May 15, 1934. R. C. OSGOOD 1,958,441

HOISTING MECHANISM

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Fig. 1.

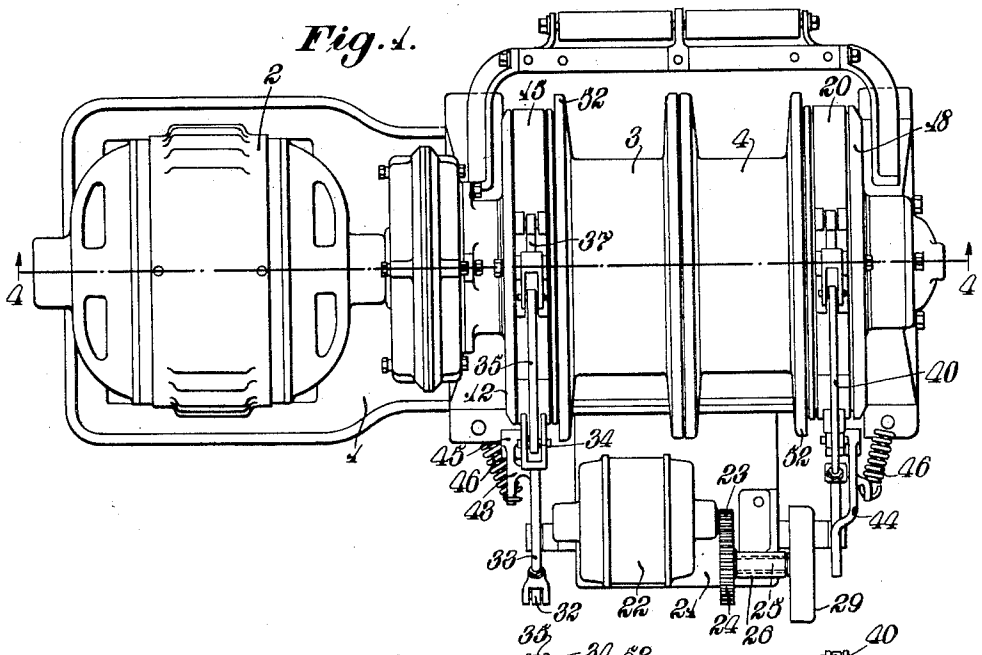


Fig. 2.

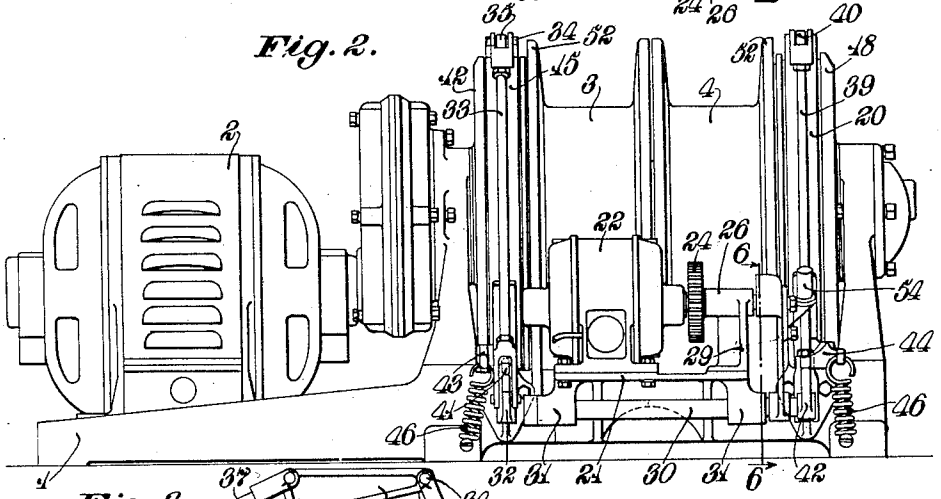
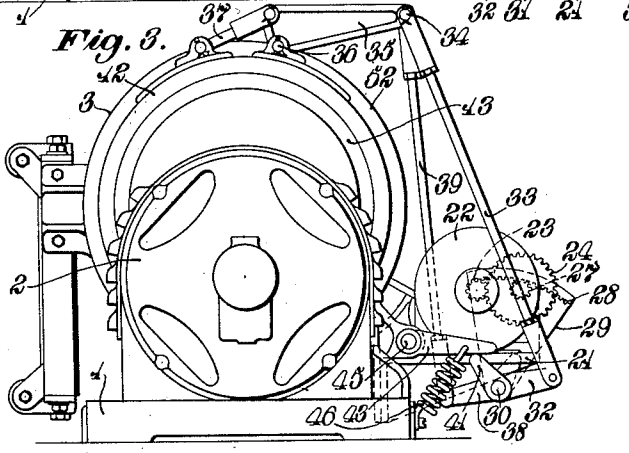


Fig. 3.



