Nov. 6, 1962 G. K. KACHINSKAS 3,062,344

POWER HOIST WITH MANUAL OPERATING DEVICE

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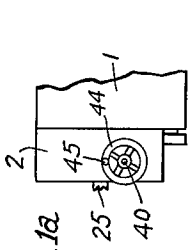


Fig-1a

Fig-2

Fig-1

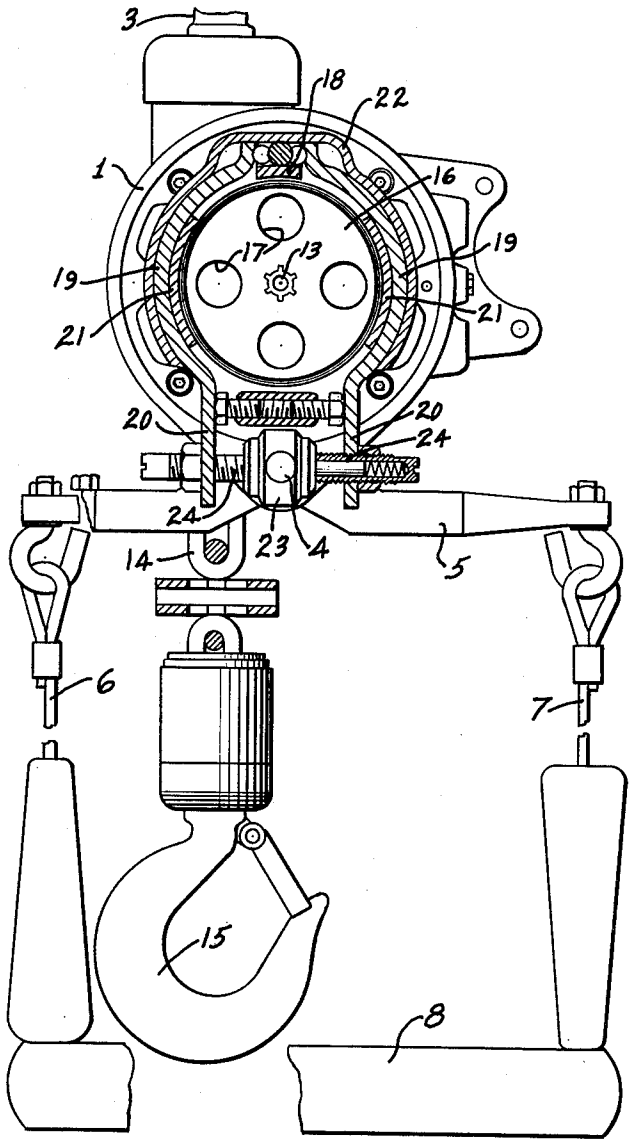
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Fig. 3



