

PATENT SPECIFICATION

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(54) STRUCTURAL ELEMENT

(71) We, A/S AKERS MEK. VERKSTED, a Company organised under the laws of Norway of Munkedamsveien 45, Oslo 2, Norway, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a structural element for use in the fitting out of cabins etc., on board ships, oil rigs or the like. In particular the invention relates to structural elements in the form of boxlike substantially parallelepipedic hollow bodies, the adjacent edges of which elements are provided with complementary stepped configurations for mutual tight overlapping engagement, the resulting joints between the elements including locking members in the form of locking flaps, stamped out of the mutually engaging surfaces, extending in the plane of the elements.

Various previously known elements of this type are known for use in assembling self supporting walls or ceilings for the fitting out of cabins etc. onboard ships or the like.

Previously known structural elements of this type have certain drawbacks. Thus the locking flaps stamped out of the plate material can easily be accidentally deformed before as well as during the assembly of the elements. This has a detrimental effect on the locking action, and can also result in an incorrect mutual positioning of the elements. It is an object of the invention to overcome such drawbacks.

The present invention provides a structural element suitable for use in the formation of walls or ceilings in the fitting out of cabins and the like onboard ships, oil rigs or the like, which element comprises a boxlike, substantially parallelepipedic hollow body having opposite side edges each having a stepped configuration for

mutually overlapping engagement with the side edge of an adjacent element in use of said elements to form a said wall or ceiling, the stepped side edges having interlocking means in the form of locking flaps stamped out of stepped-side-edge portions parallel to the main faces of the element, said flaps having a curved transverse cross-section the convex side of which is directed inwardly, the openings resulting from the stamping out of said flaps extending to a greater length than the length of the respective flaps.

The box-like elements are preferably made from metal, e.g. aluminium or especially steel, but they can also be made from other fibreproof and sufficiently strong material. The filling of the plate elements is preferably of a fireproof insulating material, most preferably of rock-wool, though other material having favourable insulating properties against fire and noise as well as thermal conductivity can be used.

Conveniently the element of the invention comprises two plates each having opposite side edges formed with flanges for forming, together with the respective side edges of the other of said plates, the stepped side edges of the element, the flanges being so disposed and dimensioned that when the two plates are assembled to form the element, the flanges of one of said plates tightly embrace the flanges of the other of said plates, the latter flanges engaging the inner surface of said one of said plates so that the thickness of the element is determined by the depth of said latter flanges.

Desirably the mutually superposed portions of the flanges are provided with superposed apertures through which apertures are disposed rivets for securing the two plates together in register with each other for forming the element. In addition, by stamping out the locking flaps and apertures for receiving rivets by means of which plate edges or flanges are secured to

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each other to form the box-like elements, additional advantages of manufacturing economy may be achieved.

The following description of a preferred embodiment of the invention is illustrated with reference to the accompanying drawings in which:

Figure 1 is a perspective view showing the upper part of two structural elements A and B in position before assembly;

Figure 2 is a cross-section taken along the line II-II in Figure 1;

Figure 3 shows in larger scale a section through a part of the joint just before interengagement of two locking flaps by longitudinal displacement of the elements; and

Figure 4 is a section through the lower part of one of the elements of Figure 1.

A structural element A is built up from first and second face plates 2 and 3, respectively, made of, for instance, steel plate. The first plate 2 has at each side edge a flange 2' extending normally from an inner or rear surface of the plate. The second plate 3 has a generally 'Z' shaped flange extending from each side edge comprising a first flange portion extending normally from an inner or rear surface of said plate 3, a second flange portion 3'' extending outwardly from the first portion parallel to the main plane of the plate 3, and a third outer flange portion 3' extending in the same direction as the first portion extends and generally parallel thereto.

The first and second face plates 2 and 3 are assembled together with the flanges 2' of the first plate 2 and the outer flange portions 3' of the second plates 3 superposed at each side so as to form a substantially parallelepipedic hollow structural element A with stepped side edges and held together by, for example, rivets disposed through apertures 4 in the flanges 2' of the first plate 2 and corresponding apertures in the outer flange portions 3' of the second plate 3.

The outer flange portions 3' have a width corresponding substantially to that of the flanges 2' and the free edges of said outer flange portions 3' engage the inner or rear surface of the first plate 2. Said outer flange portion 3' thereby serves also as a spacer (between the main planes of plates 2 and 3) to provide the desired overall thickness of the whole element A. As may be seen in Figure 1 the structural element A is an essentially boxlike structure 1. The interior 1' of which is filled with a suitable insulating material, for example, rock wool. In the second flange portions 3'' of the stepped side edges, which portions 3'' extend parallel to the main planes of plates 2 and 3, locking flaps 7 are stamped out.

