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Mita et al.

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[54] **DOUBLE DRUM WINCH**

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[51] **Int. Cl.** **B66d 1/26**

[58] **Field of Search** ..... 254/185 B; 192/4 R, 18 A

[56] **References Cited**

UNITED STATES PATENTS

2,445,116	7/1948	Huston	254/185 B
2,529,299	11/1950	Tourneau	254/185 B
2,703,161	1/1955	Keim et al.	192/4 R

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[57] **ABSTRACT**

A double drum winch having a hook drum and a boom drum is provided in which power from a power source is transmitted through high and low speed clutches, hook up and down moving clutches, boom up and down moving clutches, and hook brake, and boom brake to the respective drums. A high and low speed switching control valve controls the clutches, and at least two control valves are provided for operating the drums.

3 Claims, 2 Drawing Figures

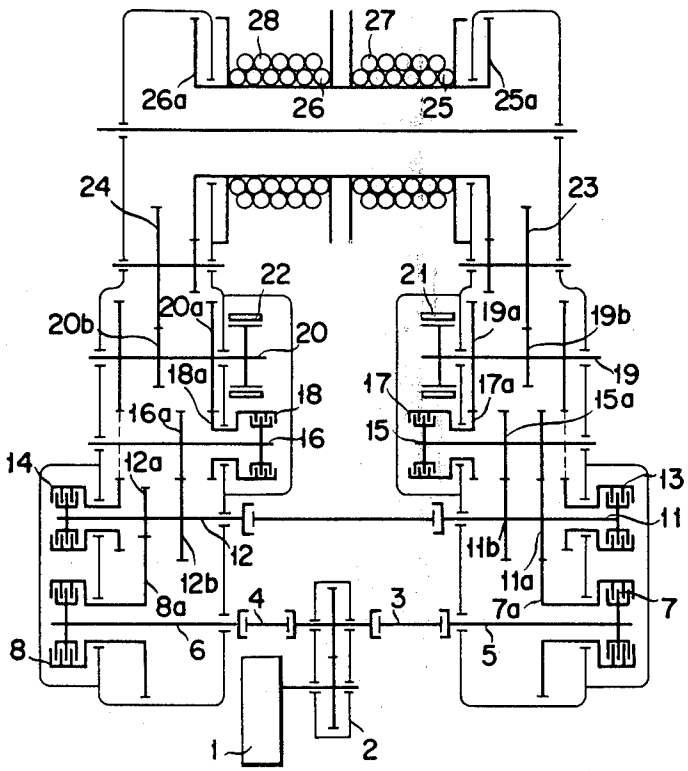


FIG. 1

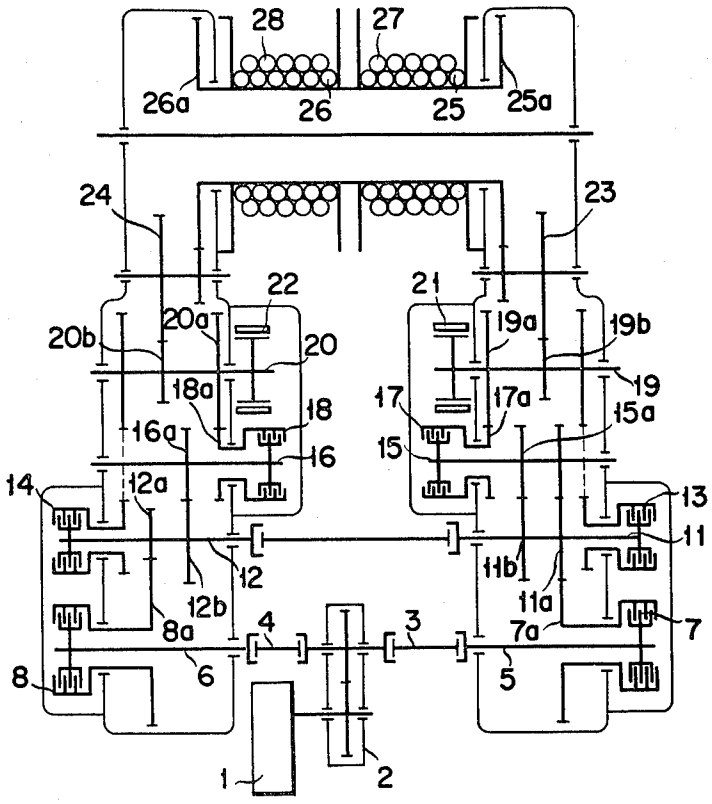
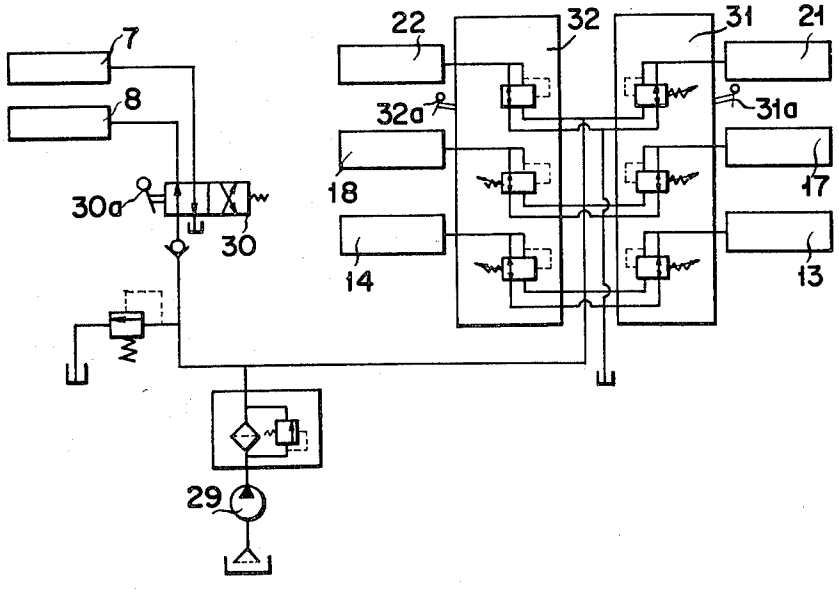

