June 24, 1958 H. A. BERLINER 2,839,812

METHOD OF MANUFACTURING A STRUCTURAL PANEL

Filed March 12, 1956

Fig. 1

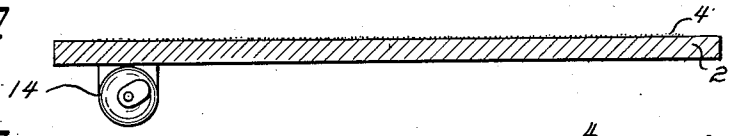


Fig. 2

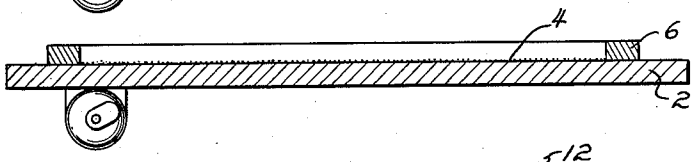


Fig. 3

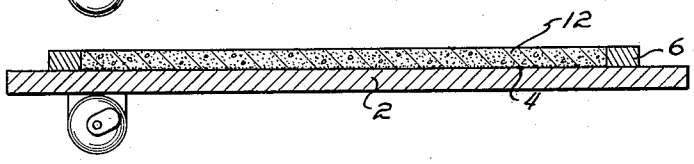


Fig. 4

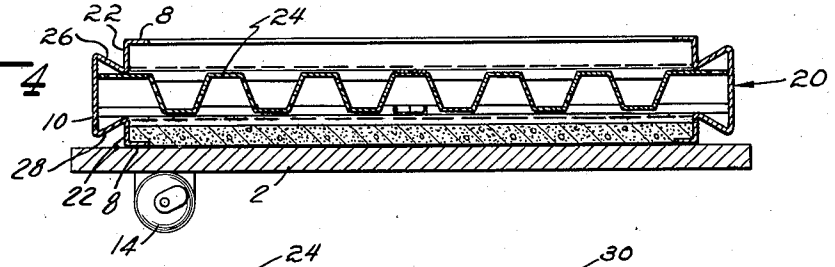


Fig. 5

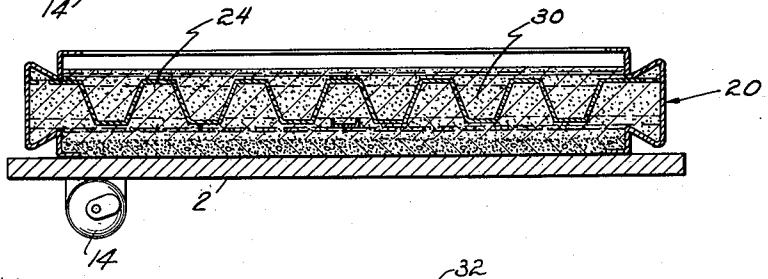
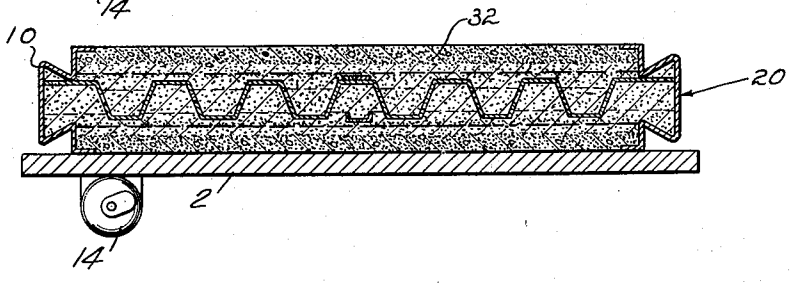


Fig. 6



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METHOD OF MANUFACTURING A STRUCTURAL PANEL

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2 Claims. (Cl. 25—154)

This invention relates broadly to the art of building construction and, more particularly, to the manufacture of pre-fabricated structural members adapted to be used in the construction of buildings of all types.