These locking flaps 7 are given a somewhat curved cross-section 7' with their concave surfaces facing outwardly and their convex surfaces facing inwardly towards the apertures from which they have been stamped, as clearly appears from Figure 2. By this means a substantial increase in the strength of the flaps 7 is obtained so that they are not so easily deformed. At the same time the locking flaps of adjacent plates will interengage more favourably with a mutual contact zone, extending substantially along a line 8, instead of, as previously, across an area which according to experience gives less controllable interengagement.

By stamping out the flaps 7 to form them, an opening in the plate material will occur behind them. According to the invention these openings are made longer than the length of the flaps. This relation appears clearly from Figure 3. The length of the flaps is termed *l* while the length of the openings 6 is termed *L*. This feature makes it substantially easier to assemble as well as disassemble the elements. In previously known constructions where *L* was almost equal to *l* it proved to be difficult to obtain engagement and release of the co-operating locking flaps. By making *L* substantially longer than *l*, this disadvantage is substantially minimised.

In accordance with a further feature of the preferred embodiment, the lower and/or upper edges of the elements A and B are provided with a central groove 9 adapted for receiving a member 10, which forms the respective edge portions of the boxlike elements, a part of said member 10 engaging in the groove 9, for example as shown in Figure 1, lower part, or, in cross-section, in Figure 4. The edge trim 10 is there shown as comprising a generally 'U'-shaped strip 11 with flanges extending outwardly from the free ends of the 'U'-shape. Conveniently the edge trim 10 is made from plate which has had a central strip portion bent up to form the 'U'-shape. Figure 4 also shows with broken lines a ledge or rail 12 secured to the deck or floor-plates which support the elements A and B. A liner 12' made from fire-proof sealing material can be arranged between the top of the ledge 12 and the bottom of the 'U'-shaped portion 11 of the edge member 10.

It will be understood that the invention can be modified in many ways within the scope of the invention. Thus the cross-section profile of the flaps need not follow an even curvature as shown.

WHAT WE CLAIM IS:—

1. A structural element suitable for use in the formation of walls or ceilings in the fitting out of cabins and the like onboard



each other to form the box-like elements, additional advantages of manufacturing economy may be achieved.

5 The following description of a preferred embodiment of the invention is illustrated with reference to the accompanying drawings in which:

10 Figure 1 is a perspective view showing the upper part of two structural elements A and B in position before assembly;

Figure 2 is a cross-section taken along the line II—II in Figure 1;

15 Figure 3 shows in larger scale a section through a part of the joint just before interengagement of two locking flaps by longitudinal displacement of the elements; and

20 Figure 4 is a section through the lower part of one of the elements of Figure 1.

25 A structural element A is built up from first and second face plates 2 and 3, respectively, made of, for instance, steel plate. The first plate 2 has at each side edge a flange 2' extending normally from an inner or rear surface of the plate. The second plate 3 has a generally 'Z' shaped flange extending from each side edge comprising a first flange portion extending normally from an inner or rear surface of said plate 3, a second flange portion 3'' extending outwardly from the first portion parallel to the main plane of the plate 3, and a third outer flange portion 3' extending in the same direction as the first portion extends and generally parallel thereto.

35 The first and second face plates 2 and 3 are assembled together with the flanges 2' of the first plate 2 and the outer flange portions 3' of the second plates 3 superposed at each side so as to form a substantially parallelepipedic hollow structural element A with stepped side edges and held together by, for example, rivets disposed through apertures 4 in the flanges 2' of the first plate 2 and corresponding apertures in the outer flange portions 3' of the second plate 3.

40 The outer flange portions 3' have a width corresponding substantially to that of the flanges 2' and the free edges of said outer flange portions 3' engage the inner or rear surface of the first plate 2. Said outer flange portion 3' thereby serves also as a spacer (between the main planes of plates 2 and 3) to provide the desired overall thickness of the whole element A. As may be seen in Figure 1 the structural element A is an essentially boxlike structure 1. The interior 1' of which is filled with a suitable insulating material, for example, rock wool. In the second flange portions 3'' of the stepped side edges, which portions 3'' extend parallel to the main planes of plates 2 and 3, locking flaps 7 are stamped out.

These locking flaps 7 are given a somewhat curved cross-section 7' with their concave surfaces facing outwardly and their convex surfaces facing inwardly towards the apertures from which they have been stamped, as clearly appears from Figure 2. By this means a substantial increase in the strength of the flaps 7 is obtained so that they are not so easily deformed. At the same time the locking flaps of adjacent plates will interengage more favourably with a mutual contact zone, extending substantially along a line 8, instead of, as previously, across an area which according to experience gives less controllable interengagement.

