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V. S. LUNDELL

2,370,740

WINDOW OPERATOR

Filed Oct. 14, 1942

2 Sheets-Sheet 1

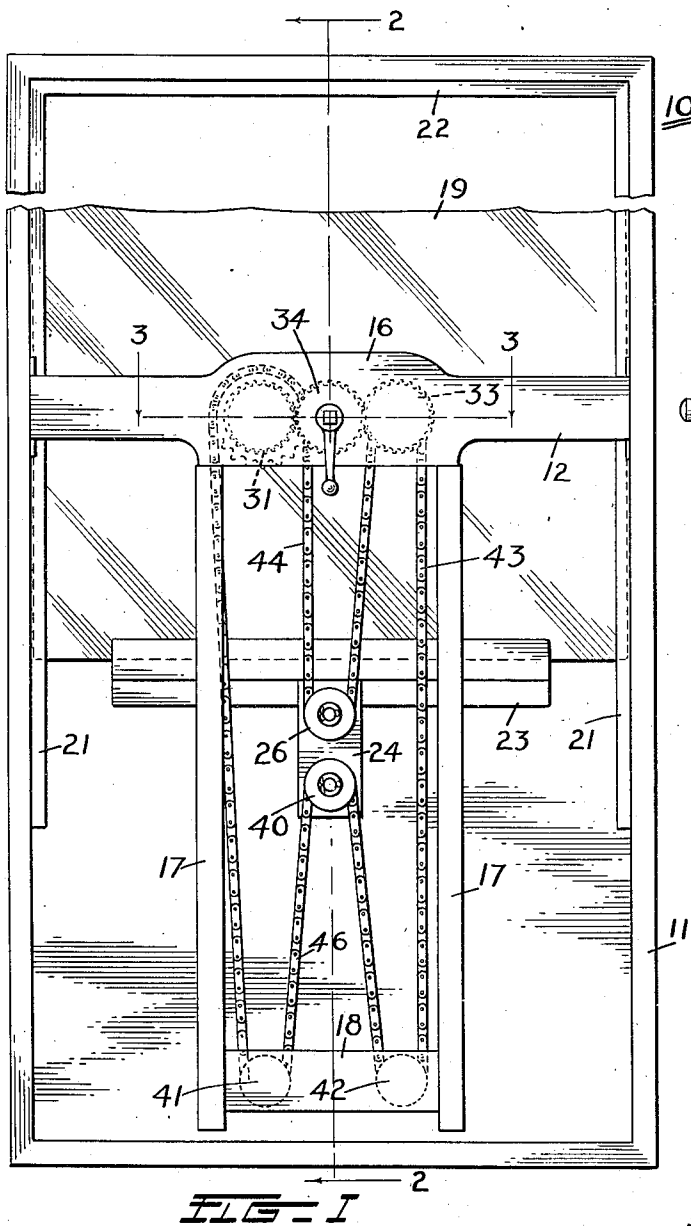


FIG. 1

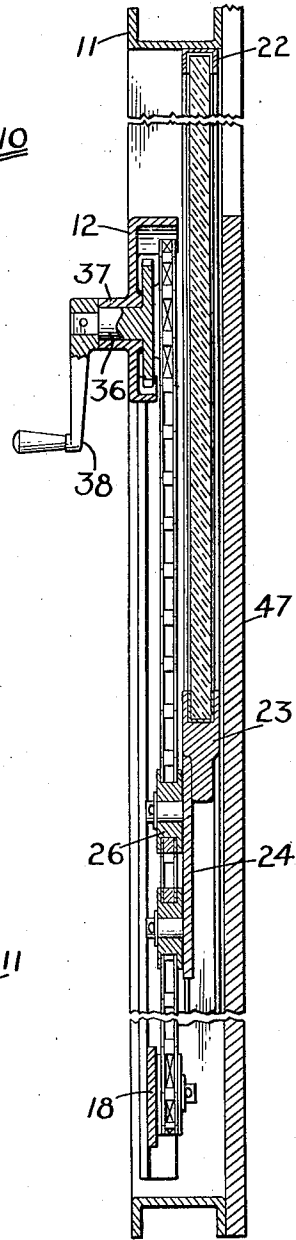


FIG. 2

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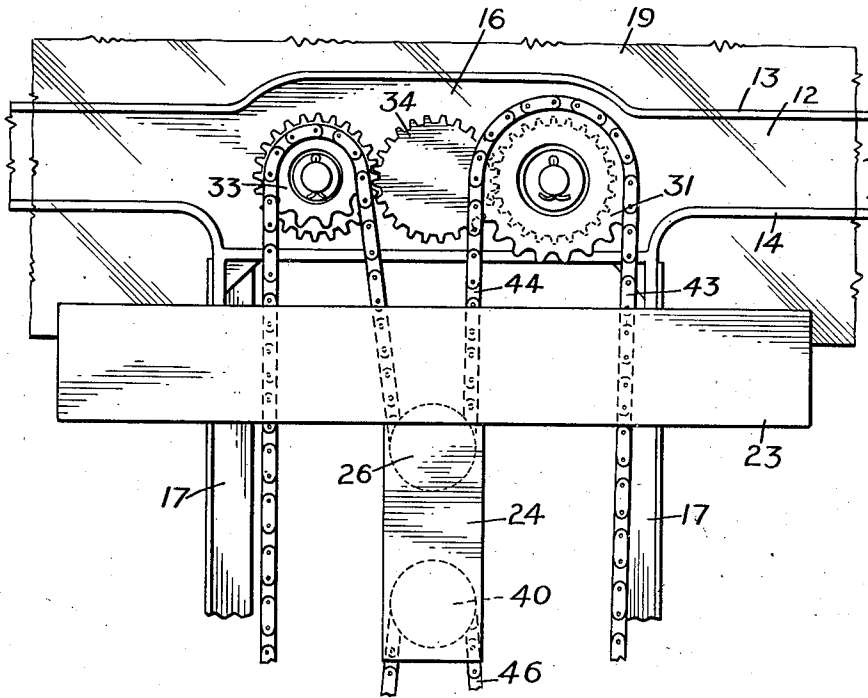
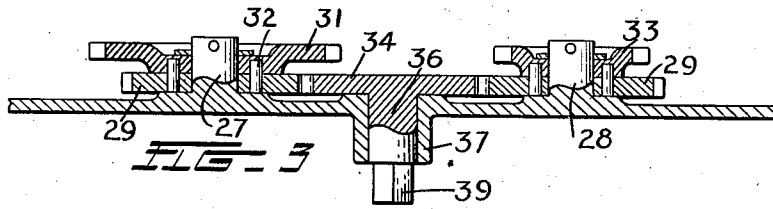


FIG. 4

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2,370,740

WINDOW OPERATOR

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Application October 14, 1942, Serial No. 461,911

5 Claims. (Cl. 268—128)

This invention relates to an improved operating mechanism for windows, and particularly to a mechanism for windows of the sliding type.

More specifically, the invention is directed to an operating mechanism for use with windows such as are commonly provided in ships. These windows are constructed with heavy frames and glass to withstand hard usage, and are not susceptible to operation by means of conventional operators. Windows of this nature must be capable of being so operated as to provide an effectual seal against the elements when in closed position and be positively held in such position, or in open position.

The present invention has for its object the provision of an operator of such ruggedness as to be capable of adjusting ships' windows or other heavy windows. Additionally, the invention provides an operator that is positive in its action and which, by reason of its low efficiency, assures the window remaining in any operated position. Additionally, the invention is directed to a heavy duty operation that is not only of simple design and construction, but is capable of adjustment to alter the ratio of movement between the operating handle and the window.

Other objects and advantages of the invention will be more fully understood from a consideration of the following specification, taken in conjunction with the accompanying drawings; and in which

Fig. 1 is a front elevational view of the invention mounted on a window structure, the front panel or enclosure of the operator having been removed;

Fig. 2 is an enlarged vertical sectional view of the structure of Fig. 1 and is taken substantially on line 2—2 of that figure;

Fig. 3 is an enlarged horizontal sectional view of a part of the operator mechanism, being taken substantially on the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged fragmentary rear elevational view of a part of the operator mechanism.

