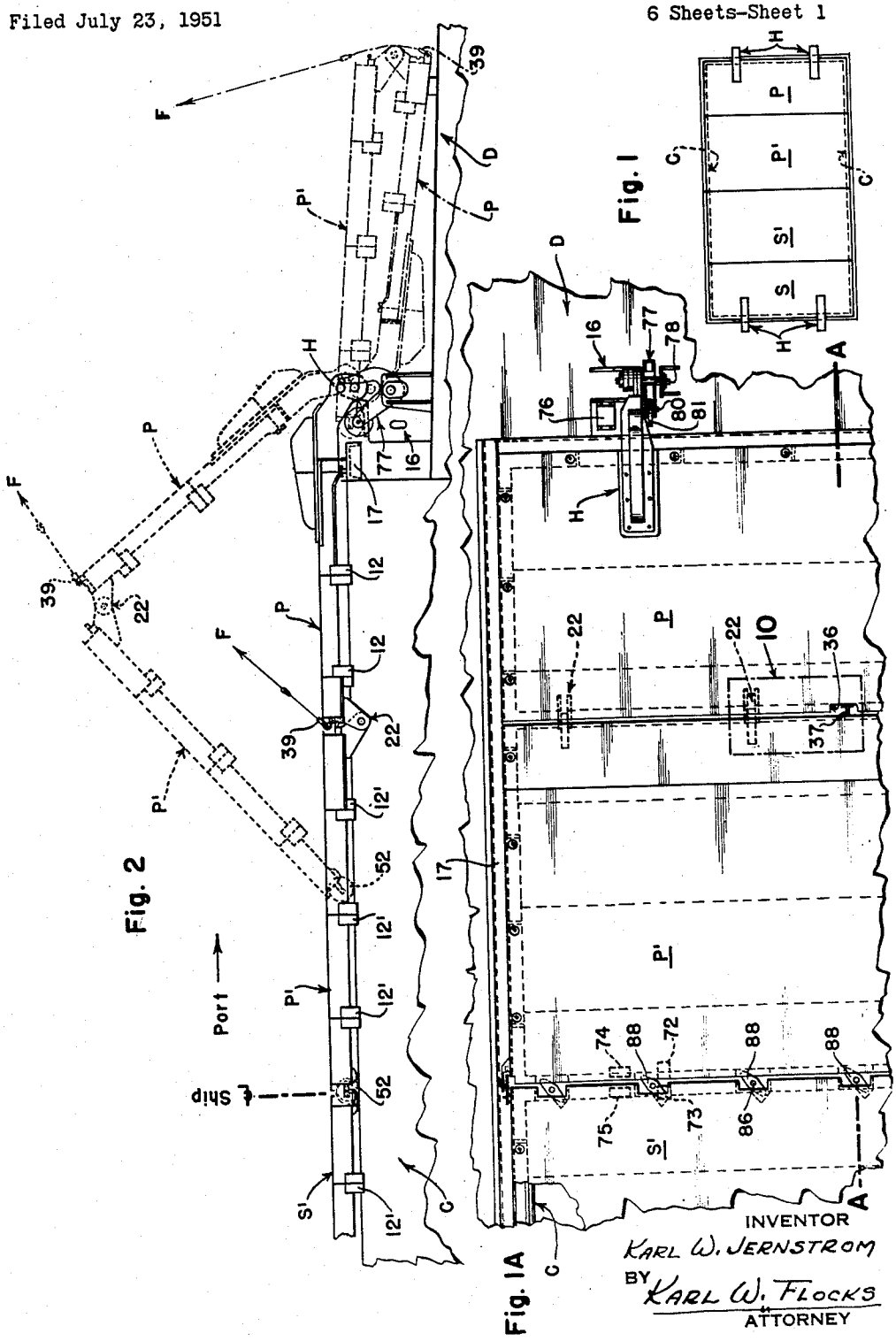
Dec. 28, 1954 K. W. JERNSTROM 2,697,998

HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

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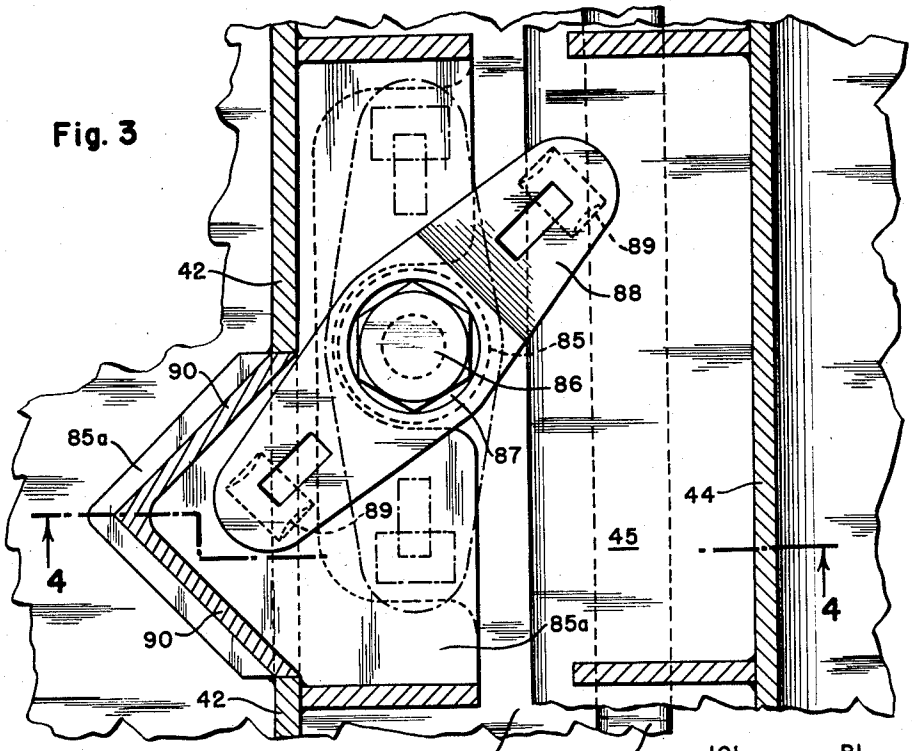


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HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

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Fig. 3



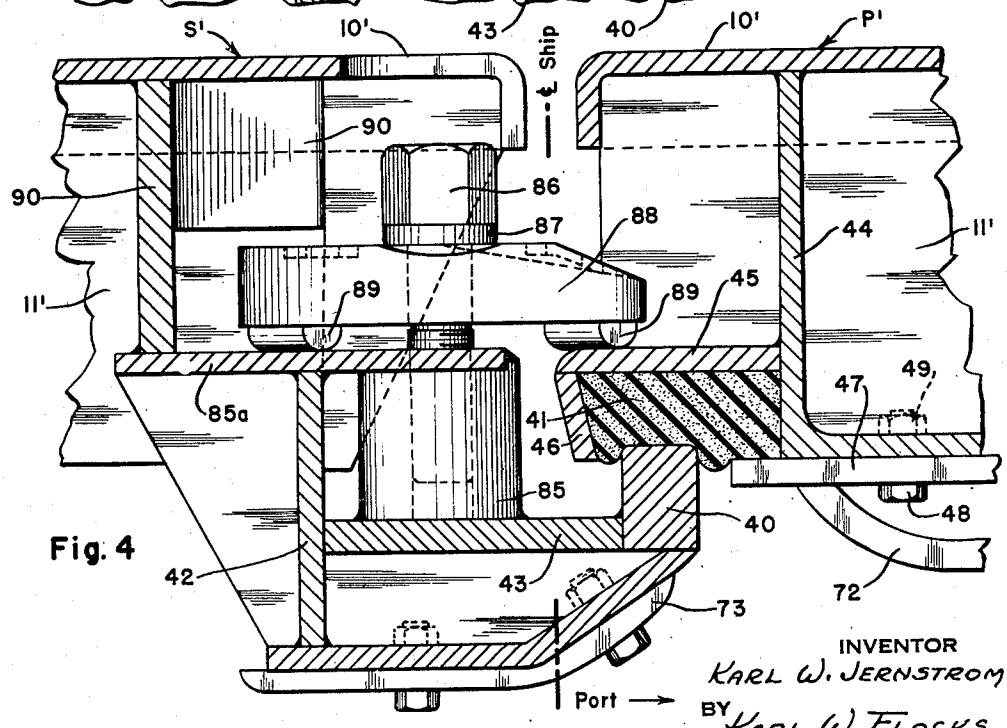


Fig. 4

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HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

