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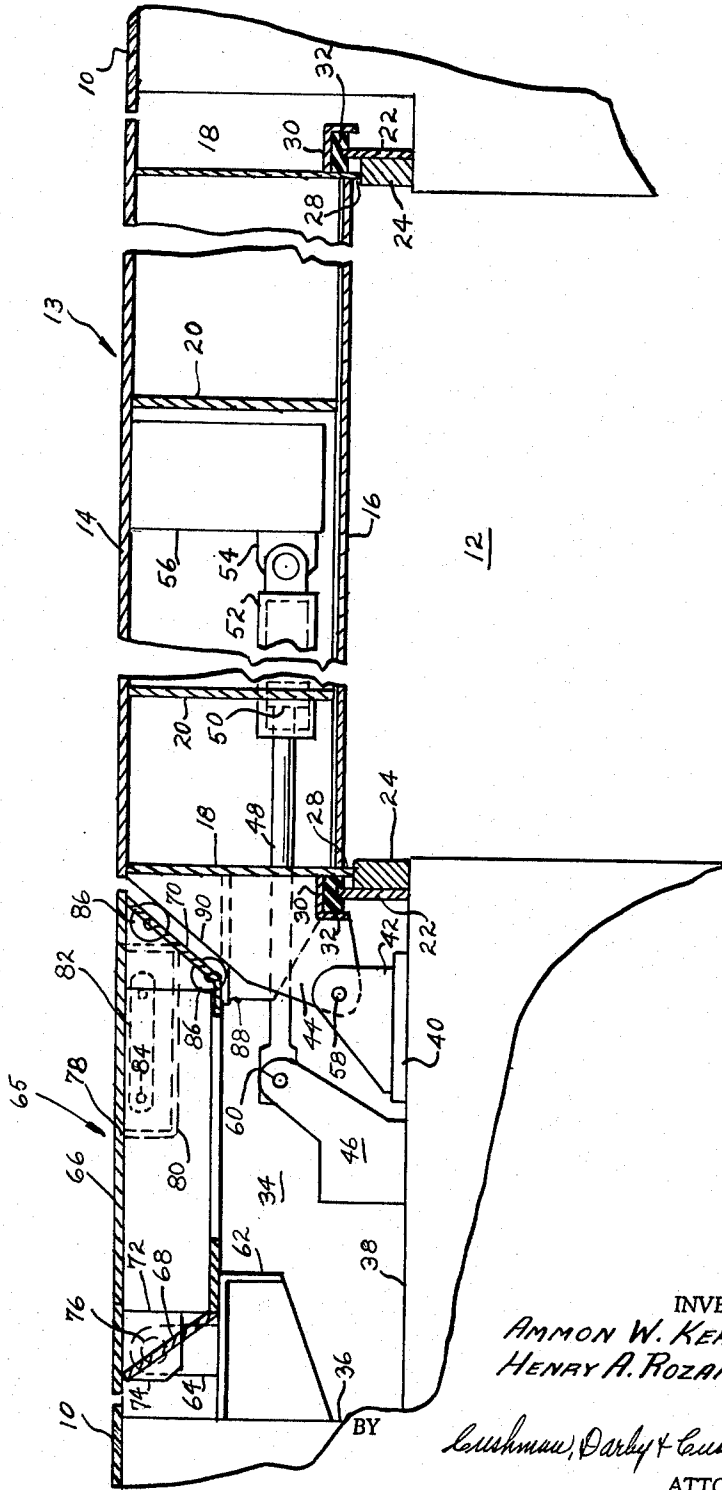
3,179,079

HATCH COVER ARRANGEMENT

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3 Sheets-Sheet 1

Fig. 1.



