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CONSTANT TENSION DEVICE FOR BOAT FALLS

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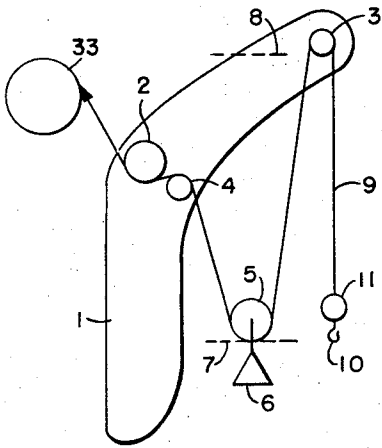


Fig. 1

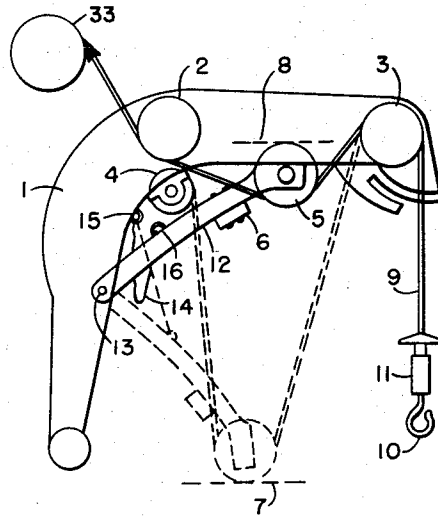


Fig. 2

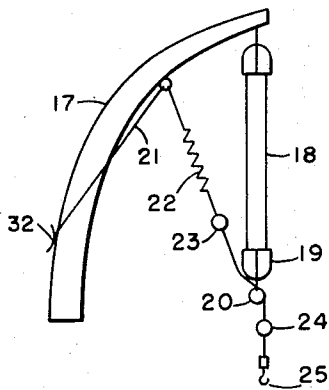


Fig. 3

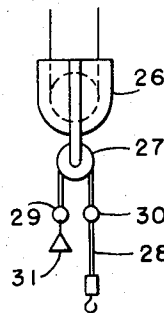


Fig. 4

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CONSTANT TENSION DEVICE FOR BOAT FALLS 5

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(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates generally to hoisting equipment and more particularly to apparatus for and methods of providing a substantially constant tension for wire falls and the like, which are required to operate under conditions, such as those encountered in the launching and retrieving of small craft in rough seas, where the load is capable of experiencing sudden and irregular movement.

The Welin type gravity davit installed on most ships requires an appreciable weight to be added to the hook in order to maintain the wire falls taut and in the winch drum grooves. In rough weather, this weight can inflict serious injury to both boat and crew if it unexpectedly breaks free of the stabilizing influence of the load as, for example, when the boat suddenly pitches on the crest of a wave. Furthermore, the purpose for which this weight is installed is usually defeated when the hook is finally secured to the boat for as the boat rises on the next wave crest oftentimes it carries the hook and weight along with it, thereby introducing slack into the wire falls and causing the wire to jump from the drum groove.

It is accordingly a primary object of the present invention to provide an arrangement for hoisting equipment wherein a substantially constant, relatively light, upward force is available at the hook end of the line and effective over a predetermined amount of vertical travel thereof.

A secondary object of the present invention is to provide a constant tension device for boat falls which will expedite the boat lowering and raising operations in rough seas and involve a minimum of danger to the boat and its crew.

A still further object of the present invention is to provide a constant tension device for boat falls which is of simple and rugged construction, and requires a minimum of supervision, maintenance, and repair.

Other objects and many of the attendant advantages of this invention will be readily appreciated as same becomes better understood by reference to the following detailed description and considered in connection with the accompanying drawings wherein:

Fig. 1 is a schematic diagram which illustrates in a simple manner the operating principle involved in the present invention;

Fig. 2 illustrates a practical embodiment of the present invention as applied to a Welin type gravity davit;

Fig. 3 depicts an alternative arrangement for use with a radial type davit;

And Fig. 4 illustrates a modification of the present invention which can be adapted to the lower block of a crane's tackle.

Referring now to the schematic diagram of Fig. 1, a convention Welin type gravity davit 1 which supports at its arm portion, arm and armhead blocks 2 and 3 respectively, is modified by the addition thereto of an idler

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block 4 and a riding block 5. Line 9 which is secured at one end to the drum of a power winch 33, is reeved through the sheaves of these blocks and terminates in its other end in hook 10 which is weighted by member 11. Riding block 5 is designed so as to be free to move in a vertical direction between lower and upper limits 7 and 8 respectively, and supports a counterweight 6 whose function, as will be more clearly appreciated hereinafter, is to counteract the downward force of member 11 and produces a net upward force at hook 10 for the purposes herein before enumerated.

If, for purposes of explanation, the total weight of hook 10 and member 11 is assumed to be 50 lbs. and that of riding block 5 and counterweight 6 120 lbs., then as long as the riding block is unrestrained by either stop, a net upward force of 10 lbs. will be present at hook 10 because of the mechanical advantage of the system, the weight and stiffness of wire 9 being neglected. It is this upward force which is relied upon to keep the falls from going slack if and when the boat load is unexpectedly lifted by the sudden appearance of a wave crest.