Referring to the drawings, the reference numeral 10 is employed to generally designate a window structure of the sliding sash type, to which is applied an operator embodying one form of the invention. In the present disclosure, the window structure includes only a single sash instead of the conventional two sashes, the single sash serving to close an opening in the upper portion of the frame of the structure. The window structure includes a rectangular frame 11 having a transverse rail 12 located approximately midway of the frame length. This rail is rigidly attached to the vertical side rails of the frame

and includes upper and lower flanges 13 and 14. Centrally, the rail is widened, as at 16, flanges 13 and 14 following this change in contour. Depending from the central portion 16 are angle members 17. These members are connected at their lower ends by a cross plate 18. The length of the members 17, or the position of plate 18, may vary, as operational requirements are altered, one window structure with respect to another.

A single sash 19 is mounted in guide channels 21 that are permanently attached, in any suitable manner, to the inner faces of the side rails of the frame 11. The channels join with a horizontal channel 22 that is attached to the top horizontal rail of the frame 11. Channels 21 and 22 may be provided with suitable rattle and weather-proofing material, such as felt, rubber, etc. The material applied to the channels is old and well known and forms no part of the invention.

The sash 19 is carried by a member 23. The upper edge of this member is formed with a channel opening in which the sash is securely positioned. Attached to, or integral with the member 23 is a depending bracket 24. It is noted that the member 23 spans the angle members 17 and that the bracket 24 is between these members. On the upper end of the bracket 24, adjacent the member 23, is a pulley 26. The central portion 16 of the rail 12 is provided with stud shafts 27 and 28. These shafts mount identical gears 29. However, shaft 27 is also fitted with a sprocket 31 secured, as by pins 32, to gear 29. Shaft 28 mounts a smaller sprocket 33 that is secured by pins to gear 29. The gears 29 are suitably spaced to mesh with an intermediate gear 34, preferably of the same diameter as gears 29. Gear 34 includes a shaft 36 that projects through a suitable opening in the rail 12, adequate bearing for the shaft being provided in a collar 37. A suitable crank 38 is mounted on the squared end 39 of the shaft 36.

