Feb. 10, 1931. M. P. HOLMES 1,792,093

CONTROLLING MECHANISM

Filed Oct. 8, 1921

Fig. 1.

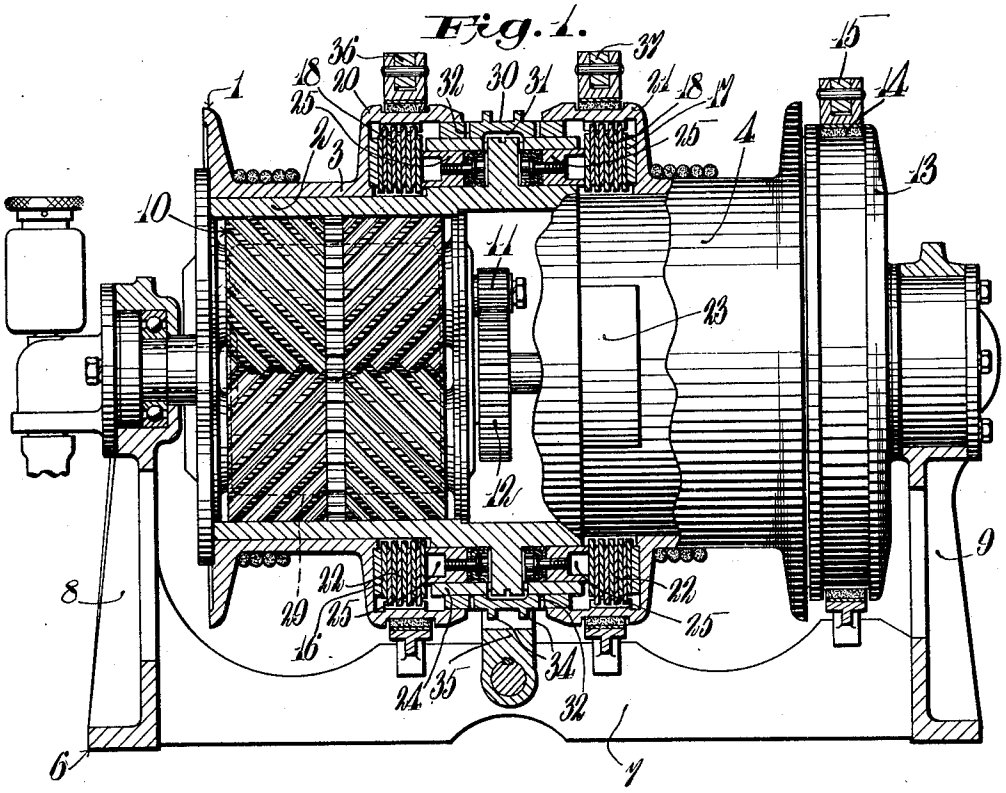
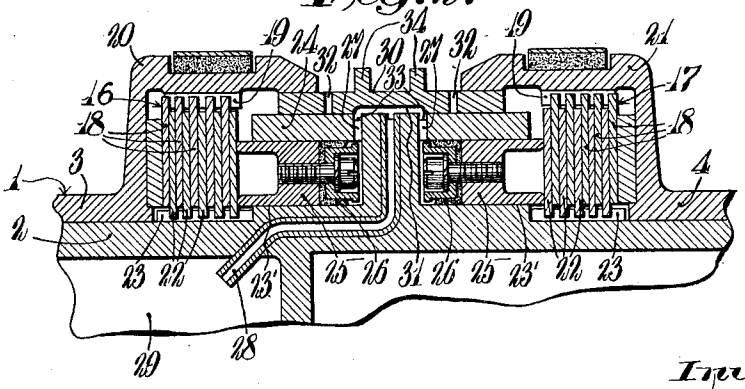


Fig. 2.



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UNITED STATES PATENT OFFICE

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CONTROLLING MECHANISM

Application filed October 8, 1921. Serial No. 506,497.

My invention relates to controlling mechanisms, and more especially to controlling mechanisms for hoists, of the type shown in my Patent No. 1,708,177, dated April 9, 1929.

