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Dinkel

[11] **3,766,699**

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[54] **CONSTRUCTIONAL ASSEMBLY, E. G. FOR CONSTRUCTING BUILDINGS, CONTAINERS AND VEHICLE BODIES**

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[30] **Foreign Application Priority Data**

June 4, 1971 Austria 4853

[52] **U.S. Cl.** **52/592,** 52/282, 52/309, 52/505, 52/601, 52/607, 52/627

[51] **Int. Cl.** **E04b 2/14,** E04c 2/26, E04c 2/52

[58] **Field of Search** ..... 52/309, 607, 606, 52/601, 592, 627, 282, 615, 220, 221, 576, 577, 505; 161/139; 296/31 P; 220/9 F

[56] **References Cited**

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Primary Examiner—John E. Murtagh
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[57] **ABSTRACT**

A constructional assembly comprising a core part having non-intersecting channels therethrough which cross over each other, the channels being adapted to receive both clamping elements, for detachably interconnecting adjacent constructional assemblies, and also wiring and piping, and the channels extending parallel to side wall surfaces of the core part; at least one load-bearing cover plate which is disposed adjacent a said side wall surface and which is offset in relation to the core part, the core part being less dense than the cover plate and at least one stiffener member which covers a region of the core part which is not covered by a cover plate.

