June 20, 1961 J. MERCIER 2,989,303

ACTUATING MECHANISM FOR SLIDING MEMBERS

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FIG. 1

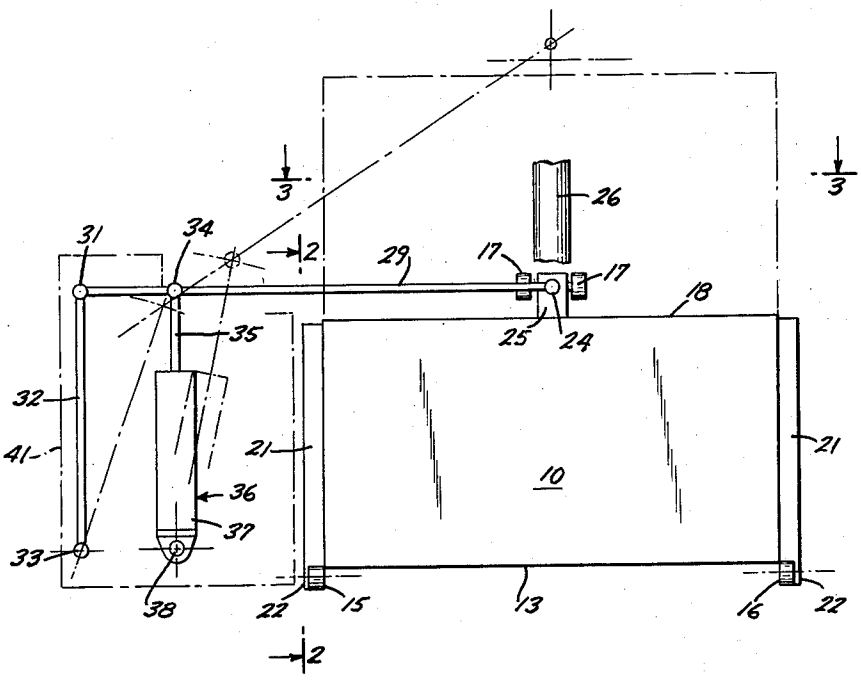
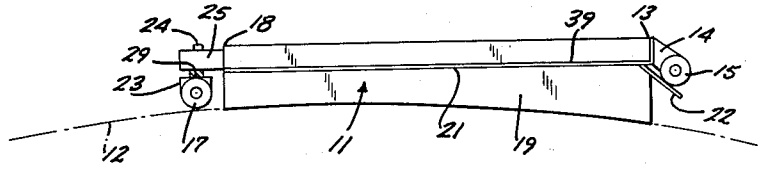


FIG. 2



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FIG. 3

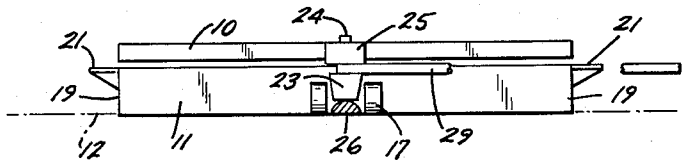


FIG. 4

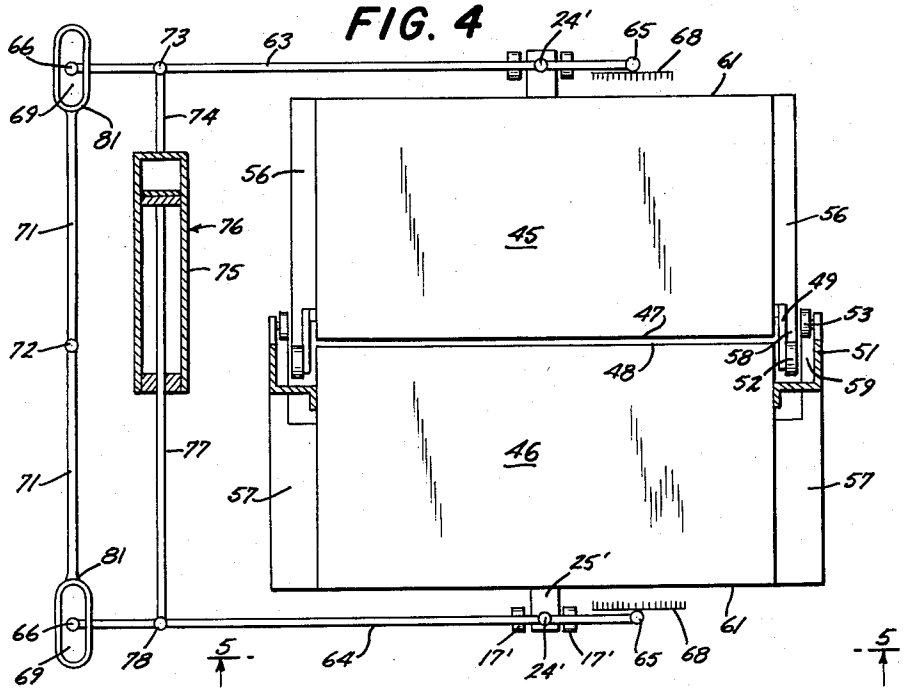
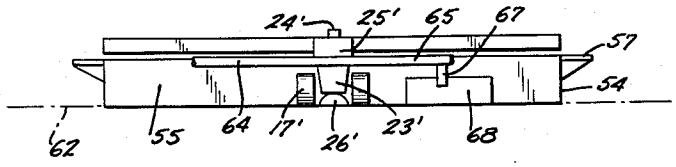