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Fig. 4.

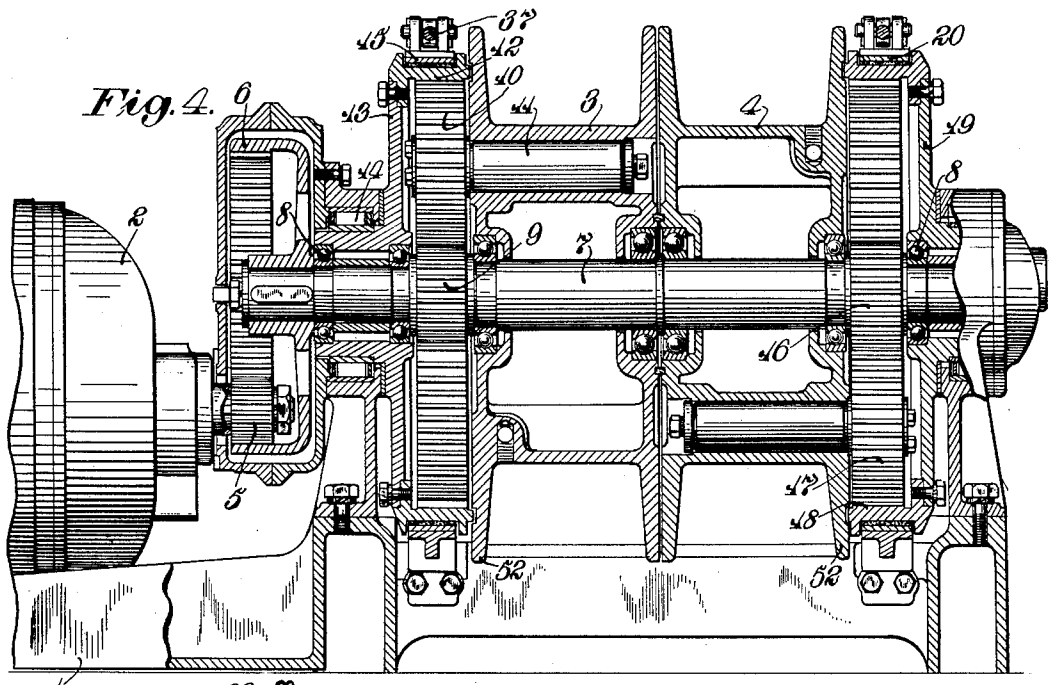


Fig. 5.

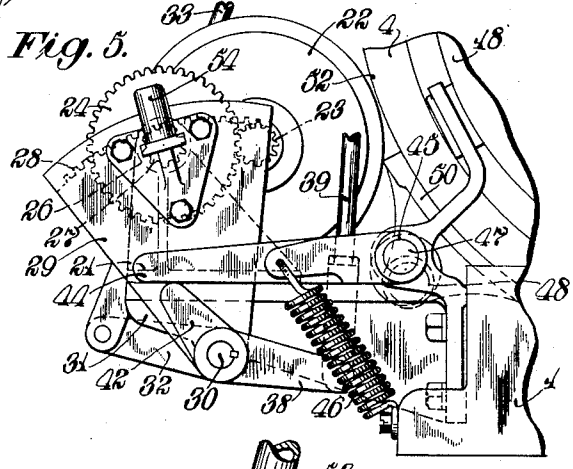


Fig. 6.

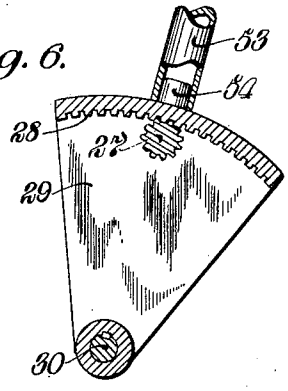


Fig. 8.

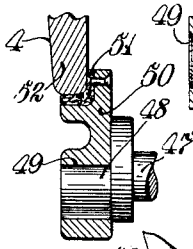


Fig. 9.

