July 27, 1926. 1,593,595

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DOUBLE DRUM HOIST

Filed July 3, 1925 2 Sheets-Sheet 1

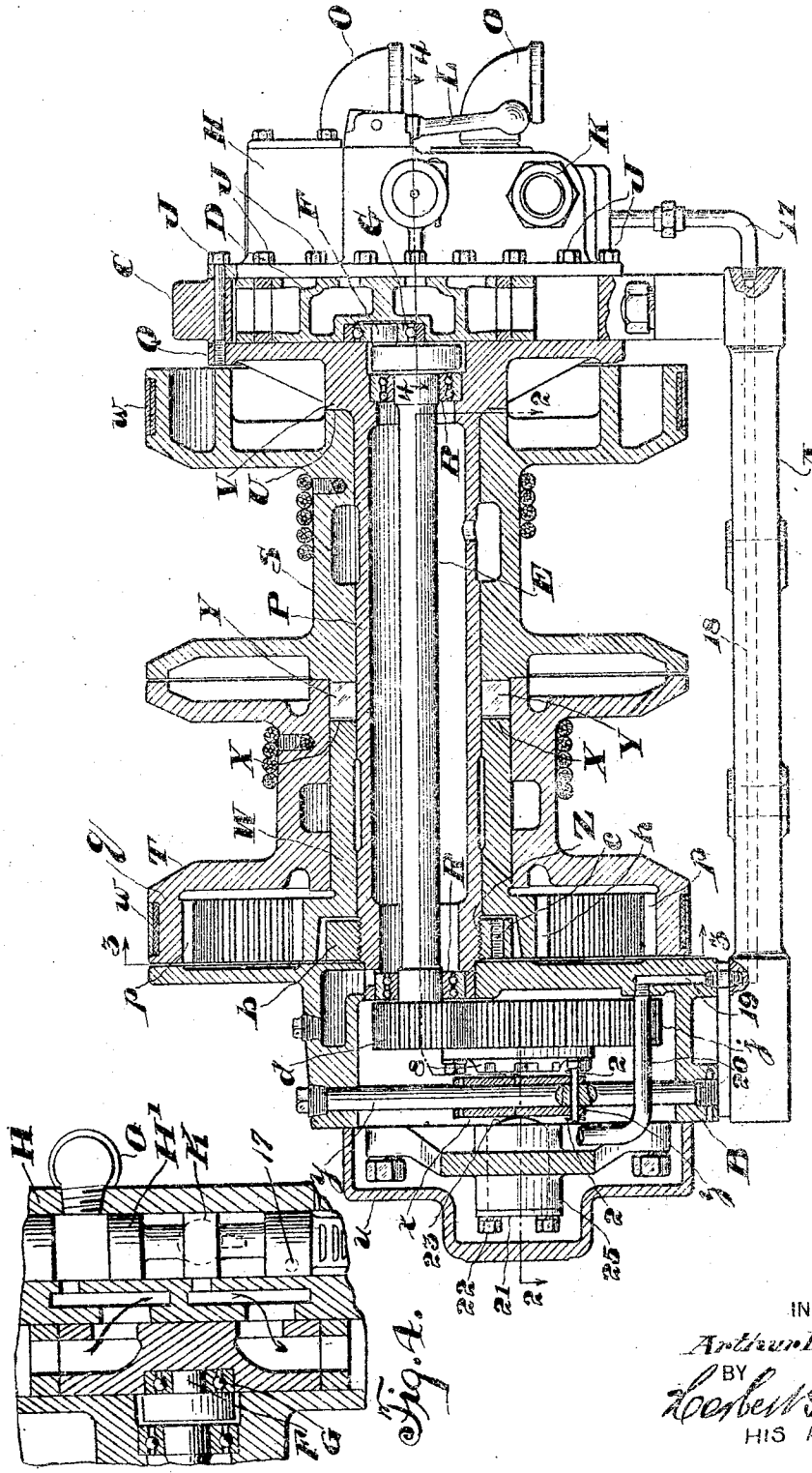

Fig. 1.

