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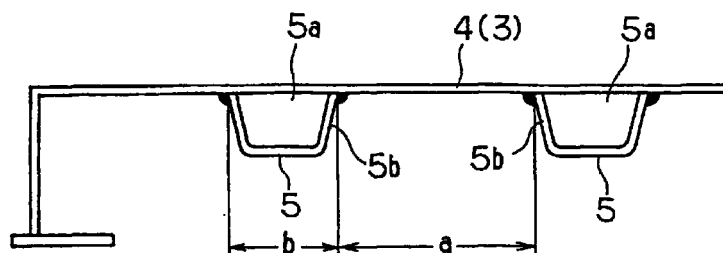
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(54) **COVER OR DECK STRUCTURE FOR MARINE VESSEL**

(57) A cover or deck structure for marine vessels. Beams (5) having a U-shaped or V-shaped cross section are welded and fixed to a back surface of a top plate (4) at predetermined intervals with opened surfaces

thereof in close contact with the top plate (4). The cover or deck is enhanced in rigidity, reduced in welding distortion and improved in its workability.

FIG.2



EP 1 038 763 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to improvements in a vessel cover or deck structure.

BACKGROUND OF THE INVENTION

[0002] Up until the present, apart from the mainframe, additional strengthening angle members, bulk plate, flat bars or the like have been secured by welding in fixed intervals to the rear surface of a top plate in order to maintain the rigidity of the top plate of a hatch cover for example.

[0003] Deformations are occurred in the top plate of the hatch cover due to the load of the cargo containers or the pounding of seawater from above. As a result, in all regions surrounded by such additional strengthening members, compression is applied in both in the longitudinal and transverse directions parallel to the top plate surface. Thus the top plate which is surrounded by the mainframe has a tendency to undergo partial buckling. The problem is occurred with respect to the car deck of vessels onto which the weight of vehicles loaded on the vessels.

[0004] In order to create a certain buckling strength in the top plate, it is necessary to make the intervals (pitch) between these additional strengthening members as small as possible. As a result, the welded spots become extremely numerous and the problem has arisen that productivity is reduced.

[0005] Furthermore as shown in Fig.4, in order to fillet weld the top plate 10 for example on both sides of the abutting distal end of the angle member 11, although this is the same for all types of additional strengthening members, the problem of large deformations easily occurring has arisen due to the top plate 10 undergoing welding distortion in particular when the pitch is small.

[0006] It is extremely difficult to weld without generating welding distortion. Even if the deformation is removed by subsequent processing, the process requires considerable skill and processing time and, as a result, efficiency suffers.

[0007] Furthermore the top surface of flange of the letter "L" shaped angle member which is welded to the rear surface of the top plate of the hatch cover has the tendency to be accumulated particulate material which is stored in bulk in the hold. Thus the difficulty of cleaning has become a great problem.

DISCLOSURE OF THE INVENTION

[0008] The present invention is proposed to solve the above problems.

[0009] The present invention is provides a vessel cover or a deck structure which comprises "U" or "V"

shaped beams are secured by welding in fixed intervals to the rear surface of a top plate so that the open face of the beams closely adheres to the top plate.

[0010] Further and preferably, if the width of the "V" or "U" shaped beam is taken to be "b" and the width of the beam interval is taken to be "a", then the beams are disposed so that $a/b=1.5-3$.

[0011] According to the present invention, since the cross section of the V' or "U" shaped beam is formed in a box shaped structure, the rigidity of the top plate and the buckling strength is increased. As a result, the pitch disposition of the beams may become large. Moreover since the welding positions are only those sections which face the outside, welding operations are simplified and to that degree the deformations as a result of welding are reduced. Thus any post-processing to remove deformations is easy. Furthermore since the open face of the beam is in an occluded box form, no accumulation of particulate material on the beam occurs and to that degree maintenance such as painting is easy. Also buckling strength may be effectively improved without great increases in the density of the interval of the disposed beams.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a schematic view showing a first embodiment of the present invention.

Fig. 2 is a cross sectional view of the main components of the present invention.

Fig. 3 is a view showing the characteristics of the buckling stress.

Fig. 4 is a cross sectional view of a conventional example.

PREFERRED EMBODIMENTS OF THE INVENTION

[0013] The embodiments of the present invention as adapted to a hatch cover will be explained below with reference to the accompanying drawings.

[0014] In Fig.1, reference numeral 1 denotes a hatch opening which is provided with a hatch cover 3 which opens and closes the opening 1 in the peripheral adjoining portion 2. The hatch cover 3 is formed, for example, from a pair of covers. As a hatch cover side rolling types, pontoon types or the like are known in the art.

[0015] A beam 5 which is "V" or "U" shaped in cross section is secured by welding in mutually parallel intervals of a certain pitch to the rear surface of the top plate 4 of the hatch cover 3.

[0016] Both legs 5b of the "V" or "U" shaped beam 5 are fixed by fillet welding on the respective outer sides so that the open face 5a of the beam is closely attached to the top plate 4.