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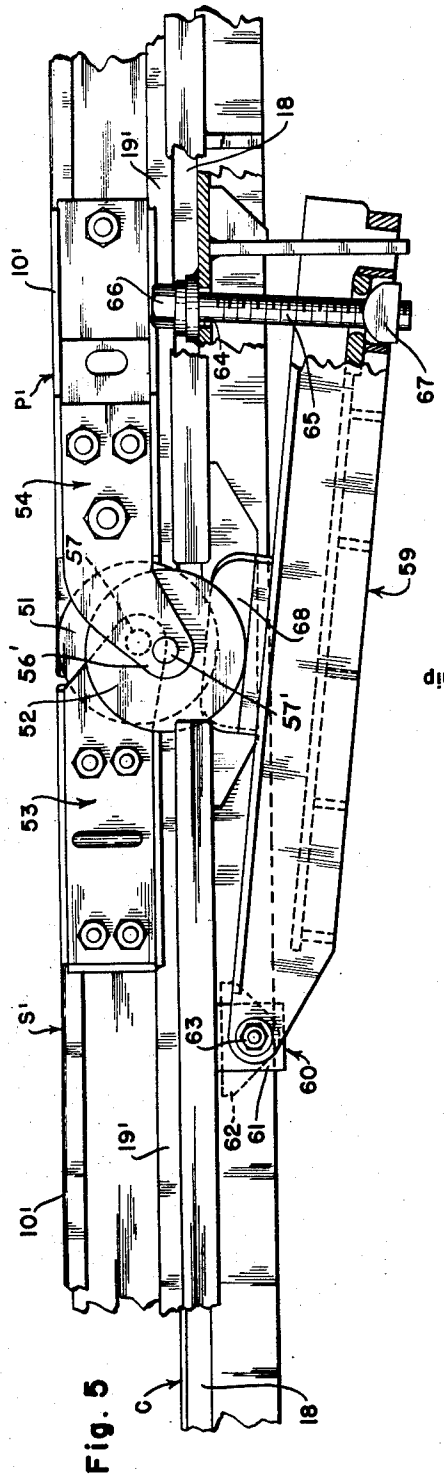


Fig. 5

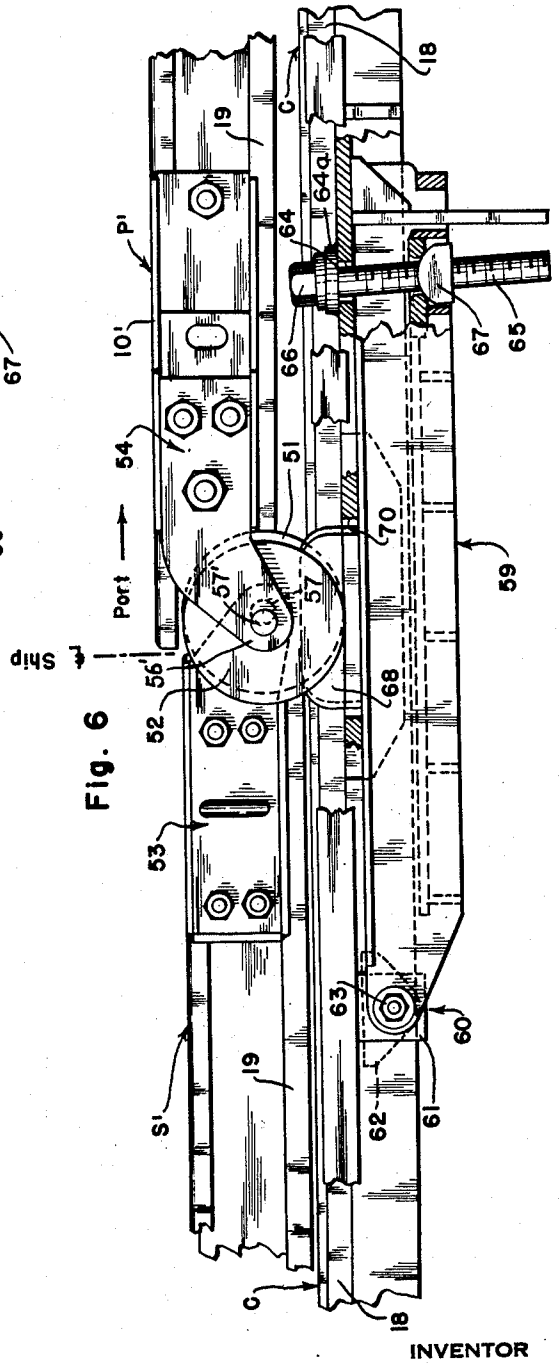


Fig. 6

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HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

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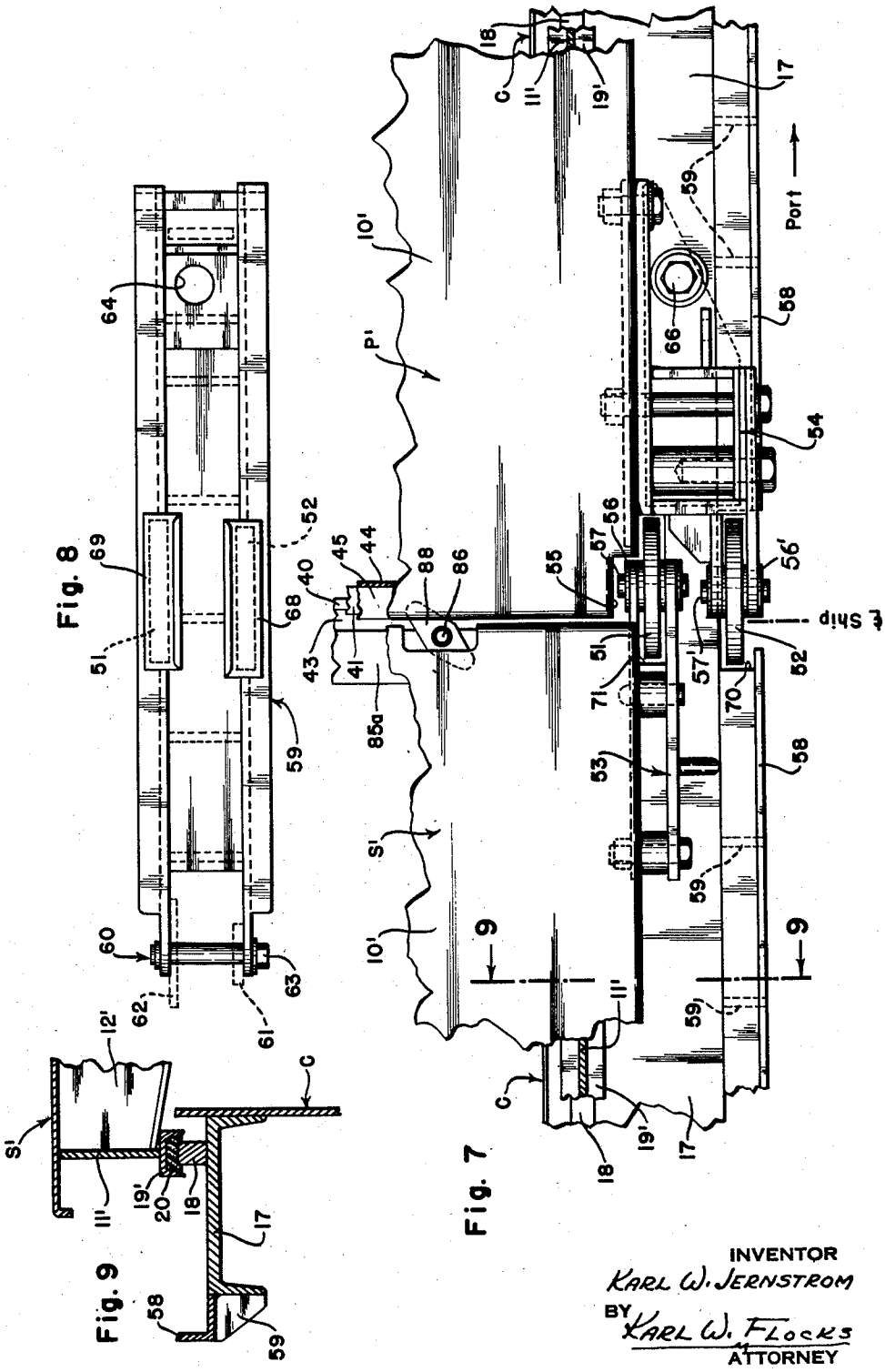


