D. MAGGI.

BOAT LIFTING AND LAUNCHING MECHANISM.

APPLICATION FILED JULY 19, 1918.

1,398,702. **Patented Nov. 29, 1921.**

2 SHEETS—SHEET 1.

FIG. 1.

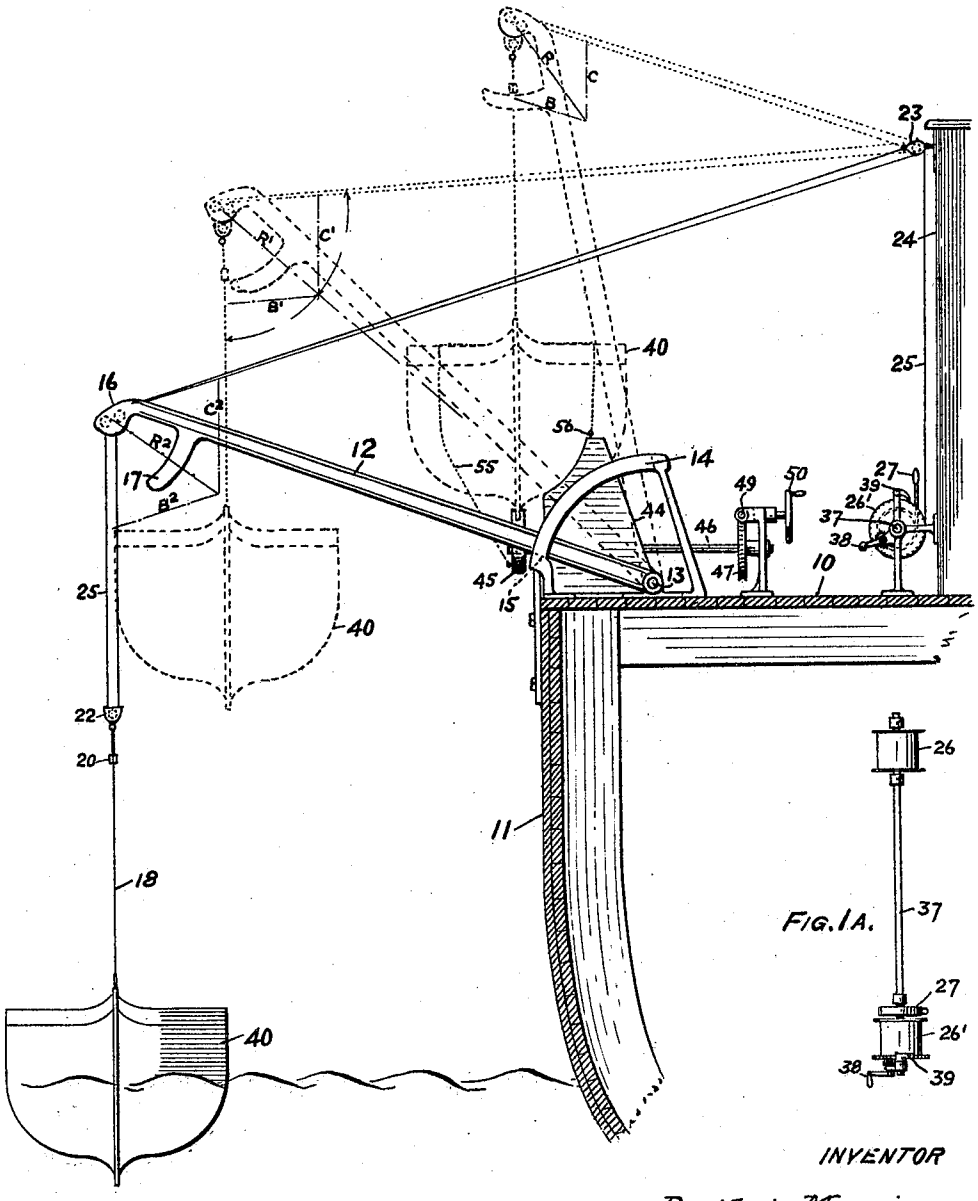


FIG. 1A.

