# United States Patent [19]

**Vavilov et al.**

[11] **3,850,411**

[45] **Nov. 26, 1974**


[54] **HOISTING WINCH**


[76] Inventors: **Felix Fedorovich Vavilov,** ulitsa Demonstratsy 75, kv. 38, Tula; **Jury Leonidovich Leonov,** ulitsa Zhurkovskogo 1, kv. 10; **Alexei Maximovich Sedov,** ulitsa Entuziastov 1, kv. 1, both of Khabarovsk; **Dmitry Stepanovich Kamsky,** ulitsa Mira, 25, kv. 19, Navoi, all of U.S.S.R.



[22] Filed: **June 1, 1973**

[21] Appl. No.: **366,214**

[52] **U.S. Cl.** ..... **254/186 R,** 254/187 R

[51] **Int. Cl.** ..... **B66d 1/24**

[58] **Field of Search** ..... 254/175.7, 186 R, 186 HC, 254/187 R



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,273,747 | 7/1918 | Davidoff | 254/186 HC |
| 3,390,785 | 7/1968 | Lado et al. | 254/186 RX |
| 3,477,695 | 11/1969 | Noly | 254/187 X |



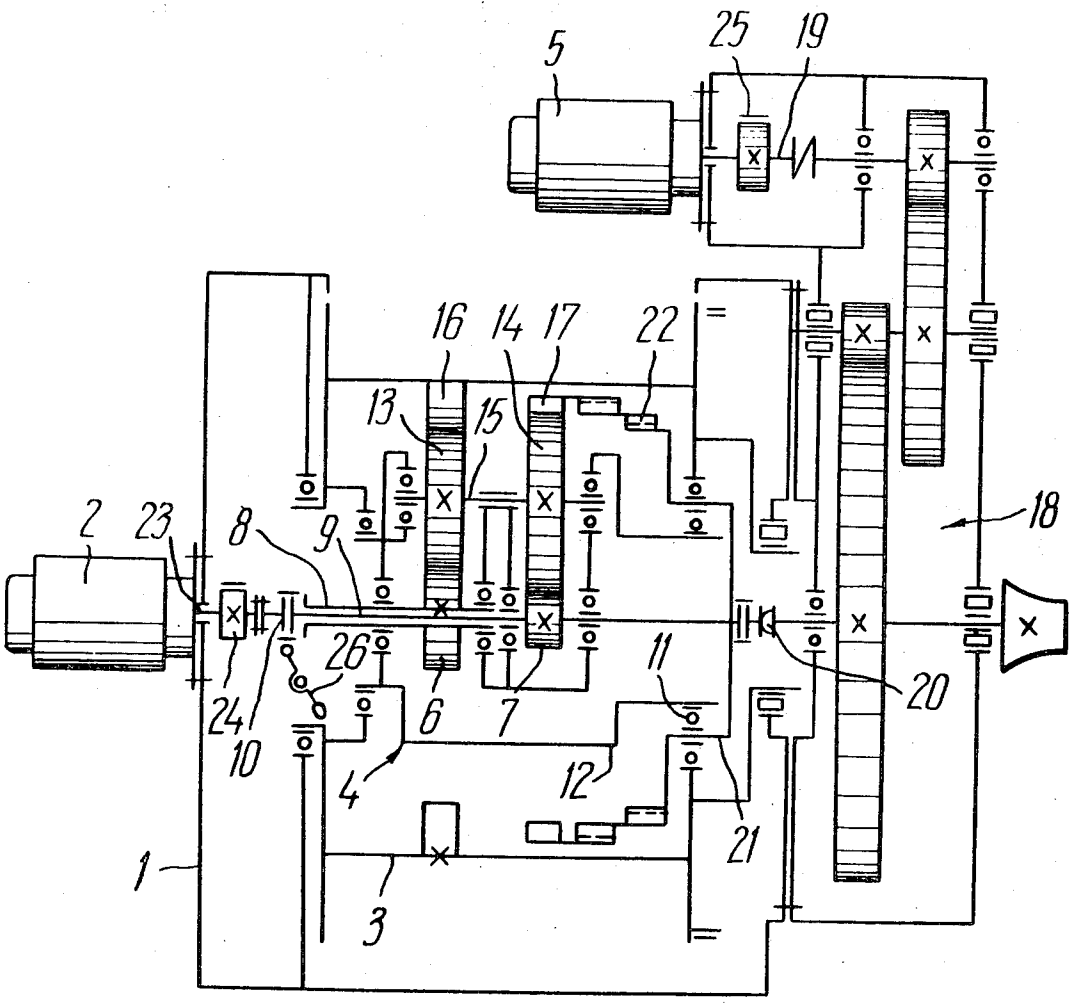
*Primary Examiner*—Stanley H. Tollberg
*Assistant Examiner*—John P. Shannon
*Attorney, Agent, or Firm*—Eric H. Waters