An object of my invention is to provide an improved controlling mechanism. Another object of my invention is to provide an improved controlling mechanism for double drum hoists. A further object of my invention is to provide an improved air controlled clutch mechanism whereby the members controlled thereby may be alternately connected and disconnected from another member. Other objects and advantages of my invention will hereafter appear.

In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice.

In these drawings,—

Fig. 1 is a view partially in elevation with parts broken away and partially in central vertical section through a hoisting mechanism provided with the illustrative form of my improved controlling mechanism, the parts of the latter being shown entirely in section.

Fig. 2 is a view on an enlarged scale of the details of construction of my improved controlling mechanism, the section being taken through a different portion of the mechanism from that shown in Fig. 1.

Similarly as in my copending application referred to above, I disclose herein a double drum hoist comprising a rotating drum mechanism generally designated 1 and comprising an inner drum or drum driver member 2 and outer drums 3 and 4 coaxially disposed upon the drum 2 and rotatable relative thereto or simultaneously therewith under certain circumstances hereinafter described. The drum 2 is journaled in a suitable support generally designated 6 and comprising a base 7 and upright standards 8 and 9. Within the drum 2 is arranged a driving motor generally indicated 10, which motor drives by means of gears 11, 12, etc. the drum 2. As the manner in which this is accomplished is well known and further immaterial to the present invention, it will not be further described other than as follows. Means is provided including a member 13, which is journaled in the standard 9 and provides a bearing (not shown) for one end of the drum 2, and braking means 14 controlled by controlling mechanism 15 whereby the operation of the motor 10 may cause the drum 2 to rotate about its axis or whereby the drum may remain stationary and the member 13 rotated.

For the purpose of connecting the drums 3 and 4 either selectively or simultaneously to the drum 2 I have provided means comprising a plurality of friction clutches 16 and 17, each including a plurality of friction disks 18 held against rotation relative to the drums 3 and 4 by connection with splines 19 secured to oppositely disposed collars 20 and 21 formed on the drums 3 and 4. Interposed between the disks 18 are disks 22 splined to the drum 2 as indicated at 23. It will be evident that when either series of disks 18 carried by the drums 3 and 4 is caused to tightly engage its associated series of disks 22 nonrotatably secured to the drum 2, the respective drum 3 or 4 will be frictionally locked to the drum 2 and rotated therewith when the latter rotates.

For the purpose of causing frictional engagement between the disks 18 and 22 as desired I provide means including annular cylinders 23′ arranged herein in alinement with each other and coaxial with the axis of rotation of said drum 2 and surrounding the outer periphery of the drum 2 and formed in a raised band or collar 24 adjacent the center thereof. Within the cylinders 23′ are reciprocable annular pistons 25 which comprise cup packings 26 whereby the leakage of air may be minimized and these pistons are adapted to press into engagement the friction disks controlled thereby. For the purpose of supplying pressure to the cylinders 23′ I have arranged ports 27 extending through the periphery of the collar 24 and to supply pressure to these ports I have arranged a passage 28 communicating with the inlet supply space 29 of the motor 10, whereby fluid under pressure may be supplied to whichever set of the ports 27 is desired and so either the drum 3 or the drum 4 driven. Controlling the connection between the ports 27 and the passage 28 is a slide valve 30 having an annular groove

31 formed therein of sufficient width simultaneously to connect both series of ports 27 with the supply port 28 and likewise having arranged toward the lateral edges of the valve annulus from the groove 31 ports 32 adapted to communicate, when the valve annulus is shifted longitudinally, with the ports 27 and vent the cylinders which it is desired to have connected to the atmosphere. The annular slide valve 30 is provided with upstanding lugs 34 forming collars engaged by a shifting fork 35 whereby the slide valve may be shifted from one position to the other with ease. It will be noted that the ports 27 communicate with the annular grooves 33 extending completely around the periphery of the collar 24, thereby ensuring exhaust despite possible rotation of the ports 32 relative to the ports 27. So also the passage 28 opens into a groove extending completely around the periphery of the collar 24.

For the purpose of braking the movement of the drums 3 and 4 suitable brake bands provided with any appropriate kind of brake applying means are arranged as indicated at 36 and 37.