Fig. 7

Fig. 8

Fig. 9

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HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

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Fig. 10

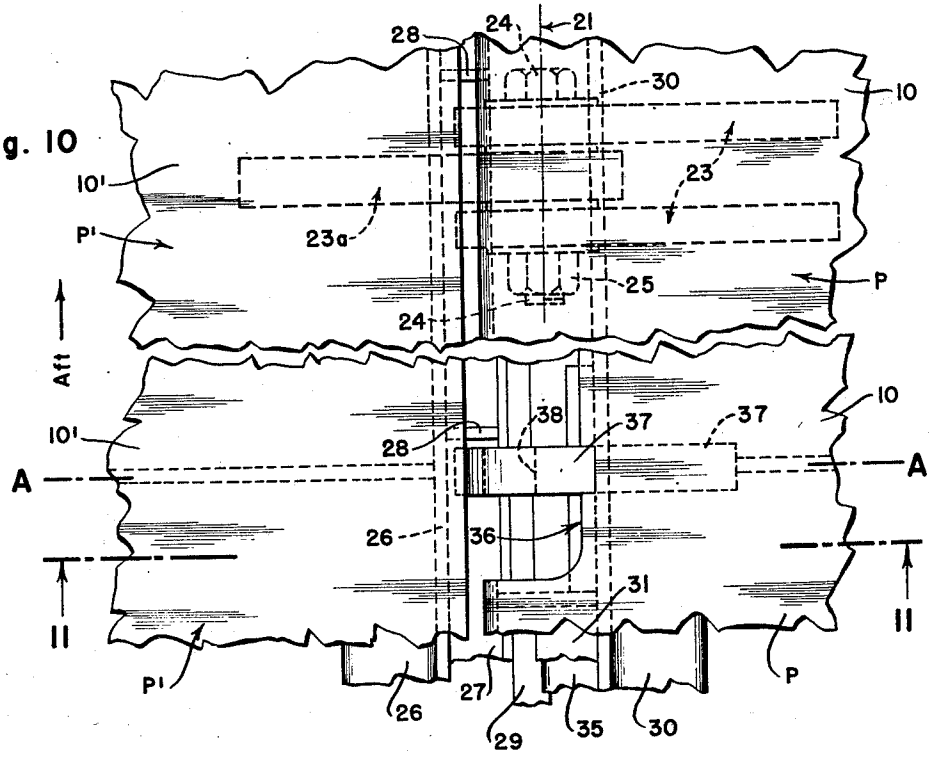
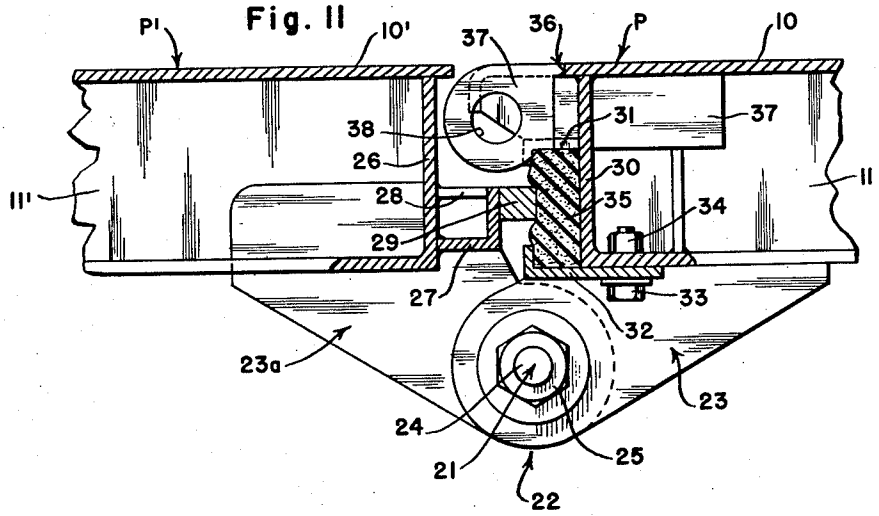


Fig. 11

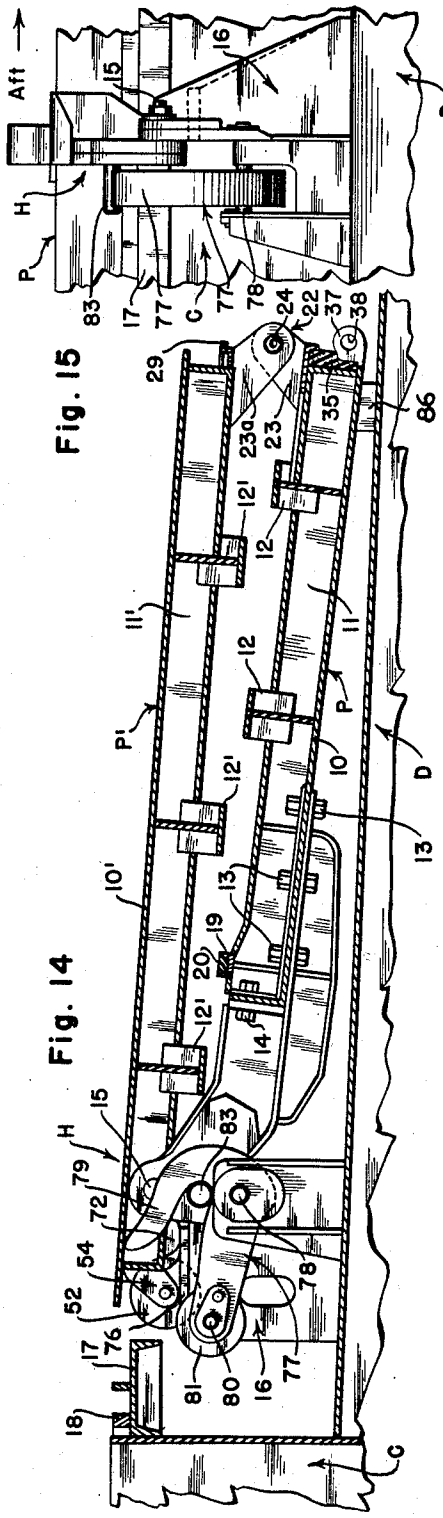


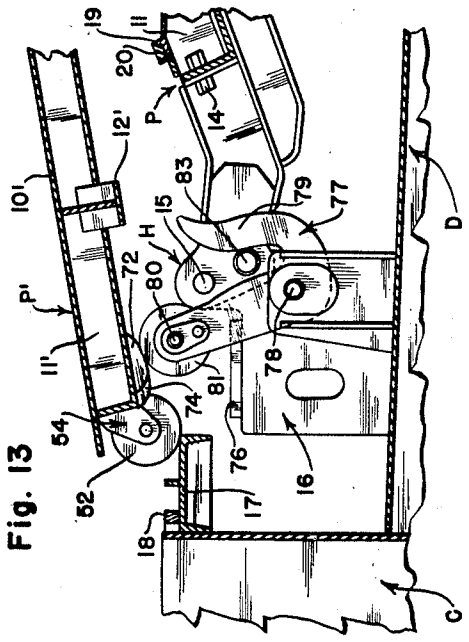
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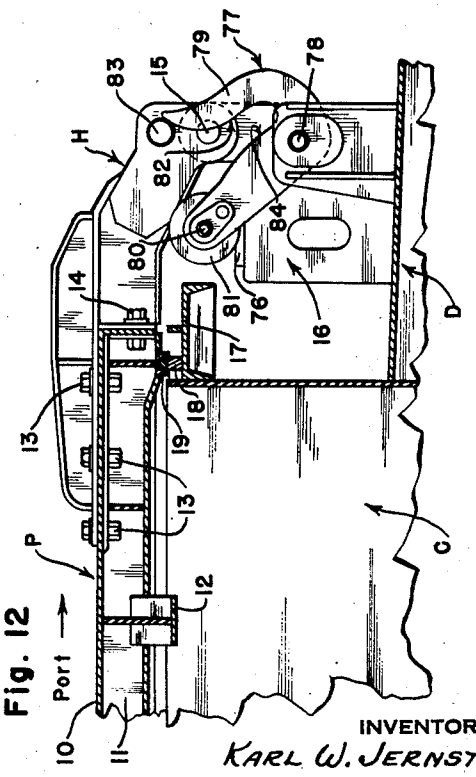
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HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

