Dec. 13, 1966 J. WERMAN 3,290,843

BEAM AND ALL CONSTRUCTIONS APPLICABLE THERETO

Filed Jan. 3, 1964 2 Sheets-Sheet 1

Fig. 1

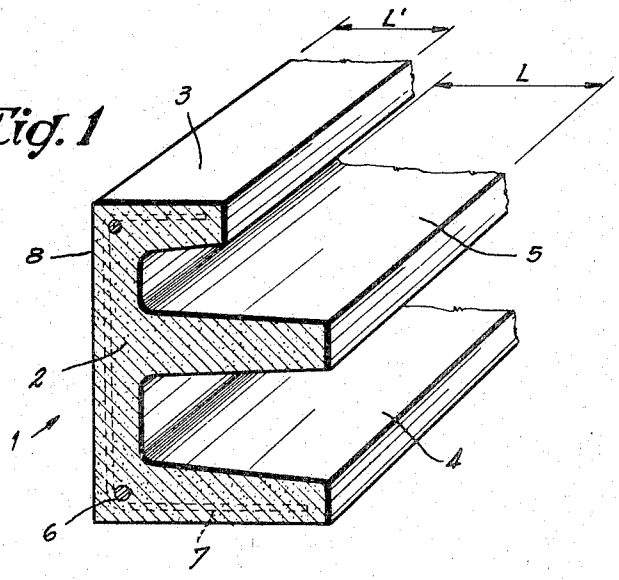


Fig. 2

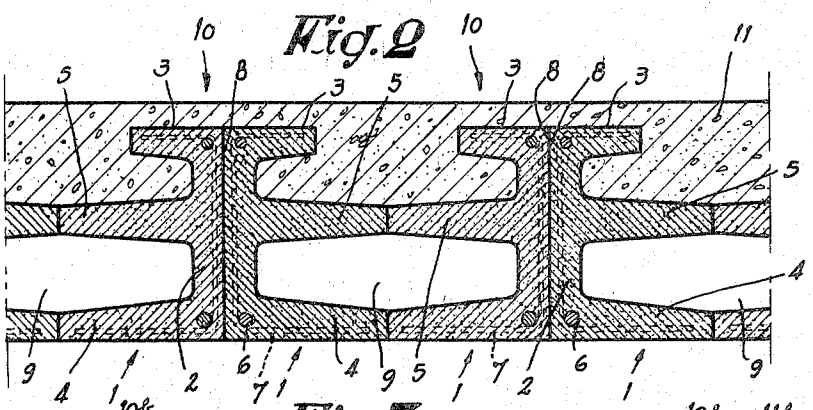
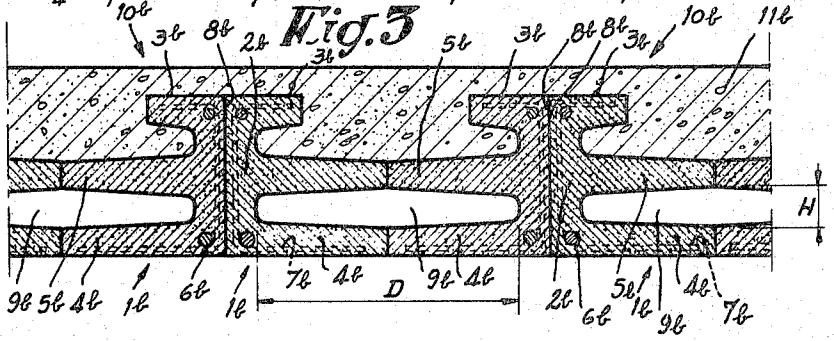


