Oct. 13, 1936. P. A. VOIGT 2,057,654

WALL ASSEMBLY

Filed June 13, 1936

Fig. 1.

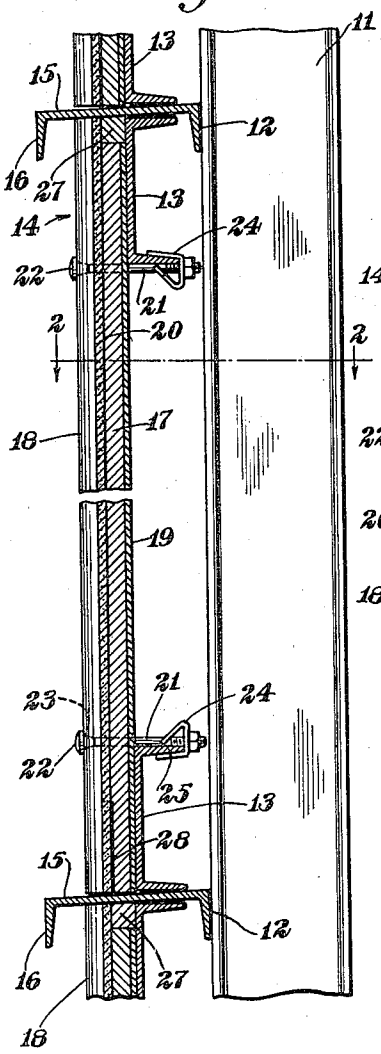


Fig. 2.

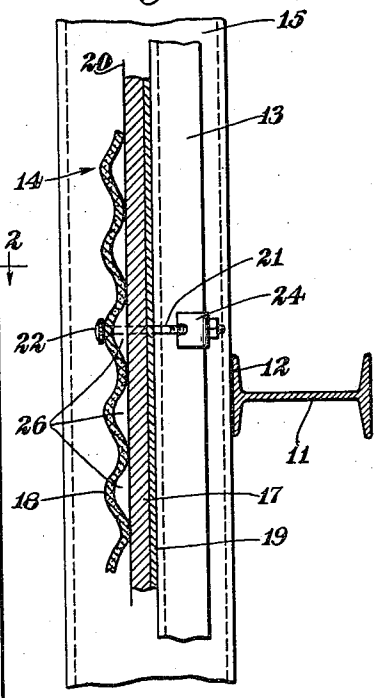
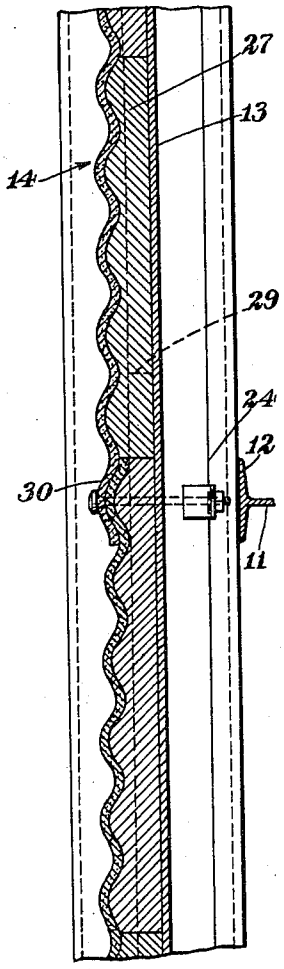


Fig. 3.



INVENTOR
PAUL A. VOIGT.
BY Virgil C. Kline
ATTORNEY

Patented Oct. 13, 1936 2,057,654

UNITED STATES PATENT OFFICE

2,057,654

WALL ASSEMBLY

Paul A. Voigt, Glendale, N. Y., assignor to Johns-Manville Corporation, New York, N. Y., a corporation of New York

Application June 13, 1936, Serial No. 84,983

9 Claims. (Cl. 72—16)

This invention relates to a wall assembly or construction.

It is an object of the invention to provide a lightweight, fire-resistant wall that is relatively inexpensive and easily assembled and that requires only a light structural framing, with no closely spaced vertical studs, for example. Other objects and advantages will appear from the detailed description that follows.

The invention comprises a supporting substructure, a corrugated sheet forming a part of the exposed face of the finished wall, a lightweight thermal insulating and preferably resiliently compressible sheet disposed behind the facing and in front of (outside) the substructure, and suitable means securing the said sheet to the substructure. The invention comprises, also, a wall assembly, of the kind described, including means extending over the upper edge of the corrugated sheet for preventing the entrance of water between the said sheet and a member of plane surface disposed behind the said sheet.