Filed July 23, 1951 6 Sheets-Sheet 6







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United States Patent Office 2,697,998 Patented Dec. 28, 1954

2,697,998

HATCH STRUCTURE AND PIVOTED CLOSURE MEANS THEREFOR

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Application July 23, 1951, Serial No. 238,081

12 Claims. (Cl. 114—202)

This invention relates to hatches, and the general object is to provide a novel and efficient hatch structure for the weather deck of a ship.

The invention is particularly useful in connection with ships having weather deck openings of relatively great size in comparison with the adjacent free area of the deck, inasmuch as the articulated hatch cover may, when in closed position, bridge a very large hatchway, and yet, when opened and folded, occupy but little of the deck area. Deck openings of great size are found on ships engaged in handling massive articles of freight; and the hatch covers, which are essentially beams, are required to be of considerable strength not only on account of the length of span but also in order to withstand the poundings of heavy seas. Therefore, covers for large hatchways are necessarily extremely heavy. An important feature of the present invention is the relative ease with which a cover of great weight may be handled. In the past in hatches with a cover having two oppositely disposed sections adapted to be joined and sealed intermediate of the ends of the hatchway, the seal between the two sections involves an overlap which renders it necessary to open and close the sections in a particular order. This is highly unsatisfactory since, in many cases, articles of cargo may well be handled through a certain portion of the hatchway without necessitating an uncovering of the entire hatchway.

Accordingly, an object of the present invention is to provide a two-section hatch cover whereby a seal construction is provided at the meeting edges of the sections which permits either section of the cover to be opened and closed independently of its companion.

A further object of the present invention is the provision of means for undertaking the load of the free end of the cover before the wheels thereof roll entirely off the ends of the tracks at the sides of the hatchway, and for easing the free end downward to a position of rest. Such means, operating in reverse, may lift the free end of the cover and position the wheels thereof for reengagement with the tracks. These means may comprise cams of particular construction which are hereinafter described in detail. The purpose of such means is not only to support the free end of the cover when it completely clears the hatchway, but also to lower this end to a position wherein no part of it is higher than the top edge of the coaming, and to lower it gently to prevent damage to the cover. The advantages inherent in stowing the opened cover where it cannot interfere with swinging cargo will be obvious.

A still further object of the present invention is to provide an articulated hatch cover arrangement that can be fully opened in a very short time.

A still further object of the invention is to provide an articulated hatch cover which provides a completely watertight seal about the periphery of the hatch and the joints of the hatch cover.

A still further object of the invention is to provide an improved construction and arrangement of articulated hatch cover to enable a large hatch to be readily uncovered and the covers to be stowed clear of the hatchway.

These and other objects of the invention are accomplished by the following invention which comprises a hatch having a cover with two oppositely disposed articulated sections. For convenience herein, the longitudinal edges of the hatch are referred to as sides, and the latitudinal edges as ends. In this form the inside of the coaming

is unobstructed; the outside of the coaming is provided with a peripheral flange, and a continuous weatherstrip is mounted on the flange slightly away from the coaming. One panel of each section is hingedly mounted on the deck adjacent an end of the hatchway. The wheels of the free ends of the sections, which are adapted to be joined and sealed in the middle of the hatchway, are arranged to roll on the sides of the flange outside the weatherstrip. Cams are provided at both ends of the hatchway for handling the free ends of the sections in the manner previously described. The flange is cut away, in part, near the centers of the two sides of the hatchway; and there on each side of the hatchway, is a jack for receiving and handling the wheels. The cover sections are provided with gaskets for engaging the coaming weatherstrip. Each section is formed of two pivotally joined panels; and a weatherstrip and gasket combination is provided at all panel joints. This form of the invention includes the feature that either cover section may be opened and closed without respect to the other section; and dogs are provided for locking the free ends of the sections together when the cover is in closed and sealed position.

In the drawing the hatch is indicated as being longer abeam than fore and aft with the latitudinal median line coincident with the centerline of the ship; and, where necessary for clarity, the centerline of the ship and an indication of shipboard direction is entered in the figures. It will be seen here that the sections of the cover operate athwart ship. This nonlimiting illustration of the invention has been adopted to facilitate reference to certain members of the structure in the detailed description.

Fig. 1 is a small scale diagrammatic plan showing the hatch cover in closed position.

Fig. 1A is a much enlarged fragmentary plan view of the general structure, also showing the cover in closed position. In this figure only slightly more than a fourth of the structure is seen, this portion being represented in Fig. 1 by approximately the upper righthand quarter thereof.

Fig. 2 is a diagrammatic elevational section showing only slightly more than one half the structure taken on the line A—A of Fig. 1A. In solid lines the cover is indicated as closed; in dotted lines the port section of the cover is shown partly opened; and in dot and dash lines this section is shown completely opened, folded upon itself, and resting upon the deck beyond the coaming.

Fig. 3 is a partly sectional plan view of typical means for sealing and locking the joint between the two sections of the cover in the center of the hatch.

Fig. 4 is an elevational section taken on the line **4—4** of Fig. 3.

Fig. 5 is an elevational detail of the forward mid portion of the structure, showing the cover in closed and sealed position, and also showing a jack for lowering the two sections of the cover into sealed position and for raising them from such position.

Fig. 6 is a view showing the sections of the cover nearly in closed position, but not joined, and being supported by said jack.

Fig. 7 is a detailed plan view corresponding to Fig. 5.

Fig. 8 is a plan view of the lever of the jack shown in Figs. 5 and 6.

Fig. 9 is the section **9—9** of Fig. 7.

Fig. 10 is an enlarged plan view of parts enclosed by the rectangle **10** of Fig. 1A.

Fig. 11 is the section **11—11** of Fig. 10.

Figs. 12, 13, and 14 are fragmentary sectional elevations taken on the line A—A of Fig. 1A, and much enlarged with respect to the scale of Fig. 1A, showing, respectively, the cover completely closed, nearly removed from the hatch, and completely removed from the hatch and at rest upon the deck.

Fig. 15 is a fragmentary elevational view of the structure corresponding to Fig. 12.

The general arrangement of the hatch when in closed position is seen in Fig. 1. The port and starboard sections of the cover are generally similar except for means for sealing and locking the free ends of the sections together when the hatch is closed. As shown, each section comprises two pivotally joined panels—a main panel

hingedly mounted on the deck of the ship adjacent an end of the hatchway, and an extension panel, the free edge of which extends to the middle of the hatchway when the section is closed.

With reference particularly to Fig. 1, the main panel of the port section of the cover is designated P, the extension panel thereof P'; the main panel of the starboard section is designated S, the extension panel thereof S'. As seen schematically in Fig. 1, each main panel is provided with two hinge structures H connecting the panel to the deck. C is the hatch coaming.

In the particular embodiment of the invention herein illustrated each panel of a cover section is a rigid composite structure comprising a cover plate, peripheral reinforcing members, and transverse beams, respectively designated **10**, **11**, and **12** as of the main panels, and **10'**, **11'**, and **12'** as of the extension panels. The general structure is best shown in Fig. 14, an elevational section taken on the longitudinal median line A—A of the cover (see Fig. 1A).

