may be used and the hoist may be operated with or without an automatic brake.

The motor comprises the case A having the case cover B' secured thereto as by means of the cap screws C which also hold the parts against the hoist housing D.

The rotary driving member of the motor consists of a plurality of rigidly connected angularly disposed cylinders, of which only one cylinder E is shown in the drawings for purposes of illustration, there being in fact three cylinders constructed as integral parts of a suitable cylinder casing H which connects and braces the cylinders.

The cylinder casing H is mounted to rotate about the hollow stationary shaft L

suitably supported in the case A at one side of the case, and extending into a rotary sleeve or bushing O keyed to the cylinder casing H to rotate therewith, and suitably connected to rotate a driven member, such as the motor shaft P extending through the case cover B' and through the hoist housing D and supported in a bearing F in the gear case B.

The walls of each cylinder, indicated generally by the reference character E, are preferably slotted longitudinally at opposite sides at their outer portions for a portion of their length, as indicated at Q through which slots extend the wrist pins R of the pistons S, and spacing sleeves T are preferably provided over the wrist pins. Stationary eccentrics U and V are mounted at each side of the cylinder casing H in any suitable manner, and in this instance the eccentric U is preferably formed as a part of the stationary shaft L, the shaft and eccentric being held from rotation as by means of the pin W. The eccentric V is conveniently held to the case cover B' as by means of the pin X, and the sleeve O and motor shaft P rotate within the eccentric V which forms a bearing for the sleeve. A plurality of yokes a, b and c, and d, e and f are revolvably mounted side by side on the eccentrics U and V respectively, and ball bearings g consisting of cages and balls, as shown, are preferably interposed between the yokes and the eccentrics. The yokes are assumed to be connected in pairs to the projecting ends of the wrist pins R, as shown and described in the aforesaid Patent No. 1,484,960. The intermediate yokes b and e forming one pair are adapted to be connected to the wrist pin R of the cylinder E shown in the drawing, and the other pairs of yokes are connected to the wrist pins of the other cylinders, not shown, it being understood that there are twice as many yokes as cylinders.

Suitable means are provided for supplying and distributing motive fluid to the cylinders, and as shown pressure fluid, as compressed air, may be supplied and exhausted through the hollow stationary shaft L from the supply connection Y.

A suitable throttle valve Z is provided for controlling the supply of fluid from the supply connection Y and for reversing the mo-

tor. The drum h having the rope or cable j is suitably keyed to the drum shaft k formed as the hub or tubular extension of the internal gear o rotatable within the outer flange portion p of the hoist housing forming a part of the gear case, so that the drum rotates about the motor shaft P . A driving pinion q is carried by the motor shaft P and a frame r carrying double planetary or intermediate gears s is rotatably mounted within the gear case wholly upon an extension t of the drum shaft k . Each intermediate or planetary gear s is formed with two portions u and v having different numbers of teeth and a stationary internal gear w is conveniently formed as an integral part of the gear case B .

The planetary gears s are carried on pins x rotating in ball bearings in the intermediate gear frame r and in order that this planetary gearing may act as a reduction gear, the internal gears w and o are provided with different numbers of teeth. In the present instance, let it be assumed that the driving pinion q has twelve teeth for example and that the portion u of each planetary gear s has twenty-seven teeth of the same pitch as the pitch of the teeth on the driving pinion, while the portions v of the planetary gears have twenty-four teeth likewise of the same pitch. The stationary internal gear w may be assumed to have sixty-six teeth while the rotatable internal gear o has sixty-three teeth all of the same pitch. In consequence of this construction, as the planetary gears s are rotatively driven around the inside of the stationary internal gear w by the driving pinion q carrying with them the intermediate gear frame r , the rotatable internal gear o will be driven at an

angular velocity depending upon the difference between the numbers of teeth on the two internal gears.

In assembling the epicyclic reduction gearing, the construction is such that the rotatable internal gear o may be rotated relatively to the stationary internal gear w to a given point at which one tooth on each internal gear will coincide as indicated at the point y for instance on Figure 3 and on each double planetary gear s there is one point at which the cutting of the teeth on the two portions of the gears is commenced so that two spaces come in line permitting the planetary gears to be assembled properly with the internal gears.

We claim:—

In a hoist, the combination of a drum housing having an outer flange portion forming part of a gear box, a motor shaft passing through the housing and having a driving pinion at its outer end, an internal gear inside the said flange portion of the housing and having a tubular hub journaled on the motor shaft and forming the drum shaft, a drum rotatable with said tubular hub, an extension on the hub forming a bearing, an intermediate frame rotatably mounted wholly upon said extension of the hub, double planetary gears carried by said frame, and a gear case having an internal gear secured to the outer flange portion of the housing, the different portions of the planetary gears having different numbers of teeth meshing with the said internal gears respectively.

In testimony whereof we have signed this specification.

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