The mode of operation of this mechanism will be readily apparent. Assume that the motor 10 is running and that the drum 2 is rotating and that it is desired to connect the right hand drum 4 for rotation with the drum 2 while the left hand drum 3 is released from any connection therewith and left free; the shifting mechanism 35 will be operated to move the annular slide valve 30 bodily to the right, thereby disconnecting the left hand ports 27 from the supply passage 28, and connecting them with the left hand vent passages 32. This will permit the left hand piston 25 to be released and so relieve the pressure upon the left hand friction clutch 17. The right hand friction clutch 16 will, however, be under full pressure due to the flow of pressure fluid from the chamber 29 through the passage 28, ports 27, to cylinder 23′ to act upon the right hand piston 25, thereby causing the friction rings 18 and 22 to engage and rotate together and drum 4 to rotate with drum 2. To effect the opposite result, the slide valve 30 is moved to its opposite position. When in mid position the valve 30 causes both drums 3 and 4 to rotate with drum 2. This makes possible the use of this control with a boom derrick. When using a drag scoop, the valve will be shifted rapidly from one position to the other to avoid placing an undue tension on the drag lines.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a controlling mechanism for hoists having a motor housing and a motor element therein, said housing having journals formed upon its periphery, and a pair of drums rotatably mounted on said journals, a fluid pressure operated clutch means for each drum including elements carried by the housing and by the drum respectively, and a single valve means for directing pressure fluid to either of said clutch means to connect the corresponding drum in driving relation with said motor,

2. In a hoisting mechanism, a fluid pressure motor whose casing provides journal surfaces for a plurality of drums, a plurality of drums rotatably supported by said surfaces, and means actuated by a portion of the fluid pressure supply to said fluid pressure motor for connecting said drums alternately or simultaneously in driving relation with said motor.

3. In a controlling mechanism for hoists having a rotatable drum driver member, a pair of relatively rotatable winding drums rotatably mounted upon the periphery of said member, a motor, and operative driving connections between said motor and member, the combination of fluid pressure operated clutch means carried by said member for connecting either of said drums to said member for rotation therewith, and means for supplying fluid pressure to said clutch means.

4. In a hoisting mechanism, a fluid pressure motor, having a casing mounted for rotation, a plurality of relatively rotatable winding drums rotatably mounted on the periphery of said casing, means carried by said casing and drums and actuated by a portion of the fluid pressure supply to said fluid pressure motor for connecting said winding drums either selectively or simultaneously to said casing, and means for controlling the supply of fluid pressure to said connecting means.

5. In a hoisting mechanism, a plurality of drums, friction disks carried thereby, a driving member intermediate said drums, friction disks carried thereby and adapted to engage said first mentioned disks, and fluid pressure controlled means intermediate said drums and including a valve and actuating means therefor reciprocable between the planes of said disks for causing selective engagement between the disks carried by said driving member and those carried by one or the other of said drums.

6. In a hoisting mechanism, a plurality of drums having a power transmission shaft therein, friction disks carried by said drums, a driving member intermediate said drums, friction disks carried thereby and adapted to engage said first mentioned disks, and fluid pressure controlled means intermediate

said drums and including a valve reciprocable between the planes of said disks for causing selective engagement between the disks carried by said driving member and those carried by one or the other of said drums, said valve being disposed outside of said shaft.

7. In a hoisting mechanism, a pair of drums each provided with friction disks nonrotatably engaged therewith, a driving member for said drums provided with series of disks adapted to operatively engage said first mentioned disks, means intermediate said series of disks including a plurality of fluid actuated members operative to engage one or the other of said series of disks with their corresponding first mentioned disks, and control means for said fluid pressure actuated members also entirely arranged intermediate said series of disks.

8. In a hoisting mechanism, a pair of drums each provided with friction disks nonrotatably engaged therewith, a driving member for said drums having a fixed longitudinal relation to said drums and directly provided with series of disks adapted to operatively engage said first mentioned disks, means intermediate said series of disks including cylinder forming means, a plurality of fluid actuated members reciprocable therein and operative to engage one of the other of said series of disks with their corresponding first mentioned disks, and control means for said fluid actuated members, said fluid pressure actuated members being disposed coaxial with said drums and movable in paths parallel thereto.