Fig. 4.

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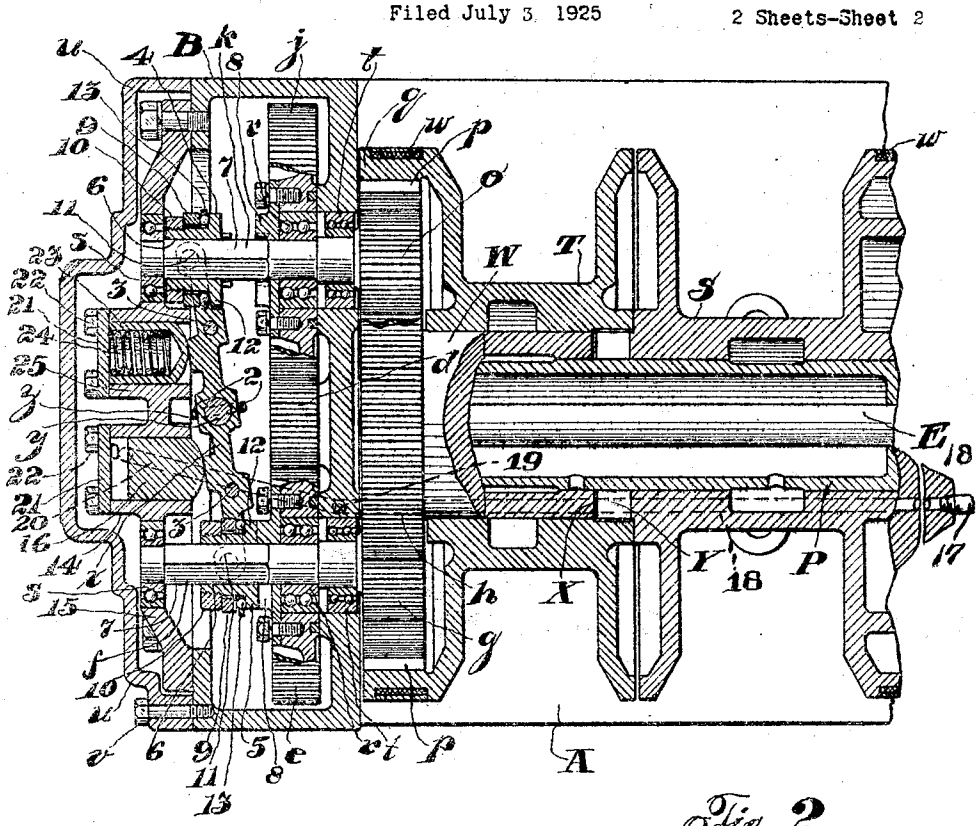

Fig. 2.

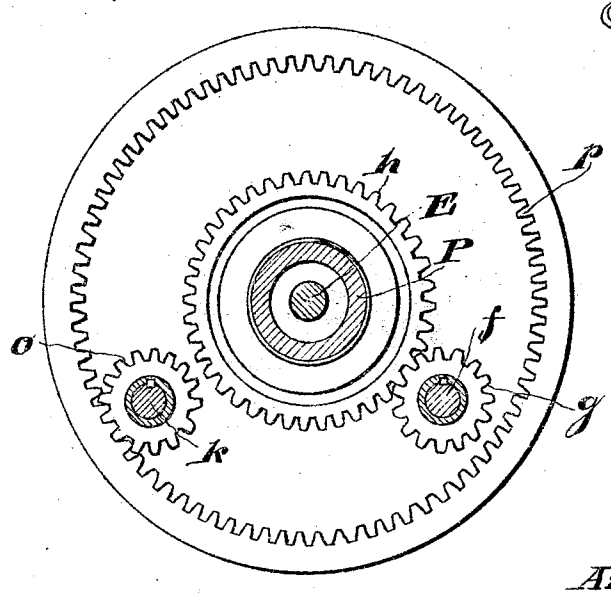

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DOUBLE-DRUM HOIST.

