United States Patent

[11] 3,633,961

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[21] Appl. No. **88,731**
[22] Filed **Nov. 12, 1970**
[45] Patented **Jan. 11, 1972**

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[54] POWERED CRANE HOOK DISCONNECT AND OVERLOAD DEVICE

6 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **294/82**
[51] **Int. Cl.** **B66c 1/36**
[50] **Field of Search** 294/82

[56] **References Cited**

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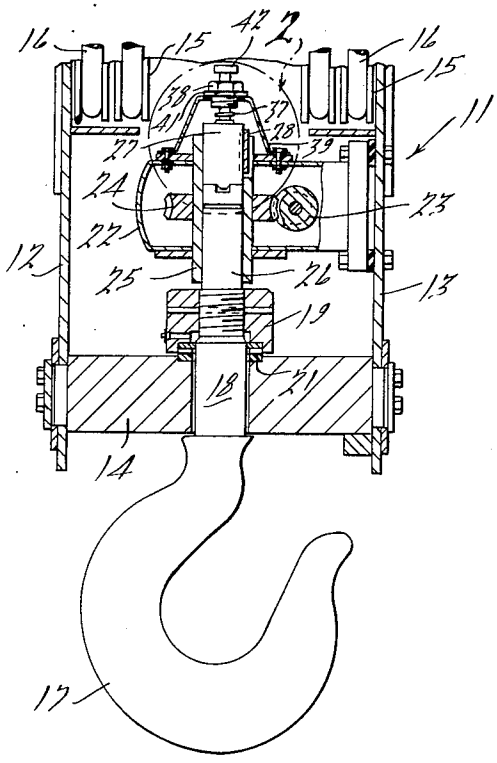
ABSTRACT: A crane hook having power-operated rotating means comprising a tapered radial key connection which drives the hook shank. Should the hook encounter resistance to turning, a plunger carrying the upper element of the key connection will rise, permitting disengagement of the drive and hook. Continued rotation of the plunger will cause reengagement of the key connection, with disengagement again occurring if the overload conditions still exist. A spring is provided for adjusting the resistance of the key connection to disengagement.