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FIG. 5

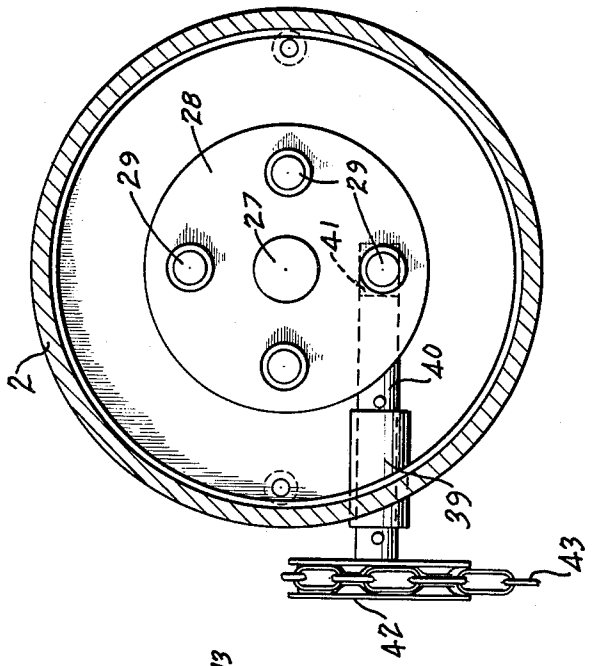
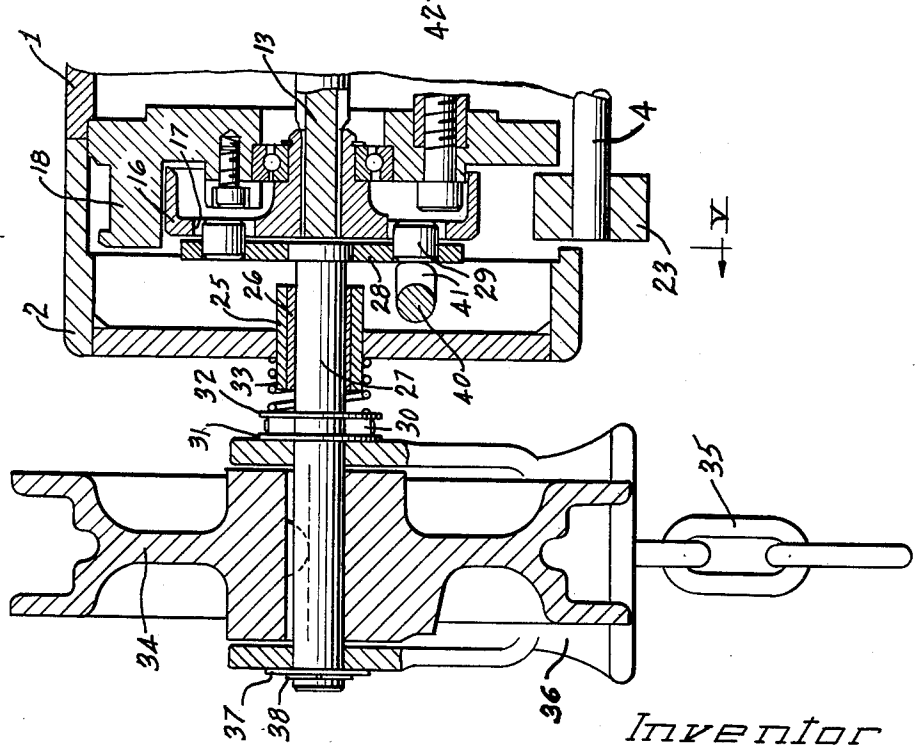


FIG. 4



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POWER HOIST WITH MANUAL OPERATING DEVICE

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7 Claims. (Cl. 192—3)

This invention relates to improvements in a power hoist with manual operating device, and more particularly to a hoist most frequently mounted in an overhead position to elevate and lower articles initially therebeneath; the hoist being operated by any suitable form of power including electricity, air, an internal combustion engine, etc., there being means provided to actuate the hoist manually in the event of power failure. A hoist of this character has numerous and various uses as will be apparent to one skilled in the art.

In the past, many and various types of suspended power hoists have been developed, either stationary or traveling by way of a trolley, and these hoists have been power actuated by electric motors, air motors, and internal combustion engines. Usually such hoists embody automatically locking braking means which are set immediately when power is cut off by manipulation of the control means. The hoists usually embody a control shaft actuated by a control lever from each end of which a pull rope or cord depends. Upon a pull by the operator upon either of the ropes, depending in which direction operation of the hoist is desired, the brake means are released and the hoisting mechanism connected with its power source. Obviously, in the event of power failure the only thing that might be accomplished is the lowering of a load already partially or fully elevated by manual release of the braking means, the hoist otherwise being inoperable. In no instance of which I am aware have previously developed power hoists been equipped with means for the manual actuation of the hoisting mechanism in the event of power failure. However, conditions of extreme emergency sometimes exist when a power failure occurs, and it may be extremely important that a load be moved by a hoist during that interval of power failure.

With the foregoing in mind, it is an important object of the instant invention to provide a power hoist having manual brake control, and which embodies manual means for actuating the hoist selectively engageable with the hoisting mechanism, whereby the hoist may be operated manually in the event of power failure.

Another object of the instant invention is the provision of manually operable means for actuating a power hoist in the event of power failure, which means may be selectively coupled to the drive shaft of the hoist.

Also a feature of the instant invention is the provision of a power hoist with means for manually operating that hoist in the event of power failure, such means including clutch elements between the manually operable means and the drive shaft of the hoist, such clutch elements being selectively and easily engageable and locked in engaged position.