Application filed July 3, 1925. Serial No. 41,295.

This invention relates to hoists, but more particularly to a power driven hoist of the double drum type in which either drum may be driven selectively from the common driving shaft.

The objects of this invention are to enable two drums, as for instance, the haulage drum and a tail-rope drum to be driven from a non-reversible source of power as for instance an air motor or an electric motor by improved means and devices which enable one drum to be automatically connected with the driving element while the other drum is simultaneously disconnected from the driving element, although the motor always rotates in the same direction.

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

The invention consists of the combinations of elements, features of construction and arrangement of parts having the general mode of operation substantially as hereinafter described and more particularly pointed out in the appended claims and illustrated in the accompanying drawings, in which

Figure 1 is a longitudinal view in elevation, partly in section, of a hoist constructed in accordance with the practice of the invention,

Figure 2 is a plan view in section taken on the line 2—2 through Figure 1 looking in the direction of the arrows,

Figure 3 is a view taken through Figure 1 on the line 3—3 looking in the direction of the arrows, and

Figure 4 is a transverse section taken through Figure 1 on the line 4—4 looking in the direction of the arrows.

Referring to the drawings, the invention is shown embodied in a motor hoist of the double drum type in which a base plate A supports at one end a gear casing B and at its other end a cylinder C. In this instance, a non-reversible fluid actuated motor is indicated in which a piston D of the square type is adapted to reciprocate within the cylinder C for rotating a driving shaft E. Any suitable means may be provided for connecting the piston D with the driving shaft E as for instance, a crank pin F provided with a frictionless bearing G housed within one side of the piston D. A valve casing H forms a cover for one side of the cylinder C and is suitably secured thereto as by means of bolts J. Pressure fluid to the valve casing H may be supplied through a connection K and the supply of pressure fluid for actuating the piston D is controlled by a suitable throttle valve H′ in the valve casing H having a throttle handle L. The connection between the handle L and the throttle valve H′ may be like that disclosed in United States Patent No. 1,566,349 entitled Double drum hoist granted to F. M. Slater, December 22, 1925. In this instance pressure fluid will be admitted to the cylinder C in either of the limiting positions of the handle L. However, it is to be understood that the motor will rotate in only one direction irrespective of the position of the handle L. Pressure fluid is exhausted from the motor through suitable outlet connections O secured to the valve casing H and preferably arranged so that the exhaust of pressure fluid is directed downwardly.

In this instance, a center bearing P encases the driving shaft E and has a flange Q at one end to form a cover for one side of the cylinder C. The center bearing P like the valve casing H, is held in position by the bolts J which are screw threaded into the flange Q. The driving shaft E is preferably arranged concentrically with the center bearing P and is provided at its ends with frictionless bearings R supported by said center bearing. In this instance, a tail-rope drum S is journalled on the center bearing P and is provided with a shoulder U which abuts a shoulder V formed on the center bearing for preventing endwise movement of said drum in one direction. A bushing W is mounted loosely on the center bearing P and carries at one end clutch members X which are adapted to cooperate with similar clutch members Y formed on the drum S for rotating said drum. The clutch members X and Y may be of any suitable form, but are preferably of a design which will eliminate end thrust. In addition to serving as an extension for the drum S, the bushing W also serves as a bearing for a haulage drum T which is mounted loosely upon said bushing.

To the end that longitudinal movement of the drums S and T and the bushing W may be limited, the end of the center bear-

ing P is threaded as at Z to receive a correspondingly threaded collar *b*. The collar *b* may be provided with a tapped hole *c* to receive any suitable threaded instrument for removing said collar from the center bearing.