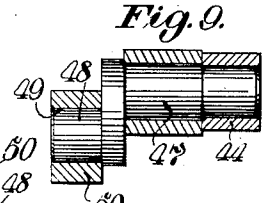
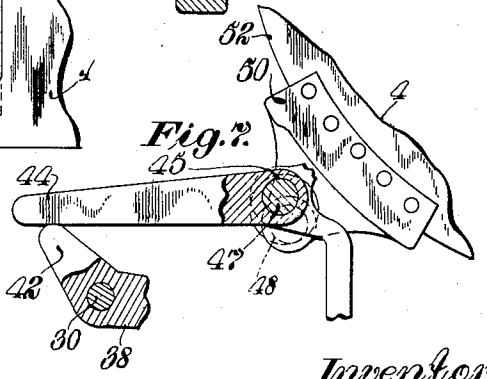


Fig. 7.



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UNITED STATES PATENT OFFICE

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HOISTING MECHANISM

Robert C. Osgood, Claremont, N. H., assignor to Sullivan Machinery Company, a corporation of Massachusetts

Application June 20, 1932, Serial No. 618,287

14 Claims. (Cl. 254—185)

This invention relates to hoisting mechanisms, and more particularly to improvements in the drum drive control and drum brake mechanism for a hoisting mechanism of the double drum type.

An object of this invention is to provide an improved hoist control mechanism. Another object is to provide an improved drive control mechanism for a hoist, and, more particularly, improved drum drive control mechanism for a hoist of the double drum type. A further object is to provide an improved drum drive control mechanism for a double drum hoist whereby when one drum is connected to its drive, the other drum is always disconnected from its drive. Another object is to provide, in a mechanism of the above character, an improved drum spinning brake whereby when a drum is disconnected from its drive, it is automatically braked, the brake being released whenever the drum is connected to its drive. A still further object is to provide an improved power operated means for effecting connection or disconnection of the hoisting drums to and from their respective driving means. Still another object is to provide an improved drum drive control mechanism wherein a torque motor is employed for actuating the drum drive control means, the torque motor being operatively connected to the drive control means through improved operating connections. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings, there is shown, for purposes of illustration, one form which the invention may assume in practice.

In these drawings,—

Fig. 1 is a plan view of a hoisting mechanism having associated therewith the illustrative embodiment of the improved drum drive control means.

Fig. 2 is an a side elevational view of the hoisting mechanism shown in Fig. 1.

Fig. 3 is an end elevational view of the improved hoisting mechanism.

Fig. 4 is a central, longitudinally extending vertical sectional view taken substantially on line 4—4 of Fig. 1 and illustrating the drum driving means.

Fig. 5 is a fragmentary view illustrating a drive of the improved drive control means.

Fig. 6 is a detail sectional view taken on line 6—6 of Fig. 2.

Fig. 7 is a detail view illustrating the improved operating means for the drum brake.

Fig. 8 is a detail sectional view taken through the drum brake and illustrating a portion of the brake operating means.

Fig. 9 is another detail section through a portion of the drum brake operating means.

In this illustrative embodiment of the invention, there is shown a double drum hoisting mechanism, herein, for illustrative purposes, of the same general type as that disclosed in my Patent No. 1,740,707, patented Dec. 24, 1929, and generally comprising a base 1, a driving motor 2, and relatively rotatable hoisting drums 3 and 4 driven by the motor. Now referring to the specific structure of the hoisting mechanism, it will be noted that fixed to the power shaft of the motor 2 is a motor pinion 5 meshing with an internal gear 6 fixed to one end of a main drum drive shaft 7. The shaft 7 is journaled at its opposite ends within suitable bearings 8, 8 carried within upstanding end brackets secured to the base 1. The drums 3 and 4 are journaled on the shaft 7 in the manner shown. Referring more particularly to the driving means for the drum 3, it will be observed that fixed to the shaft 7 is a pinion 9 meshing with a spur gear 10 journaled on a stud 11 secured within the drum. The gear 10 meshes with an internal gear 12 formed on a rotatable reaction member 13 journaled within suitable bearings 14 carried within the adjacent end bracket. Cooperating with the external surface of the reaction member 13 is a brake band 15. When the reaction member 13 is held against rotation, the drum drive gear 10 rolls around the internal gear 12 as a trackway, thereby effecting drive of the drum; and when the reaction member is released, the drum 3 remains idle. The drum 4 is driven through similar connections, including a pinion 16 secured to the shaft 7 and meshing with a drum drive gear 17, in turn meshing with an internal gear 18 carried by a rotatable reaction member 19. Rotation of the member 19 is controlled by a brake band 20.