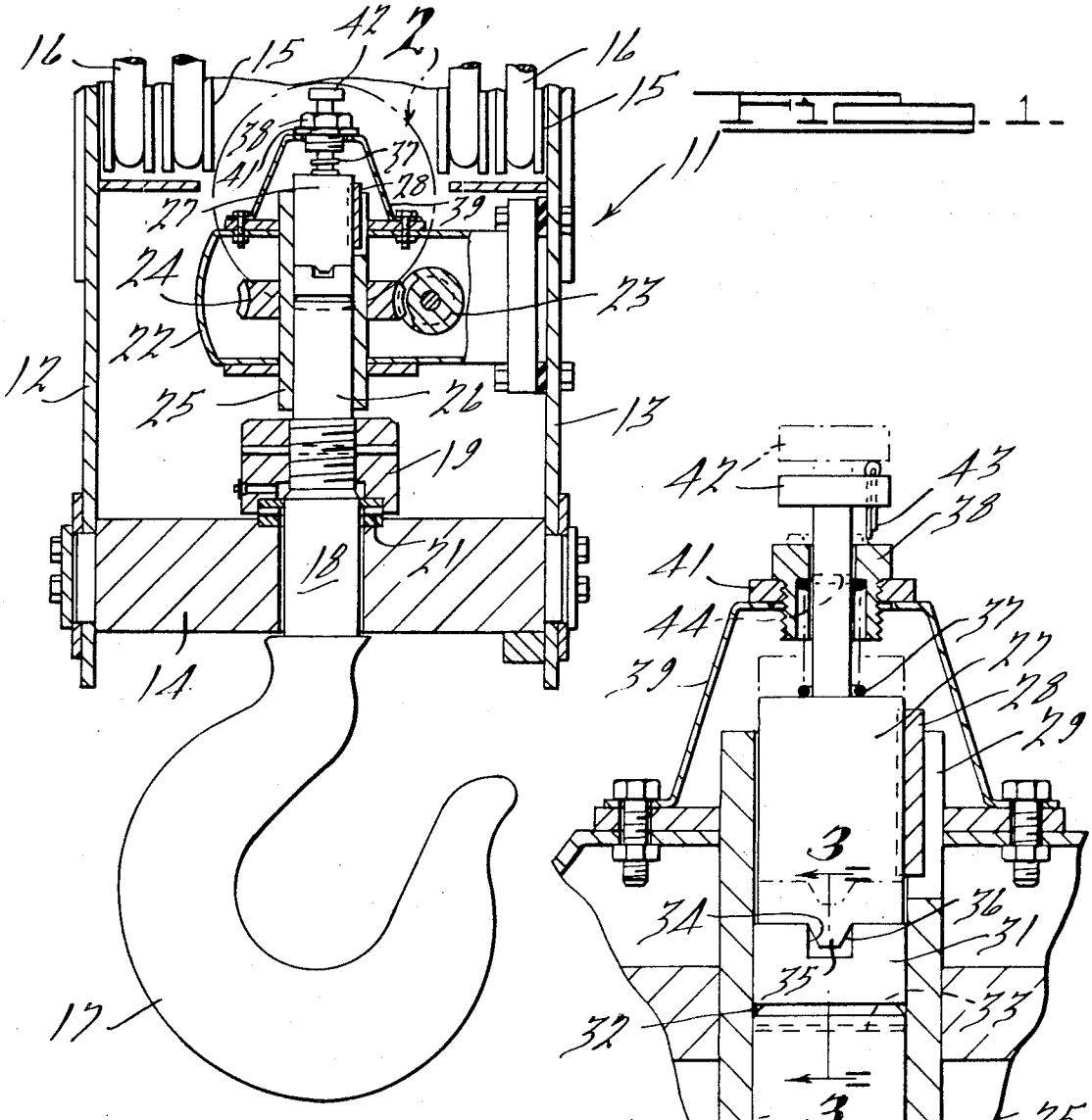


FIG. 1

FIG. 2

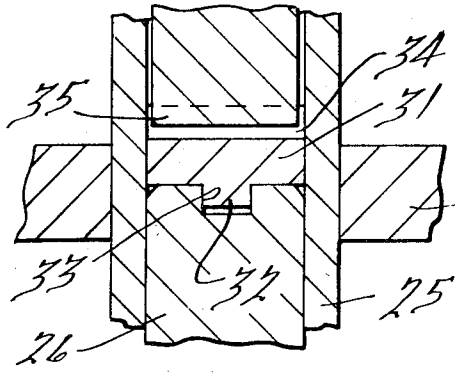


FIG. 3

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POWERED CRANE HOOK DISCONNECT AND OVERLOAD DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to crane hooks, and more particularly to devices in which the hook is rotated by power for proper load orientation, for example when loading or unloading the hull of a ship. Devices of this type are intended to eliminate the need for manual rotation of the load during raising or lowering. However, should the load encounter an obstruction during rotation, means must be provided for permitting the drive motor to continue operation until the overload is removed. A disconnect device to permit manual load rotation is also a desirable feature of such units.

2. Description of the Prior Art

Existing methods of providing disconnect and automatic overload protection during hook rotation utilize clutches and other torque limited slip couplings. These have the disadvantages of heavy weight and bulkiness, large numbers of parts which increase the cost, and the frequent need for maintenance and repair. They are also difficult to adapt to standard hoist reevings and require sophisticated electronic controls.

BRIEF SUMMARY OF THE INVENTION

According to the invention, the disadvantages of these previously known devices are avoided and a simplified apparatus is provided which automatically disconnects the hook from the drive and protects it against overloading. The device affords complete protection of all its drive components and greatly reduces the cost of construction of such a unit. It comprises a hollow shaft which drives the crane hook shank through a coaxial plunger having a tapered radial key connection with the shank. Should the hook encounter turning resistance, the plunger will rise as the key connection becomes disengaged, the shaft continuing to be rotated by the power source.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view in cross section showing the novel device;

FIG. 2 is an enlarged fragmentary elevational view taken in the area marked 2 of FIG. 1; and

FIG. 3 is an enlarged cross-sectional view in elevation taken along the line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A bottom block assembly for a crane is generally indicated at 11 in FIG. 1 and comprises a pair of sideplates 12 and 13, a crosshead 14 at the lower end of the sideplates and shaft-supported sheaves 15 at their upper ends, the head being supported by cables 16. A crane hook 17 is supported by crosshead 14, the hook having a shank 18 extending upwardly through the crosshead. A nut 19 is threadably mounted on shank 18 and rests on a bearing 21 supported by the crosshead.