In this instance, rotary motion from the driving shaft E is imparted to the tail-rope drum S by a train of gears comprising a driving pinion *d* secured to the end of the driving shaft E, and which pinion is in constant mesh with an intermediate gear *e* mounted loosely on a shaft *f*. The shaft *f* carries at one end an intermediate pinion *g* which meshes with a gear *h* preferably formed integrally with the bushing W. A somewhat similar train of gearing is provided for driving the haulage drum. In this instance an intermediate gear *j*, of substantially the same formation as the gear *e*, is mounted loosely upon a shaft *k* and like the gear *e* is in constant mesh with the driving pinion *d*. An intermediate pinion *o* is keyed to the end of the shaft *k* and meshes with an internal gear *p* carried by a flange *q* of the drum T.

In order to reduce friction between the intermediate gears *e* and *j* and the shafts *f* and *k* respectively, suitable frictionless bearings *r* are provided as are also bearings *s* and *t* for the outer and inner ends respectively of the shafts *k* and *f*. A cover *u* is provided for the gear casing B to protect the mechanisms in said casing against dust and dirt and may be secured in position in any suitable manner, as for instance, by bolts *v* extending through the cover and screwed into the casing B.

Usually in machines of this character, a braking element is provided. In this instance, a separate brake in the form of a band *w* is provided for each drum. Any suitable mechanism may be provided for manipulating these bands, but such mechanism preferably consists of means which will automatically produce a drag on the drums when the drums are disconnected from the driving element.

In accordance with the practice of the invention, a clutch yoke *x* is arranged in the gear casing B and is secured at its center to a rotatable rod *y* by means of a pin *z* which preferably extends through the yoke and the rod *y* and may be held against displacement in any suitable manner as for instance cotter pins 2. The yoke *x* is preferably formed in half sections which may be secured together by bolts 3.

In order to enable one or the other of the drums to be connected selectively with the driving element, clutch members 4 and 5, preferably off-set from the longitudinal axis of the hoist are arranged slidably on the shafts *k* and *f* respectively, and are provided with a polygonal bore 6 to cooperate with a correspondingly formed portion 7 of said shafts for preventing rotation of the clutch members with respect to said shafts. Clutch teeth 8 are secured to the intermediate gears *j* and *e* to cooperate with the clutch members 4 and 5 respectively. In this instance, clutch collars 9 are provided for the clutch members 4 and 5 and are held in position by nuts 10 screwed on one end of said clutch members. The collars 9 are connected pivotally to the yoke *x* by means of trunnions 11 carried by said collars. In order to reduce friction between the clutch collar 9 and a flange 12 of the clutch members 4 and 5, a frictionless bearing 13 is interposed between said collar and said flange.

Suitable means are provided for automatically actuating the clutch yoke *x* for sliding the clutch member 5 into engagement with the teeth 8 on the intermediate gear *e* simultaneously with the admission of pressure fluid to the motor. To this end, a cylinder 14 preferably formed integral with a bearing plate 15, is provided with a plunger 16 which abuts at its forward end the yoke *x*. Pressure fluid for actuating the plunger 16 is conveyed from the valve casing H through a pipe 17 communicating with a passage 18 formed in the base plate A and thence through a passage 19 formed in the gear casing B and through a pipe 20 connecting the passage 19 with the rearward end of the cylinder 14. A cover plate 21 forms a closure for the rear end of the cylinder 14 and is secured in position by means of bolts 22. The exhaust of pressure fluid from the cylinder 14 is in this instance controlled by the throttle handle L.

In order to disengage the clutch member 5 after the pressure fluid has been exhausted from the cylinder 16 and to automatically slide the clutch member 4 into engagement with the clutch teeth 8 on the intermediate gear *j*, a plunger 23 actuated by a spring 24 is arranged within a cylinder 25 and is adapted to bear with its front end against the yoke *x* on the opposite side of the rod *y*. The cylinder 25 like the cylinder 14 is provided with a similar cover plate 21 which is also held in position by means of bolts 22.