[0017] The "V" or "U" shaped beam 5 is formed in a

box shape with the top plate 4 when it is welded to the rear surface of the top plate 4. Since these beams 5 increase buckling strength in a direction parallel to the face of the top plate 4, as shown in Fig. 2, the beam intend may be increased in comparison with the conventional angle member.

[0018] Fig. 3 shows the relationship of beam pitch with the size of stress when the top plate 4 generates a buckling with respect to the direction parallel to its face. However the case of the "V" or "U" shaped beam 5, it is clear that, in comparison with the angle member, even if the pitch is large, buckling is unlikely to occur.

[0019] Furthermore this case, if the width of the "V" or "U" shaped beam 5 is taken to be "b" and the interval to the neighboring beam is taken to be "a" and the range is set $a/b = 1.5 - 3$, the buckling strength is conspicuously increased. This fact has been confirmed experimentally. If a range is made smaller than above the range, the beam interval increases in density. However the increase in buckling strength is not proportional to the increase in the density of the pitch and the overall effect is small.

[0020] In this way, if the weld pitch becomes large, the number of welding spots decreases to that degree. In addition, since both leg sections 5b of the "V" or "U" shaped beam 5 on which welding is performed are separated from one another, there is little generation of welding deformation and to that degree post-processing to eliminate any such deformation is reduced. On the other hand, since the open face of the "V" or "U" shaped beam 5 forms a closely adhering and occluded space on the rear face of the top plate 4, no accumulation of particulate material carried as cargo in bulk in the hold of the vessel occurs in the interior of the beam. Furthermore there is no necessity for cleaning, painted sections are reduced and to that degree maintenance is simplified.

[0021] Moreover this embodiment given above is a beam 5 which is "V" or "U" shaped in cross section, however the invention is not limited in this respect, and of course may be in the form of an open trapezoid, half-round section or rectangle.

[0022] Moreover it is possible to adapt the present invention in the same way not only to a hatch cover but also to a car deck or the like.

Claims

1. A vessel cover or a deck structure comprising "U" or "V" shaped beams which are secured by welding in fixed intervals to the rear surface of a top plate so that the open face of the beams closely adheres to the top plate.
2. A vessel cover or a deck structure as defined in Claim 1 where in the beams are disposed so that the relationship $a/b = 1.5 - 3$ is satisfied where "a" is a beam interval and "b" is a width of the "U" or "V"

shaped beam.

