United States Patent

[11] 3,572,638

[72] Inventor **Masamitsu Tatsuguchi**
Funabashi, Japan

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[73] Assignee **Mitsui Shipbuilding and Engineering Co. Ltd.**
Tokyo, Japan
[32] Priority **Sept. 25, 1968**
[33] **Japan**
[31] **43/69615**

[54] **MANUALLY OPERATED WINCH**
3 Claims, 5 Drawing Figs.

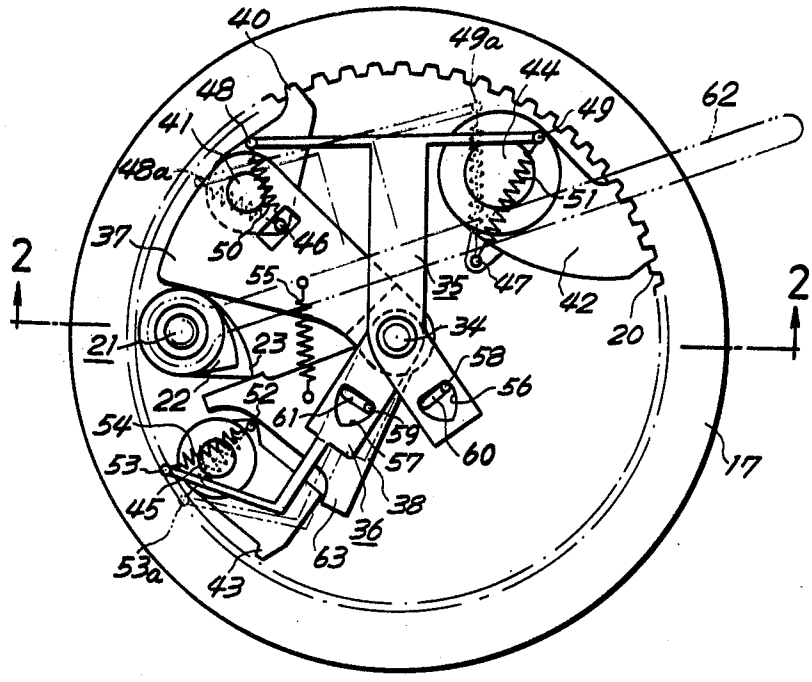
[52] **U.S. Cl.** **254/150,** 254/186, 254/167, 74/142
[51] **Int. Cl.** **B66d 1/04**
[50] **Field of Search** ..... 254/150, 186, 186 (HC), 167; 74/126, 142

[56] **References Cited**
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Primary Examiner—Harvey C. Hornsby
Assistant Examiner—Merle F. Maffei
Attorney—Howson and Howson

ABSTRACT: A winch for a wire-winding drum in which the drum has an internally toothed ratchet having three pawls spaced circumferentially about the ratchet with the first pawl operating to advance the drum, the second pawl operating to prevent reverse rotation of the drum and the third pawl operating to arrest the drum when the first two pawls are disengaged. The third pawl is arranged so that it cannot engage the ratchet when the first two pawl are engaged and automatically escapes the ratchet when the drum reverses.