FIG. 5



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2,989,303

ACTUATING MECHANISM FOR SLIDING MEMBERS

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4 Claims. (Cl. 268—48)

This invention relates to actuating mechanism for sliding members and more particularly for hatch covers.

As conducive to an understanding of the invention it is noted that where hatch covers are displaced by cables and windlasses, free movement of personnel and cargo may be impeded and the cables may snarl with resultant inoperativeness. Where motor driven pinions and racks are used, the construction is relatively expensive.

It is accordingly among the objects of the invention to provide an actuating mechanism for a sliding panel that is relatively simple in construction, having but few relatively inexpensive parts that are not likely to become deranged and which will automatically and dependably effect movement of a sliding panel between open and closed position.

Where the sliding hatch cover panel is seated on the coaming of a hatchway when in closed position, and must be lifted slightly when initially laterally displaced toward open position, for heavy panels, considerable force is initially required for this purpose which, if directly applied to the panel would require a correspondingly large and bulky motor. Furthermore, since relatively little force is required to effect lateral movement of the panel once it has been lifted, the use of a large motor would be wasteful.

It is accordingly another object of the invention to provide an actuating mechanism of the above type which with a given actuating force in one direction will apply a greatly increased force to effect movement of the panel from closed position and thereupon automatically will reduce the force effecting continued movement of the panel from closed position and increase the rate of movement of the panel and will also effect closing of the panel at such increased rate.

According to the invention from its broader aspect, the force exerted by a motor disposed exteriorly of the panel is transmitted to the latter by a lever that is displaced in a plane below the plane in which the panel is displaced and substantially parallel thereto.

According to a specific embodiment of the invention, the lever against which the motor reacts has associated elements and is so mounted that upon initial actuation of the motor to move the panel from closed position, the lever will function as a lever of the second class with resultant greater force applied to move the panel than that applied to actuate the lever and with continued outward movement of the panel automatically will function as a lever of the third class with enhanced rate of displacement of the panel.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

FIG. 1 is a plan view of a single hatch cover panel and associated actuating mechanism,

FIG. 2 is a view taken along line 2—2 of FIG. 1,

FIG. 3 is a view taken along line 3—3 of FIG. 1,

FIG. 4 is a plan view of another embodiment of the invention, and

FIG. 5 is a view taken along line 5—5 of FIG. 4.

Referring now to FIGS. 1 to 3 of the drawings, a rectangular panel 10 is provided adapted to be positioned over a hatchway to close the latter. The panel when in closed position rests on a coaming 11 (FIG. 2) rising from the deck 12 of a ship for example, suitable gaskets

(not shown) being provided to effect a seal when the panel is in closed position.

The panel 10 at each end of its side edge 13 has a downwardly inclined arm 14 (FIG. 2) the lower end of each of which mounts a roller 15, 16 and guiding means, illustratively a pair of rollers 17 are mounted on the side edge 18 of the panel, respectively positioned on each side of the center thereof.

Extending along each of the upper edges of the side walls 19 of the coaming 11 are lateral rails 21, the ends 22 of which adjacent the edge 13 of the panel being inclined downwardly, say, at an angle of 45 degrees.

The rollers 17 are mounted on a support 23 secured to the lower end of a pin 24 depending from an arm 25 extending laterally outward from the center of said edge 18, said rollers 17 being positioned so that they will ride on the deck 12. The rollers are guided by a rail 26 (FIG. 3) positioned therebetween, said rail 26 protruding only slightly above the deck 12 so that it will not interfere with the movement of personnel or equipment.

Pivotally connected to pin 24 between arm 25 and support 23 at a level below the plane of movement of the panel 10 is one end of a lever 29. The other end of lever 29 is pivotally connected as at 31 to one end of a connecting rod 32, the other end of which is pivotally connected as at 33 to a fixed support laterally displaced from the hatchway.

