Dec. 14, 1965 SAKAE MURAKAMI 3,223,385

HOIST COMPRISING AUTOMATIC VARIABLE SPEED WINDING MEANS

Filed Dec. 12, 1963 2 Sheets-Sheet 1

Fig. I.

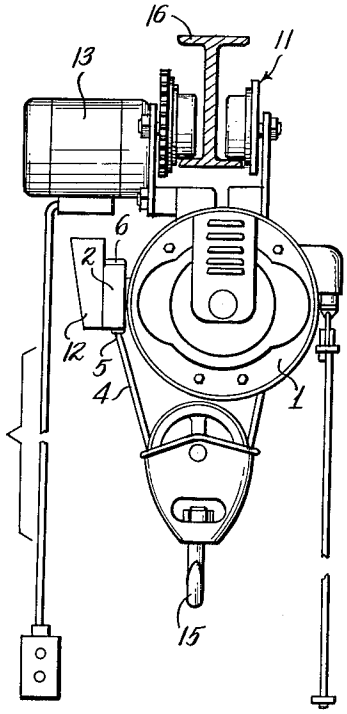


Fig. II.

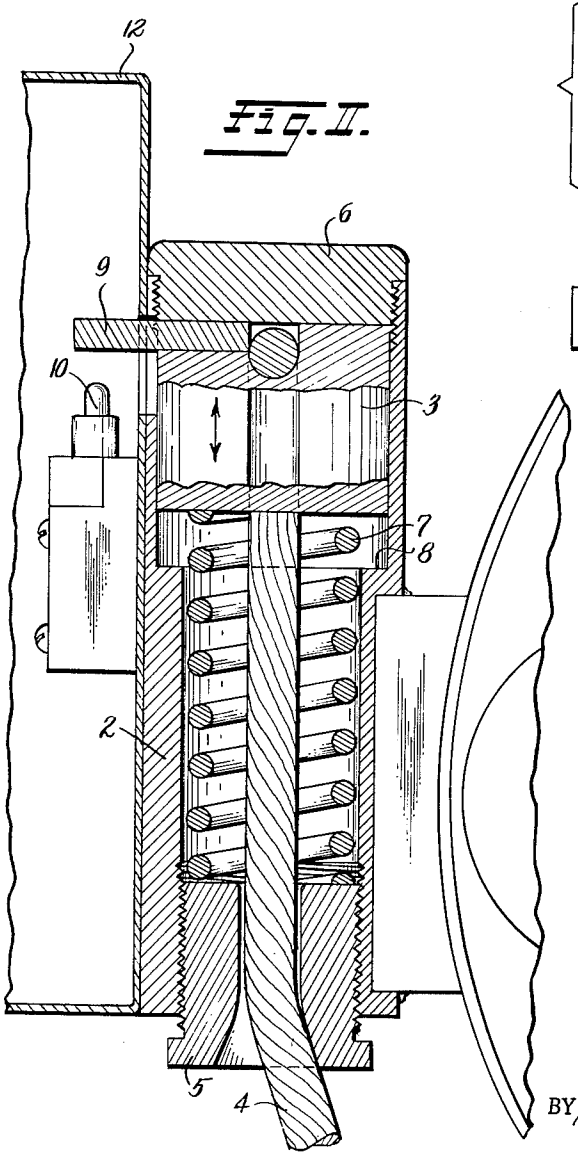
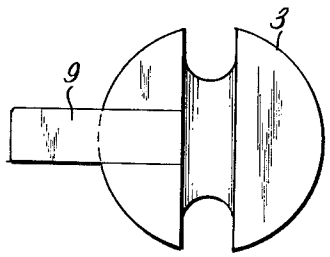


Fig. III.