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FIG. 1

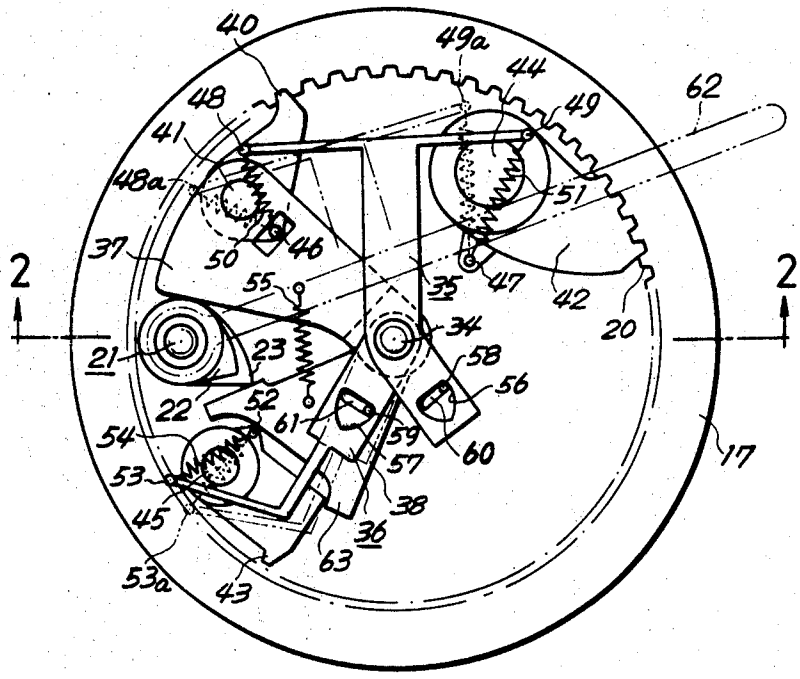
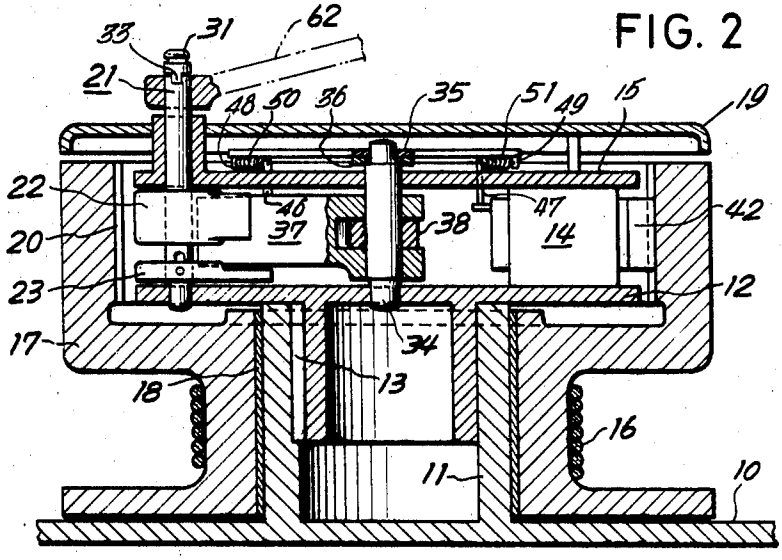


FIG. 2



Inventor:
Masamitsu Tatsuguchi
by Howson & Howson Attys.

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FIG. 3

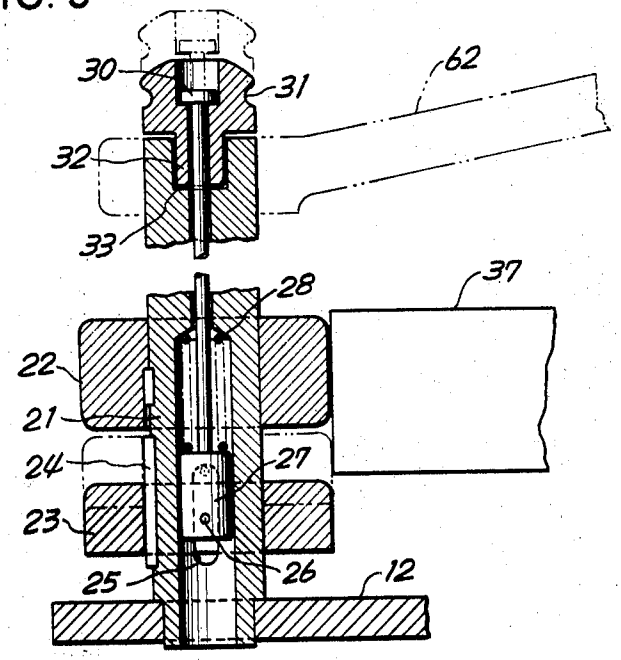


FIG. 4

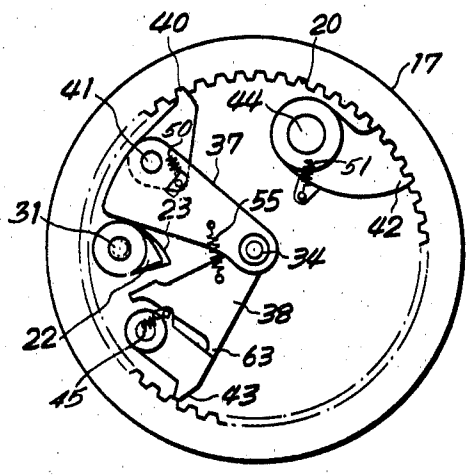
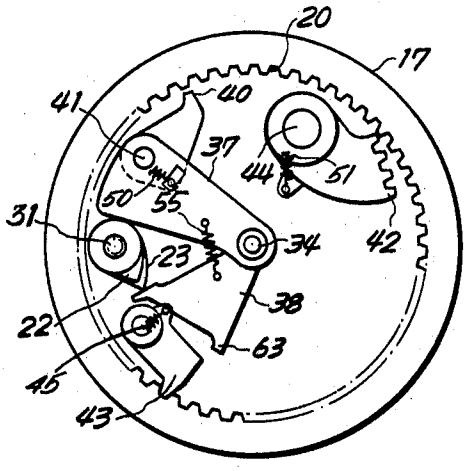


