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"A SHEET METAL WALL"

The present invention relates to a sheet metal wall. In particular, though not solely the invention relates to a sheet metal wall which may be free standing, affixed to another substrate or placed back to back to form a metal wall to define a cladding or partition presenting a smooth exterior surface.

BACKGROUND OF THE INVENTION

Sheet metal walls are presently provided in many differing forms for many different applications by a variety of manufacturers.

Sheet metal walls can be utilised to impart an aesthetically pleasing cladding to an otherwise rough construction material. Such sheet metal walls can be either affixed to the substrate or affixed at any of its ends to hold the structure in place. The orientation of these structures is not limited to any particular surface and they have found application in cladding of walls, ceilings and even floors.

The use of a substantially flat panel backed by, at least a minimum, of one stringer, is not new. Reference is made here to JP 2000045492.

A wall may be constructed such that it is free standing in the form of a fence. Such constructions may be used, for instance, for security or where visual privacy is required, and is a light easily erectable, modular assembly.

When use is made of corrosion resistant material, such as aluminium or electro galvanically plated metal, an appealing long lasting structure can be created. Adherent to the facade of the structure can be any number of coatings or finishes as well as those that can be fabricated into the wall structural material itself. All of these processes are known in the present art.

It would however be an advantage to provide a light weight, cost effective wall that can be easily manufactured using existing processes, that can be packed flat for transportation either assembled or for assembly on site, erected with commonly available tooling with minimum skill yet provide a strong resilient structure that is aesthetically pleasing.

SUMMARY OF THE INVENTION

Accordingly it is an object of the present invention to provide a sheet metal wall which goes some way to providing the abovementioned desiderata or which will at least provide the public with a useful choice.

- 5 In a first aspect the present invention consists in a sheet metal wall comprising:
a first sheet of metal folder to define a substantially quadrilateral shaped panel providing a substantially planar facade side and a non facade side,
said first sheet metal folded to provide a plurality of corrugations projecting in said non facade side,
- 10 at least one stringer of a second sheet metal engaged to said first sheet on said non facade side extending across the plurality of corrugations.
Preferably said plurality of corrugations are substantially parallel.
Preferably said plurality of corrugations extend from and between opposite sides in said quadrilateral shaped panel defined by said first sheet of metal.
- 15 Preferably said quadrilateral shaped panel is of unequal length sides.
Preferably said quadrilateral shaped panel is of rectangular shape.
Preferably said plurality of corrugations are substantially equi-spaced.
Preferably said plurality of corrugations extend from and between the opposite and longer of the sides in the rectangular shaped panel.
- 20 Preferably said at least one stringer extends transverse to said corrugations.
Preferably said at least one stringer extends at right angles to said corrugations.
Preferably said at least one stringer extends from and between the other of said sides of said quadrilateral shaped panel.
Preferably said at least one stringer extends from and between the shorter of the
- 25 sides in the rectangular shaped panel.
Preferably said at least one stringer is provided with rebates complementary to the corrugations.
Preferably said rebates of said at least one stringer are of a depth equal to the height of said corrugations in said non facade side such that the between said corrugations, said at least one stringer can contact said first folded sheet between said corrugations on the side
- 30 of said sheet opposite to said facade side.
Preferably said at least one stringer is a channel section.

Preferably said at least one stringer provides the bottom of said channel to lie against the said first folded sheet between said corrugations on the side of said sheet opposite to said facade side.

5 Preferably said at least one stringer is affixed to said first folder sheet between said corrugations.

Preferably said at least one stringer is affixed by rivets.

Preferably said at least one stringer is punch rivetted to said first folded sheet.

Preferably said at least one stringer has its opening of its channel section projecting away from said first fold sheet.

10 Preferably said at least one channel is of a "C" shaped section.

Preferably said corrugations are of a width no greater than twice the thickness of said first sheet.

Preferably said corrugations project at substantially right angles.

15 Preferably said at least one stringer is of greater depth than the height of said corrugations.

Preferably said rebates of said at least one stringer are narrow slots of a complementary shape to said corrugations.

Preferably there are provided two stringers to said first folded sheet.

20 Preferably a first of said two stringers extends immediately inward and along a first edge of said first folded sheet.

Preferably the second of said stringer extends spaced a distance between edges of said first folded sheet.

Preferably said two stringers are substantially parallel to each other.

25 In a second aspect the present invention consists in a sheet metal wall as hereinbefore described when used as a cladding member to a structural wall.

In a further aspect the present invention consists in a sheet metal wall as hereinbefore described when used as a partitioning wall.

Preferably said walls are positioned to place said corrugations in a substantially vertical manner.

30 In a further aspect the present invention consists in a wall comprising:

a sheet metal wall as hereinbefore described engaged to a like sheet metal wall in a manner such that the two are engaged to each other by a connection formed between said stringers.

In still a further aspect the present invention consists in a sheet metal wall as herein described with reference to the accompanying drawings.