All hinge structures H for mounting the main panels of the cover sections are either alike or complementary to each other. As shown in Figs. 1A, 2 and 12–15, the hinge is rigidly secured to the edge of the main panel at the outer end of the section by bolts **13** and **14** and is pivotally mounted at **15** on a suitable structure **16** based upon the deck.

It will be understood from Fig. 1 that the present hatch is not only rectangular but the corners are square. As shown in Figs. 1, 7 and 12–15, the coaming C, which extends a suitable distance above the deck, is surrounded near its upper edge by a flange **17**, preferably formed of channels, which may be welded or otherwise secured to the coaming.

Mounted on the flange **17** and surrounding the coaming, and being slightly removed outwardly therefrom, is a continuous weatherstrip **18**, preferably formed of bar stock of rectangular cross section welded to the top of the flange. The weatherstrip is nowhere completely shown. A portion thereof is seen in Figs. 5, 6 and 7; the strip is shown in section in Figs. 9, 12, 13, and 14. The upper surface of the weatherstrip is nearly on the level with the top edge of the coaming.

Mounted on the lower edges of certain of the reinforcing members **11** and **11'** of the cover panels is a channel **19**, **19'**, carrying within it a resilient gasket **20**. This structure is nowhere completely illustrated; however, its structure is made sufficiently clear in Figs. 5, 6, 7, 9 and 12–15. There are necessarily a plurality of channels **19** and gaskets **20** since the structure must be interrupted at the joints of panels; but it will be understood that the structure is substantially continuous, when the cover is in closed position, and registers with the coaming weatherstrip **18** all around the hatchway, the various gaskets **20** being pressed firmly against the weatherstrip **18** as best shown in Figs. 9 and 12.

It is to be understood that the structure is continuous near the periphery on three sides of each main panel, and is present near each outer edge of each extension panel.

As the form of hatch cover herein illustrated comprises four sections, it will be readily understood that three transverse joints across the hatchway are required to be provided with means for rendering them watertight when the cover is closed. As shown in Figs. 1A, 2, 10, and 11, the main panel and the extension panel of each section are pivotally joined on an axis **21** by means of a plurality of hinges **22**. These hinges are mounted on the normal underside of the panels, as best shown in Fig. 11, thus when the section is in closed position the hinges are not visible from above. The hinge **22** comprises a shackle formed of two like elements **23** suitably secured, as by welding, to the underside of a main panel; and a member **23***a* also secured, as by welding, to the underside of the adjoining extension panel, the member **23***a* being pivotally secured within the shackle by means of a bolt **24** passed through the hinge structure as best seen in Figs. 10 and 11. The bolt is maintained in place by means of a nut **25**. The edge of the extension panel is provided with a transverse angle **26** on which is mounted, as by welding, another angle **27** which may form a gutter from one side of the section to the other between the panels thereof. The angle **27** is reinforced at intervals, as shown in Fig. 10, by ties **28** extending between the two angles. Applied to the outside of angle **27**, as by welding, is a weatherstrip **29** which, like both angles, extends from side to side of the section along the edge of the extension panel. The adjoining edge of the main panel of the section is provided with a transverse angle **30**. Secured, as by welding, to angle **30** is another transverse angle **31**. Another transverse angle **32** is secured to the bottom of angle **30** by means of a series of bolts **33** and nuts **34**. Enclosed between angles **30**, **31**, and **32**, as best shown in Fig. 11, is a resilient gasket **35**. It will be understood that the structure shown in cross section in Fig. 11 extends from side to side of the hatchway when the cover section is closed, as in this figure. With the section in closed position, the weatherstrip **29** engages and presses into gasket **3**, slightly deforming the latter and providing a watertight seal along the joint of the two panels of the section.

As best shown in Fig. 10, the edge of the top plate **10** of a main panel is cut away at **36**. A member **37** is suitably secured to the underside of the plate **10**, as by welding and extends outwardly so as to be exposed in the cutaway area. The exposed portion of member **37** is provided with an eyelet at **38**. A shackle **39** at the end of a fall F (Fig. 2) may be secured to the member **37** in the usual manner, as by passing a pin through suitable eyelets in the shackle and through the eyelet at **38**. Thus the section may be raised and buckled at the pivotal joint of the panels thereof, as shown in Fig. 2.

A seal construction is provided at the junction of the extension panels of the sections at the center of the hatchway. In the structure shown in Figs. 3 and 4, a weatherstrip **40** is mounted on the extension panel and a cooperating resilient gasket **41** is mounted on the adjacent extension panel. A reinforcing transverse plate **42** is provided beneath the cover plate **10'** of the starboard extension panel near the free edge thereof. The weatherstrip is secured, as by welding, to plate **42** by a number of ties **43**, seen in part in Figs. 3 and 4. It will be noted that the weatherstrip **40** is positioned slightly beyond the centerline of the ship on the port side thereof when the cover is in closed position, as in Figs. 3 and 4. Also that the level of the weatherstrip is considerably lower, in this position, than that of cover plate **10'**. It will be further noted that neither the cover plate **10'** of the starboard section or that of the port section extends quite to the centerline of the ship, and that a narrow gap remains between the plates when the hatch is closed. A reinforcing transverse angle **44** is provided beneath the cover plate of the port extension panel near the edge of the plate, as shown in Figs. 3 and 4. Secured to the angle **44** is a structure formed of a strip **45** and another strip **46**, the latter strip being secured to the former, as by welding, and the structure being preferably welded to angle **44**. It will be noted in Fig. 4 that the angle between strips **45** and **46** is less than 90°. This structure provides a channel which extends from side to side of the port section, near its free end, the base of the channel being wider than the mouth thereof, and within the channel is the resilient gasket **41**, mentioned above. Beneath the flange of angle **44**, as best shown in Fig. 4, is another strip **47** which is secured to the angle by means of bolts **48** and nuts **49**. This strip, as seen in Fig. 4, extends slightly beneath part of the gasket **41**, and is employed as a clamp to prevent escape of the gasket. As the strip **47** is removable, a shim (not shown), when required, may be mounted between it and the flange of angle **44** so that increased pressure may be exerted upon the gasket **41**.

When the cover sections are in fully closed position, as illustrated in Figs. 3 and 4, the gasket **41** rests upon the transverse weatherstrip **40**, the gasket being slightly deformed by pressure derived from the weight of the section, as shown, and thereby a watertight seal is provided across the middle of the hatchway.

It will be seen in Fig. 4 that the starboard section cannot be moved until the port section has been moved a slight distance upwardly therefrom in order to disengage the gasket **41** from the weatherstrip **40**. However, it will be shown subsequently that the median seal of the hatch may be broken in a simple manner whereupon either cover section may be then raised, buckled, and removed without interfering with the other section.

The extension panel of each section of the cover is provided with a wheel at each corner of the free end of the section, the wheels being adapted to roll lengthwise of the hatch along the sides of flange **17**.

The wheels are carried each by a bracket mounted on a side of the extension panel of the section. As shown more clearly in Figs. 5, 6 and 7, the wheels of the star-

board section are designated **51**, those of the port section **52**. Wheels **51** are carried by brackets **53** mounted on the sides of the extension panel S', which extends slightly beyond the free end of the starboard section. Wheels **52** are carried by brackets **54** mounted on the sides of the extension panel P'. The brackets **54** do not extend beyond the free end of port section, but the wheels **52** do extend slightly beyond, as best shown in Figs. 5, 6 and 7.

The brackets may be, and here are shown to be, composite structures, suitably held together and secured to the sides of the extension leaves as by bolts and nuts, as shown in Figs. 5, 6, and 7. It will be noted in Fig. 7 that a wheel **51** is positioned nearer its related extension panel S' than is wheel **52** to its related extension panel P'. Also bracket **54** is designed, as clearly shown, so that wheel **51** may freely attain the position here illustrated without interference by said bracket. It will also be noted in Fig. 7 that part of the corner of the cover plate **10'** of extension panel P' is cut away at **55** to clear a portion of the bracket **53** and the hub **56** and axle **57** of wheel **51**. The hub of a wheel **52** is designated **56'** and its axle **57'**.