Mounted on the lower end of bracket 24 is a pulley 40. Further pulleys 41 and 42 are mounted on the cross plate 18. An endless chain 43 extends over sprocket 31, downwardly beneath and around pulley 26 and thence upwardly again over sprocket 33. The chain then continues downwardly beneath and around pulley 42, upwardly over the upper portion of pulley 40, then downwardly over pulley 41, and again upwardly over sprocket 31.

It will be noted that sprockets 31 and 33 are of different size and, consequently, an uneven movement of the chain 43 takes place. This uneven movement is translated into a shortening or lengthening of the U-shaped portions 44 and

46 of the chain. As the portion 44 increases in length, portion 46 will correspondingly decrease in length, and since these portions of the chain move over pulleys 26 and 40 carried by bracket 24 on member 23, the sash 19 will be moved downwardly of the frame. Conversely, if the crank 38 is rotated in a direction to shorten portion 44 of the chain, that is, from the position of Fig. 1 to that of Fig. 4, member 23 will be raised and the sash 19 moved toward closed position.

Through the use of gears 29 and 34, together with sprockets 31 and 33, there can be no lost motion as between the crank and member 23. Thus the drive is positive and no operational slippage can occur. Additionally, by reason of the arrangement of the chain and pulleys, the mechanical advantage is such that the sash 19 may be moved into sealing closed position or into any open position despite the presence of any foreign matter in the guide channels 21 and 22. Furthermore, the sash, when moved into any position, will not become dislodged from such position through vibration, nor can it be adjusted from one position to another except through operation of the crank 38.

It is of course evident that the lower portion of the frame 11, between rail 12 and the bottom of the frame, is enclosed; the outside closure being suggested at 47 and the inside closure being entirely removed to disclose the working parts of the operator.

Although applicant has shown and described an operator with only one mechanical advantage ratio and one type of mounting for the length changing portions 44 and 46 of the chain, together with certain other specific structural details, it will be apparent that variations of this structure may be made and are contemplated insofar as such variations are within the scope of the invention as defined by the annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:

1. In a window structure having a frame and a window sash slidably mounted in the frame, a sash operator comprising a fixed horizontal rail substantially midway of the length of said frame, a pair of spaced apart differential sprockets, said sprockets being shaft mounted on said rail, gears for simultaneously rotating said sprockets in opposite directions, a sash carrying member, idler pulleys adjacent the lower end of said frame, an endless chain extending around and engaging the outer portions of said sprockets and said idler pulleys, looped portions of said chain between said sprockets and said idler pulleys, means on said member for engaging said looped portions, and operable means for rotating said gears to uniformly alter the relative length of said looped portions and move said sash carrying member.

2. In a window structure having a frame and a window sash slidably mounted in the frame, a sash operator comprising a rail fixed substan-

tially midway of the length of said frame, a pair of differential sprockets, said sprockets being shaft mounted on said rail in spaced relationship and each including a gear, a drive gear in mesh with the gear of each of said sprockets and operable to rotate said sprockets in opposite directions, a sash carrying member, idler pulleys on said member, fixed idler pulleys remote from said rail, an endless chain having drive engagement with said sprockets, a looped portion of said chain intermediate its engagement with said sprockets engaging one of the idler pulleys of said member, a further looped portion in said chain being formed by engagement of said chain with another idler pulley of said member and said fixed idler pulleys, and means for operating said drive gear to alter the relative length of the looped portions and thereby move said sash carrying member.

3. In a window structure having a frame and a window sash slidably mounted in the frame, a sash operator comprising a fixed rail, a pair of differential sprockets mounted on said rail, gears for simultaneously rotating said sprockets in opposite directions, a sash carrying member, idler pulleys on said member, fixed idler pulleys beneath said rail, an endless chain, a looped portion of said chain engaged with an idler pulley on said member intermediate its driving engagement with said sprockets, a further looped portion of said chain engaged with another idler pulley on said member, and means for rotating said gears to alter the relative length of the looped portions to move said sash carrying member.

4. In a window structure having a frame and a window sash slidably mounted in said frame, a sash operator comprising an endless chain or the like, drive members of different operative speeds and idler pulleys, said chain encompassing said members and pulleys, a sash carrying member, idler pulleys on said sash member, and looped portions of said chain engaged with the pulleys of said sash member, and means for operating said drive members to actuate said chain and alter the relative length of the looped portions whereby to raise or lower the sash carrying member.

5. In a window structure having a frame and a sash slidably mounted in said frame, a sash operator comprising a fixed member, a pair of differential sprockets on said member, means operable to rotate said sprockets in opposite directions, a pair of fixed idler pulleys, an endless chain or the like extending around and engaging the outer portions of said sprockets and said idler pulleys, said chain being of such length as to provide looped portions, a sash carrying member, and means on said sash carrying member engaged by said looped portions, said sprockets, when rotated, uniformly altering the relative length of said looped portions to effect movement of said sash carrying member.

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