28
27
26a
26
25
25a
24
23
22
21
20b
20a
20
19a
19b
18a
19
17
17a
15a
18
16a
15
16
14
12a
13
11
12
11b
11a
12b
8a
4
3
7a
7
8
6
5
1
2

FIG. 2


7
8
22
32
31
21
32a
31a
30a
18
17
30
14
13
29

DOUBLE DRUM WINCH

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a winch used mainly for the side crane of construction machinery, and more particularly to a mechanical two-drum winch in which the respective drums are independently operated.

2. Brief Description of the Prior Art

Since two drums cannot be independently operated in a winch of this type known heretofore, an operation to elevationally move the hook by the other drum while elevationally moving the boom with the one drum cannot be down. Thus the working range is limited. Since the crane is so constructed as to operate many levers, skill is necessary for the operation, and further it causes operating error, or the driver tends to be fatigued rapidely.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a double-drum winch which independently operates the respective drums with fewer control levers.

It is another object of the present invention to provide a double-drum winch which may expand the working range by simplifying operation.

It is still another object of the present invention to provide a double-drum winch which may prevent erroneous operation.

DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the double-drum winch according to the present invention will become more fully apparent from the following description of the drawings taken in conjunction with the accompanying drawings, in which like reference numerals and characters designate corresponding parts and components and in which:

FIG. **1** is a schematic mechanical view of one embodiment of the double-drum winch according to the present invention; and,

FIG. **2** is a hydraulic circuit of the device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is now made to the drawings, which show one embodiment of the double-drum winch of the present invention.

In the drawings, numeral **1** indicates a power source such as an internal combustion engine or prime mover carried on construction machinery (not shown), which is connected to clutch shafts **5** and **6** provided at right and left sides through universal joints **3** and **4**, respectively provided at both sides of reduction gear **2**. Low and high speed clutches **7** and **8** are provided at the clutch shafts **5** and **6**, and the output gears **7***a* and **8***a* of the clutches **7** and **8**, respectively are connected through gears **11***a* and **12***a* to a pair of clutch shafts **11** and **12**, respectively connected by the universal joint provided at the intermediate portion. Hook down moving clutch **13** and boom down moving clutch **14** are provided laterally in space at right and left at the clutch shafts **11** and **12**, respectively. Gears **11***b* and **12***b* are separately provided at the clutch shafts **11** and **12**, respectively, which gears **11***b* and **12***b* are engaged with gears **15***a* and **16***a*, respectively provided at clutch shafts **15** and **16**. Hook up moving clutch **17** and boom up moving clutch **18** are provided at the clutch shafts **15** and **16**, respectively, and the output gears **17***a* and **18***a* of the clutches **17** and **18** respectively are engaged with gears **19***a* and **20***a* fixed to brake shafts **19** and **20**, respectively. Hook brake **21** and boom brake **22** are provided at the brake shafts **19** and **20**, respectively, and gears **19***b* and **20***b* are separately fixed thereto, and these gears **19***b* and **20***b* are engaged with gears **25***a* and **26***a* of two drums **25** and **26** respectively provided coaxially therewith through intermediate gears **23** and **24**. One drum **25** is a hook drum, and wire **27** is wound thereon for elevationally moving up and down the hook (not shown), while the other drum **26** is a boom drum and wire **28** is wound thereon for luffing the boom (not shown).