Still another object of the instant invention resides in the provision of manual means associated with a power hoist for operating the hoist upon power failure, which means include a clutching element for engagement with the brake drum of the hoist, resilient means normally urging the clutch means into disengaged position, and means for selectively locking the clutch means in engaged position in opposition to the resilient means.

It is a further object of the instant invention to provide manually operable means for driving a power hoist in the event of power failure, which means are embodied in a simple form of construction attachable to the frame or

casing of the power hoist, and which may be associated with the power hoist without change in the character or structure of the normal hoisting mechanism.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, other will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which

FIGURE 1 is a fragmentary elevational view of a power hoist incorporating means for manually actuating the same, the structure embodying principles of the instant invention;

FIGURE 1*a* is a fragmentary elevational view of the lower left hand portion of FIGURE 1 showing another actuating means;

FIGURE 2 is an enlarged view of the structure of FIG. 1, with parts broken away, and parts shown in section;

FIGURE 3 is a fragmentary transverse vertical sectional view taken substantially as indicated by the line III—III of FIG. 2, looking in the direction of the arrows, and showing certain parts in elevation;

FIGURE 4 is a fragmentary vertical sectional view, enlarged, of the structure shown in the lefthand portion of FIG. 2; and

FIGURE 5 is a fragmentary vertical sectional view taken substantially as indicated by the line V—V of FIG. 4.

As shown on the drawings:

As stated above, the instant invention may be embodied in substantially any kind of power driven hoist, as long as the hoist brake is under manual control. The invention may be incorporated in a hoist driven by an electric motor, a hoist driven by a gasoline or internal combustion engine, but by way of example for illustrative purposes, and not by way of limitation, the instant invention is shown embodied in a hoist driven by an air motor.

The illustrated embodiment of the instant invention includes a hoist having a frame or casing **1** with an end closure **2** thereon. Secured to the top of the casing **1** is a supporting hook **3** by means of which the entire hoist may be suspended from a trolley, or other suitable traveling or stationary support. Interiorly of the casing **1** is a known form of air motor, hoisting mechanism, and brake control means. The hoist motor is started or stopped, and the braking means released or permitted to return to braking position by the manual actuation of a control shaft **4** which extends lengthwise of the casing **1**. This shaft may be oscillated in either direction depending upon which way the hoist is desired to operate by means of a control lever **5** secured intermediately to the shaft **4** and from the ends of which lever pull cords or ropes **6** and **7** depend, these pull cords being connected at their bottom ends by a cross handle **8**. When the handle **8** is inclined in one direction, the hoist will elevate a load, when the handle is inclined in the opposite direction, the hoist will lower a load, and when the handle is horizontal the hoist motor is stopped and the braking means permitted to automatically resist movement of the hoist.

Pivotal movement of the shaft **4** by the control handle **8** causes a like movement of a sector gear **9** at the motor end of the casing **1** which in turn rotates a drive or switch gear **10** which actuates a suitable air valve element **11** admitting air to the air motor. A suitable source of compressed air man be connected to the intake pipe **12**. Actuation of the motor causes rotation of the hoist drive shaft **13** around which is a suitable pulley wheel or sproket for a load chain **14**, on the lower end of which is a load hook **15**, certain of these parts not being shown in the drawings, but all being known in the art.

With reference now to FIG. 3 in particular, it will be seen that the braking mechanism for the hoist em-

bodies a brake drum 16 splined or equivalently secured to the drive shaft 13 of the hoist. This drum is provided with a plurality of apertures 17 therein, in the illustrated instance there being four, but that particular number is not essential. Adjacent the brake drum 16 is a fixed supporting plate 18 in the casing, and held by this plate is a pair of pivotal opposed brake shoes 19—19 each of which has an extension 20 on the lower end thereof. Each brake shoe is provided with a suitable brake lining 21, and a generally U-shaped brake spring 22 has arms bearing against the shoes 19—19 and urging them into tight engagement with the brake drum to hold the shaft 13 against rotation. The braking means are thus automatically effective each time the control shaft 4 is in neutral position. When the control shaft 4 is moved in either direction, a cam 23 carried on the end of the shaft between confronting portions of a pair of stub shafts 24—24 threadedly engaged in the projections 20—20 on the brake shoes spreads the brake shoes apart so that there is no restraint on the rotation of the brake drum and shaft 13. Obviously, the amount of release can be controlled by the amount of turn of the control shaft 4, a 90° turn fully releasing the braking means.