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3 Sheets-Sheet 2

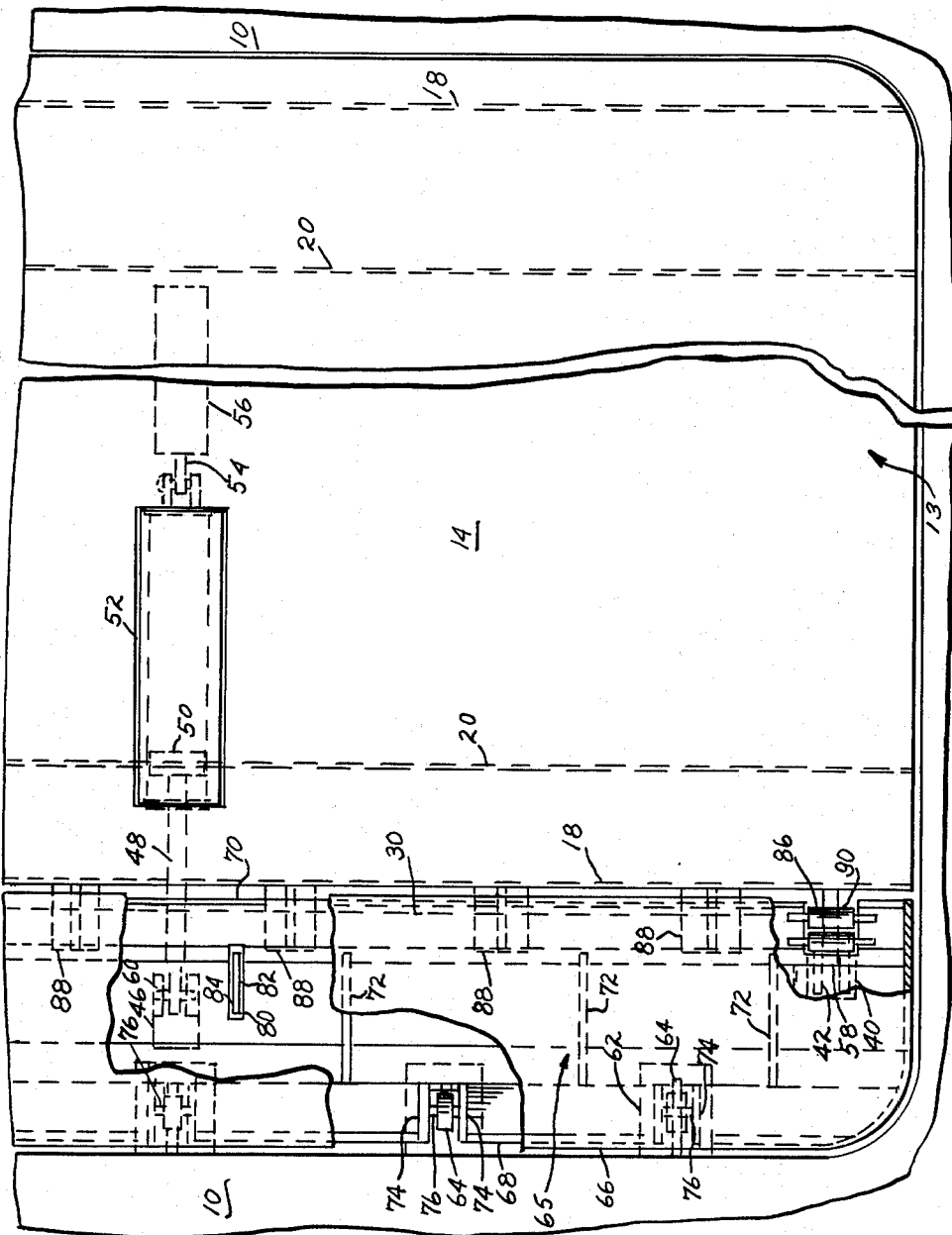


Fig. 2.

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HATCH COVER ARRANGEMENT

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This present invention relates to an improvement in a hatch cover arrangement wherein the hatch cover is coplanar with the adjacent deck structure when in its closed position and, more particularly, to the actuating mechanism for such a hatch cover arrangement.

In the past, mechanical actuation arrangements have been provided for operating hatch covers. However, these arrangements have resulted in serious shortcomings such as the extension of at least a part of the actuating mechanism above the level of the deck structure when the hatch cover was closed or in the structure where the actuating mechanism was recessed below the level of the adjacent deck structure, the hatch covers were necessarily cumbersome. In addition, a major problem has been the provision of an effective seal of the hatch with the hatch cover in the closed position.

An important object of the present invention is to overcome the shortcomings of prior art structures by providing an improved hatch cover arrangement having an actuating mechanism which is recessed entirely below the level of the deck.

Ancillary to the immediately preceding object, it is a further object of the invention to provide an integrated cover plate arrangement for covering the actuating mechanism, the cover plate being automatically operative on actuation of the hatch cover.