A preferred embodiment of the invention is illustrated in the drawing, and the invention will be exemplified by description in connection therewith.

Fig. 1 is a vertical sectional view of a wall constructed in accordance with the invention.

Fig. 2 is a longitudinal sectional view on line 2—2 of Fig. 1.

Fig. 3 is a longitudinal sectional view across a vertical joint between facing elements of the wall.

There is shown a supporting substructure including columns 11, as, for instance, I-beams spaced far apart, say 20 feet or so.

Horizontal members or girts are secured to the columns, as by spot welding at positions 12. Each of the horizontal members may suitably include two elements 13, whose faces lie in the plane of the back of the wall sheet assembly 14 and another element 15 that is secured to the substructure and to which the elements 13 are secured. The element 15 extends from the substructure and slopes downwardly in a forward direction, and at its outer edge, extends below the level of the top edge of the said sheeting and terminates preferably, in a downwardly extending flange 16.

The wall sheeting includes as a backing element, an appreciably resilient, lightweight, thermal insulating sheet of the type of a fibre board, as, for instance, a sheet of felted wood or cane fibre commonly sold as insulating lumber, also, a sheet comprising composited and stiffened alternating plies of corrugated and plane-surface asbestos paper, or the like. This lightweight sheet should be shape-retaining and adapted to withstand substantial compression without collapse or a great decrease in the thickness.

The outer sheeting 18 of the wall is corrugated, strong, water-impermeable, and resistant to buckling or denting under pressure or shock.

The wall may include, for some purposes, a substantially rigid and strong sheet 19, of generally plane faces, disposed on the back of the insulating sheet 17 and suitably secured thereto as by casein, a phenol formaldehyde condensation product or other suitable adhesive. This sheet 19 is held firmly in contact with the substructure, by means that will be described.

Also, the wall contains preferably a waterproof lining material 20, as, for instance, an asphalt-impregnated roofing felt or other flexible waterproof sheet, disposed continuously between the corrugated facing and the lightweight sheet 17. I may use for the sheets 18 and 19 sheets of compressed asbestos and Portland cement and similar compositions, steel or ceramic ware. However, the asbestos and Portland cement composition is preferred, because of its lightness, minimized tendency to buckle, resistance to elevated temperatures, and small weight for a given strength and stiffness.

The wall sheets are secured to the substructure as by such means as a bolt 21. This bolt is preferably provided with a non-corrodible exterior of the head 22 and of the tapered shank 23. It may be constructed as described in U. S. Patent 2,021,929, issued to me on November 26, 1935. Thus, the head and also the shank of the bolt adjacent to the head may be lead-covered.

At its threaded end, the bolt engages a suitable clip or hook 24, which, in turn, engages a projecting element or other part of the substructure, as, for example, a flange 25. The tapered shank of the bolt fits snugly in a preformed hole in the corrugated facing sheet.

When the nut on the bolt 21 is tightened, the corrugated facing is drawn firmly against the inwardly disposed sheets 17 and this sheet, or the sheet 19, if used, against the substructure. Because the facing contacts over a very small part only of its total area with the backing material, the pressure is concentrated along certain narrow zones and a tight and non-rattling assembly is promoted.

Also, there are defined spaces 26 between convolutions of the corrugated facing and the fibre or other backing element. These spaces permit drainage, in a downward direction, of any water

or dew that may have access to the rear of the corrugated facing.

Means are used either to minimize or to prevent entirely the entrance of rain between the upper portions of the facing and backing sheets of the wall. For this purpose, there may be used a somewhat yieldable flashing strip 27 at the top of the panel. Here the corrugated facing extends above the top edge of the lightweight backing sheet 17, by an amount approximately equal to the height of the strip 27. The flashing strip contacts at its back firmly against an element of generally plane surface secured to the substructure and constituting, if desired, a part of the substructure. At its face, the strip conforms to the back of the top portion of the corrugated sheet, as illustrated.

Entrance of rain water into the insulating sheet at the bottom thereof is prevented by a flashing member 28 which may consist of flexible, waterproof, thin sheet of asphalt-impregnated roofing felt or the like, extending vertically between the facing and the backing and also outwardly and under the lower edge of the corrugated facing.

The wall sheets suitably rest at the bottom, upon the top of the downwardly sloping portion of one of the projecting elements 15, the element thus forming a drainage sill or ledge below the panel.

At the top of the sheets, on the other hand, they fit below the lower face of an element 15 and may be flashed thereagainst by the strip 27. Here, the element 15, extending completely over the upper edge of the sheets, shields the structure against entrance of rain, by forming a drainage platform thereover.