WITNESS:

INVENTOR

Desiderio Maggi

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2 SHEETS—SHEET 2.

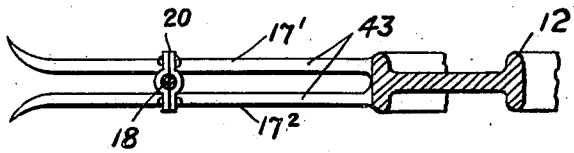


FIG. 4.

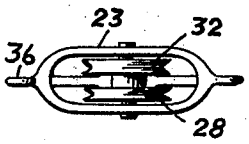


FIG. 5.

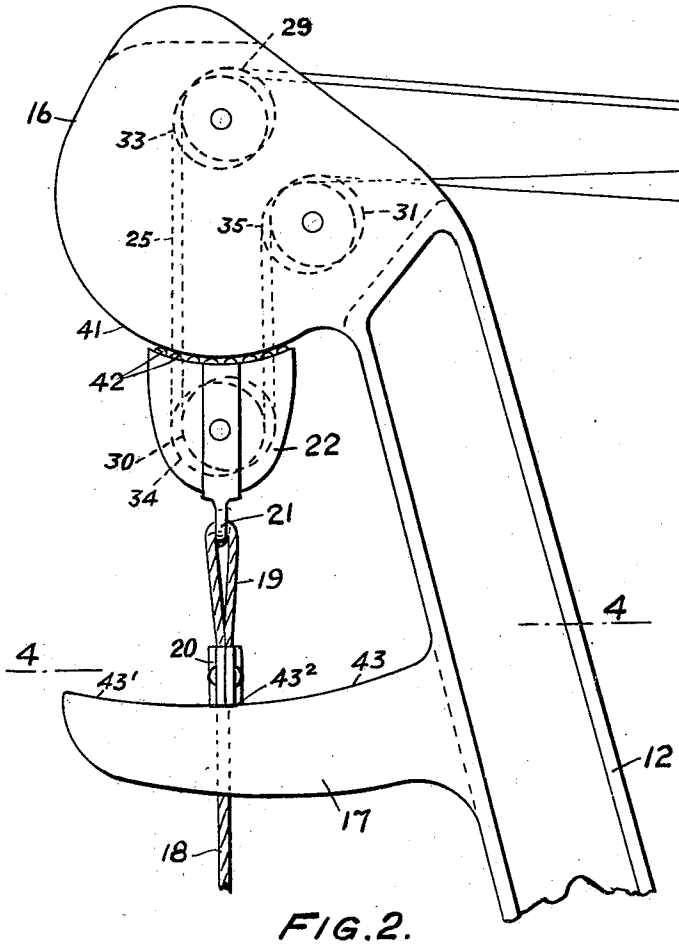


FIG. 2.

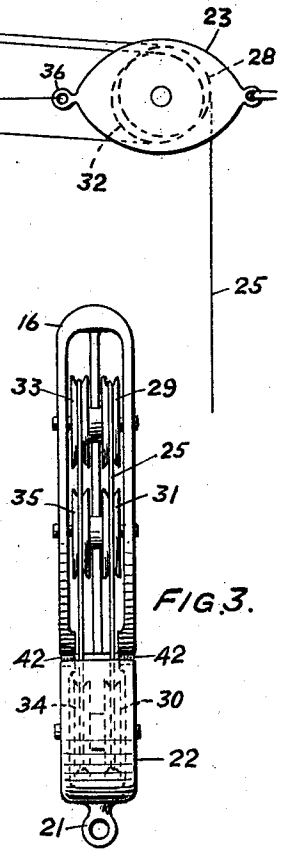


FIG. 3.

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UNITED STATES PATENT OFFICE.

DESIDERIO MAGGI, OF PHILADELPHIA, PENNSYLVANIA.