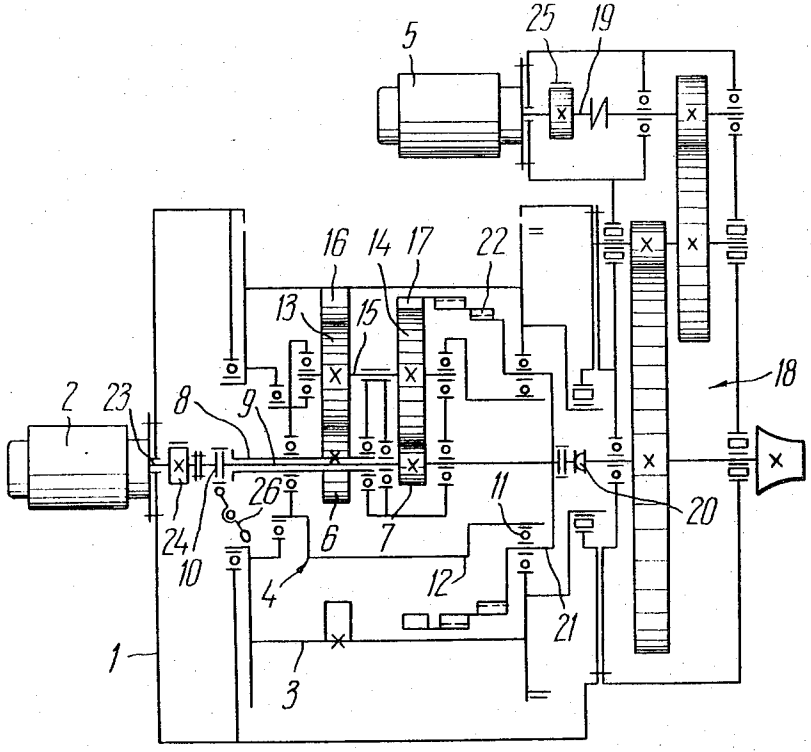


[57] **ABSTRACT**

The hoisting winch has a winding drum with a planetary gear built into the latter, the sun wheels of said planetary gear being alternatively connected to a drive via a clutch coupling, and respective epicycles, one of which being connected to the drum and the other kinematically coupled with an additional drive for a short-time increase in the speed of the drum rotation for cargo's speedy lift-off from ship deck.


**1 Claim, 1 Drawing Figure**




5
25
19
16
14
17
22
13
15
18
2
23
8
9
26
11
20
24
10
6
7
4
12
21
1
3

# HOISTING WINCH

The present invention relates to hoisting machinery and mechanisms and more particularly to multispeed winches.

A hoisting winch embodied according to the invention is most expedient to be used for hoisting operations on vessels, specifically, of fishing fleet in conditions of rough sea.

Known in the art are winches comprising a frame mounted on which are a drive and a drum with a planetary gear built into it.

The planetary gear comprises two coaxial sun wheels of different diameters, whose shafts are alternatively connected with the drive via a clutch coupling. A carrier set freely in the drum rotating in bearings supports planet pinions interconnected in pairs, said pinions being in constant mesh with sun wheels. Said planetary gear has two epicycles of different diameters, which are respectively engaged with the planet pinions. One of the epicycles is connected to the drum, the other to the winch frame (cf. FRG US. Pat. No. 1 531 310, cl. 35c, 1/24, and U.S. Pat. No. 3 460 807, cl. 254–185).

The abovementioned known winches cannot be applied for transferring a cargo from one ship to another at rough sea, as the get-away speed of the cargo from ship deck is not sufficient for preventing the cargo's impact against the deck or its superstructure during lift-off and subsequent hoisting, which is, in its turn, not safe for personnel.

It is an object of the present invention to provide a hoisting winch for transferring cargoes from one ship to another in conditions of rough sea, as would ensure a short-time increase in the speed of cargo's lift-off from the deck to a height sufficient to prevent its impact against the deck or superstructure.

Another object of the present invention is to raise safety for personnel during cargo transfer operations.

According to these and other objects, a hoisting winch is proposed, wherein a planetary gear built into a rope-winding drum has a carrier freely set in said drum and supporting planet pinions interconnected in pairs, said planet pinions being in constant mesh, on the one side, with coaxial sun wheels of different diameters, alternatively connected with a drive via a clutch coupling, and, on the other side, with epicycles of different diameters, one of which is connected to the drum for its rotation, and, according to the invention, said hoisting winch has an additional drive kinematically coupled, for increasing the speed of rotation of said drum, with the other epicycle freely moving (floating) under load within the rotation plane.

The primary object of the invention was to provide a hoisting winch as would permit an additional, short-time increase in the speed of the drum rotation.

This object has been accomplished by provision that in a hoisting winch, wherein a planetary gear built into a rope-winding drum has a carrier freely set in said drum and supporting planet pinions interconnected in pairs, said planet pinions being in constant mesh, on the one side, with coaxial sun wheels of different diameters, alternatively connected with a drive via a clutch coupling, and, on the other side, with epicycles of different diameters, one of which is connected to the drum for its rotation, according to the invention, there is an additional drive kinematically coupled, for increasing the speed of said drum rotation, with the other epicycle freely moving (floating) under load within the rotation plane.