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HOIST COMPRISING AUTOMATIC VARIABLE SPEED WINDING MEANS

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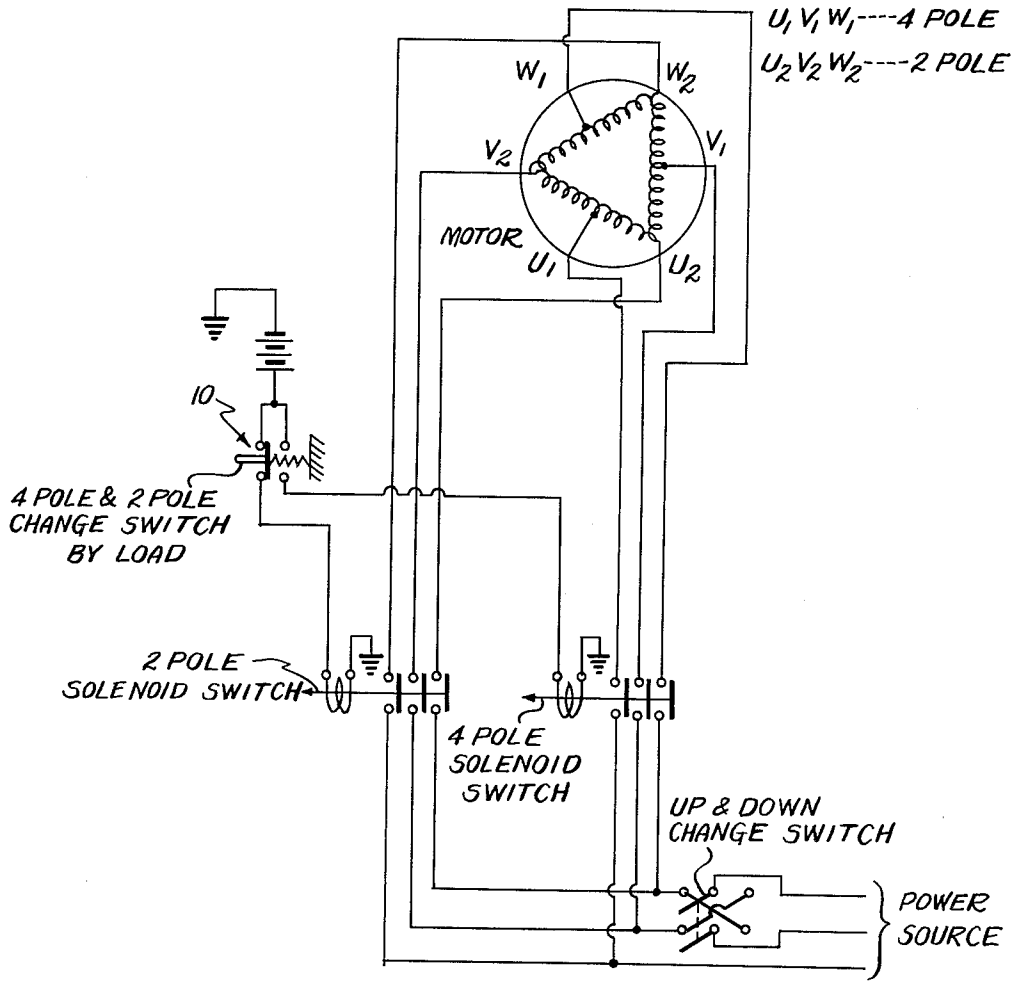


Fig. IV.

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United States Patent Office

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HOIST COMPRISING AUTOMATIC VARIABLE SPEED WINDING MEANS

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Claims priority, application Japan, Dec. 15, 1962, 37/76,586
3 Claims. (Cl. 254—173)

My invention relates to a hoist comprising winding means adapted to shift automatically from one speed to another in response to the imposition of a load on the hoist chain or cable.

The object of my invention is to provide a device which will automatically wind and unwind a hoist chain rapidly when there is no load on the hoist but will operate more slowly, but more powerfully when a load is applied.