BOAT LIFTING AND LAUNCHING MECHANISM.

1,398,702. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed July 19, 1918. Serial No. 245,649.

To all whom it may concern:

Be it known that I, DESIDERIO MAGGI, a subject of the King of Italy, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Boat Lifting and Launching Mechanism, of which the following is a specification.

My invention relates to mechanism for lifting, launching and retaining boats, intended primarily for use on vessels.

The purpose of my invention is to lift and lower a boat by sheaves located upon a swinging davit and a sheave block connected with the boat, fitting the sheave block to turn about the end of the davit as the davit swings, and lifting or lowering by a continuous pull or slacking of the rope leading to the sheaves.

Further purposes will appear in the specification and in the claims thereof.

My invention resides both in the method involved and in apparatus whereby the method may be carried out.

I have preferred to illustrate my invention by one form only, selecting a form which is practical, efficient and thoroughly reliable and which at the same time well illustrates the principles of my invention.

Figure 1 is a transverse section of a portion of a vessel with side elevation of my mechanism thereon.

Fig. 1[A] is a top plan view of part of the mechanism shown in Fig. 1.

Fig. 2 is an enlarged side elevation partly diagrammatic, of a portion of the structure seen in Fig. 1.

Fig. 3 is a broken end elevation of a part of the structure seen in Fig. 2.

Fig. 4 is a section of Fig. 2 upon line 4—4.

Fig. 5 is a top plan view of a sheave block shown in Fig. 2.

In the drawing similar numerals indicate like parts.

In the usual launching mechanism for boats with existing forms of davit and deck storage of the boats, the boats are loaded before they are launched and a large launching force is required. These men must be left on the deck until after the boat has been rested in the water.

The requirement for a large launching force is additionally objectionable because of the danger of death or injury of a sufficient number of this force to cripple it for the work required or incapacitate it for launching the boat, putting this boat out of commission or requiring dependence upon inexperienced help at a critical time.

The practice at the present time of lowering the two ends of the boat independently is also objectionable, because of the serious danger from unequal lowering of the two ends, tending to spill the occupants or swamp the boat.

While the same structure which is advantageous for lowering the boats to launch them is advantageous also in facilitating the lifting of the boats to position, I emphasize the launching herein because of the emergency conditions under which it must be accomplished and the tremendously greater importance of and in the launching.

I have shown the ship deck 10 and sides 11 conventionally. Instead of the usual form of davits having fixed vertical shaft axes I supply two swinging davits 12 pivoted at 13, one at each end of the boat so as to swing between the approximate positions shown in full dotted lines in Fig. 1.

Each davit is supported against side movement by a pair of guards 14 on opposite sides of the davit and carrying a stop 15 against which the davit rests in its full line position in Fig. 1.

At the outer end each davit carries a bifurcated or skeletoned head 16 and bifurcated bracket arm 17. Because of their irregular shape and preferred integral construction the davits would ordinarily be forged or cast. For additional strength the main body or beam is shown as of I-beam section, as best seen in Fig. 4.

I purpose lowering or lifting and swinging the boat by a combination movement operated through block and tackle mechanism directly lowering or lifting the boat in part of its movement and swinging the boat by upward swinging of the davits through the remainder of the movement. Evidently the exact number and disposition of the pulleys of the block is not controlling and that which I have shown is merely illustrative of a good form suitable for the purpose. I will therefore describe the form of the illustration with notice that the number and position of the sheaves will differ with changing requirements and individual preferences on the part of the designer.

The boat as shown is supported by wire cables 18, one at each end, having eyes 19 at their upper ends, formed by rope clamps

20 which are here conveniently used to perform the double function of securing the ends of the wire ropes and taking the weight of the boat when resting against the bracket arms 17 as more fully hereinafter described.

The eyes 19 engage beckets 21 in sheave blocks 22 coöperating with sheave blocks 23 secured to any fixed deck support 24 through the intermediary of sheaves in the davit heads. Where the weight is small, one at least of these sheave blocks can be omitted.