Provision of a hoisting winch embodied according to the present invention on sea-going vessels permits the reloading of cargoes, both in raid and high sea, in conditions of rough sea without calling at port, which is essentially advantageous to cargo ships and fishing vessels because of shorter durations of cruises and higher operating efficiency.

When used on fishing vessels, the proposed hoisting winch helps reduce idle time during loading and reloading operations when transferring the catch or fish produce from one vessel to another, as these operations can now be carried out despite swell of sea; besides, the proposed winch ensures intactness of cargoes being reloaded and safety for personnel.

Follows the description of an exemplary embodiment of the invention, reference being had to an appended drawing which shows the functional diagram of the winch, according to the invention.

The hoisting winch has a frame **1** arranged on which is a drive **2** serving as the primary drive for said winch and being an electric motor. Same frame mounts a winding drum **3** with a planetary differential gear **4** built into said drum and an additional drive **5** fashioned as an electric motor.

The planetary gear **4** comprises two sun wheels **6** and **7** of different diameters. Said sun wheels are coaxial and secured respectively on shafts **8** and **9** connected, via a clutch coupling **10**, to the drive **2**. Said coupling permits alternative engagement of the wheels **6** or **7** depending on the weight of a cargo being hoisted.

The drum **3** accomodates a carrier **12** freely rotating in bearings **11** and supporting planet pinions **13** and **14** interconnected in pairs by means of a shaft **15**.

Said planet pinions **13** and **14** are respectively in constant mesh with the sun wheels **6** and **7**. Besides, the former are in mesh with coaxial epicycles **16** and **17** different diameters. The epicycle **16** is connected to the drum **3** for the rotation of the latter, while the epicycle **17** is made floating, i.e., it may move within the plane of rotation under the action of forces developing when the epicycle **17** engages the planet pinions **14**. This epicycle is kinematically coupled with the additional drive **5** intended for a short-time increase, in the speed of rotation of the drum **3**.

The kinematic coupling is made up of a reducing gear **18** connected to the shaft **19** of the drive **5** from one side and to a nave **21** via a coupling **20** from the other side, said nave **21** being linked with the epicycle **17** via a double-joint coupling **22**.

Borne by the shaft **23** of the drive **2** and by the shaft **19** of the drive **5** are the pulleys of brakes **24** and **25**.

The hoisting winch is made operative in the following way:

First, by means of a lever **26**, the clutch coupling **10** is displaced so as to connect the shaft **8** or **9** to the shaft **23** of the drive **2** to transmit rotation to the sun wheels **6** or **7** respectively. For hoisting a minor load, the wheel **6** should be engaged and for hoisting a major one, the wheel **7**. After that, the main drive is engaged.

Meantime, the additional drive **5** is arrested by means of the drive **25**, and the epicycle **17** is naturally immovable.

From the sun wheel **6** (**7**), rotation is imparted on to the planet pinions **13** and **14.** Resting against the immovable epicycles **17,** the pinion **14** transmits rotation to the epicycle **16** and the drive **3.** Thus, the drum **3** is rotated from the main drive **2.**

In case a speedy lift-off of a cargo is required, the additional drive **5** should be engaged after eliminating the rope sagging and slacking, having released the pulley of the brake **25** at the same time. From the shaft **19,** the rotation is transmitted on to the epicycle **17** via the reducing gear **18,** coupling **20,** nave **21,** and coupling **22.** As a result, the drum **3** acquires an additional speed of rotation. If properly directed, the rotation of the main **2** and additional **5** drives results in the summation of the drum rotation speeds developed owing to said drives.

Engagement of the additional drive **5** is effected at the moment of the cargo lift-off for a limited period of time necessary for speedy hoisting of the cargo to a height making impossible its impact against the deck in case of rolling at rough sea. After that, the additional drive is disengaged and arrested by the brake **25.**

Further hoisting and lowering of the cargo on the ship deck where the winch is positioned is done by means of the main drive **2.**



Short-time engagement of the additional drive **5** permits to use it with marked overload; in its turn, this makes possible the provision, on its shaft **19,** of an additional motor with a small weight per effective power unit.

What we claim is:

**1.** A hoisting winch comprising: a winch frame; a drive arranged on said frame; a winding drum mounted on said frame; a planetary gear built into said drum and consisting of: two sun wheels of different diameters, arranged coaxially in said drum, a carrier provided freely in said drum, planet pinions interconnected in pairs and borne by said carrier and respectively in constant mesh with said sun wheels, two epicycles of different diameters, which are in constant mesh with said planet pinions, one of said epicycles connected to said drum and the other arranged with the possibility of free travel under load within the rotation plane; a clutch coupling intended for alternative connection of said sun wheels with said drive; additional drive mounted on said frame and kinematically coupled with said other eipicycle to increase the rotation speed of said drum; and braking mechanisms for said drives.

* * * * *