This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively and any or all combinations of any two or more of said parts, elements or features and where specific integers are mentioned herein which has known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of a corrugated sheet metal wall with stringers at the top of the wall and three quarters of the way to the bottom of the wall.

Figure 2 is an end elevation of the corrugated metal wall showing the end form of the stringers together with the side view of the corrugations and return.

Figure 3 is a sectional view through Section AA of Figure 1.

Figure 4 is a bottom plan view of the metal wall shown in Figure 1.

Figure 5 is an isometric view of a corrugated metal wall showing the corrugated metal panel cut away for clarity of the stringers.

Figure 6 is an end elevation of the present invention placed back to back to provide a free standing wall with outward facing facade.

Figure 7 illustrates the use of the present invention in the lining of a room, in this case a toilet block.

DETAILED DESCRIPTION

With reference to Figure 1, there is shown a corrugated sheet metal wall assembly 1, viewed from the inside or non facade side, consisting of a substantially quadrilateral sheet metal panel 2 and its association thereof, with metal stringers of a channel section 3, 4 running substantially parallel with the long sides of the quadrilateral panel. At least one stringer is utilised along the upper section of the quadrilateral panel 3 and one towards the lower section of the panel 4. The channel sections are fastened preferably by rivets 5, though any equivalent fastening means is applicable. Alternatively a push through rivet system can be utilised wherein part of the metal of either the stringer or the corrugated sheet metal is utilised for pushing through and mating with the other sheet.

Whilst the present invention shows the stringers extending substantially parallel to the longer of the edges of the quadrilateral shape, the arrangement may be provided in a configuration where they extend parallel to the shorter sides. A parallel arrangement will provide the stiffest configuration of the wall panel, however the present invention is not limited to the stringers extending at right angles to the corrugations as shown in Figure 1. The provision of two stringers is desirable, however further stringers may also be included and is really dependent on the size of the sheet metal that is used to define the wall section.

With reference to Figure 2 there is shown the present invention from a side elevation. The upper and lower stringers, 3 and 4 respectively, can be seen as well as the preferred channel form of these stringers. Indicated also is the outside facade face 7, the non facade side 6 and their relation to the general assembly of the corrugated sheet metal wall. The intrusion of the corrugations 8 into the non facade side can be clearly seen. The rivets 5 are provided flush with the outside facade face and pierce through both the corrugated metal wall and the channel stringers to rigidly fix the two together. The combination of a lower and upper stringer imparts considerable stiffness and a space frame like structure, with relatively low weight.

A section view illustrated in Figure 3, from Section AA in Figure 1, indicates the thin nature of the corrugations, barely thicker than twice the through section thickness of the metal sheeting. As a result and with the corrugations being on the internal, non facade face 6 a smooth face to the external or facade face of the structure is provided. The groove as a result of the fold that is formed on the facade side is so created as to be substantially sealed to the ingress of dirt and other foreign bodies to the interior of the corrugation, thus presenting an aesthetically pleasing facade that is easily maintained and is also available for a wide range of surface coatings. It is the plurality vertical folds provided at regular intervals of the sheet metal facade that imparts the resistance of the structure to out of plane bending in the vertical direction. The corrugations also serves a second use in that it keys the sheet metal wall and the stringers together, by way of rebates which can be further seen in Figures 4 and 5.

Depicted in Figure 4 is the bottom plan view of the present invention showing the upper stringer 3 and the plurality of rebates 10 in the stringer which receive the corrugations 8 of the sheet metal panel 2. The returned ends 11 of the sheet metal panel can also be observed at the extreme ends of the assembly to create further rigidity and also to

present an aesthetically pleasing termination to the structure and the hiding of any raw metal edges.

5 Illustrated in Figure 5 is the present invention shown in isometric view. A cut away of the sheet metal panel 2 shows clearly the rebates 10 in the upper and lower stringers 3 and 4 respectively. These are so formed to receive the corrugations of the inner facade 6 to reinforce the structure in bending out of plane in the horizontal direction. By a plurality of fasteners 5 the two mating faces 12 of the stringers can be brought to bear on the coincident faces (not shown) of the internal facade. Further shown are the returns 11 of the sheet metal wall at the termination of the structure and are at either end. The return is
10 interrupted in this example for the upper and lower stringers.

Shown in Figure 6 is the present invention in one configuration where two assemblies are placed back to back to construct a wall to present an smooth facade on either side. The maintaining of these in relative proximity to one another may be achieved through separate mounting of each structure or affixing to each other through any know commercial method,
15 including but not limited to fasteners, adhesives or brackets or any combination thereof. A thinner configuration may be easily achieved by the staggering of the upper and lower stringers of one wall. Both of these configurations create a high stiffness structure that is light yet tough.

20 Depicted in Figure 7 is the use of the sheet metal structure 1 in the internal lining of a room, to dress the precast concrete construction wall 13. In this instance the room is a lavatory. The sheet metal wall can be used on all or any of the surfaces, including the ceiling 14. The addition of a window 15 is easily achieved as is the creation of an aperture for a door.