An encased electric motor 22, or gear reducer driven by an electric motor, is secured to sideplate 13 and carries a worm gear 23 meshing with a worm wheel 24 on a hollow shaft 25. This shaft is mounted on an extension 26 of shank 18 and extends thereabove. A plunger 27 is slidably mounted in the upper portion of shaft 25 and has an axially extending key 28 disposed within a keyway 29 in shaft 25. An insert 31 is disposed between the upper end of shank extension 26 and the lower end of plunger 27. The lower end of insert 31 carries a radial key 32 disposed in a keyway 33 at the upper end of shank extension 26. The upper end of insert 31 has a keyway 34 within which is disposed a radial key 35 carried by the lower end of plunger 27. This key has tapered sidewalls 36 so that key 35 will ride out of keyway 34 should plunger 27 be rotatably driven with a predetermined torque while insert 31 is held against rotation.

Means are provided for adjusting the amount of torque necessary to force key 35 out of keyway 34. This means comprises a helical coil compression spring 37 the lower end of which engages plunger 27 while the upper end is held by a bushing 38. This bushing is supported by a cover 39 secured to the top of motor 22. Bushing 38 is threaded in a nut 41 secured to the top of housing 39, and the compression of spring 37 may be varied by adjusting the height of bushing 38 in the nut.

A handle 42 extends upwardly from plunger 27 through spring 37 and bushing 38. This handle is for the purpose of manually disconnecting the drive when desired so that hook 17 may be rotated at will. A cotter pin 43 is provided which, when inserted in a radial hole 44 of handle 42 after it has been raised, will hold the handle in its lifted position. In this position, plunger 27 will assume the dot-dash line position of FIG. 2.

In operation, the parts will normally be as in their position shown in FIGS. 1 to 3. Rotation of worm gear 23 by motor 22 will cause worm wheel 24 and hollow shaft 25 to rotate. This will rotate plunger 27 through key 28. The plunger will rotate insert 31 through key 35, the insert causing shank extension 26 to rotate by means of straight-sided key 32.

Should the load carried by hook 17 encounter an obstruction, further rotation of insert 31 will be prevented. Continued driving of plunger 27 will therefore cause the sloping sidewalls 36 of key 35 to ride upwardly out of straight-sided keyway 34 against the urging of spring 37. Plunger 27 will thus continue to rotate along with hollow shaft 25 while insert 31 and hook 17 remain stationary. After 180° of rotation, key 35 will again drop into keyway 34 and if the overload conditions still exist, disengagement will again occur. After the obstruction is removed, hook 17 will continue to be rotated as previously.

What is claimed is:

1. In a power-rotated crane hook assembly, a crane hook having an upwardly extending shank, a hollow shaft surrounding said shank and extending upwardly therefrom, power means rotatably driving said hollow shaft, a plunger within the upper portion of said hollow shaft and keyed thereto so as to permit axial plunger movement, and means connecting the lower end of said plunger and the upper end of said shank including interfitting radial key and keyway elements, the sidewalls of one of said elements being straight and the sidewalls of the other said element being sloped whereby continued rotation of said hollow shaft after a load supported by said hook encounters an obstruction will cause said plunger to rise and the key and keyway elements to become disengaged.

2. The combination according to claim 1, said means further comprising an insert between said shank and plunger, the lower portion of said insert having a straight-sided radial key and keyway connection with the shank, said first-mentioned key and keyway elements connecting said plunger and insert.

3. The combination according to claim 1, said key element being formed on said plunger and having said sloping sides.

4. The combination according to claim 1, further provided with an adjustable spring engaging the upper portion of said plunger and urging said key and keyway elements together, whereby the torque necessary to disengage the key and keyway elements can be preselected.

5. The combination according to claim 1, said means interconnecting the plunger and shank further comprising an insert therebetween, the lower portion of said insert having a straight-sided key and keyway connection with the shank, said first-mentioned keyway element being straight-sided and formed at the upper end of said insert.

6. A bottom block assembly for a crane hook comprising a pair of sideplates, a crosshead, a crane hook having a shank extending upwardly through said crosshead and rotatably supported thereby, an upright extension on said shank, a motor secured to one of the said sideplates, a hollow shaft on said shank extension and extending upwardly through said motor, a driving connection between said motor and hollow shaft, a

plunger in the upper portion of said hollow shaft and having an axial key connection therewith, an insert between said plunger and shank extension, a straight-sided radial key connection between said insert and shank extension, the connection between said plunger and insert comprising key and keyway elements at least one of which has sloping sides, whereby continued rotation of said hollow shaft after the load supported by said hook has encountered an obstruction will cause said plunger to ride up on said insert to thereby disconnect the drive from the hook.

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