FIG. 5



Inventor
Masamitsu Tatsuguchi
by Howson & Howson Attys.

MANUALLY OPERATED WINCH

This invention relates to a manually operated winch, particularly to a horizontal type of winch suitable for mooring a pontoon.

An object of this invention is to provide a manually operated winch which is of relatively simplified construction comprising pawls and ratchet.

Another object of this invention is to provide a manually operated winch which may be easily released without braking.

These and other objects of this invention and various features and details of the operation and construction thereof are hereinafter more fully set forth and described with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of a manually operated winch in accordance with this invention with parts partially taken off in order to show an inner construction;

FIG. 2 is a sectional view taken on line 2–2 in FIG. 1;

FIG. 3 is an enlarged sectional elevational view showing a cam shaft portion;

FIG. 4 is a plan view showing a condition before releasing; and

FIG. 5 is a plan view showing a condition after releasing.

Referring now more particularly to the drawings, there is disclosed, by way of example, a supporting cylinder 11 projects on a base plate 10, and a lower frame 12 is fixed to the inner side of the cylinder 11 by a key 13 and bolt (not shown). On the lower frame 12, an upper frame 15 is provided with suitable space from the frame by blocks 14. A cup-shaped drum 17 winding a wire 16 has internally toothed ratchet 20 and being rotatably supported out of the supporting cylinder 11 by a journal 18. A cover 19 is provided over the upper frame 15.

A shaft 21 is rotatably supported to the upper frame 15 and lower frame 12. Between the upper and lower frames 15 and 12, a high load cam 22 is fixed to the shaft 21 and a low load cam 23 is slidably mounted on the shaft by a key 24. Each cam has an involute profile respectively. As shown in FIG. 3, the low load cam 23 is connected to a rod 27 in the shaft 21 by a pin 26 through a slot 25 of the shaft 21. The rod 27 is slidably inserted in the shaft 21 and urged downwardly by a spring 28, and a collar 30 at the top of the rod is seated to a shoulder of a knob 31. A protrusion 32 projected downwardly from the under side of the knob 31 and extending in the direction right to the axis is engaged with a slot 33 at the top of the shaft 21.

At the center of the upper and lower frames 15 and 12 is secured a shaft 34 on top of which change levers 35 and 36 rotatably mounted, and a cam follower 37 and a holding lever 38 are also rotatably mounted on the shaft between the flanges. On the end of the cam follower 37, an advancing pawl 40 engageable with the ratchet 20 is rotatably mounted by a pin 41. There are also rotatably provided a detent pawl 42 and an arresting pawl 43 between the upper and lower frames by pins 44 and 45 respectively. The pawls 40 and 42 have rods 46 and 47 upwardly extending through holes (not shown) of the upper frame 15, and between the top ends of the rods and T-shaped arm ends 48 and 49 of a changing lever 35, springs 50 and 51 are connected respectively. There is also provided a spring 54 between a rod 52 and an end 53 of the changing lever 35. In the condition shown in FIG. 1, the springs 50 and 51 act so as to engage the pawls 40 and 42 with the ratchet 20, and the spring 54 acts to disengage the arresting pawl 43 from the ratchet. The cam follower 37 is engaged with the cam 22 by the spring 55 provided between the cam follower 37 and lever 38. Each changing lever 35 and 36 has generally triangular holes 56 and 57 in which are located arms 60 and 61 of handle shafts 58 and 59. Thus, if the shafts 58 and 59 are rotated, the changing levers are rotated by the arms 60 and 61.

In the condition shown in FIG. 1, when the handle 62 fixed to the shaft 21 is reciprocated, motion of the high load cam 22 causes the cam follower 37 to swing. Thus, the advancing pawl 40 operates to rotate the ratchet 20 and drum 17 in the clockwise direction to wind the wire 16. At the same time, the low load cam 23 is also rotated, but the cam is situated at the lower position where it does not engage with the cam follower 37.