In the particular construction shown, each of the sheave blocks 22, 23 is given two sheaves, and two pairs of coaxial sheaves are used in the head. The ropes 25 are wound on the drums 26 and 26′ (Fig. 1ᴬ), controlled by brake 27. The ropes extend at opposite ends of the boat over sheaves, 28 of block 23, 29 in the head, 30 in the block 22, 31 in the head, 32 in block 23, 33 in the head, 34 in block 22, and 35 in the head to the becket 36 or any relatively fixed point.

The drums 26 and 26′ are connected by shaft 37, are operated from either or both ends by crank 38 and any suitable intermediate gearing, and are latched at 39. A single operating mechanism is thus available for winding both of the ropes 25 uniformly to lift the boats and swing the davits or to unwind rapidly and reliably under hand or foot brake control in launching as hereinafter more fully described.

In the highest dotted davit position in Fig. 1, the diagram of forces is completed by the dot-and-dash lines B, C. They are equal because the forces are equal. Consequently the resultant R bisects the angle between. Since this bisector extended lies above the pivot 13, the pull on the ropes holds the davits safely and firmly in raised positions.

In the intermediate dotted position shown, the lines B′ C′, completing the parallelogram of forces, are also equal though the angle is different. The position has been chosen so that the bisector R′ of the new angle formed passes through the pivot 13. Excluding other conditions the davits will be in neutral position with respect to the strain on the ropes. However, the weight of the davits will be sufficient in this position and positions slightly above it to cause the davits to fall to the position shown in full lines in Fig. 1. As the davits fall the resultant R^2 of the parallelogram completed by lines B^2 C^2 extends farther and farther below the pivot 13, increasing the downward strain upon the davit and because of the weight of the boat.

The importance of proportioning the supporting arms 17 so that at the time of casting off of the clamps 20 from the arm, the resultants shown shall pass below the pivots 13, or at least not higher above these pivots than will compensate for the weight of the davits, will be seen from a consideration of the effect of having these resultants too high. In such a case, the ropes 25 would be paid out during the time the davits are swinging down to boat-releasing position, during which time, the four strands between the heads 16 and the supports 23 would be lengthened by, let us say, five or ten feet, each representing the difference in separation of the blocks and heads in the two positions. However, as soon as the boat is cast off from the supporting arms, if the resultants of the forces shown be directed above the pivot points 13, by a greater distance than that which is compensated by the weight of the davits the rope sections, passing freely over the sheaves at the end of the davits, will pull the davits up and drop the boat, throwing the davits back the entire five or ten feet and dropping the boat a corresponding distance. At the same time the upward swinging of the davits will throw the boat against the side of the vessel from which it is being launched.

In all of these several positions 15° allowance for list of the vessel required by the admiralty rules must be considered and the boat must not be freed from its support hereinafter described, until it is clear for lowering by more than the list allowance.

As I use the block and tackle mechanism to lift the boat 40 from the position shown in Fig. 1 until the blocks 22 engage the head and then use the same block and tackle mechanism to pull the davit up to the position shown at the right in dotted lines, in that figure, carrying the boat along with it, (reversing these operations to launch the boat) and the blocks 22 swing about the pairs of sheaves 29, 33 and 31, 35 during both directions of movement of the davit head, I form the lower faces of the bifurcated heads in the form of curves 41. These are preferably so designed that the sum of the rope lengths from the sheaves 30 and 34 passing about the sheaves 29, 33, 31 and 35 will not be changed by movement of the blocks about the heads. I also provide the blocks with suitably mounted rollers 42 to reduce the friction of travel of the block about the head.

It will be obvious that for special advantages sought the curves 41 may be varied so as to increase or reduce the total rope length during the travel of the blocks about the curves 41 of the heads to more securely lock the boat upon the bracket arms 17 or more fully facilitate the release of the boat from these arms during launching of the boat, respectively, as the special purpose and other structure of the davits may require or render desirable.