Another object of the present invention is to provide a hatch cover actuation arrangement which maintains the upper surface of the hatch cover flush with the adjacent deck structure when in the closed position and which projects the hatch cover a minimum distance above the deck when the cover is opened.

Still another object of the invention is to provide improved sealing means for the hatch when the hatch cover is closed.

Further objects and the entire scope of the invention will become more fully apparent when considered in light of the following detailed description of an illustrative embodiment of the invention and from the appended claims.

The illustrative embodiment may be best understood by reference to the accompanying drawings wherein:

FIGURE 1 is a fragmentary vertical sectional view partly in elevation and partly broken away of the illustrative embodiment with the hatch cover in its closed position;

FIGURE 2 is a fragmentary top plan view of the hatch cover arrangement of FIGURE 1 partially broken away to illustrate the cover plate and hatch cover hinge means; and

FIGURE 3 is a fragmentary vertical sectional view, similar to FIGURE 1, but illustrating the hatch cover in its opened position.

Briefly, the invention comprises a hatch cover arrangement wherein the hatch cover is pivotally connected to one end of a hydraulic cylinder, the piston rod of the piston within this cylinder being pivotally connected to

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a support member positioned in a recess, or well, provided in the deck adjacent one side of the hatch. The hatch cover is pivotally mounted to other support means within this recess such that on supplying the cylinder with pressure, the cylinder moves with respect to the piston and its piston rod thereby pivoting the hatch cover from a closed to an open position. On reversing the hydraulic pressure, the hatch cover returns to its original closed position. About the hatch opening there is provided a metallic seal bar which cooperates with a gasket surrounding the lower side portions of the hatch cover to positively seal the hatch preventing moisture from entering the hatchway and tank contents from escaping the hatchway. Equally spaced support blocks adjacent to the previously described seal bar, limit the amount of gasket compression. By mounting the pivoting means and the hydraulic actuation device for the hatch cover within the recess in the deck, the upper surface of the hatch cover is positioned coplanar with the adjacent deck structure.

To cover the recess, a cover plate assembly is provided, the principal cover plate portion of which is also coplanar with the deck and with the upper surface of the hatch cover. This cover plate assembly is pivotally mounted to be automatically opened when the hatch cover is displaced from its closed position thereby preventing the cover plate from interfering with the hatch cover operation. Actuation of the cover plate is accomplished by providing rollers on the cover plate assembly which cooperate with cammed or inclined surfaces of the hinge blades for the hatch cover such that on opening, the rollers ride along the hinge blades in a generally upwardly direction to then engage the upper surface of the hatch cover during the final portions of displacement thereof as the cover is fully opened. On closing of the hatch cover, the rollers of the cover plate assembly move downwardly, due to the weight of the assembly, along the upper surface of the hatch cover and then along the hinge blades allowing the cover plate to resume its initial position substantially flush with the deck and the upper surface of the hatch cover.

Now that the invention has been broadly described, the precise structure of the illustrative embodiment will be set forth with reference to the drawings wherein like character or reference numerals represent like or similar parts. Referring to FIGURES 1 and 2, there is illustrated generally the deck structure 10, which for convenience has been illustrated as being a conventional flat surfaced deck arrangement. Within the deck structure there is provided a hatch or opening shown generally at 12. A hatch cover, indicated generally at 13, covers hatch 12. The structure of the hatch cover includes substantially parallel upper and lower elements 14 and 16 which are interconnected to each other by side walls 18 and a plurality of vertical braces 20. A metallic rim 22, which serves as a seal bar for the hatch cover gasket when the cover is in its closed position, is mounted about the opening of hatch 12. Equally spaced support blocks 24, positioned adjacent seal bar 22 and attached thereto, provide a positive stop for hatch cover 13 when in the closed position. Spacer blocks 24 also limit the compression of the sealing gasket 32. A generally L-shaped member 30 is connected to the outside periphery of the walls 18 of hatch cover 13. This member provides a channel within which a resilient gasket 32 is positioned. Gasket 32 serves as a sealing means for the hatch by engaging the rim or seal

bar 22 when the hatch cover is closed, thereby positively compressing the gasket to seal the hatch. The engaging surface of gasket 32 lies in a plane substantially parallel to elements 14 and 16 of the hatch structure and to the upper surface of seal bar 22 during engagement.