In the operation of the device let it be assumed that it is desired to rotate the tail-rope drum S, the throttle valve H′ may then be moved to admit pressure fluid to the motor and to uncover the pipe 17 (Figure 4). In this position of the valve, air is admitted through the pipe 17 and the associated passages into the rearward end of the cylinder 14. Upon the admission of pressure fluid into said cylinder, the plunger 16 is forced outwardly against the yoke *x* and causes said yoke to rock about its

pivot until the clutch member 5 is brought into engagement with the clutch teeth 8 carried by the intermediate pinion *e*. Upon reversal of the throttle lever L, the air is exhausted from the cylinder 14 and the plunger 23 will then be automatically forced outwardly by the spring 24. In this way, the yoke *x* is caused to rock in the opposite direction whereby the clutch member 5 is drawn out of engagement with the teeth 8 on the intermediate gear *e* and the clutch member 4 is simultaneously pressed into engagement with the teeth 8 carried by the intermediate gear *j*.

I claim:

1. In a hoist, the combination of a frame, a driving shaft, drums rotatable about said driving shaft, a motor adapted to run only in one direction and connected to rotate said shaft, a valve casing on the motor, clutches at one end of the hoist for selectively connecting the drums with the driving shaft, and fluid actuated means for actuating said clutches, said means being connected to receive pressure fluid from the valve casing simultaneously with the admission of pressure fluid to the motor.

2. In a hoist, the combination of a frame, a driving shaft, drums rotatable about said driving shaft, a motor adapted to run in only one direction connected to rotate said shaft, a valve casing on the motor, a pair of clutches at one end of the hoist for connecting the drums with the driving shaft, and fluid actuated means connected to receive pressure fluid from the valve casing for connecting one drum with the drive shaft and simultaneously disconnecting the other drum from said shaft.

3. In a hoist, the combination of a frame, a driving shaft, drums rotatable about said driving shaft, a motor adapted to run in only one direction connected to rotate said shaft, an oscillatory clutch yoke, a pair of clutches associated with said yoke and off-set from the longitudinal axis of the hoist, and a fluid actuated plunger associated with the yoke to actuate the clutches for simultaneously connecting one drum with the driving shaft and disconnecting the other drum from said shaft.

4. In a hoist, the combination of a frame, a driving shaft, drums rotatable about said driving shaft, a motor adapted to run in only one direction connected to rotate said shaft, an oscillatory clutch yoke pivoted at its center, clutches supported by the ends of the yoke, a cylinder, a fluid actuated plunger in said cylinder to rock the clutch yoke in one direction to enable one of the clutches to connect one of the drums with the driving shaft, and automatic means for rocking the yoke in the opposite direction upon the release of pressure fluid from the cylinder for disconnecting the first said drum from the driving shaft and for simultaneously actuating the other clutch to connect the other drum with the driving shaft.

5. In a hoist, the combination of a frame, a driving shaft, a center bearing supported by the frame, a pair of drums rotatable about the shaft and the center bearing, a motor adapted to run in only one direction connected to rotate said shaft, a gear case, a pair of shafts in said case and having polygonal portions, a gear mounted loosely on each shaft associated with the drums and connected to be rotatated by the driving shaft, clutch teeth carried by said gears, a clutch collar arranged slidably on each shaft, a clutch yoke pivoted centrally and connected to the clutch collars, a cylinder, a fluid actuated plunger in the cylinder to slide one of the clutch collars into engagement with the teeth on one gear for connecting one of the drums to be rotated by the driving shaft, a spring pressed plunger for automatically disengaging the first said clutch collar from the teeth upon the release of pressure fluid from the cylinder and to simultaneously slide the other clutch collar into engagement with the teeth on the other gear for connecting the other said drum to be rotated by the driving shaft.

In testimony whereof I have signed this specification.

ARTHUR E. PETERS.