In my co-pending application Ser. No. 382,677, now abandoned, for Pre-Fabricated Building Construction Panel, I have described and claimed a building construction panel of new and improved structure, having exterior slabs or layers of hard, strong cast aggregate, and intermediate slab or layer of lightweight aggregate of low strength, a corrugated sheet of metal embedded in the intermediate slab, and a metallic frame surrounding the entire cast and embedded structures. There are many obvious ways by which this new and improved panel may be made but by the present invention I have provided a simple, easily practised, inexpensive and quick method of making the panel which, by reason of its advantages, permits the panel to be made either at a central place or on any construction job in a minimum time and at minimum expense.

The invention is described in the following specification and illustrated in the accompanying drawing, in which:

Figs. 1 to 6 show successive steps in the method of making a building construction panel according to the invention.

The building construction panel to which the invention relates and which is made by the method provided by the invention, is a composite, flat panel comprising a thick layer or slab of lightweight aggregate which is relatively impervious to the passage of heat and moisture but which has low resistance to mechanical action, and having embedded therein a corrugated member formed of perforated sheet metal which is the principal load-bearing member of the panel. At one or both faces of this slab there are relatively thin layers or slabs of hard, relatively heavy, high strength concrete aggregate which may have a reticulated reinforcing sheet embedded therein and which are homogeneously united to the slab of lightweight aggregate to provide a monolithic structure. A metallic frame surrounds the entire periphery of this panel and receives the edges of the corrugated member to insure that the corrugated member will carry any loads to which the panel may be subjected.

In the manufacture of this panel by the method according to the invention a flat horizontal surface **2** is provided and on this is placed or spread a separating agent **4** which may be a fabric, a chemical separating agent, a plastic sheet, oil or other material which will prevent adhesion of a cast concrete aggregate to the surface **2**. On this separating agent there is then placed a wooden frame **6** which, in the usual manufacture of a panel of rectangular shape, is itself rectangular in shape and of internal dimensions equal to the internal dimensions of the inturned flange **8** which forms part of the peripheral frame **10** which surrounds and forms part of the finished panel. The frame **6** is deep enough to permit a layer of concrete aggregate to be poured and

cast within it which will have the requisite and designed thickness, or depth, of one of the exterior layers of hard, strong concrete of the finished panel. In usual panels this exterior layer may be three-eights inch in thickness and the frame **6** is therefore at least that high. After the frame has been placed in position concrete aggregate **12** is poured within the interior space defined by it to a uniform depth equal to the requisite and designed thickness of one of the exterior layers of the panel. While the concrete is being poured, and for a short time thereafter, the entire assembly of surface **2**, separating agent **4**, frame **6** and fluid concrete **12** is given a rapid oscillating or vibratory horizontal movement by means such as the motor and unbalanced weight device shown at **14**. When the aggregate **12** has fully settled and has become sufficiently firm so that it will not slump the frame **6** is removed and the metallic structure **20**, which with the cast aggregate forms the completed panel, is placed on the surface **2** in surrounding relation to the cast aggregate **12**. As stated, the inner dimensions of the wooden frame **6** are equal to the inner dimensions of the flange **8** which forms part of peripheral frame member **10** and therefore the inner peripheral edge of flange **8** will just abut the periphery of the cast aggregate **12** at the lowest part thereof. However, the concrete **12** may be flowed into the space above flange **8** and within the frame **10**, as shown in Fig. 4.

The metalic structural member of the panel comprises a peripheral frame member **10** having an inwardly-facing central part of C-shaped cross-section with strips **22** extending in opposite directions from its upper and lower arms, and inwardly directed flanges **8** extending toward the center of the panel from the strips **22**.