The hydraulic circuit for controlling the above winch is shown in FIG. **2**. Source **29** of hydraulic pressure feeds hydraulic fluid or oil, through one branch to low and high speed clutches **7** and **8** through speed switching control valve **30** and through another branch to the hook and boom brakes **21** and **22**, hook up and down moving clutches **13** and **17**, and boom up and down moving clutches **14** and **18**, respectively through the hook operating valve **31** and boom operating valve **32** respectively. All of the following operations can be operated by three levers such as operating lever **30***a* of the speed switching control valve **30**, operating lever **31***a* of the hook operating valve **31**, and operating lever **32***a* of the boom operating valve **32**. The respective clutches and brakes are engaged and disengaged by hydraulic pressure and spring forces as shown in the following Table **1**:

TABLE 1

Relation of the clutches and brakes by Spring force and hydraulic pressure

	Engagement	Disengagement
Hook Brake	spring	Hydraulic pressure
Boom Brake	spring	Hydraulic pressure
Hook up moving clutch	Hydraulic Pressure	spring
Hook down moving	Hydraulic pressure	spring
Boom moving clutch	Hydraulic pressure	spring
Boom down moving clutch	Hydraulic pressure	spring
Low speed clutch	Hydraulic pressure	spring
High speed clutch	Hydraulic pressure	spring

That is, the hook brake **21** and boom brake **22** are energized by the tension of the spring and are deenergized by the hydraulic pressure, and the other clutches are engaged by the hydraulic pressure and are disengaged by the tension of the spring.

The operation of thus constructed device will now be described, for example, when the boom is lifted and the hook is simultaneously lifted responsive to the content of the work, the hook upwardly moving clutch **17** and boom upwardly moving clutch **18** are engaged, and the other clutches and brakes are all disengaged, and the hook and boom operating valves **31** and **32** are operated. Thus, the rotary force from the source **1** of power rotates hook drum **25** and boom drum **26** simultaneously through reduction gear **2**, one of high and low speed switching clutches **7** and **8**, clutch shafts **11** and **12**, hook and boom up moving clutches **17** and **18**,

brake shafts **19** and **20**, and intermediate gears **23** and **24**. Thus the boom is elevated and the hook is also elevated.

On the contrary, when the boom and the hook are simultaneously moved downward, only the hook down moving clutch **13** and boom down moving clutch **14** are engaged. And, when the hook is elevated while the boom is lowered, the hook up moving clutch **17** and the boom down moving clutch **14** are engaged and the other clutches and brakes are disengaged. The relation of these clutches and brakes responsive to the work is shown in the following Table **2**. When the speed is varied, the speed switching control valve **30** is operated so as to selectively engaged or disengage the high and low speed clutches **7** and **8**.

TABLE 2

Relation of the clutches and brakes by the content of operation

Content of Operation		Clutch				Brake	
Hook	Boom	Hook up	Hook down	Boom up	Boom down	Hook	Boom
Up	Up	on	off	on	off	off	off
Down	Down	off	on	off	on	off	off
Up	Down	on	off	off	on	off	off
Down	Up	off	on	on	off	off	off
Stop	Up	off	off	on	off	on	off
Stop	Down	off	off	off	on	on	off
Up	Stop	on	off	off	off	off	on
Down	Stop	off	on	off	off	off	on
Stop	Stop	off	off	off	off	on	on

It should be seen from the foregoing description that in the present invention the two drums are independantly operated with the result that the luffing of the boom and up and down movement of the hook can be operated simultaneously and all the operations can be conducted with fewer operating levers and smaller operating force. Thus, there is less probability of operation error, and the operation is easy, and the fatigue of the driver is greatly reduced.

The present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

We claim:

1. A double-drum winch having a source of power, comprising:

a. high and low speed clutches connected to the source of power;

b. hook up and down moving clutches connected to said high and low speed clutches for upwardly and downwardly moving the hook;

c. boom up and down moving clutches connected to said high and low speed clutches for upwardly and downwardly moving the boom;

d. a hook brake connected to said hook down moving clutch;

e. a boom brake connected to said boom down moving clutch;

f. a hook drum connected to the brake shaft of said hook brake;

g. a boom drum connected to the brake shaft of said boom brake;

h. a hook operating valve for switching the hook up and down moving clutches and hook brake;

i. a boom operating valve for switching said boom up and down moving clutches and boom brake; and,

j. high and low speed switching control valve for switching said high and low speed clutches, whereby said boom and said hook may be independently operated.

2. A double-drum winch as set forth in claim **1**, wherein said hook and boom brakes are engaged by the tension of a spring means and disengaged by hydraulic pressure, and said clutches all are engaged by hydraulic pressure and disengaged by the tension of the spring means.

3. A double-drum winch as set forth in claim **1**, wherein said hook drum and boom drum are coaxial with each other.

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