A typical boat hoisting operation is as follows: When the brake on the winch is initially released and the falls are being payed out, with riding block 5 at upper stop 8 and free to move in a downward direction, hook 11 will remain at the davit head in the vicinity of armhead block 3 regardless of how much wire rope is payed out from the winch drum. However, as soon as block 5 is stopped in its downward travel, that is, when it meets stop 7, hook 11 will then pay out from the davit head. Thereafter, when a downward pull is exerted at the hook to permit the attachment of the boat, the falls will continue to pay out with only a 10 lb. resistance being offered until the riding block 5 is prevented from moving in an upward direction by the interference of upper stop 8. Thereafter, the full strength of the winch installation is available for raising the load.

It will thus be seen that the distance between stops 7 and 8 determines the length of hook travel over which a constant tension is available for insuring the safe attachment or releasement of the load. In the showing of Fig. 1, this length will be approximately equal to twice the vertical movement permitted riding block 5 by the separation of the upper and lower stops.

Fig. 2 discloses the application of the above concept to a standard Welin type gravity davit. In this instance, riding block 5 is supported from the upright portion of davit 1 by an arm 12 which is capable of pivotable movement about pin 13. A counterweight 6 in the form of a heavy block is attached to this arm at a point near its extremity by suitable bolts and normally urges this arm in a downward direction against any opposing force which might be applied from the winch drum via line 9 to counteract this movement. Normally, with the winch drum 33 locked, the tension on line 9 is sufficient to keep member 11 in the vicinity of armhead block 3 and riding block 5 at upper stop 8. The upward movement of riding block 5 is limited by the extremity of arm 12 abutting a confronting portion of the armhead of the davit, while the lower movement is regulated by the length of cable 14 secured to a pair of hooks, 15 and 16, located at the point of curvature of the davit arm and an intermediate point of arm 12 respectively.

It is to be understood, of course, that the locating of riding block 5 need not be restricted to that shown in the above embodiment for the necessary upward force at hook 10 to be realized. This riding block 5 could be brought inboard and installed in a suitable housing or trunk which would permit it to duplicate the above movements. Also, it will be appreciated that hook 10 can be readily replaced with a conventional pulley block; in which case, of course, the extremity of wire rope 9 after

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passing through the sheave of this block would be secured to a suitable point on the end of the davit arm near arm-head block 3.

Fig. 3 illustrates an alternative embodiment of the present invention which has particular application to a radial type davit. Here, the hoisting tackle is generally represented by reference character 18; and the lower block 19 thereof carries an eye 20 through which passes line 21 which has one of its ends tied to cleat 32 and the other end to hook 25. Connected in series with this wire rope is a long spring 22. A pair of stops, 23 and 24, are secured to line 21 on opposite sides of eye 20, and purposely dimensioned so as to be incapable of passing through this eye. It will be apparent that the desired upward force at hook 25 can be achieved by adjusting the tension on line 21, the consequence of which, of course, is to vary in turn the tension of the long spring 22 and that stops 23 and 24 define the length of hook travel over which the constant upward force is present.

Fig. 4 illustrates the application of the present invention to the lower block of the hoisting tackle of a crane. In this arrangement, a pendant block 27 supported by lower block 26 of the tackle carries a pendant 28 which has affixed thereto hoisting and lowering stops 29 and 30. A counterweight 31 is secured to the other end of the pendant, and the difference between its weight and that of the hook constitutes the net upward force present at the load end of the line. Just as in the arrangement of Fig. 3, stops 29 and 30 are too large to pass through the limited opening between lower block 26 and pendant block 27.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination, a crescent shaped davit having an upright section and a forwardly extending arm section, a pair of blocks mounted in a spaced relationship on said arm section, a hoisting line cooperating with said blocks, said line terminating at one end in a weighted hook and the other end at a winch drum, a riding block supporting a counterweight resting on said line, said counterweight and riding block having sufficient mass to overcome the weight of said hook, and means for regulating the vertical movement of said riding block whereby

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a substantially constant upward force is available at the hook over a predetermined length of travel thereof due solely to the action of said counterweight and riding block for expediting its attachment to an oscillating load.

2. A device for providing a constant tension in a wire falls comprising in combination a crescent shaped davit, first and second spaced blocks secured to the arm sections of said davit, and a line reeved through the sheaves of said blocks, and passing under the sheave of said first block and over the sheave of said second block, said line being attached at one end to a source of power and at the other end to a weighted hook, a riding block, said riding block supporting a counterweight and bearing on said line at a point between said blocks, said counterweight and riding block having sufficient mass to overcome the downward force of said weighted hook and produce a resultant upward force at said hook, and means for limiting the vertical travel of said riding block whereby said upward force is available over a predetermined amount of travel of said hook due solely to the action of said counterweight and riding block and allowing said hook to be engaged with a load anywhere within said predetermined amount of travel of said hook.

3. In combination, a substantially crescent shaped davit having an upstanding portion and an arm portion at approximately a right angle thereto, first and second spaced blocks secured to said arm portion, an arm pivotably mounted on the upstanding portion of said davit, a riding block mounted on said arm, a wire rope secured at one end to a winch drum and the other end to a weighted hook, said line contacting the sheaves of said first and second blocks and said riding block, a weight attached to said arm and normally urging said arm in a downward direction, said weight and arm having a mass of such a magnitude as to overcome the weight of said hook when said arm is free to rotate, a means for limiting the angle through which said arm can pivot so that the amount of vertical travel of said hook under the influence of said arm is limited whereby said hook may be engaged with a load anywhere within said vertical travel by application of a force on the hook just sufficient to overcome the force exerted by said arm.

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