13 Claims, 8 Drawing Figures

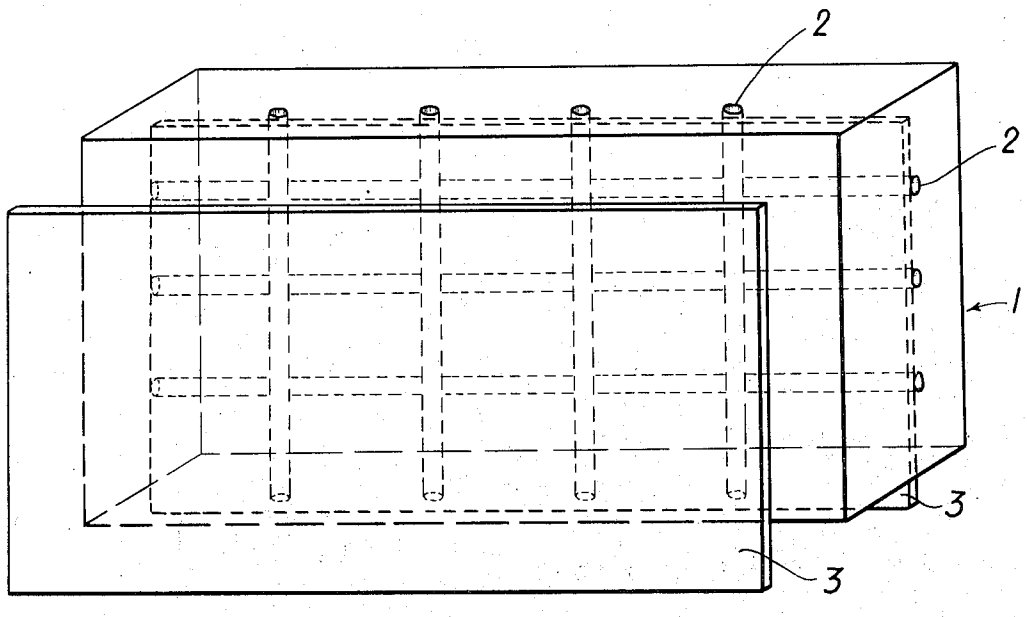


FIG. 1

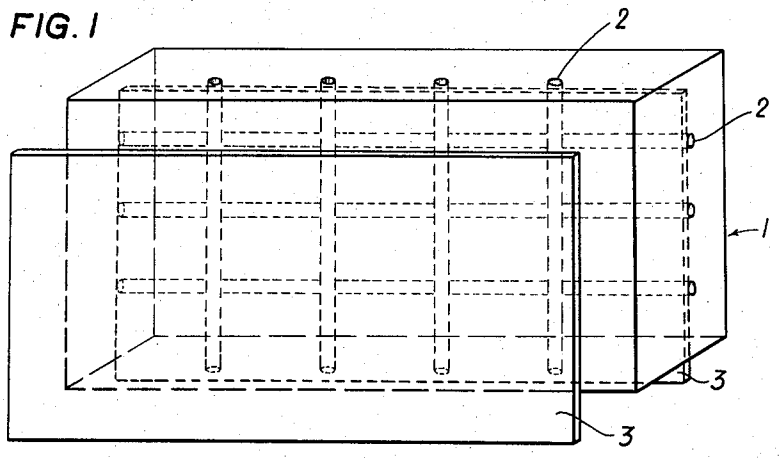


FIG. 2

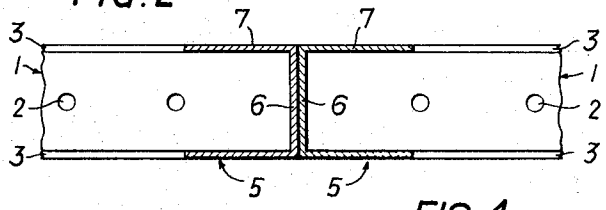


FIG. 3

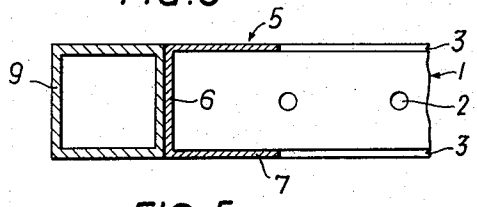


FIG. 4

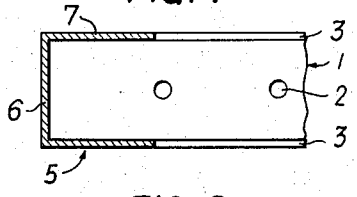


FIG. 5

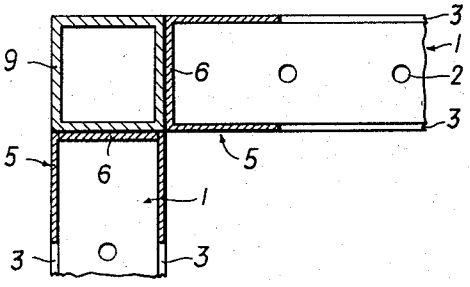


FIG. 6

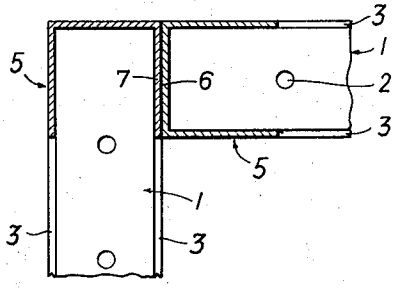


FIG. 7

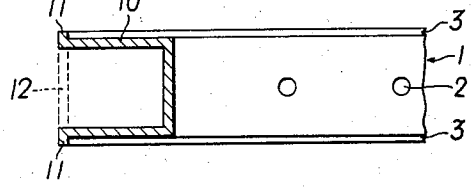
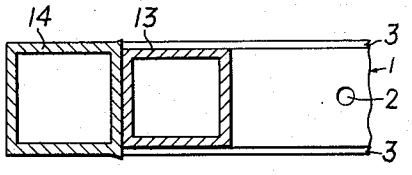


FIG. 8



CONSTRUCTIONAL ASSEMBLY, E. G. FOR CONSTRUCTING BUILDINGS, CONTAINERS AND VEHICLE BODIES

The invention relates to a constructional assembly, e.g., for the construction of buildings, containers, and vehicle bodies.

Known building systems are disadvantageous because, irrespective of which constructional assemblies are used, that is to say irrespective of whether these assemblies comprise building elements of mineral materials or plastics, and irrespective of whether they comprise single-layer or multi-layer building elements, they require a non-detachable connection of the building elements. This has the necessary consequence that when the building elements are separated from one another they are damaged and are capable of only very limited re-use.

Thus a building system is known (Austrian Pat. specification No. 204,237), which is composed of a multi-layer building element provided with continuous bores and with tensioning elements, the latter being concreted in the bores. The separation of the building elements from one another, and their re-use is consequently completely impossible.

Known building systems which use multi-layer building elements made of light material are moreover also disadvantageous because the building elements have very large dimensions and consequently very narrow limits are imposed on the forms of buildings which can be produced therefrom. Moreover, these known building elements are additionally disadvantageous in that, because of their spatial size, expensive machines are required for their production, so that manufacturing costs are high. Furthermore, building elements of this kind give rise to heavy transport costs.

The object of the present invention is to provide a constructional assembly from which buildings, containers, and vehicle bodies, for example, may be constructed with simple equipment, while the component parts of these constructional assemblies, being detachable from one another, may be completely re-used for the purpose of changing the shape of the buildings.

According therefore to the invention there is provided a constructional assembly comprising a core part having non-intersecting channels therethrough which cross over each other, the channels being adapted to receive both clamping elements, for detachably interconnecting adjacent constructional assemblies,and also wiring or piping, and the channels extending parallel to side wall surfaces of the core part: at least one load-bearing cover plate which is disposed adjacent a said side wall surface and which is offset in relation to the core part, the core part being less dense than the cover plate or plate and at least one stiffener member which covers a region of the core plate which is not covered by a cover plate or which is disposed between cover plates.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:

FIG. 1 shows a perspective view of a constructional assembly according to the invention,and

FIGS. 2 to 8 are plan views of stiffener members of constructional assemblies according to the invention by means of which the constructional assemblies are held or joined together.