When the blocks 22 have been lifted sufficiently to engage the curves 41 of the davit heads, the direct lifting operation ceases

and the continued pull upon the ropes 25 swings the davits to the position shown at the right in dotted lines in Fig. 1. During this davit swinging operation the blocks 22 travel about the curves 41 of the heads and at the same time the ropes 18 first approach and then pass between the jaws 17′, 17² of the bracket arms, the rope clamps 20 passing above the arms, preferably quite close to them. The curves 43 of the upper surfaces of the arms preferably correspond to the curves 41 in that both may closely enough approach arcs of circles to be made or based upon arcs of circles having a common center. However, if it be desired that the rope clamps 20 shall wedge against the upper curves of the arms 17′, 17² during this inward swinging of the ropes 18 with respect to the davit length, the curves 43 may be spaced farther from the heads at the outer portions 43′ than at the final resting point 43² as shown, allowing the rope clamps to slip in easily at the start but to tighten upon the arms as the position of rest in Fig. 2 is approached.

Describing now the operation of launching the boat, to whose improvement my invention is primarily directed, a single man at the handle 38 may release the catch and control the drum by the brake, allowing the ropes 25 to unwind. As the weight of the boat is taken upon the bifurcated bracket arms 17, the boat cannot lower directly at the start and the davits swing downwardly to some such position as that shown in the left dotted position in Fig. 1 before the rope clamps are swung free from the supporting arms 17′, 17².

This position should not only be far enough down for the resultant of the forces and weight of the davits to tend to move the davits farther down when the rope is fed out, but the boat must be far enough out from the vessel, before this release of the rope clamps permits it to be lowered, so that a 15° list cannot swing the boat into dangerous proximity to the vessel. This means that the effective lengths of the arms 17′, 17² should be at list 15° in arc length greater than their theoretical length.

Further feeding of the ropes 25 results in the davits swinging to the position shown in full lines, after which the blocks 22 and boat 40 are lowered together from the end of the head.

During all of the swinging movements of the davits the blocks 22 travel over the surfaces of the curves 41 and the rope clamps travel along the surfaces of the curves 43.

By reason of the continuity of the launching operation and its operation from a single position, my mechanism can be operated by one man. Reliable control of the greatest weight possibly to be handled does not require any better brake power than that in common use in winches used upon merchant vessels at the present time.

As will be recognized, my launching mechanism is most effective with a one-man mechanism for releasing the boat from its position of rest on the vessel, as reduction in the number of men required for actually lowering the boat would be of less benefit if an additional number of men were required to cast the boat free from the vessel. Such a release mechanism is shown in Fig. 1.

For the purpose of stowing body abutments 44 are provided and the body is held in position against them by an eccentric keel holding device 45, operated through shaft 46, worm wheel 47, worm 49 and handle 50 in connection with a lanyard 55, hooked at 56 to one of the abutments.

It will be evident that my mechanism affords a quick and effective launching equipment, capable of holding the boat in raised position and lowering it by control from a single point and by a single operator; also that it affords a maximum of control with a minimum of labor and effort and is so fully automatic as to be free from risk of accidental or careless wrongful operation. The speed of operation is limited by the desired lowering speed alone.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a boat launching mechanism, swinging davits having curved lower surfaces at their outer ends, sheaves in the outer end of the davits above the curved surface and eccentric to this surface, a sheave block for each davit, and ropes passing about the sheaves and combining to support the sheave blocks concentrically with respect to the curved surfaces.

2. In a boat lifting and launching mechanism, swinging davits having curved lower surfaces at their outer ends, sheaves in the outer ends of the davits above the curved surface, a sheave block for each davit adapted to ride against these surfaces, friction reducing means on the blocks engaging the curved ends of the davits and ropes passing about the sheaves of the davits and of the blocks to operate them.

DESIDERIO MAGGI.