By stamping out the flaps 7 to form them, an opening in the plate material will occur behind them. According to the invention these openings are made longer than the length of the flaps. This relation appears clearly from Figure 3. The length of the flaps is termed *l* while the length of the openings 6 is termed *L*. This feature makes it substantially easier to assemble as well as disassemble the elements. In previously known constructions where *L* was almost equal to *l* it proved to be difficult to obtain engagement and release of the co-operating locking flaps. By making *L* substantially longer than *l*, this disadvantage is substantially minimised.

In accordance with a further feature of the preferred embodiment, the lower and/or upper edges of the elements A and B are provided with a central groove 9 adapted for receiving a member 10, which forms the respective edge portions of the boxlike elements, a part of said member 10 engaging in the groove 9, for example as shown in Figure 1, lower part, or, in cross-section, in Figure 4. The edge trim 10 is there shown as comprising a generally 'U'-shaped strip 11 with flanges extending outwardly from the free ends of the 'U'-shape. Conveniently the edge trim 10 is made from plate which has had a central strip portion bent up to form the 'U'-shape. Figure 4 also shows with broken lines a ledge or rail 12 secured to the deck or floor-plates which support the elements A and B. A liner 12' made from fire-proof sealing material can be arranged between the top of the ledge 12 and the bottom of the 'U'-shaped portion 11 of the edge member 10.

It will be understood that the invention can be modified in many ways within the scope of the invention. Thus the cross-section profile of the flaps need not follow an even curvature as shown.

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1. A structural element suitable for use in the formation of walls or ceilings in the fitting out of cabins and the like onboard



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ships, oil rigs or the like, which element comprises a boxlike, substantially parallelepipedic hollow body having opposite side edges each having a stepped configuration for mutually overlapping engagement with the side edge of an adjacent element in use of said elements to form a said wall or ceiling, the stepped side edges having interlocking means in the form of locking flaps stamped out of stepped-side-edge portions parallel to the main faces of the element, said flaps having a curved transverse cross-section the convex side of which is directed inwardly, the openings resulting from the stamping out of said flaps extending to a greater length than the length of the respective flaps.

2. An element as claimed in Claim 1, which comprises two plates each having opposite side edges formed with flanges for forming, together with the respective side edges of the other of said plates, the stepped side edges of the element, the flanges being so disposed and dimensioned that when the two plates are assembled to form the element, the flanges of one of said plates tightly embrace the flanges of the other of said plates, the latter flanges engaging the inner surface of said one of said plates so that the thickness of the element is determined by the depth of said latter flanges.

3. An element as claimed in Claim 2, wherein mutually superposed portions of the flanges are provided with superposed apertures through which apertures are disposed rivets for securing the two plates together in register with each other for forming the element.

4. An element as claimed in Claim 2 or Claim 3, wherein one of said two plates has at each side edge a flange extending normally from an inner surface thereof, and the second of said two plates has a generally 'Z'-shaped flange extending from each side edge, which 'Z'-shaped flange comprises a first flange portion extending normally from an inner surface of said second plate, a second flange portion extending outwardly from the first portion parallel to the main plane of the second plate and a

third outer flange portion extending in the same direction as the first portion extends and generally parallel thereto.

5. An element as claimed in any of the preceding claims, wherein the element's lower and/or upper edges are provided with a central groove for receiving a co-operating part of an edge trim.

6. An element as claimed in Claim 5, wherein said edge trim comprises a strip having a central portion bent up into a 'U'-shaped form to provide said co-operating part.

7. An element as claimed in Claim 6, wherein sealing means are provided within the base of said 'U'-shape.

8. An element as claimed in any of the preceding claims, wherein the openings resulting from the stamping out of the locking flaps extend to a substantially greater length than the length of the respective flaps.

9. An element as claimed in any of the preceding claims which is made of metal plates.

10. An element as claimed in Claim 9, wherein the metal is steel or aluminium.

11. An element as claimed in any of the preceding claims which is filled with a fireproof insulating material.

12. An element as claimed in Claim 11, wherein said material is rock wool.

13. A structural element for the fitting out of cabins and the like substantially as described hereinbefore with particular reference to Figures 1 to 4 of the accompanying drawings.

14. A wall or ceiling made of a plurality of elements according to any of the preceding claims assembled together with their stepped side edges in mutually overlapping engagement.

15. A cabin or the like fitted out with elements as defined in any of the preceding claims.

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