The constructional assembly illustrated in FIG. 1 consists of a core part 1, which is provided with non-intersecting bores or channels 2 which extend horizontally and vertically or in an inclined direction and cross one another spatially, and into which clamping elements (not shown) or installation pipes or wires (not shown) can be inserted. At its opposite side wall surfaces the core part 1 is provided with cover plates 3, for example of hard plastics material or of a metal, the shapes and sizes of the cover plates 3 being identical to those of the side wall surfaces of the core part 1, although they are offset in relation to the core part in a direction inclined by 45° to the edges. In this way, two neighbouring edge parts of the cover plates overlap the corresponding edge regions of the core part of two juxtaposed assemblies and reliable sealing of the joints or, depending on the stiffness of the cover plates, a good plug-and-socket connection is achieved. By means of clamping elements which are disposed in the bores 2 of the core part 1, a group of superimposed and/or juxtaposed assemblies are joined fast together, although this connection can be released at any time.

The core part 1 forms a thermal and acoustic insulation layer, whereas the cover plates 3 are load bearing and serve the purpose of taking the static pressure. For this purpose the cover plates 3 are made of load bearing material, such as wood, aluminum, steel, plastics, or else ceramic material. For the purpose of reinforcement, each cover plate 3 may be provided with internally or externally situated stiffening ribs (not shown).

The cor part, which is less dense than the cover plates 3,is composed of a light material, for example an expanded mineral material or a foamed plastics material, with which additives may be admixed. The core part 1 may more particularly be made of compressible material, for example foamed plastics material, and may be made slightly larger than the two cover plates 3, so tha when a plurality of assemblies are assemblied together, the cover plates of adjacent assemblies abut one another only by compressing the respective core parts 1. The sealing of the building elements in relation to one another is thereby substantially improved.

FIG. 2 of the drawings shows two assemblies which are fastened together by a stiffener member or bar which has the shape of two U-shaped bars 5 joined together along the outer surfaces of their webs 6. A stiffener bar is necessary when a number of assemblies are disposed side by side, in order to impart the necessary strength to the wall thus formed. The thickness of the flanges 7 of the bar corresponds to the thickness of the cover plates 3. The length of the flanges is selected to correspond to the amount of offset of the cover plates 3 in relation to the core part 1. The web of the bar is provided with bores (not shown) corresponding to the bores 2 in the core part.

In FIG. 3 of the drawings a stiffener bar is shown which is formed by a bar 5 having a U-shaped profile to the web of which a square tube 9 is fastened, the latter serving primarily to reinforce the U-bar, but also capable of receiving pipes or wires of all kinds. FIG. 4 shows a bar 5 which has a U-shaped profile and which serves as a frame to the assembly, that is to say as a closure bar for fastening the clamping elements.

The stiffener bar shown in FIG. 5 consists of two bars 5 which have a U-shaped profile and which are fastened to respective surfaces of a square tube 9 which lie at right angles to one another. This stiffener bar

serves to connect assemblies for the purpose of forming two walls lying at right angles to one another, and also for fastening any clamping elements provided.The square tube **9** may for example project beyond the U-shaped bars in order to form a roof connection.

FIG. **6** shows a similar stiffener bar of which however one flange **7** of a U-shaped bar **5** is fastened to the web **6** of the other U-shaped bar **5.** Square tubes to receive pipes or wires may naturally be interposed as required between all these sections.

FIG. **7** illustrates a stiffener bar **10** which is likewise U-shaped or box-shaped, but the thickness of which corresponds to the thickness of the core part **1,** while its width corresponds to the offset of the cover plate **3** in relation to the core part **1.** In addition, this bar is provided with outwardly extending projections **11** against which the cover plates **3** come to bear. This bar, which is likewise provided with bores corresponding to the bores of the core part **1,** likewise serves to strengthen the wall, as a bar for fastening the clamping elements, and optionally for receiving electrical wiring or sanitary piping. In order to effect closure, this bar may be provided with a cover **12,** as indicated in broken lines.

Finally, FIG. **8** shows a similar stiffener bar which however is in the form of a closed box-shaped tube **13** to which a likewise closed box-shaped tube **14** is attached in order to increase its strength.

The stiffener bar shown in FIG. **7** corresponds to the stiffener bar shown in FIG. **4,** and the stiffener bar shown in FIG. **8** corresponds to that shown in FIG. **3,** that is to say the stiffening bars may in each case be disposed on the other side of the assembly. It will be appreciated that variations of the stiffener bar shown in FIG. **7** corresponding to the forms of construction shown in FIGS. **2, 5** and **6** may likewise be employed.