A recess or well, generally indicated at 34, is provided in the deck 10 immediately adjacent one side of the hatch 12. This recess is defined by a side wall 36 and a bottom wall 38. Hinge support means for the hatch cover 13 and actuating means by which the hatch cover may be pivoted about the hinge means to move the hatch cover between its opened and closed positions are mounted within the well. The hinge means comprises a plurality of spaced support bases 40 which are mounted on the upper surface of the bottom wall 38 of recess 34. Hinged supports or apertured ears 42 are attached to each of the bases 40. These hinge supports are pivotally connected by pins 58 to hinge blades 44 which are attached to the hatch cover 13 along the side wall 18 adjacent the recess. Pins 58 lie in a plane which is substantially that defined by the surface of gasket 32 which engages the seal bar 22. This positioning eliminates gasket chafing as the hatch cover is opened.

A vertically extending support member 46 is also mounted on the upper surface of the bottom wall 38 of the recess 34. A piston rod 48 is pivotally connected at one of its ends to this vertical support 46 by pin 60. This piston rod extends through an aperture in the side wall 18 of the hatch cover 13 adjacent the recess and is connected at its opposite end to a piston 50 located within a cylinder 52 below the level of the upper surface 14 of the hatch 13. The cylinder 52 is pivotally connected to a tab 54 which is joined to a vertically extending stud 56 mounted to the underside of upper surface 14. This hydraulic cylinder arrangement provides the actuating means for pivoting the hatch cover in a manner to be described hereinafter.

In order to achieve the pivoting movement, the positioning of the relative pivot points of the hatch cover and the actuating means is most important. As stated previously, both the pivoting pins 58 and 60 for the hatch cover and the actuating means respectively, are positioned within the recess 34. The hatch cover is pivotally connected to the hinge supports 44 by pins 58 which are positioned below the level of the upper surface of the adjacent deck structure, and substantially parallel thereto. The pivot pin 60 of the piston rod is positioned above the level of the hatch cover pins 58 and is displaced further from the hatch cover than are pivot points 58. However, pin 60 is also below the level of deck 10. As shown in FIGURE 1, this relative positioning of the pivot pins allows a counterclockwise movement of the hatch cover when the actuating means is energized to move the hatch from the closed to the opened position.

A plurality of shelves 62 are spaced along the wall 36 of the well. Hinge support members or apertured ears 64 are attached to the upper surfaces of these shelves. These support members provide a mounting for the pivotal movement of a cover plate assembly generally indicated by the numeral 65 which is located above the recess 34 having its upper surface 66 substantially coplanar with the adjacent deck 10 and the upper surface 14 of the hatch cover when the hatch cover is in its closed position. This cover plate assembly 65 comprises a principal cover plate portion 66 which serves as the upper surface of the assembly. Angle bars 68 and 70, which extend transversely of the recess 34 as seen in FIGURES 1 and 2, are mounted to the underside of the portion 66 at opposite ends thereof. These bars are generally L-shaped having obtuse interior angles along their lines of bending. The bars 68 and 70 are interconnected to each other by means of vertically extending support members 72 which unite the inwardly directed free ends of the angle bars to the underside of plate 66. A plurality of spaced pairs of hinge members 74 project through slots provided in

angle bar 68, each pair being pivotally joined to its associated hinge support 64. The hinge members 74 of each pair are positioned on opposite sides of their respective support members 64 and are joined thereto by means of pins 76.

A slot 78 is provided in the upper surface of the cover plate assembly 65. A cup-like structure 80 is attached beneath the slot to the underside of plate 66. A lever 82, which is pivotally connected to the cup-like structure by means of a pin 84, serves to provide a means for manually pivoting the cover plate about pins 76 to open and close the cover plate independently of the hatch cover actuation. Located in apertures within the angle bar 70 are pairs of rollers 86, the function of which will be described hereinafter.

A plurality of spaced shelves 88 are mounted to the side wall 18 of the hatch cover which is adjacent the recess 34. With the hatch cover 13 in its closed position, these shelves 88 and shelves 62, attached to wall 36 of the recess 34, serve as supports for the angle bars 68 and 70 thereby supporting the entire cover plate assembly 65. The rollers 86 are mounted to the angle bar 70 immediately adjacent the hinge blades 44 and are slightly spaced therefrom with the hatch cover in its closed position. The surfaces 90 of the hinge blades adjacent the rollers are cammed or inclined for a purpose to be described in regard to the operation of the arrangement.