9. In a hoisting mechanism, a pair of drums each provided with friction disks nonrotatably engaged therewith, a driving member for said drums provided with series of disks adapted to operatively engage said first mentioned disks, means intermediate said series of disks including cylinder forming means, a plurality of fluid actuated members reciprocable therein and operative to engage one or the other of said series of disks with their corresponding first mentioned disks, and an annular ring member forming control means for said fluid actuated members, said fluid pressure actuated members being disposed coaxial with said drums and movable in paths parallel thereto.

10. In a hoisting mechanism, a pair of drums each provided with friction disks nonrotatably engaged therewith, a driving member for said drums provided with series of disks adapted to operatively engage said first mentioned disks, means intermediate said series of disks including a plurality of fluid actuated members operative to engage one or the other of said series of disks with their corresponding first mentioned disks, and control means for said fluid actuated members including an annular valve member slidable longitudinally of said driving member, said fluid pressure actuated members being disposed coaxial with said drums and movable in paths parallel thereto.

11. In a fluid pressure operated hoisting mechanism, a pair of drums, a fluid pressure motor having a casing disposed between the remote ends of said drums and a fluid supply passage therein, and means actuated by a portion of the fluid pressure supply to said motor for selectively connecting said drums in driving relation to said motor, said means receiving their supply through the motor casing from said fluid supply passage.

12. In a fluid pressure operated hoisting mechanism, a pair of drums having adjacent ends, a fluid pressure motor having a casing disposed between the remote ends of said drums, a fluid supply connection for said motor coaxial with and extending through one of said drums, and fluid operated clutch means for connecting said drums in driving relation to said motor, said clutch means being supplied with operating pressure fluid from the motor fluid supply by connection with the latter at a place between the planes of the adjacent ends of the winding surfaces of the drums.

13. In a hoisting mechanism, a fluid pressure motor, a pair of coaxial drums arranged to be driven thereby, said motor having a casing projecting into the ends of said drums, fluid operated clutch means for connecting said motor in driving relation with said drums, a fluid supply connection for said motor, and means communicating with said motor fluid supply connection at a point within the space enclosed within a cylinder whose surface coincides with the winding surfaces of said drums for supplying operating fluid to said fluid operated clutch means.

14. A hoisting mechanism comprising a pair of relatively rotatable winding drums, a motor having a rotatable casing driven thereby, fluid pressure actuated means carried by said casing and drums for connecting said winding drums either selectively or simultaneously to said casing, means for controlling the supply of fluid pressure to said latter means, and frictional drive control means for controlling rotation of said casing.

15. A hoisting mechanism comprising a pair of relatively rotatable winding drums, a unidirectional driving motor, a rotatable drum driver element, operative driving connections between said motor and driver element, means carried by said driver element and disposed between the adjacent ends of said drums for connecting one or the other of the latter to said driver element for rotation therewith, a common source of actuating medium for supplying such medium to both the motor and to the connecting means, and means for controlling the supply of such medium to the motor, said con-

trolling means being adapted to cut off the supply to both the motor and to the connecting means.

16. A hoisting mechanism comprising a motor, a casing therefor having journal means thereon, an element, operative driving connections between said motor and said element, a pair of relatively rotatable winding drums having bearings cooperating with said journal means and adapted to be rotatable relative to said element, means for connecting one or the other of said drums to said element, a common source of actuating medium for supplying such medium to both the motor and to the connecting means, and means for controlling the supply of such medium to the motor, said controlling means being adapted to cut off the supply to both the motor and to the connecting means.

17. In a hoisting mechanism, a rotatable drum driver member, a pair of relatively rotatable winding drums surrounding said member, a motor, operative driving connections between said motor and said member, fluid pressure operated mechanism for connecting said drums to said member, and a control for said connecting mechanism including a longitudinally shiftable member supported by and encircling said driver member.