A preferred embodiment of my invention will now be described with reference to the accompanying drawings in which:

FIG. I is an elevational view showing the entire hoist;

FIG. II is a partial vertical section taken through the device for attaching the chain to the pulley block;

FIG. III is a plan view showing only the slidable member to which the cable is attached and the pin projecting therefrom; and

FIG. IV is a circuit diagram showing a conventional 2 pole-4 pole motor energized through circuits controlled by a switch **10**.

Like reference numerals denote like parts throughout the several views.

Referring now to FIG. I, it will be seen that the illustrated hoist comprises a motor **1**. This motor is of a known type which may be operated as either a two-pole motor or a four-pole motor, depending on which way a switch is thrown. If, as a two-pole motor it opperates at 3600 r.p.m., for example, as a four-pole motor it will turn at only 1800 r.p.m., but will exert twice the torque. To one side of the motor **1** there is attached a cylindrical housing **2**, and an anchorage member **3** is mounted in this housing for vertical sliding movement relative thereto. The end **4** of the hoist chain, cable, or rope, as the case may be, is fastened over this anchorage member while the other end of the chain is attached to a drum driven by the motor **1**. Downward movement of the anchorage member is limited by a shoulder **8** within the cylindrical casing, and resisted by a spring **7** which rests on an adjusting screw **5** screwed into the bottom of the cylindrical housing. The top of the housing is covered by a cap **6**, and an arm **9** projects from the slidable anchorage member into a switch box **12**, through suitable registering slots in the walls of the cylinder and switch box. In this box is a limit switch **10** positioned to be thrown by the arm **9** when the slidable anchorage is pulled down against the resistance of the spring **7** by a load applied to the cable **4**. This switch is connected to shift the motor from four-pole to two-pole operation and vice versa, and is biassed toward the two-pole position.

Also shown are a trolley **11**, which carries the hoist, a rail **16** on which the trolley rides, a gear motor **13** which drives the trolley along the rail, and a hook **15** suspended from the hoist chain, but these form no part of the invention.

It will be readily appreciated that when there is no load on the chain the anchorage **3** and arm **9** will be kept in their upper positions by the spring **7**, so that the switch **11** will remain in the position causing two-pole operation of the motor **1**, toward which position the switch is biassed, magnetically or otherwise.

When a load is attached to the hoist which is sufficient to overcome the resistance of the spring, the anchorage and arm will come down, the switch **10** will be thrown, and the motor will be shifted to four-pole operation.

It will be noted that the load required to produce this effect may be altered by tightening or loosening the adjusting screw **5**, thus increasing or decreasing the compression of the spring **7**. Moreover, the shoulder **8** is so positioned as to prevent the arm **9** from forcing the switch **10** beyond its normal path of travel.

The specific embodiment of my invention hereinbefore described may of course be altered as to detail without thereby departing from the spirit of my invention as defined by the following claims.

What is claimed is:

1. Hoisting apparatus comprising an electric motor connectable to operate as either a two-pole or a four-pole motor and to develop a distinctly greater torque when connected for operation as a four-pole motor than as a two-pole motor, a control switch movable between a first position in which it connects said motor to develop one of said torques and a second position in which it connects said motor to develop the other of said torques, means biassing said switch toward said second position, actuating means movable between a first position in which it holds said switch in its first position and a second position in which it permits said switch to assume its second position, means biasing said actuating means toward its second position, flexible load supporting means connected at one end to said actuating means to transfer thereto at least a predetermined portion of any load supported by said load supporting means, and move said actuating means and switch means into their first positions when said predetermined load portion is sufficient to overcome the force exerted by said biassing means, and means driven by said motor connected to wind up and unwind said flexible load supporting means.

2. Hoisting apparatus as claimed in claim **1** comprising means for limiting the path of travel of said actuating means.

3. Hoisting apparatus as claimed in claim **2** comprising adjustable means for regulating the pressure on at least one of said biassing means.

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