Pivotally connected as at 34 to the lever 29 adjacent the pivot 31 thereof is the outer end of the piston rod 35 of a hydraulic jack 36, the cylinder 37 of which is pivotally connected as at 38 to a fixed support also laterally displaced from the hatchway.

The connecting rod 32 and the jack 36 are desirably substantially parallel when the panel 10 is in closed position, so that the force which the lateral components exert upon the pivot 24 when the panel 10 is moved to open position by lever 29, will be reduced.

The jack 36 and the connecting rod 32 as well as a portion of lever 29 are desirably covered by a hood or casing 41, the latter having a lateral opening in its side wall to permit displacement of the lever 29.

Desirably the upper surface of the casing 41 lies in the same horizontal plane as that of the panel 10 so that a flat surface is provided on which a crew member may stand while loading the hatch.

In operation of the unit, when the jack 36 is actuated to effect outward movement of its piston rod 35, the panel 10 will be moved to the open position shown in dot and dash lines in FIG. 1.

As the panel initially moves to the left from the closed position shown in FIG. 2, the rollers 15, 16 will ride up the inclined portions 22 of the rails 21. This will immediately lift the associated edge 13 of the panel 10 so that the latter will be at a slight incline from the horizontal with the lower edge 39 of the panel spaced from the upper edge of the coaming 11. Consequently, no injury will be imparted to the sealing gaskets as the panel is moved to fully open position.

Similarly, when the piston rod 35 of the hydraulic jack 36 is retracted to move the panel 10 to closed position, the rollers 15 and 16 riding on the rails 21 will retain the lower edge 39 of the panel 10 spaced from the upper edge of the coaming until the panel has reached substantially its fully closed position. At this time the rollers 15 and 16 will ride down the inclined portion 22 of the rails 21 for full closure of the panel 10 without injury to the gaskets.

In the embodiment shown in FIGS. 4 and 5, two rectangular panels 45 and 46 are provided to close the hatchway, the panels being movable in opposed directions.

The panels 45 and 46 at each end of their adjacent edges 47 and 48 have downwardly inclined arms 49, 51,

the lower end of each of which mounts a roller 52, 53, the arm 51 being positioned outwardly of the arm 49 to permit free movement of the panels.

Extending along each of the upper edges of the side walls 54 of the coaming 55 are lateral rails 56, 57, the inner ends 58, 59 of which are inclined downwardly, say at an angle of 45 degrees, the rollers 52 and 53 riding on rails 56 and 57 respectively.

A pair of rollers 17' are mounted on a support 23' secured to the lower end of a pin 24' depending from an arm 25' extending laterally outward from the center of the side edges 61 of each of the panels, said rollers respectively being positioned on each side of the center of said panels, straddling a guide rail 26' and riding on the deck 62.

Pivotally connected to each of the pins 24' between arm 25' and support 23' at a level below the plane of movement of the associated panel are levers 63 and 64, said pivotal connections being between the ends 65, 66 of each lever. The end 65 of each lever mounts a depending pin 67 (FIG. 5) adapted to abut against an associated fixed stop 68 upon initial movement of the panels from closed position.

The other end 66 of each of the levers is pivotally and slidably mounted in an elongated slot 69 at one end of an associated connecting rod 71, the other ends of said rods being pivotally connected to a fixed support 72.

Pivotally connected to lever 63 as at 73 is one end of a rod 74 secured at its other end to the cylinder 75 of a hydraulic jack 76. The free end of the piston rod 77 of the jack 76 is pivotally connected as at 78 to lever 64.

In operation of the unit when the jack 76 is actuated to effect outward movement of its piston rod 77, the cylinder 75 of the jack will also move outwardly. As a result, an outward component of force will be applied to points 73, 78.

By reason of the location of the points 65, 24', 73 and 65, 24', 78 of levers 63, 64 respectively, each of the levers will function as a force multiplier, i.e., as levers of the second class. Thus, as the pins 67 will abut against the stops 68, the panels will start to move away from each other, the ends 66 of each of the levers moving along the length of the associated slots 69.

As the panels initially move away from each other from the closed position shown in FIG. 4, the rollers 52, 53 on each panel will ride up the associated inclined portions 58, 59 of the rails 56, 57. This will immediately lift the associated edges 47, 48 of the panels 45, 46 so that the latter will be at a slight incline from the horizontal with the lower edge of the panels spaced from the upper edge of the coaming 55.

Consequently, no injury will be imparted to the sealing gaskets as the panels are moved further to fully opened position.