Now referring to the improved drum drive control means, it will be noted that carried on a lateral support 21 suitably attached to the base 1, is a torque motor 22, herein preferably of the reversible electric type, although it is evident that motors of other suitable types may be employed. The power shaft of this motor has fixed thereto a spur pinion 23 meshing with a spur gear 24 fixed to a horizontal shaft 25 suitably journaled within a bracket 26 attached to the support 21. Fixed to the opposite end of the shaft 25 is a spur gear 27 meshing with the teeth

of a gear segment 28, herein formed on an arm 29 keyed to a horizontal operating shaft 30, herein arranged parallel with the torque motor shaft. The shaft 30 is suitably journaled within bearing brackets 31, 31 formed on the support 21. Now referring more particularly to the operating means for the brake band 15, it will be noted that fixed to one end of the shaft 30 is a crank or arm 32 pivotally connected to a link 33, in turn pivotally connected at 34 to a lever 35. This lever is pivotally connected at 36 to one end of the brake band, and is connected through a pivoted link connection 37 to the other end of the brake band 15. It will thus be seen that when the lever 35 is swung downwardly through the crank and link connection, the ends of the brake band are drawn together, thereby to effect application of the brake band; and when the lever 35 is swung upwardly, the brake band is released. The brake band 20 is operated through similar connections including a crank or arm 38 fixed to the other end of the shaft 30 and extending oppositely from the arm 32, and this arm is connected through a link 39 to a lever 40 similar to the lever 35, and similarly connected to the ends of the brake band 20. Due to the arrangement of the operating connections for the brake bands, one is always released when the other is applied.

Braking means is also employed for preventing undesirable spinning of the drums when the drums are disconnected from their driving means; and this braking means, in this instance, comprises cranks or arms 41 and 42 fixed to the opposite ends of the operating shaft 30 and herein formed integral with the arms 32 and 38, respectively; and these arms 41, 42 underlie and abut levers 43 and 44, respectively, pivotally mounted at 45 within suitable bearing brackets attached to the base. These levers are normally urged toward their downward or released position by means of coil springs 46. Each of the levers 43, 44, as shown in Fig. 7, is fixed to a shaft 47 suitably journaled within the bearing brackets and having formed thereon a crank 48 on which is pivotally mounted, at 49, a brake shoe 50. Each brake shoe carries suitable braking material 51 for engaging the adjacent drum flange 52 of each drum. It will thus be seen that when the lever is swung upwardly by the arm against the tension of the spring, the crank 48 is swung downwardly and outwardly, thereby effecting release of the brake shoe from the drum flange. When the arm is rotated to permit downward movement of the lever, under the tension of the spring, the crank 48 is swung inwardly, thereby to effect application of the brake. It will thus be seen that the drum drive control structure and the spinning brake structure for both drums are substantially identical, save that they are so arranged that rotation of shaft 30 in one direction causes drive of one drum and braking of the other, and reverse rotation of shaft 30 causes drive of the latter drum and braking of the former.

When the torque motor 22 is operated in one direction, for instance to effect drive of drum 4, the brake band 20 is applied, while the brake band 15 controlling the drum 3 is released; thereby effecting connection of the drum 4 to its drive while the drum 3 is disconnected from its drive. At this same time, the spinning brake controlling the drum 4 is released, while the spinning brake controlling the drum 3 is applied. The torque motor 22 rotates to effect application of the brake until the brake band 20 is fully applied, and then stops, the motor constantly urging and holding the brake band in fully applied position as long as power is supplied thereto. When the torque motor 22 is reversed, the drive control brake 15 for the drum 3 is applied, while the brake 20 controlling the drum 4 is released and the drum spinning brake is applied to the drum 4, while the spinning brake for the drum 3 is simultaneously released. The motor 22 is provided with any suitable form of controlling means whereby the direction of motor rotation may be controlled at will. If it is desired to operate the drum drive control means by manual power, this may be accomplished by connecting a suitable handle 53 to a projection 54 formed on the arm 29, thus enabling swinging of this arm manually back and forth, and thus through the connections above described, applying and releasing the brake bands of the drum drive control mechanism.

As a result of this invention, it will be noted that an improved drum drive control mechanism is provided for a hoist whereby the hoisting drums may be controlled in an improved manner. It will further be noted that by the provision of the improved control means, it is possible to effect alternative control of the drums and alternative braking of the drums, one drum always being released from its drive when the other drum is connected to its drive, and the disconnected drum always being braked. These and other advantages of the improved hoisting mechanism will be clearly apparent to those skilled in the art.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form is shown for purposes of illustration only and that the invention may be modified and embodied in various 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 hoisting mechanism, relatively rotatable hoisting drums, drum drive and control means including a rotatable member adapted to be held stationary to effect drum drive and a brake band for holding said member, and motor operated means for effecting alternative connection of the drums to their respective driving means and including a motor common to the control of both drums and means actuated by said motor for controlling said brake bands.