In low load, the knob 31 is lifted against force of the spring 28 and turned 90° when the protrusion 32 is removed from the slot 33, and rested on the top of the shaft 21. Thus, the low load cam 23 is raised to the position in front of the cam follower 37 through the rod 27 as shown by the chain line. Under this condition, reciprocating the handle 62, the low load cam 23 operates to rotate the ratchet 20 and the drum 17.

In release of the drum, turning the handle shaft 59 in the counterclockwise direction in FIG. 1, the changing lever 36 is rotated in the counterclockwise direction by the lever 61 and the end 53 is moved to the position 53*a* shown by the chain line after passing through the neutral point of acting direction of the spring 54 to the pawl 43. Thus, the arresting pawl 43 is so arranged that the end of the pawl can not engage within the teeth of the ratchet 20 when the pawls 40 and 42 engage with the ratchet 20. Thus, the arresting pawl 43 engages with the top of the tooth of the ratchet as shown in FIG. 4. Thereafter, turning the level 60 in the counterclockwise direction by the handle shaft 58, the changing lever 35 is rotated in the counterclockwise direction and the ends 48 and 49 are moved to the positions 48*a* and 49*a* respectively. Thereby actuating directions of the springs 50 and 51 to the pawls 40 and 42 are inverted so that the pawls 40 and 42 are urged to disengage from the ratchet. However, the pawls 40 and 42 are not disengaged, because reverse revolution force of the ratchet by load acts to rotate the pawls to engage with the ratchet. Thereafter, manipulating the handle 62 to advance slightly the ratchet 20, the pawl 42 will be disengaged and the pawl 43 will be engaged with the ratchet. At that time, the lever 38 is rotated in the clockwise direction by the spring 55, the end 63 engages with the back side of the pawl 43 to arrest the disengagement of the pawl. Therefore turning reversely the handle 62 to free the pawl 40, the pawl is disengaged from the ratchet by the spring 50. When the shaft 21 is rotated in the clockwise direction by the handle 62, the lever 38 is rotated in the counterclockwise direction by the cam 23 so that the end 63 removes from the back side of the arresting pawl 43 as shown in FIG. 5. Thus, if the changing lever 36 is turned to the solid line position in FIG. 1 to change the actuating direction of the spring 54, the pawl 43 is disengaged from the ratchet so that the drum 17 will be released.

The pawl 43 is adapted to escape from the ratchet 20, if the ratchet reversely rotates. Therefore, even though the pawl 43 engages with the ratchet by the spring 54 without changing the lever 36, the ratchet can be released.

From the foregoing it will be observed that this invention provides a novel manually operated winch which is easily manufactured by pawls and a ratchet, and which does not need a brake mechanism because the arresting pawl holds the drum, which means that the winch is of simplified construction and facile to handle.

While particular embodiment of this invention has been illustrated and described herein, it is not intended to limit the invention to such a disclosure, and changes and modifications may be incorporated and embodied within the scope of the following claims.

I claim:

1. A manually operated winch comprising: a drum for winding a wire providing an internally toothed ratchet, a cam follower pivotally provided in said drum, an advancing pawl provided on said cam follower to engage with said ratchet, a detent pawl provided to prevent reverse rotation of said drum, an arresting pawl operable to escape in reverse rotation of said ratchet, a manually operable cam mechanism to rotate said cam follower, means for holding said arresting pawl in the condition engaging with said ratchet and changing means for said pawls to engage with or disengage from said ratchet, said pawls are so arranged that said arresting pawl can not engage within teeth of said ratchet when said advancing pawl and detent pawl engage with said ratchet.

2. A manually operated winch in accordance with claim 1 wherein said manually operable cam mechanism has a high load cam and low load cam and means for changing said cams.

3. A manually operated winch in accordance with claim 1

wherein said changing means comprise changing levers and spring provided between ends of said levers and pawls and are so arranged that the directions of forces of said springs for said pawls may be inverted.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,572,638 Dated March 30, 1971

Inventor(s) Tatsuguchi Masamitsu

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2 between lines 15 and 16, insert the following:
--urged to the ratchet 20. However, the arresting pawl 43 :
Line 20, change "level" to --lever--.
Column 4 line 2, change "spring" to --springs--.

Signed and sealed this 3rd day of August 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER,
Commissioner of Pate