Now that the structure of the illustrative embodiment has been set forth, its operation will be described. As stated previously, in the closed position shown in FIGURE 1, the projections 28 of the side walls 18 of the hatch cover rest on the support blocks 24 attached to the rim 22. This allows the seal bar 22 to indent the resilient gasket 32 to insure the sealing of the hatch 12. In this position the cover plate 65 above the recess is closed, the angle bars 68 and 70 rest on shelves 62 and 88, respectively, and the rollers 86 are spaced slightly from the inclined or cammed surfaces 90 of the hinge blades 44. When the hatch cover is closed, the deck structure 10, the cover plate 65 and the upper surface 14 of the hatch 13 are substantially coplanar. Upon introduction of fluid to the left of piston 50 in the hydraulic cylinder 52, which is preferably of the double acting type, the cylinder 52 moves with respect to the piston thereby creating a counterclockwise moment about pin 58 causing the hatch cover to be elevated towards its open position. As the movement of the cover progresses, the inclined or cammed surfaces 90 of the hinge blades 44 engage first the upper ones of the pairs of rollers 86. This contact causes the cover plate 65 to be elevated thereby pivoting it about pin 76. As the upward movement of the hatch cover continues, the inclined surfaces 90 of the hinge blades become more vertically oriented to thereby contact the lower ones of the pairs of rollers 86 to continue elevation of the cover plate. As the operation progresses, these lower rollers ride to the uppermost portion of inclined surfaces 90 and then continue their motion onto and along the upper surface 14 of the hatch cover 13. The relative positions of the hatch cover and the cover plate when the cover is fully opened may be seen by reference to FIGURE 3. As is obvious from this figure, the hatch cover extends in a vertical direction and since its lowermost point is within the recess 34, its vertical displacement is at a minimum with respect to the deck structure above. The cover plate 65, however, is at an angle inclined with respect to the vertical as the lower rollers 86 still rest against the upper plate 14 of the hatch cover.

On changing of the hydraulic condition within the cylinder to close the hatch cover, the reverse process occurs. As the hatch cover closes, the lower rollers 86 ride along the plate 14 of the hatch cover until they reach the edge thereof and then begin to ride downwardly along the inclined surfaces 90 of the hinge blades until such a time as the upper rollers engage these inclined surfaces. As the hatch cover completes its closure, the seal bar

22 depresses the resilient gasket 32 until the projections 28 of the side walls 18 of the hatch cover stop the downward motion of the hatch cover upon coming in contact with support blocks 24. Simultaneously, the cover plate assembly 65 comes to rest on shelves 62 and 82. At this point, the hatch cover may be locked by suitable means (not shown) to maintain the hatch cover in its closed position. The degree of compression of the gasket is controlled by this stopping arrangement which limits the movement of the hatch cover when closed. Thus, an effective seal is achieved without undue compression of the gasket.

The above described embodiment is illustrative of a preferred embodiment of the invention but is not intended to limit the possibilities of insuring automatic hatch cover actuation of a hatch cover positioned flush with the adjacent deck in order to provide minimum extension of the hatch cover above the deck when opened, and to automatically operate cover plates overlying the recess in the deck adjacent the hatch cover. The hatch cover actuation arrangement disclosed herein is an example of an arrangement in which the inventive features of this disclosure may be utilized, and it will become apparent to one skilled in the art that certain modifications may be made within the spirit of the invention as defined by the appended claims.

What is claimed is:

1. In a hatch cover arrangement of the type including a hatch cover which is substantially coplanar with the upper surface of an adjacent deck structure when closing a hatch therein, the improvement comprising: means hinging said hatch cover for pivotal movement on an axis spaced below and substantially parallel to the upper surface of the deck structure, actuating means connected to said hatch cover and to the adjacent deck structure below the level of the upper surface of the same for pivoting said hatch cover about said hinging means, said hinging means being supported at a level below that of said actuating means and positioned intermediate the hatch cover and the connection of the actuating means to the deck structure thereby allowing said hatch cover to open and close when said actuating means is actuated.

2. The hatch cover arrangement of claim 1 wherein said hinging means is supported at a level to allow only a portion of the entire hatch cover to extend above the adjacent deck structure when said hatch is fully opened.