The means by which the hoist may be manually operated in the event of power failure are best seen in FIGS. 2, 4 and 5. The showing in FIG. 2 shows the manual drive disengaged, while the showing in FIG. 4 shows the manual drive engaged to operate the drive shaft of the hoist. These means embody a sleeve or bearing boss 25 fixed in the end of the closure 2 and a bearing bushing 26 inside the element 25 operates against the shaft 27 extending through it, which shaft may both rotate and reciprocate within the bushing 26. On the inner end of the shaft 27 and secured thereto is a clutch disc 28 having a plurality of pins 29 projecting laterally therefrom, these pins being the same in number as the holes 17 in the brake drum 16 and disposed complementally to those holes. When the shaft 27 is operatively connected to the drive shaft 13 of the hoist, the pins 29 extend within the holes 17 of the brake drum as seen in FIG. 4. Thus, the brake drum functions as the other clutch member.

Exteriorly of the end closure 2 a pin 30 extends diametrally through the shaft 27 and a washer 31 is disposed on the outer side of the pin while a washer 32 is disposed on the inner side. Between the washer 32 and the end wall of the cover 2 is a coil spring 33 which normally urges the shaft 27 outwardly so that the clutch means are disengaged. On the outer portion of the shaft 27 a pulley wheel or chain sprocket 34 is keyed to the shaft to accommodate a hand drive chain 35. Also secured around the shaft is a suitable chain guide 36 held in place against the washer 31 by an outer washer 37, there being a retaining ring 38 engaged with the outer end of the shaft.

Means are provided to cause selective engagement of the clutch means, and in this instance the means are of simple form and embody a bearing sleeve 39 secured in the side wall of the end closure 2 through which a shaft 40 extends, this shaft carrying a cam 41 on its inner end. On the outer end thereof the shaft carries a chain wheel 42 for a hand chain 43 by means of which the shaft 40 may be rotated to move the cam into set or released positions. As seen in FIGURE 2, the cam 41 does not engage the clutch disc 28, and the spring 33 has moved the shaft end the clutch disc outwardly into disengaged position, the pins 29 being totally without the apertures 17 in the brake drum. In this position, the hoist is power operated. In the event of power failure, the cam shaft 40 may be turned 90° to the position seen in FIG. 4, to thereby force the cam disc 28 inwardly so the pins do engage in the apertures 17 of the brake drum, and the mechanism is set for hand operation of the hoist. It will be noted that the cam effectively locks the clutching mechanism in engaged position against accidental slippage, and it will remain so engaged until the cam shaft 40 is rotated in the opposite direction to the position of FIG. 2.

In operation, the instant invention is extremely simple and positive. With the mechanism in the position seen in FIG. 2, the hoist is under power operation. In the event of power failure, when it is desired to operate the hoist by hand, it is only necessary to actuate the hand chain 43, turning the cam shaft and cam 41 clockwise as viewed in FIG. 2, to cause the pins or projections 29 on the clutch disc 28 to enter the apertures 17 in the brake drum and assume the position seen in FIG. 4. In the event the pins 29 do not exactly meet the apertures in the brake drum, a slight turning of the shaft 27 by means of the hand chain 35 will bring the pins into register with the holes and permit the 90° turn of the cam. It will be understood, of course, that should the hoist be mounted on the upper deck of a ship for handling loads in the hold of the ship, where there are men available on the upper deck at the same level as the hoist, a hand wheel 44 having a crank 45 projecting therefrom, FIGURE 1*a*, might be substituted for the chain wheel 42 and hand chain 43 to control the cam.

To raise or lower the hoist load hook 15 in an unloaded condition, the control handle 8 is moved so that either of the pull cords 6 or 7 is held in pulled position to release the hoist braking means by way of the control shaft 4. The brake is thus maintained open or in released position while the hand chain 35 is manipulated in the desired direction to either raise or lower the hook.

To raise the hook 15 while loaded, it is necessary to effect an alternate movement of the control handle 8 and the hand chain 35. The hand chain 35 must be initially held to prevent the load from slipping or falling, and then by way of the handle 8 the brake is released. The hand chain can then be pulled in the direction to elevate the load, and after each pull of the hand chain the handle 8 must be released to set the brake. Then a new hold is taken on the hand chain, the brake released and another pull effected. This alternative movement of the handle 8 and the hand chain 35 insures a safe elevation of the load.