A sheet metal member **24** of corrugated construction is disposed within the interior of the peripheral frame member **10** and extends at all its edges into the C-shaped part of the frame member. The depth of the corrugations of the sheet metal member **24** is approximately the same as the distance between the ends of the upper and lower arms **26**, **28** of the C-shaped part of the peripheral frame member and, as the edge parts of the corrugated member are received within the C-shaped part of the frame member, it will be seen that the upper and lower surfaces of the corrugated member lie approximately at the level of the inner ends of the strips **22**. The thickness or depth of the layer of aggregate **12** which is cast within the wooden frame **6** is preferably less than the width of the strip **22**. Therefore, when the structural member **20** is placed in position on the surface **2**, as described hereinbefore, the upper surface of the layer **12** of aggregate will lie below the lower surfaces of the corrugations of the member **24** and below the upper longitudinal edge of the lower strip **22**, all as shown in Fig. 4. When the parts are in the described position a lightweight, low-strength aggregate **30** is poured within the peripheral frame member **10** to approximately the level of the upper surface of the corrugations of member **24**. While this pouring is continued and for a short time thereafter, the oscillating or vibrating mechanism **14** is operated in order to insure that the aggregate **30** and layer **12** merge completely along and over their contacting surfaces in order to provide a homogeneous and monolithic mass. The vibratory movement also insures that all parts of the structure will be completely filled with aggregate. The aggregate **30** is poured to such a depth that its upper surface is above the lower surface of the upper strip **22** and the space above the aggregate **30** and defined by this peripheral strip may now be filled with aggregate **32** which will provide a hard, high-strength concrete material when hardened. This material is poured until its top surface is flush with the upper flange **8**. During this final pouring operation the

mechanism **14** may be operated to vibrate the entire structure in order to insure that the upper layer **32** of hard, high-strength aggregate merges completely with the center layer of the light-weight low-strength aggregate **30** over their entire contacting surfaces. The entire cast structure is now allowed to harden and is then removed from the surface **2**. The resulting product is a generally flat panel comprising a relatively thick slab of lightweight, low-strength aggregate filling and embedding the corrugated metal member **24**, which forms the principal structural member of the panel. On one or both surfaces of this slab are relatively thin layers or slabs of high strength, hard concrete aggregate. The entire cast structure is completely surrounded by the frame member **10** and it will be noted that this peripheral frame member provides a mold within which the central and upper slabs of aggregate are cast. The peripheral frame member is completely filled by cast aggregate.

While I have described and illustrated one method according to my invention, it will be apparent to those skilled in the art that other embodiments, methods and steps, as well as modifications of those disclosed, may be made and practised without departing in any way from the spirit or scope of the invention, for the limits of which reference must be had to the appended claims.

What is claimed is:

1. The method of manufacture of a structural panel which consists in casting a relatively thin layer of an aggregate which forms a hard, high-strength concrete, while said layer is sufficiently firm that it will not slump but before it has set placing about its periphery a metallic frame member having a C-shaped cross section with the layer of aggregate within the peripheral frame member, pouring a relatively thick layer of aggregate which forms a light-weight, low-strength concrete on the previously cast layer and within and to a level below the upper surface of the surrounding peripheral metallic frame member, and casting a third relatively thin layer of aggregate which forms a hard, high-strength concrete on said second layer and within the surrounding peripheral metallic frame member, and allowing said layers of cast aggregate to harden.

2. The method of manufacture of a structural panel which consists in casting a relatively thin layer of an aggregate which forms a hard, high-strength concrete, while said layer is sufficiently firm that it will not slump but before it has set placing about its periphery a metallic frame member having an inwardly facing C-shaped cross section with the layer of aggregate within the cross-section of the peripheral metallic frame member, pouring a relatively thick layer of aggregate which forms a light-weight, low-strength concrete on the previously cast layer and within the surrounding peripheral metallic frame member, and casting a third relatively thin layer of aggregate which forms a hard, high-strength concrete on said second layer and within the surrounding peripheral frame, allowing said layers of cast aggregate to harden, and subjecting the cast aggregate to rapid vibratory movement during each pouring operation.

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