18. In a hoisting mechanism, a rotatable housing member, a driving motor disposed within said member, a pair of relatively rotatable winding drums surrounding said member and having rotatable supporting connection therewith, and controlling mechanism for connecting said drums to said housing including for each drum clutch elements carried respectively by said drums and said housing, a longitudinally shiftable member encircling and slidable on said housing, and fluid pressure operated mechanism for effecting the shifting of said shiftable member to actuate said clutch elements.

19. In a hoisting mechanism, a motor having a rotatable casing, a pair of relatively rotatable winding drums journaled on the exterior of said casing, and means for either selectively or simultaneously connecting said drums to said casing for rotation therewith.

20. In a hoisting mechanism, a motor having a rotatable casing and fluid pressure supply means, a pair of relatively rotatable winding drums journaled on the exterior of said casing, and means for selectively connecting said drums to said casing for rotation therewith including means carried by said casing and operated by the pressure in said supply means.

21. In a hoisting mechanism, a motor having a rotatable casing and fluid pressure supply means, a pair of relatively rotatable winding drums journaled on the exterior of said casing, means for selectively connecting said drums to said casing for rotation therewith including a clutch for each drum carried by said casing, and means operated by the pressure in said supply means for actuating said clutches.

22. In a hoisting mechanism, a motor having a rotatable casing and cylinders formed therein, a pair of relatively rotatable winding drums journaled on the exterior of said casing, and means including reciprocable fluid actuated pistons arranged in said cylinders for connecting said drums to said casing for rotation therewith.

23. In a hoisting mechanism, a motor having a rotatable casing and cylinders formed therein, a pair of relatively rotatable winding drums journaled on the exterior of said casing, and means including reciprocable fluid actuated pistons arranged in said cylinders for either selectively or simultaneously connecting said drums to said casing for rotation therewith.

24. In a hoisting mechanism, a motor having a rotatable casing and cylinders formed therein, a pair of relatively rotatable winding drums journaled on the exterior of said casing, clutches carried by said casing for connecting either of said drums to said casing for rotation therewith, and means including reciprocable fluid actuated pistons arranged in said cylinders for selectively applying said clutches.

25. In a hoisting mechanism, a rotatable drum driver member, a pair of relatively rotatable winding drums rotatably mounted upon the periphery of said member, and means for selectively connecting either of said drums to said member for rotation therewith including fluid pressure operated clutch means individual to each drum, annular cylinders and cooperating pistons for operating the same carried by said member, and means for supplying pressure fluid to said cylinders.

26. In a hoisting mechanism, a driving motor, a rotatable casing in which said motor is housed, a pair of relatively rotatable winding drums rotatably mounted upon said casing, and means for selectively connecting either of said drums to said casing for rotation therewith including fluid pressure operated clutch means individual to each drum, annular cylinders and cooperating pistons for operating the same carried by said casing, and means for supplying pressure fluid to said cylinders.

27. In a hoisting mechanism, a fluid pressure motor whose casing provides journal surfaces for a plurality of drums, a pair of drums rotatably supported by said surfaces, and means actuated by a portion of the fluid pressure supply to said fluid pressure motor for selectively connecting one or the other of said drums in driving relation with said motor.

28. In a hoisting mechanism, a fluid pressure motor having a casing mounted for ro-

tation, a pair of relatively rotatable winding drums rotatably mounted on the periphery of said casing, means carried by said casing and drums and actuated by a portion of the fluid pressure supply to said fluid pressure motor for selectively connecting one or the other of said winding drums to said casing, and means for controlling the supply of fluid pressure to said connecting means.

29. A hoisting mechanism comprising a pair of coaxial relatively rotatable winding drums, a driving motor, a cylindrical member concentrically disposed within said drums for supporting the same, operative driving connections between said motor and member including a driving shaft disposed within and rotatable relative to said member, and means carried by said member for connecting the same to one or the other of said drums alternatively comprising a member projecting radially of said cylindrical member, and an element carried by and movable about the end of said radially projecting member, movement of which in one direction effects connection of one drum, and movement of which in the other direction effects connection of the other drum.

In testimony whereof I affix my signature.

MORRIS P. HOLMES.