To lower the hook 15 while loaded merely requires pulling the hand chain 35 in the lowering direction. The load on the hoist aids in the lowering operation, and this work is done while the brake is engaged.

To reset the mechanism for power operation, it is simply necessary to turn the cam shaft 40 90° to release the cam, and the spring 33 effects automatic separation of the clutch disc and brake drum.

From the foregoing, it is apparent that I have provided an extremely simple arrangement embodied in a power hoist for hand operation of that hoist in the event of power failure. The structure is an extremely economical addition to the normal hoist structure, and it is unnecessary to alter the structure of the power hoist mechanism itself, except to provide apertures in the brake drum and utilize a different end cap on the hoist frame or casing.

It will be understood that modification and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In combination, a power driven hoist having a drive shaft, manually operable means carried by the casing of said hoist and selectively connectable to actuate the hoist drive shaft in the event of power failure, said means including a clutch, resilient means normally urging said clutch to disengaged position, and manually actuated cam means to cause engagement of said clutch and lock the clutch engaged against the action of said resilient means until manually released.

2. In a power hoist having a casing with a drive shaft and hoisting mechanism therein, an auxiliary shaft in the end of the casing opposite the drive shaft, a pulley wheel keyed on said auxiliary shaft, a hand chain to rotate said pulley wheel, clutch means between the hoist drive shaft and said auxiliary shaft, resilient means normally urging said clutch means into disengaged position, and manually operable means to selectively engage said clutch means and lock the same engaged against the action of said resilient means until manually released to permit manual actuation of the hoist in the event of power failure.

3. In a power hoist having a casing with a drive shaft and hoisting mechanism therein, an auxiliary shaft carried by the hoist casing, a pulley wheel on said auxiliary shaft, a hand chain to operate said pulley wheel, clutch means carried in part by said auxiliary shaft and in part by the hoist drive shaft, resilient means urging said clutch means into disengaged relationship, and manually controlled cam means to lock said clutch means in engaged relationship against the action of said resilient means.

4. In a combination, a power hoist having a drive shaft, power means for operating the drive shaft, a manually operable control shaft for controlling the actuation of the power means, a brake drum on the drive shaft, braking means for acting on the drum to brake the drive shaft, said braking means being releasable from acting on said drum by said control shaft, and a manual hoisting assembly selectively engageable with the brake drum to actuate the hoist drive shaft in the event of failure of said power means.

5. In a power hoist having a drive shaft, power means for operating the drive shaft, a control shaft for controlling the actuation of said power means, a brake drum on the drive shaft, braking means normally engaging said drum but releasable by said control shaft, a reciprocatory shaft mounted in the casing of the hoist, a pulley wheel on said reciprocatory shaft, a hand chain to actuate said pulley wheel, clutch driving means on said reciprocatory shaft to engage said brake drum, resilient means normally urging said reciprocatory shaft away from said brake drum, and manually operable cam means to move said reciprocatory shaft against the action of said resilient means to engage said clutch driving means with said brake drum.

6. In a power hoist having a casing and a drive shaft therein with a brake drum thereon having a plurality of apertures therein, a reciprocable shaft extending into the casing of said hoist, manually operable means on said reciprocable shaft to rotate the same, resilient means normally urging said reciprocable shaft away from said brake drum, a disc clutch driving member on the end of said reciprocable shaft carrying projections to enter the apertures in the brake drum, and manually operable means to move said clutch driving members into engagement with the brake drum against the action of said resilient means.

7. In a power hoist, a casing, power drive means in one end of said casing, hoisting means including a shaft in said casing, brake means at the other end of said casing including a brake member on the end of said shaft, a reciprocable shaft extending through the other end of the casing in alignment with hoisting means shaft, a pulley wheel on said reciprocable shaft to operate the same, means to actuate said pulley wheel, clutch means on the inner end of said reciprocable shaft to drivingly engage said brake member, resilient means normally urging said clutch means away from said brake member, and hand actuated means to move said clutch means into engagement with said brake member against the action of said resilient means and lock such engagement until the same is manually released.

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