2. In a hoisting mechanism, relatively rotatable hoisting drums, drum drive and control means, and motor operated means distinct from said drum drive means for effecting alternative connection of the drums to their respective driving means and including a reversible torque motor arranged along one side of the drum with its axis parallel with the drum axes and parallel shaft connections actuated by said motor and connected to said control means.

3. In a hoisting mechanism, relatively rotatable hoisting drums and driving means therefor including a motor, and means for effecting alternative connection of the drums to their respective driving means including a motor and operative connections between said motor and the drive control means for each drum including an operating shaft arranged parallel with the drums and having connections at its opposite ends with the drum driving means.

4. In a hoisting mechanism, relatively rotatable hoisting drums, driving means therefor, drum braking means, and means for effecting alterna-

tive driving and braking of said drums including a motor common to both drums and operative connections between said drum control means and said braking means and said motor and having common operating connections for the braking means and the drum driving means.

5. In a hoisting mechanism, relatively rotatable drums, driving means therefor, braking means for said drums, and means including a motor common to both drums for effecting alternative driving and braking of said drum and including an operating shaft rotated by the motor shaft and means actuated by said operating shaft for applying the braking means and connecting said drums with said driving means.

6. In a hoisting mechanism, a drum, driving means therefor, braking means for said drum, and means including a reversible torque motor for effecting alternative driving and braking of said drum and operating connections actuated by said motor including a pinion, a swingable arm having a gear segment meshed with said pinion, and a shaft actuated by said arm and operatively connected to said braking means and said driving means.

7. In a hoisting mechanism, relatively rotatable hoisting drums, motor operated driving means for said drums including a rotatable member adapted to be held stationary to effect drum drive and a brake band for holding said member, and means for effecting alternative connection of said drums with said driving means including motor operated connections for actuating said brake bands including a motor common to both drums whereby when one drum is connected to its drive the other drum is disconnected from its drive.

8. In a hoisting mechanism, relatively rotatable hoisting drums, planetary drum driving means including a frictionally controlled reaction member for controlling drive of each drum, and motor operated means for effecting control of said reaction members whereby when one member is held stationary the other is free to rotate and vice versa.

9. In a hoisting mechanism, relatively rotatable hoisting drums, planetary drum driving means including a frictionally controlled reaction member for controlling drive of each drum, motor operated means for effecting control of said reaction members whereby when one member is held stationary, the other is free to rotate and vice versa, and means associated with said operating means to effect alternative braking of said drums, the drum released from its drive always being automatically braked.

10. In a hoisting mechanism, relatively rotatable hoisting drums, drum drive and control means including drum driving motor means, and motor operated means distinct from said drum drive means for effecting alternative connection of the drums to their respective driving means and including a reversible motor arranged along one side of the drums with its axis parallel with the drum axes and a parallel connection, the opposite ends of which are connected to the drum drive control means at the opposite ends of said motor, said motor rotatable in one direction to effect connection of one drum to its drive and in the opposite direction to effect connection of the other drum to its drive.

11. In a hoisting mechanism, relatively rotatable hoisting drums, frictionally controlled drum driving means including a frictionally controlled reaction member for controlling drive of each drum, and motor operated means for effecting control of said reaction members whereby when one member is held stationary the other is free to rotate and vice versa.

12. In a hoisting mechanism, relatively rotatable hoisting drums, frictionally controlled drum driving means including a frictionally controlled reaction member for controlling drive of each drum, motor operated means for effecting control of said reaction members whereby when one member is held stationary, the other is free to rotate and vice versa, and means associated with said operating means to effect alternative braking of said drum, the drum released from its drive always being automatically braked.

13. In a hoisting mechanism, relatively rotatable hoisting drums, drum driving means, clutches, one for each drum for connecting said drums in driving relation with said driving means, braking means for each drum, and motor operated means distinct from said drum driving means for automatically controlling the clutches for one drum for connecting the latter to said driving means and for operating the braking means for the other drum, the controlling means for said clutches and braking means including a common operating shaft arranged parallel with the drum axes and connected at its opposite ends to said clutches and braking means.

14. In a hoisting mechanism, relatively rotatable hoisting drums, drum driving means, clutches, one for each drum for connecting said drums in driving relation with said driving means, braking means for each drum, and motor operated means operative while said driving means continuously operates for automatically controlling the clutches for one drum for connecting the latter to said driving means and for operating the braking means for the other drum and including a control shaft connected at its ends to said clutches and braking means and a reversible torque motor for driving said shaft in either of opposite directions.

ROBERT C. OSGOOD.