FIG.1

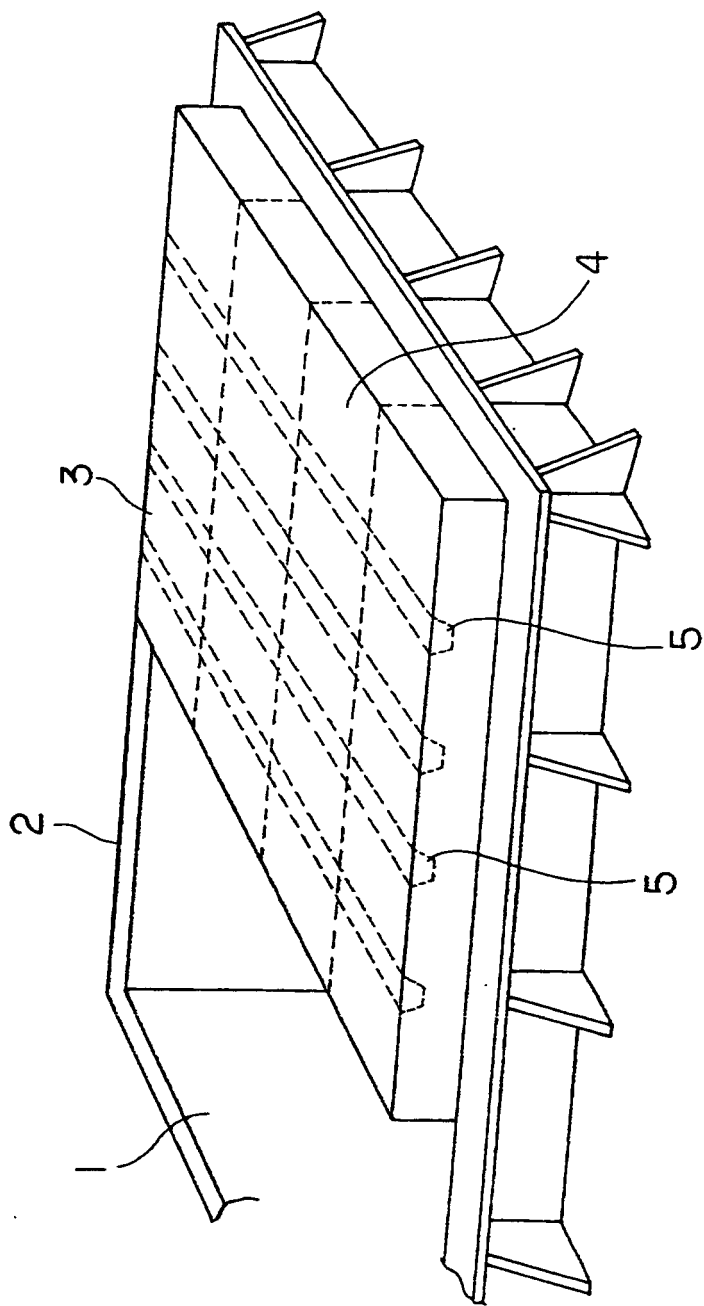


FIG.2

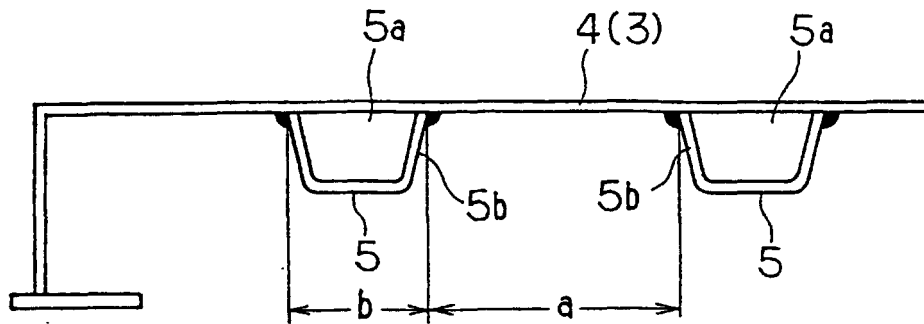


FIG.3

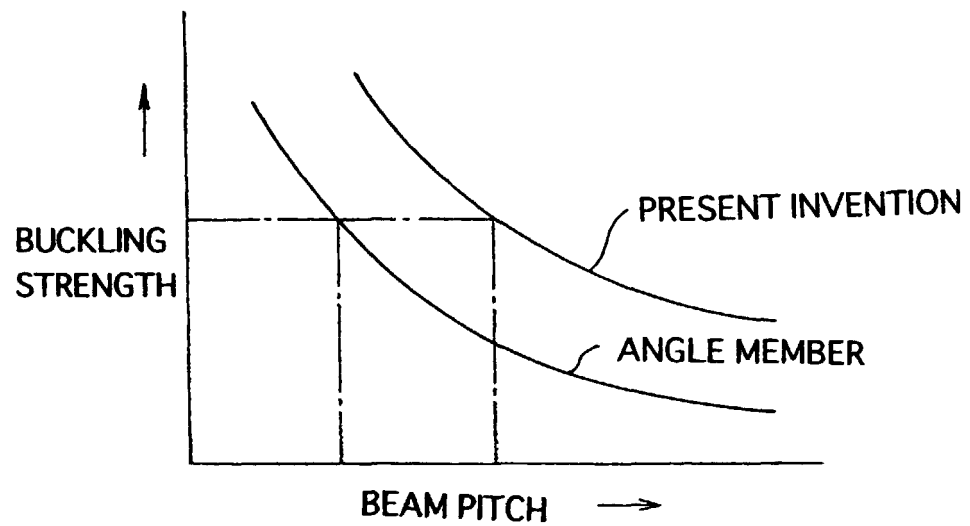
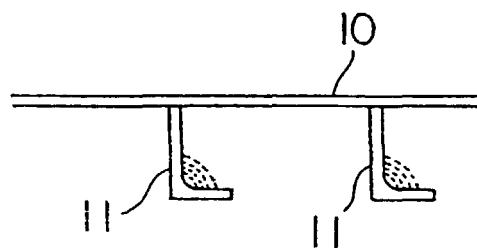


FIG.4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP98/05674

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.⁶ B63B19/14, B63B3/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl.⁶ B63B19/14, B63B3/26-3/36, B63B3/48

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1926-1999	Toroku Jitsuyo Shinan Koho	1994-1999
Kokai Jitsuyo Shinan Koho	1971-1999	Jitsuyo Shinan Toroku Koho	1994-1999

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, 49-101492, U (Akira Ikeda), 31 August, 1974 (31. 08. 74), Claims ; Fig. 3 (Family: none)	1, 2
Y	JP, 61-81492, U (Kyokuto MacGregor K.K.), 30 May, 1986 (30. 05. 86), Claims ; Figs. 5a, 5b (Family: none)	1, 2
Y	JP, 50-136887, A (Kawasaki Heavy Industries, Ltd.), 30 October, 1975 (30. 10. 75), Page 1, lower right column, lines 12, 13 ; Fig. 2 (Family: none)	1, 2
Y	JP, 52-73491, A (Hitachi Zosen Corp.), 20 June, 1977 (20. 06. 77), Fig. 2 (Family: none)	1, 2

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
4 March, 1999 (04. 03. 99)Date of mailing of the international search report
16 March, 1999 (16. 03. 99)Name and mailing address of the ISA/
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