The wall sheeting described may be preassembled as a panel and supplied to the fabricator as one unitary article. However, I prefer to preassemble only the sheet 19 and the insulating board 17, as by means of one of the adhesives described, and then apply the waterproof liner 20 and the facing 18 as the whole is being assembled in a building wall.

After the various parts of the wall have been assembled, the bolts 21 are passed through registering holes in the several layers of sheeting and in the clip and the nuts are tightened on the bolts, so that the assembly is made permanent.

For the purpose of giving greater assurance of water-tightness, the sheets may be so arranged in the assembly that the vertical joints between sections of the backing sheets 17 and adjacent sections of the corrugated facing 18 are non-registering, as illustrated, for example, in Fig. 3.

The lightweight backing sheets may meet in flush relation, as shown at the joint 29, whereas the corrugated facing sheets may overlap, as at position 30, there being used the preformed flashing strip of kind described in my said patent to close snugly the joint or the space between the corrugated facing and the plane surface of element 13.

Using such a construction, there may be constructed a wall weighing much less than heretofore constructed walls of equivalent strength and fire-resistance and costing, for instance, only about two-thirds as much as a brick wall.

This wall assembly may be used as either an outside or inside wall with equal facility.

It will be understood that the details given are for the purpose of illustration, not restriction, and that variations within the spirit of the invention are intended to be included in the scope of the appended claims.

What I claim is:

1. A wall assembly comprising a supporting substructure, a lightweight sheet of insulating material, of the type of fibre board and of generally plane surface, disposed over the substructure, a corrugated sheet disposed over the lightweight sheet, members securing the said sheets to the substructure, and means for preventing the entrance of rain into the spaces defined between the convolutions of the corrugated sheet and the lightweight sheet.

2. A wall assembly, as described in claim 1, including a substantially rigid sheet disposed over the lightweight sheet and in firm contact with the substructure.

3. A wall assembly, as described in claim 1, including a waterproof sheet disposed substantially continuously between the corrugated sheet and the lightweight sheet.

4. A wall assembly, as described in claim 1, including a plurality of each of the said sheets meeting to form vertical joints, the joints between the corrugated sheets and those between the lightweight sheets, respectively, being non-registering with each other, so that there are produced broken vertical joints.

5. A wall assembly, as described in claim 1, including a waterproof flashing member extending between the corrugated and lightweight sheets, at the lower portions thereof, and extending also outwardly under the lower edge of the corrugated sheet, so that entrance of rain water to the lightweight sheet, at the lower portion thereof, is prevented.

6 A wall assembly, as described in claim 1, including a portion of the corrugated sheet extending beyond the horizontal edge of the lightweight sheet, and flashing means substantially coextensive with said extension and contacting at one side with an element of generally plane surface secured to the substructure and contacting at the other side, in conforming manner, with the inside of the corrugated sheet.

7. A wall assembly comprising a supporting substructure, a lightweight sheet of insulating material, of the type of fibre board and of generally plane surface, disposed over the substructure, a corrugated sheet disposed over the lightweight sheet, members securing the said sheets to the substructure, and means for preventing the entrance of rain into the spaces defined between the convolutions of the corrugated sheet and the insulating sheet, the said means including a continuous element secured to the substructure and extending forwardly therefrom, completely over the upper edge of the said panel, and the forward edge of the said element terminating at a position below the level of the upper edge of the corrugated sheet.

8. A wall assembly including a supporting substructure, horizontally extending rigid members spaced vertically from each other, secured to the substructure and extending outwardly therefrom, in downwardly sloping manner, wall facing sheets extending substantially vertically and resting at their lower edges upon one of the said rigid members and terminating at the top just under one of the said members, and means securing the sheets to the substructure, the said rigid members extending from the supporting substructure a greater distance than the outermost parts of the facing sheets, so that the said members form a drainage platform extending completely over the upper edge of the facing sheets.

9. A wall assembly including a supporting sub-

structure, horizontally extending rigid members spaced vertically from each other, secured to the substructure, and extending outwardly therefrom, in downwardly sloping manner, wall facing sheets resting at their lower edges upon one of the said rigid members and terminating at the top just under one of the said members, and means securing the sheets to the substructure, the said rigid members extending from the supporting substructure a greater distance than the outermost parts of the facing sheets, and each of the said members including a flange extending downwardly from the outer edge thereof, so that each of the said members forms a drainage platform extending completely over the upper edge of the facing sheets and the said flange extends outside and below the level of the said upper edge.

PAUL A. VOIGT.