In order to improve the properties of an assembly according to the invention, particularly in respect of thermal and acoustic insulation but also in respect of resistance to fire and break-in, additional layers (not shown), for example of foamed plastics or glass wool or other materials, particularly sound-damping materials, may also be provided between the core part **1** and the cover plates **3** and inside the core part **1.** Moreover, the inner sides of the cover plates and the free regions of the core parts or of the other layer may be provided with inversely shaped profiles (not shown), for example tongues and grooves. When two assemblies are placed one against the other, the assemblies are thus held against one another or a kind of laybrinth seal is obtained. Since the cover plates are made of stronger material than the core part, they take the forces resulting from the bracing of the building elements.

For bracing purposes it is possible for example to use threaded rods which can be screwed into the material of the core part, or else use may be made of threaded bolts which are inserted into the channels and braced by nuts, while a stiffener bar may likewise be used as a closure for the wall formed by the assemblies and for the uniform transmission of the tensioning forces.

The stiffener bars serve not only to hold the assemblies together, to stiffen the walls formed by the latter, and to receive the tensioning forces, but also as closure sections for fastening windows and doors or for the fitting of assembly blocks. The stiffener bars are preferably made of plastics material, particularly glass-reinforced plastics material, and have good thermal insulation properties in order thereby to prevent the transmission of cold or heat.

According to another feature, the cover plates are provided on the bottom wider side with lugs (not shown) which overlap the nearest cover plate, thereby ensuring a reliable seal.

As should moreover be clear from the explanations given above, buildings, containers, and vehicle bodies, which optionally may be used immediately after their construction, can be constructed with the simplest equipment with the aid of assemblies as described above. If required, the buildings can be dismantled again and all the components re-used.

Finally, it should be pointed out that the assemblies need not be rectangular, but that they may also be made in rhombic or other polygonal shapes or with curved edges. Furthermore, the assemblies may also in themselves be curved, so that they can be used for forming a curved, for example spherical, wall. A larger number of possible uses therefore exist and the most diverse aesthetic effects can be achieved.

Moreover, parts of buildings or structures constructed by means of assemblies according to the invention can be transported and stacked complete because of their low weight.

I claim:

1. A constructional assembly comprising a core part having non-intersecting channels therethrough which cross over each other, the channels being adapted to receive both clamping elements, for detachably interconnecting adjacent constructional assemblies, and also wiring and piping, and the channels extending parallel to side wall surfaces of the core part; at least one load-bearing cover plate which is disposed adjacent a said side wall surface and which is offset in relation to the core part, the core part being less dense than the cover plate and at least one stiffener member which covers a region of the core part which is not covered by a cover plate.

2. An assembly as claimed in claim **1** in which each of two opposite side wall surfaces of the core part is provided with a cover plate.

3. An assembly as claimed in claim **1** in which the core part is formed of a foamed material.

4. An assembly as claimed in claim **1** in which each cover plate is made of metal or a hard plastics material.

5. An assembly as claimed in claim **2** in which the stiffener member is U-shaped and has flanges which are respectively disposed in contact with opposite side wall surfaces of the core part, the thickness of said flanges being substantially the same as that of the cover plates, adn the length of the flanges being substantially equal to the extent to which the cover plates are offset in relation to the core part.

6. An assembly as claimed in claim **5** in which a square tube is secured to the outer side of the web of the U-shaped stiffener member.

7. An assembly as claimed in claim **6** in which a plurality of stiffener members are provided, the stiffener members and cover plates collectively covering all the external surfaces of the core part.

8. An assembly as claimed in claim **6** in which there are a plurality of said assemblies, the web of a U-shaped stiffener member of one assembly being secured to a U-shaped stiffener member of an adjacent assembly.

9. An assembly as claimed in claim 8 in which a U-shaped stiffener member of each assembly is secured to a side surface of the square tube.

10. An assembly as claimed in claim 2 in which the stiffener member is box-shaped, and is disposed between and in contact with the cover plates which cover the opposite side wall surfaces of the core part, the stiffener member having walls whose length is substantially equal to the extent to which the cover plates are offset in relation to the core part.

11. An assembly as claimed in claim 10 in which the box-shaped stiffener member is strengthened by being secured to a tube.

12. An assembly as claimed in claim 2 in which the core part is made of a compressible material and is slightly larger than the cover plates, so that when a plurality of said assemblies are assembled together, the cover plates of adjacent assemblies abut each other only when the respective core parts have been compressed.

13. An assembly as claimed in claim 1 in which the core part and the at least one cover plate are made of the same material, the cover plate having been compacted to be denser than the core part.

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