With continued actuation of jack 76, the pivoted ends 66 of levers 63, 64 will engage the outer ends of the associated slot 69. As a result, the ends 65 of the levers will move away from the associated stop 68 and the panels will continue their outward movement, the levers now acting as multipliers of distance, i.e., as levers of the third class to increase the rate of opening movement.

To close the panels 45, 46, the hydraulic jack 76 is actuated to effect inward movement of its piston rod 77. As a result, the ends 66 of levers 63, 64 will abut against the ends 81 of slots 69 and thereupon the ends 65 of levers 63, 64 will move toward each other to effect inward movement of the panels to fully closed position, the levers functioning as levers of the third class for rapid closing movement of the panels.

Although in the illustrative embodiment shown the panels, when actuated, move clear of the hydraulic jacks, it is within the scope of the invention to have covers extend beyond the hatch opening over such hydraulic jacks.

The actuating mechanism above described, although of general application, is especially suitable for hatch cover panels. Thus, since none of the actuating mechanism is carried by the panels, the weight of the latter is greatly reduced so that smaller motors may be used for actuation thereof. In addition, since the actuating mechanism is covered, personnel of the ship may readily move about, which facilitates loading.

As many changes could be made in the above equipment and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. Mechanism for moving a slidably mounted panel substantially horizontally along a straight path over an opening from a first position to a second position to open and close said opening, comprising a lever extending in substantially a horizontal plane between the plane of the top surface of said panel and the plane of the opening and pivotally connected at one end to the panel near one of its edges, a pivotal mount for the end of the lever remote from the connection thereof to said panel, said lever being clear of said panel and said opening in the second position of said panel and clear of said opening in the first position of said panel, and a motor disposed exteriorly of said opening and reacting against said lever between its pivotal connection to the panel and the end of the lever remote from said pivotal connection to effect displacement of said panel.

2. Mechanism for moving a slidably mounted panel substantially horizontally along a straight path over an opening from a first position to a second position to open and close said opening, comprising a lever extending in substantially a horizontal plane below the plane of the top surface of said panel, and pivotally connected at one end to the panel near one of its edges, a connecting rod pivoted at one end to a fixed support positioned laterally of the panel and pivotally connected at its other end to the other end of said lever remote from the connection thereof to said panel, said lever being clear of said panel and said opening in the second position of said panel and clear of said opening in the first position of said panel, a motor disposed exteriorly of said opening comprising a hydraulic jack having a casing element and a movable element, the end of one of said elements being pivotally connected to said lever and the end of the other element being pivotally connected to a fixed support, said motor being positioned laterally of said panel and reacting against said lever between the two ends of the latter to effect displacement of said panel, a line extending between the pivoted ends of said connecting rod being substantially parallel to a line extending between the pivoted ends of said hydraulic jack.

3. Mechanism for moving a pair of slidably mounted panels in opposite directions substantially horizontally along a straight path over an opening from a first position to a second position to open and close said opening, comprising a pair of levers associated respectively with each of said panels and extending in substantially a horizontal plane below the plane of the top surface of said panel, one end of each of said levers being pivotally connected to an associated panel at the outer edge of said panels, each of the other ends of said levers having a pivotal mount remote from the connection thereof to said panels, both of said levers being clear of said panels and said opening in the second position of said panels and clear of said opening in the first position of said panels, and a motor common to both said levers and disposed exteriorly of said opening and reacting against said levers between their pivotal connection to the associated panel and the end of the lever remote from said pivotal connection to effect displacement of said panels in opposite directions.

4. Mechanism for moving a slidably mounted panel substantially horizontally along a straight path over an opening from a first position to a second position to open and close said opening, comprising a lever extending in substantially a horizontal plane below the plane of the top surface of said panel and pivotally connected near one end to the panel near one of its edges, a connecting rod pivoted at one end to a fixed support positioned laterally of the panel and pivotally connected at its other end to the other end of the lever remote from its connection to the panel, said lever being clear of said panel and said opening in the second position of said panel and clear of said opening in the first position of said panel, said connecting rod having an elongated slot at said other end to permit sliding movement of the end of the lever pivoted thereto, said lever having a portion extending beyond the pivotal connection thereof to said panel and a fixed stop

associated with the end of said extending portion, a motor disposed exteriorly of said panel and reacting against said lever between its pivotal connection to the panel and the end of the lever remote from said pivotal connection, whereby when said lever is initially pivoted by said motor to effect displacement of said panel the end of said extending portion will abut against the stop so that said lever functions as a lever of the second class, and with subsequent movement of said lever it will function as a lever of the third class.

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