The flange **17**, as previously suggested, may be formed of channel members. It is seen in Fig. 7 that a wheel **51** is positioned with respect to its panel S' so that the wheel will track along the upper surface of the flange near the middle of the illustrated channel member; but a wheel **52** is positioned much farther out from the coaming, and cannot track on the channel member itself. So an angle **58**, suitably secured to the outer flange of the channel, as by welding, is provided as a traction surface for wheels **52** on both sides of the hatch.

As shown more particularly in Figs. 5, 6 and 8, jacks **59** are provided at the midportions of the fore and aft sides of the hatch for the purpose of receiving and handling the wheels in the manner generally described heretofore. Each jack is a composite beam, as may be seen in plan in Fig. 8, and in elevation in two positions in Figs. 5 and 6. The jack is pivotally mounted at **60** beneath the coaming flange **17** on brackets **61** and **62** (indicated by dotted lines in Fig. 8) by means of a pin **63**. Near the end of the jack **59**, opposite to its pivoted mounting, there is a jackscrew **65**. This jackscrew passes through a hole **64** in the flange **17** and through a cup-like member **64a**, and terminates in a head **66** adapted to accommodate a wrench. The lower portion of the jackscrew **65** passes through a nut **67**, having a rounded upper surface, as illustrated, and prevented from rotation by being located within a suitable framework, as will be understood from the showings of Figs. 5 and 6.

Mounted on the top of the jack **59** are two wheel rests **68** and **69**, these being best seen in Fig. 8, but also shown in Figs. 5 and 6. Wheelrest **68** is positioned to receive wheel **52** of the port extension panel P'; wheelrest **69** is positioned to receive wheel **51** of the starboard extension panel S'. The wheelrests **68** and **69** are of equal height. As shown in Fig. 7, the angle **58** is cut away at **70**, and the channel of the flange **17** is slotted at **71**, so that, when the jack is in raised position, as shown in Fig. 6, the tops of the wheelrests may be aligned with the common traction level of the angle and the channel. Thus when the sections are being closed, the wheels roll on the angle, or channel, as the case may be, onto the wheelrests of the raised jacks. This stage of operation is illustrated in Fig. 6. It will be noted in Figs. 5 and 6 that the structures of brackets **53** and **54** are such that the wheel **51** is closer to the top of its extension panel S' than the wheel **52** is to the top of its extension panel P'. Thus when both sections are in nearly closed position, as in Fig. 6, the wheels being on a common level, the free end of the port section is markedly higher than the free end of the starboard section; and the gasket **41** of the port section is entirely out of engagement with the weatherstrip **40** of the starboard section. With the sections in the positions shown in Fig. 6 it is possible to open, independently, either section. It will be understood from Fig. 2, particularly, that the raising and buckling of a section initially simply draws the free end of the section away from the center of the hatchway; the change of planar disposition of the panels of the section being but little marked until the free end of the section has traveled a considerable distance.

The wheelrests being of equal height it will be seen that, in a sealing operation, i. e., the lowering of the

jacks when the sections are as shown in Fig. 6, the entire starboard cover section will come to rest upon the coaming weatherstrip considerably before the jack is at its lowest position, as shown in Fig. 5. Thus, when the starboard section is arrested by engagement of the series of gaskets **20** with the coaming weatherstrip **18**, the descending jack carries the wheelrest **69** away from the wheel **51**. Thus the wheels **51** are supported only by their axles and brackets. The port section, of course, continues to descend until it is arrested by engagement with the coaming weatherstrip. Just prior to final sealing, the gasket **41** of the port section engages the weatherstrip **40** of the starboard section. The seals between the panels of the sections at their pivotal joints are effected when the panels become coplanar; these seals do not depend upon the operation of the jacks. In fact the seals at the pivotal joints of the section panels are not disturbed until the section is buckled, as in opening it. If a sufficient tolerance is provided at the pivots of hinge H, the entire weight of the cover sections may be applied to the coaming weatherstrip, thereby greatly enhancing the efficacy of the peripheral seal of the hatch.

While it will be understood from the foregoing that the jacks are essential for effecting completion of the peripheral seal when closing the cover, it will also be understood that the jacks serve also to break a seal which may have become an exceedingly strong bond during a voyage. The obvious additional purpose of the jacks is to render it possible to operate one section of the cover without opening the other.

With the two sections of the cover in the position shown in Fig. 6, that is, with the jacks in raised position, either section may be raised and buckled, as shown in Fig. 2, as by a fall F having a shackle **39** attached to a member **37** of the main panel of the section. In Fig. 2, in solid lines, the port cover section is shown as it appears before it is moved otherwise than by the jacks. In dotted lines the port section is shown being raised and buckled. It will be noted that in this intermediate position of the section, the wheel **52** has been withdrawn a considerable distance from the middle of the hatchway. In dot and dash lines the port section is shown completely opened and at rest upon the deck. It is clearly indicated in Fig. 2 that at one stage of the opening operation, the wheels **52** will roll entirely off the coaming flange. The end of engagement between a wheel **52** and the coaming flange **17** in an opening operation, or, the beginning of engagement between the two members in a closing operation, is shown in detail in Fig. 13.

Fig. 12 shows the structure with the port section merely unsealed, and before any raising or buckling of the section has taken place. Fig. 13 is described above. Fig. 14 shows the port section completely opened and, in part, at rest upon the deck. Notice that no part of the free end of the section here rises above the top of the coaming.

Mounted on the normal underside of the free end of the port section of the cover are two pads **72**, which are rigid members having smooth, rounded surfaces. These pads, or skids, may be secured as by welding to the underside of the section. Only one pad **72** is shown in the drawing, although it will be understood that the two are equally spaced from the longitudinal median line A—A of the hatch. As shown in Fig. 1A, mounted on the starboard section, on the underside thereof near the free end of the section, are two functionally similar but slightly differently shaped pads, or skids, **73**, aligned with pads **72**. Mounted on the underside of the port extension panel nearly adjacent to each pad **72** is a lug **74**; and mounted similarly on the underside of the starboard extension panel nearly adjacent to each pad **73** is a lug **75**. There are, of course, four pads, or skids, and four lugs. The function of these pads and lugs can be fully understood from a description of the operation of the aft pad **72** and aft lug **74** of the port section. It will be understood that the following detailed description of the pad, lug, and related hinge and cam may be taken as representative of any of the four functionally similar devices of the hatch structure.

Mounted on the structure **16**, as best seen in Figs. 1A and 12–15, is a block **76**, preferably of oak. This block serves as a pillow upon which the free end of the section may rest when in fully opened position, as, for example, is shown in Fig. 14 wherein the lug **72** actually engages the block. The upper surface of the

block **76** is at a level which will permit the free end of the section to descend until no part of the section is higher than the coaming.

On each hinge mount structure **16** is a cam **77**, pivotally mounted thereon at **78**. The cam is hook-shaped, having a tongue **79**. Pivotally mounted at **80** on that portion of the cam opposite said tongue is a wheel **81**. The wheel **81** is aligned with pad **72**, as shown in Fig. 1A. The inside surface **82** of tongue **79** is preferably faced with bronze (not shown). Rigidly mounted on hinge H is a pin **83**, normally engaging the tip of the tongue **79** of the cam as shown in Fig. 12. As the section is raised and buckled, the main panel of the section rotates on the hinge pivot **15** as a center and the pin **83** moves in an arc around this point. As the pin moves in its arcuate path it forces the cam to pivot on **78** in a clockwise manner until eventually the cam reaches the position shown in Fig. 13. At this stage, in an opening operation, pad **72** engages the wheel **81** of the cam. It will be noted in Fig. 13 that the wheel **52** is now just at the edge of the coaming flange **17**. Were it not for the cam and its wheel, presently the free end of the section would collapse and any effort to close the section thereafter would result in thrusting the wheel **52** flatly against the edge of the coaming flange **17** so that the entire section would be locked in opened position.

As the pad **72** engages the wheel **81** of the cam, the entire section is still in process of being lowered onto the deck. The amount of pivotal movement of the main panel of the section, and, in consequence, the amount of movement away from the hatchway of the section as a whole just before the wheels **52** pass beyond the coaming flange, is clearly illustrated in Fig. 13. Both panels of the port section, in Fig. 13, are seen to be nearly horizontal beyond the hatchway. As the pivotal joint of the two panels moves farther outward from the end of the hatchway, the wheels **52** are drawn even farther to the right. Presently the free end of the port section is carried by the wheels **81** of the cams at that end of the hatchway, and the wheels **52** are out of contact with the coaming flange.