CLAIMS:

1. A sheet metal wall comprising:

a first sheet of metal folder to define a substantially quadrilateral shaped panel providing a substantially planar facade side and a non facade side,

5 said first sheet metal folded to provide a plurality of corrugations projecting in said non facade side,

at least one stringer of a second sheet metal engaged to said first sheet on said non facade side extending across the plurality of corrugations.

2. A sheet metal wall as claimed in claim 1 wherein said plurality of corrugations are substantially parallel.

3. A sheet metal wall as claimed in claim 1 or 2 wherein said plurality of corrugations extend from and between opposite sides in said quadrilateral shaped panel defined by said first sheet of metal.

4. A sheet metal wall as claimed in any one of claims 1 to 3 wherein said quadrilateral shaped panel is of unequal length sides.

5. A sheet metal wall as claimed in any one of claims 1 to 4 wherein said quadrilateral shaped panel is of rectangular shape.

6. A sheet metal wall as claimed in any one of claims 1 to 5 wherein said plurality of corrugations are substantially equi-spaced.

7. A sheet metal wall as claimed in claims 5 or 6 wherein said plurality of corrugations extend from and between the opposite and longer of the sides in the rectangular shaped panel.

8. A sheet metal wall as claimed in any one of claims 1 to 7 wherein said at least one stringer extends transverse to said corrugations.

9. A sheet metal wall as claimed in any one of claims 1 to 8 wherein said at least one stringer extends at right angles to said corrugations.

10. A sheet metal wall as claimed in claim 3 wherein said at least one stringer extends from and between the other of said sides of said quadrilateral shaped panel.

11. A sheet metal wall as claimed in any one of claims 4 to 10 wherein said at least one stringer extends from and between the shorter of the sides in the rectangular shaped panel.

12. A sheet metal wall as claimed in any one of claims 1 to 11 wherein said at least one stringer is provided with rebates complementary to the corrugations.



13. A sheet metal wall as claimed in any one of claims 1 to 12 wherein said rebates of said at least one stringer are of a depth equal to the height of said corrugations in said non facade side such that the between said corrugations, said at least one stringer can contact said first folded sheet between said corrugations on the side of said sheet opposite to said facade side.

14. A sheet metal wall as claimed in any one of claims 1 to 13 wherein said at least one stringer is a channel section.

15. A sheet metal wall as claimed in claim 14 wherein said at least one stringer provides the bottom of said channel to lie against the said first folded sheet between said corrugations on the side of said sheet opposite to said facade side.

16. A sheet metal wall as claimed in any one of claims 1 to 15 wherein said at least one stringer is affixed to said first folder sheet between said corrugations.

17. A sheet metal wall as claimed in any one of claims 1 to 15 wherein said at least one stringer is engaged by rivets.

18. A sheet metal wall as claimed in any one of claims 1 to 17 wherein said at least one stringer is punch rivetted to said first folded sheet.

19. A sheet metal wall as claimed in claims 14 or 15 wherein said at least one stringer has its opening of its channel section projecting away from said first fold sheet.

20. A sheet metal wall as claimed in claim 19 wherein said at least one channel is of a "C" shaped section.

21. A sheet metal wall as claimed in any one of claim 1 to 20 wherein said corrugations are of a width no greater than twice the thickness of said first sheet.

22. A sheet metal wall as claimed in any one of claims 1 to 21 wherein said corrugations project at substantially right angles.

23. A sheet metal wall as claimed in any one of claims 1 to 22 wherein said at least one stringer is of greater depth than the height of said corrugations.

24. A sheet metal wall as claimed in claim 12 wherein said rebates of said at least one stringer are narrow slots of a complementary shape to said corrugations.

25. A sheet metal wall as claimed in any one of claims 1 to 24 wherein there are provided two stingers to said first folded sheet.

26. A sheet metal wall as claimed in claim 25 wherein a first of said two stringers extends immediately inward and along a first edge of said first folded sheet.



27. A sheet metal wall as claimed in claims 25 or 26 wherein the second of said stringer extends spaced a distance between edges of said first folded sheet.
28. A sheet metal wall as claimed in any one of claims 25 to 27 wherein said two stringers are substantially parallel to each other.
- 5 29. A sheet metal wall as claimed in any one of claims 1 to 28 when used as a cladding member to a structural wall.
30. A sheet metal wall as claimed in any one of claims 1 to 29 when used as a partitioning wall.
- 10 31. A sheet metal wall as claimed in claim 30 said walls are positioned to place said corrugations in a substantially vertical manner.
32. A wall comprising:
a sheet metal wall as claimed in any one of claims 1 to 29 engaged to a like sheet metal wall in a manner such that the two are engaged to each other by a connection formed between said stringers.
- 15 33. A sheet metal wall as claimed in any one of claims 1 to 29 with reference to any one or more of the accompanying drawings.