3. The hatch cover arrangement of claim 1 including a recess in said deck structure adjacent one side of and open to said hatch, said hinging means and the connection of said actuating means being positioned within said recess, whereby a portion of said hatch cover is received in said recess when said hatch cover is opened.

4. The hatch cover arrangement as defined in claim 3 including a cover plate pivotally connected to said deck structure within said recess, said cover plate having its upper surface coplanar with hatch cover and with the upper surface of said deck.

5. The hatch cover arrangement as defined in claim 1 wherein said hatch cover has a downwardly extending peripheral flange, a gasket supported about the periphery of said hatch cover above the lower end of said flange, and a seal bar rigidly supported about the periphery of the hatch below the upper surface of the deck structure for engaging said gasket and sealing said hatch when the hatch cover is closed, the surface of said gasket engaging the seal bar lying in a plane substantially parallel to the upper surfaces of the hatch cover and the seal bar when the hatch cover is closed.

6. The hatch cover arrangement as defined in claim 5 wherein the axis of pivotal movement of said hatch cover lies in substantially the same plane as the surface of said gasket which engages the seal bar.

7. In a hatch cover arrangement of the type including a hatch cover which is coplanar with adjacent deck struc-

ture when closing a hatch therein, the improvement comprising: a recess in said deck structure, means supported within said recess for pivoting said hatch cover within said recess, cover plate means for covering said recess, said cover plate means positioned coplanar with said hatch cover and the adjacent deck structure when said hatch cover is closed, means for hinging said cover plate to the deck structure within said recess, means for pivoting said cover plate about its hinging means in response to the pivoting of said hatch cover to thereby simultaneously displace the hatch cover and the cover plate means, and supporting means upon which said cover plate means rests when in its closed position comprising shelves positioned within said recess and attached to both the hatch cover and the deck structure.

8. In a hatch cover arrangement of the type including a hatch cover which is coplanar with adjacent deck structure when closing a hatch therein, the improvement comprising: a recess in said deck structure along one side of the hatch, means for hinging said hatch cover within said recess, cover plate means for covering said recess, said cover plate means positioned substantially coplanar with said hatch cover and the adjacent deck structure when said hatch cover is closed, means for hinging said cover plate to the deck structure within said recess, and means for pivoting said cover plate about its hinging means in response to the opening and closing of said hatch cover thereby simultaneously displacing the hatch cover and the hatch plate.

9. In a hatch cover arrangement of the type including a hatch cover which is coplanar with adjacent deck structure when closing a hatch therein, the improvement comprising: a recess in said deck structure along one side of the hatch, means supported within said recess for hinging said cover within said recess, actuating means connected to said hatch cover and to the adjacent deck structure below the level of the same for pivoting said hatch cover about said hinging means, thereby opening and closing said hatch cover; the arrangement further comprising cover plate means for covering said recess, said cover plate means positioned coplanar with said hatch cover and the adjacent deck structure when said hatch cover is closed, means for hinging said cover plate to the deck structure within said recess, and means for pivoting said cover plate about its hinging means in response to the actuation of said hatch cover thereby simultaneously displacing the hatch cover and the cover plate.

10. In a hatch cover arrangement of the type including a hatch cover which is coplanar with adjacent deck structure when closing a hatch therein, the improvement comprising: a recess in said deck structure, means supported within said recess for hinging said hatch cover within said recess actuating means connected to said hatch cover and to the adjacent deck structure below the level of the same for pivoting said hatch cover about said hinging means, and combined stop and sealing means associated with said hatch cover to positively position said hatch cover when said cover is closed by said actuating means thereby providing a moisture-proof seal for said hatch; the arrangement further comprising cover plate means for covering said recess, said cover plate means positioned coplanar with said hatch cover and the adjacent deck structure when said hatch cover is closed, means for hinging said cover plate to the deck structure within said recess, and means for pivoting said cover plate about its hinging means in response to the actuation of said hatch cover.

11. The hatch cover arrangement as defined in claim 10 wherein said means for hinging the hatch cover comprises hinge support means mounted on the deck structure within said recess, and hinge blade means attached to said hatch cover and pivotally connected to said hinge support means; and wherein said means for pivoting said cover plate about its hinging means comprises roller means attached to said cover plate, said roller means engaging the

hinge blade means during opening and closing of said hatch cover thereby displacing said cover plate to pivot said cover plate in response to the actuation of the hatch cover.

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