As the main panel P of the port section of the cover continues to descend, the pin **83** moves into the bottom of the opening in the cam, and the latter then reverses its direction of movement and rotates counterclockwise. As this movement of the cam is initiated it will be seen, particularly in Fig. 13, that the pin **83** actually operates as a brake to retard the new movement of the cam, whereby the free end of the cover section, then supported by the cam wheels **81**, is lowered until the lugs **74** engage the blocks **76**. In Fig. 14, the port cover is shown completely opened, and at rest, the main panel resting on another block or runner **86**, preferably an oak rail mounted on the deck, and the free end of the section resting upon one of the blocks **76**.

It will be understood that when the cover is to be closed the reverse of the last described operations takes place. As the main panel is raised, as by the fall, the pin **83** forces the cam to move in a clockwise direction, and the wheel **81**, presently engaging the pad **72**, raises the free end of the section so that the wheels **52** thereof are sufficiently high to reengage the coaming flange as the lifting of the main panel is continued. Presently a condition illustrated in Fig. 13 is attained; the cam then changes direction of movement, and the wheels **52** descend onto the edge of the coaming flange and begin to roll thereupon toward the middle of the hatch.

The cam **77** is susceptible of considerable modification. The structure shown in the drawing is preferable, but it may be seen that the gist of the cam is that it be brought into position to provide a takeover support for the free end of the section just before its wheels pass beyond the ends of the flange **17**, and thereafter be lowered so that the free end of the section may be brought to a position of rest wherein no part of the section is above the level of the coaming, so that all swinging cargo, if raised sufficiently to miss the top of the coaming, will necessarily miss all parts of the hatch cover.

Referring to Figs. 3 and 4, there is shown a clamping arrangement for holding the panel sections P′ and S′ in position. As shown more clearly in Fig. 4, the material **41** is compressed by the weatherstripping **40**, thus forming the watertight seal heretofore mentioned. A boss **85** is mounted upon the strip **43** and has threaded into it a bolt **86**. This bolt projects through a dog **88** which, when the bolt **86** is sufficiently unscrewed from the boss **85**, permits the dog to be turned either into a clamping position, as shown by the full line positions of Figs. 3 and 4, or moved into the open position shown by the dotted lines in Fig. 3. On each end of the dog **88** on the underside thereof is a substantially semi-spherical member **89** which permits the ready movement of the dog **88** along the surfaces **45** and **85***a*. As shown in Fig. 3, the panel section **42** is deformed, as indicated by **90**, so as to accommodate one end of the dog **88** when the dog is in clamping position.

It may be well to point out here that the invention contemplates both a hatch which may have an articulated cover built as a unit, or a cover comprising two articulated units or sections, as illustrated. It will be immediately seen that either section of the illustrated hatch cover is the equivalent of an articulated cover built as a unit, one panel thereof being hingedly mounted on the deck or other structure adjacent an edge of the hatchway, and the free end adapted to extend, in closed position, to the opposite edge of the hatchway. Further, where two sections are employed, it is not material that the sections be substantially of the same size, as illustrated; one section might well be formed of much larger panels than its companion, this construction being dictated, say, on account of greater available free deck space at one end of the hatchway than at the other. And in such construction, of course, the sections would not join in the middle of the hatchway. It will also be understood that the cover or cover sections are not limited to two panels each.

In the illustrated structure a single jack is shown on each side of the hatchway for receiving and handling the wheels. If desired a separate jack might be provided for each wheel of the structure. Where the cover is built as a unit and the free end thereof extends to the edge of the hatchway opposite to the hinged mount of the cover, wheel jacks are of course provided at that edge of the hatchway.

While only a single form of cam, hinge, jack, watertight seal element, and other members is shown, it will be apparent to those skilled in the art that all such members are subject to modification within the scope of the invention.

To summarize, broadly, the invention contemplates a hatch comprising a coaming having a peripheral weatherstrip mounted thereon and tracks mounted on opposite sides of the hatchway; an articulated hatch cover formed of two panels, or leaves, pivotally joined edgewise, one panel being hingedly mounted adjacent the hatchway, as upon the deck, and the other panel having wheels at its free end adapted to roll upon the tracks; a series of gaskets provided on the panels of the cover and adapted to cooperate with the coaming weatherstrip; another weatherstrip mounted on one panel and another gasket mounted on the other panel at the joint thereof for rendering the joint watertight; means whereby the cover may be buckled upwardly at the pivotal joint of the panels, swung outwardly on the hinged mount as a center and with the wheels rolling along the tracks toward an edge of the hatchway, and lowered onto the deck with the panels folded together, and with the wheels entirely removed from the tracks so that the hatchway is completely unobstructed for cargo handling purposes; and other means whereby, when the cover is substantially in closed position over the hatchway, the wheels may be lowered beneath the level of the tracks so that practically the entire weight of the cover is applied directly to the coaming weatherstrip to insure an optimum seal.

It will be understood from the foregoing detailed description that the invention is by no means limited to the basic form referred to above. For example, the invention, it will be seen, may, by obvious modification, be embodied in a structure having a cover formed of two sections, oppositely disposed, and adapted to be joined and sealed intermediate the ends of the hatchway. In this form each section may comprise two or more panels, the panels being pivotally joined edgewise, as above. Also, as above, the free ends of the sections, each equivalent to the basic cover first briefly described, are provided with wheels adapted to roll upon the tracks; and means for lowering all wheels so that the weight of both sections may be applied to the coaming weatherstrip when the cover is closed, are positioned intermediate the ends of the hatchway, and may be common to the wheels of both sections.

What is claimed is:

1. A hatch for the deck of a ship comprising a coaming extending upwardly from the deck, said coaming having tracks mounted on opposite sides thereof; a weatherstrip mounted on and surrounding the coaming; an articulated hatch cover having gaskets thereon for engagement with the weatherstrip when the cover is closed, the cover comprising two panels pivotally joined edgewise, one panel being hingedly mounted outside the coaming, and the other panel having wheels mounted at its free end, the wheels being adapted to roll on the tracks, whereby, as the first-named panel is rotated from closed position, the cover is buckled, and the last-named panel is trundled from one side of the coaming to the other side thereof; and cam means pivotally secured adjacent the hinged mount of the first-named panel adapted to be actuated by the hinge of the mount for receiving and supporting the last-named panel as it passes beyond the coaming and for then easing the panel downwardly to a substantially horizontal position of rest along the deck with no part of the cover extending higher than said coaming.

2. A hatch for the deck of a ship comprising a coaming extending upwardly from the deck, said coaming having tracks mounted on opposite sides thereof; a weatherstrip mounted on and surrounding the coaming; an articulated hatch cover having gaskets thereon for engagement with the weatherstrip when the cover is closed, the cover comprising two opposite sections adapted to meet, when closed, intermediate the ends of the hatch, each section formed of two panels pivotally joined edgewise, one panel of each section being hingedly mounted outside the coaming at an end of the hatch, and the other panel of each section having wheels mounted at its free end, the wheels being adapted to roll on the tracks, whereby as the first-named panel of a section is rotated from closed position, the section is buckled, and the last-named panel of the section is trundled from a station intermediate the ends of the hatch to an end thereof; and cam means at each end of the hatch pivotally secured adjacent the hinged mount of the first-named panel of a section of the cover adapted to be actuated by the hinge of the mount for receiving and supporting the wheeled panel of a section as it passes beyond the end of the hatch and for easing the panel downwardly to a substantially horizontal position of rest along the deck with no parts of the cover extending higher than said coaming.

3. In a hatch structure of the class described, a coaming surrounded near its top edge by a flange; a weatherstrip surrounding the coaming and mounted on the flange; an articulated hatch cover having gaskets thereon for engagement with the weatherstrip when the cover is in closed position, the cover comprising two opposite sections adapted to meet, when closed, intermediate the ends of the hatch, each section formed of two panels pivotally joined edgewise, one panel of each section being hingedly mounted outside the coaming at an end of the hatch, and the other panel of each section having wheels mounted at its free end, the wheels being adapted to roll on two sides of the flange outside the weatherstrip, whereby, as the first-named panel of a section is rotated from closed position, the section is buckled, and the last-named panel of the section is trundled from a station intermediate the ends of the hatch to an end thereof; cams pivotally mounted at each end of the hatch adjacent the hinged mount of the first-named panel of a section and adapted to be actuated by the hinge of the mount for receiving and supporting the wheeled panel of a section as it passes beyond the end of the hatch and for easing the panel downwardly to a position of rest; and jacks mounted on opposite sides of the coaming intermediate the ends of the hatch and beneath the flange, each of the jacks having wheelrests for a wheel of each section, the wheelrests being movable into alignment with the top of the flange through slots therein, whereby the wheels may be lowered when the cover is in closed position so that the weight thereof is applied exclusively to the weatherstrip.

4. The combination of claim 3 including a weatherstrip mounted on one panel and a gasket mounted on the adjacent panel at the pivotal joints of the panels of each section, and another weatherstrip mounted on the wheeled panel of one section and another gasket mounted on the wheeled panel of the other section, each gasket engaging a weatherstrip under pressure when the cover is in closed position.

5. The combination of claim 3 wherein the jacks comprise levers having the wheelrests mounted thereon, each lever being pivotally mounted beneath a side of the flange intermediate the ends of the hatch, and being provided with a jackscrew passed upwardly through the flange and out of the paths of the wheels, whereby the lever may be raised and lowered in response to rotation of the jackscrew.

6. In a hatch structure of the class described, a coaming; tracks on opposite sides thereof; an articulated hatch cover comprising two panels pivotally joined edgewise, one panel being secured by hinges to mounts outside the coaming, and the other panel having wheels mounted at its free end, the wheels being adapted to roll on the tracks, whereby, as the first-named panel is rotated from closed position, the cover is buckled, and the last-named panel is trundled from one side of the coaming to the other side thereof; cams pivotally secured to the mounts outside the coaming and adapted to be actuated by the hinges thereof for receiving and supporting the last-named panel as it passes beyond the coaming and for then easing the panel downwardly to a position of rest; and jacks mounted on opposite sides of the coaming aligned with the tracks for lowering the wheels when the cover is in closed position whereby the weight thereof is applied exclusively to the coaming.

7. In a hatch structure, a coaming; tracks on opposite sides thereof; an articulated hatch cover comprising two panels pivotally joined edgewise, one panel being secured by hinges to mounts outside the coaming beyond the ends of the tracks, and the other panel having wheels mounted at its free end, the wheels being adapted to roll on the tracks, whereby, as the first-named panel is rotated from closed position, the cover is buckled, and the last-named panel is trundled across the hatch to the end of the coaming and tracks; cams pivotally secured to the mounts outside the coaming beyond the ends of the tracks; pins on the hinges adapted to engage and actuate the cams as the first-named panel is rotated; and wheels mounted on the cams for receiving and supporting the last-named panel as it passes beyond the coaming and tracks, the cams operating to lower the free end of the last-named panel to a position of rest as the first-named panel is rotated outwardly from the hatch, and to raise the free end of the last-named panel to a position in which its wheels may reengage the tracks as the first-named panel is rotated inwardly toward the hatch.

8. In a hatch structure of the class described, a coaming surrounded near its top edge by a flange; a weatherstrip surrounding the coaming and mounted on the flange; an articulated hatch cover having gaskets thereon for engagement with the weatherstrip when the cover is in closed position, the cover comprising two opposite sections adapted to meet, when closed, intermediate the ends of the hatch, each section formed of two panels pivotally joined edgewise, one panel of each section being hingedly mounted outside the coaming at an end of the hatch, and the other panel of each section having wheels mounted at its free end, the wheels being adapted to roll on two sides of the flange outside the weatherstrip, whereby, as the first-named panel of a section is rotated from closed position, the section is buckled, and the last-named panel of the section is trundled from a station intermediate the ends of the hatch to and beyond an end thereof; and cams pivotally mounted at each end of the hatch adjacent the hinged mount of the first-named panel of a section and adapted to be actuated by the hinge of the mount for receiving and supporting the wheeled panel of a section as it passes beyond the end of the hatch and for easing the panel downwardly to a position of rest.

9. In a hatch structure of the class described, a coaming; tracks on opposite sides thereof; an articulated hatch cover comprising two panels pivotally joined edgewise, one panel being secured by hinges to mounts outside the coaming, and the other panel having wheels mounted at its free end, the wheels being adapted to roll on the tracks, whereby, as the first-named panel is rotated from closed position, the cover is buckled, and the last-named panel is trundled from one side of the coaming to and beyond the other side thereof; and cams pivotally secured to the mounts outside the coaming and adapted to be actuated by the hinges thereof for receiving and supporting the last-named panel as it passes beyond the coaming and for then easing the panel downwardly to a position of rest.

10. In a hatch structure of the class described, a coaming, tracks on opposite sides thereof; an articulated hatch cover comprising two panels pivotally joined edgewise, one panel being hingedly mounted to mounts outside the coaming, and the other panel having wheels mounted at its free end, the wheels being adapted to roll on the tracks; and jacks mounted on opposite sides of the coaming and beneath said tracks, each of the jacks including a lever pivoted at one end and mounted on a jack screw at the other end, said jack screw extending upwardly through said track and being adapted to be rotated from above said track, and wheelrests mounted on said lever at an intermediate point thereon, whereby when said jack screws are rotated in one direction said wheelrests are lowered from the level of said track so that the weight of said hatch cover is applied exclusively to the coaming.

11. In a hatch structure of the class described, a coaming surrounded near its top edge by a flange; a weatherstrip surrounding the coaming and mounted on the flange; an articulated hatch cover having gaskets thereon for engagement with the weatherstrip when the cover is in closed position, the cover comprising two opposite sections adapted to meet, when closed, intermediate the ends of the hatch, each section formed of two panels pivotally joined edgewise, one panel of each section being hingedly mounted outside the coaming at an end of the hatch, and the other panel of each section having wheels mounted at its free end, the wheels being adapted to roll on two sides of the flange outside the weatherstrip, whereby, as the first-named panel of a section is rotated from closed position, the section is buckled, and the last-named panel of the section is trundled from a station intermediate the ends of the hatch to and beyond an end thereof; and jacks mounted on opposite sides of the coaming intermediate the ends of the hatch and beneath the flange, each jack including a lever pivoted at one end and mounted on a jack screw at the other end, said jack screw extending upwardly through said flange and being adapted to be rotated from above said flange, and wheelrests mounted on said lever at an intermediate point thereon, whereby when said jack screws are rotated in one direction said wheelrests are lowered from the level of said track so that the weight of said hatch cover is applied exclusively to the coaming.

12. In combination with a hatch opening surrounded by a coaming, a hatch cover comprising two cover assemblies hinged to opposite ends of the hatch opening, at least one of said assemblies having two or more sections hinged together, each hinged assembly being provided with wheels at its outer edge adapted to roll along the edges of the hatch opening and support the assembly during opening and closing operations, a gasket mounted on the wheeled end of one of said assemblies extending downwardly therefrom across the width of the hatch opening, a weatherstrip mounted on the wheeled end of the other of said assemblies, said weatherstrip located beyond the wheeled edge of said other cover assembly and extending across the width of the hatch opening, whereby when said cover assemblies are in the closed position the weatherstrip is located directly beneath said gasket, a plurality of dog assemblies mounted below the top surface of said other cover assembly adjacent to said weatherstrip, each said dog assembly comprising a boss having a threaded opening therein, a threaded bolt and a dog, said bolt extending through said dog and threadedly engaged with said boss opening, said dog having a long narrow shape with a semi-spherical bearing member at each end on the lower surface thereof, whereby said dog can be pivoted about said bolt when said bolt is loosened, and assume a position wherein one bearing member is in contact with the other said cover assembly and the second bearing member is in contact with said first assembly over said gasket so that as said bolt is tightened the gasket and weatherstrip are brought into tight engagement to seal said joint.

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