Fig. 3



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Fig. 4

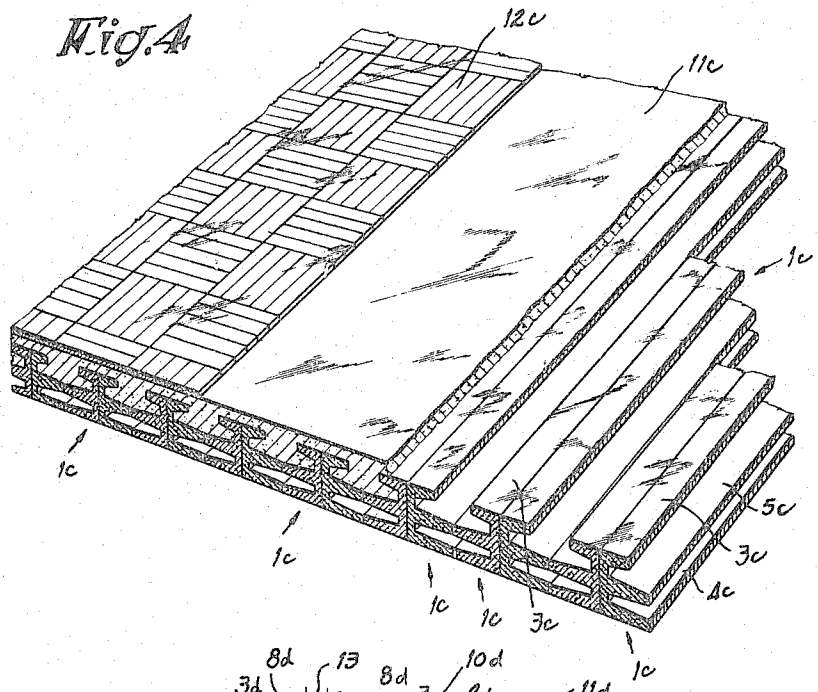


Fig. 5

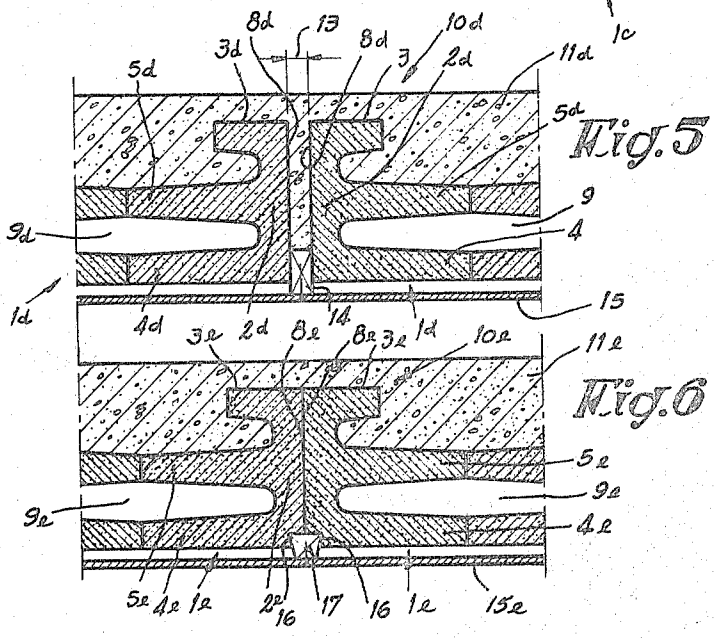


Fig. 6

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3,290,843

BEAM AND ALL CONSTRUCTIONS APPLICABLE THERETO

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4 Claims. (Cl. 52—323)

The object of this invention is the provision of a beam presenting a particular shape and of a novel conception relating to floor construction, puggings, foundation rafts and other similar constructions.

The purpose of this invention consists in the realization of extremely light beams, which are durable and easily and economically manufactured.

The construction of the present beams permits the realization under new conditions, of floor constructions and the like, under which there is a systematic solution to any requirement of rapid and economic execution. Furthermore the present construction enables the combining of optimal criterions for thermal and acoustic insulation in many ways such as in hanging ceilings, air conditioning, and the provision of passages.

Another object of the invention is to be found in a more rational division of the characteristics of floors and similar constructions, more particularly of the hollow zones and the zones of resistance, because of the minimal quantity of raw material incorporated and the possibility of an easier and more rational distribution of the reinforcement in proportion to the required load and strength-conditions.

Another object of the invention also resides in the particular facility with which the beams, and the constructions obtained with them, can be prestressed.

All these results and advantages are essentially based on the particular form of the beam, which is shaped generally in the form of the letter "E" in which median and inferior branches are of the same length, whereas the superior branch is substantially shorter than the others. Such a beam can easily be molded with the use of a very simple material, the casting being under such conditions, that the stripping could be executed by reinforcement of the molds and a perfectly stable and uniform application of the back surface of the beam on an adequate support drying area.

Such beams can be composed of concrete of variable composition in known ways, and particularly by vibration to get a good compacity, a uniform and tight texture and at the same time a reduction to a strict minimum of occluded air.

As a rule such beams will be provided with longitudinal reinforcements and stirrups, the whole being easily determined by those skilled in the art.

Although this beam can be produced in all transverse dimensions and practically in all lengths, of course in recognized and accepted building standards. According to a characteristic of the invention they may be executed in relatively reduced transverse dimensions, e.g., from 100 to 150 mm. in the width and 100 to 200 in height.

In accordance with the invention there is thus provided a series which corresponds to a specific strength and capable of being introduced in all modulated constructions

By the simple arrangement of disposing the beams by joining them opposite each other, a novel resistant structure is obtained offering great advantages. Effectively, by this jointed disposition, one obtains automatically in the lower zone of the construction, tubular passages relatively broad and of reduced height, in such a way that the efficacy of the zone of occlusive air is really maximum, as

a result of the action of a layer, a fact which is generally well known.

On the other hand, the same jointed beams determine a succession of shaped hollows which form housings and excellent means of anchorage for the filling materials. These filling materials of complementary resistance, or more generally, material for the upper filling, such as material or compounded material especially conditioned with a view to increase thermic and/or acoustic insulation.

Such constructions are extremely easily, rapidly and economically obtained. Because of the low weight of the prefabricated elements, their easy transporation, rapid placing, and the absence of any core.

Moreover there may be introduced either in the beam or in the installation thereof during construction other modifications such as laths for nailing, complementary reinforcements, deflectors for heating fluids, or refrigerant, or perforation of the lower surface, etc.

The embodiments described in detail hereafter, with reference to the following drawings are not to be considered as limitative.

FIGURE 1 is a fragmentary perspective view partly in section showing an element, in accordance with the invention.

FIGURE 2 is a fragmentary cross-sectional view of a floor (or pugging) in which a plurality of the elements corresponding to FIGURE 1 are combined.

FIGURE 3 is a view corresponding to FIGURE 2 but showing a second modification.

FIGURE 4 is a fragmentary perspective view, partly in section of a floor or pugging showing a third modification in accordance with the invention.

FIGURE 5 is a sectional view corresponding to FIGURE 2 and showing a fourth modification.

FIGURE 6 is a sectional view corresponding to FIGURE 2 and showing a fifth modification.

As it is shown in FIGURE 1, the beam element generally indicated by reference character **1**, according to the invention, in cross-section has the form of the letter E. The beam **1** is of special shape and comprises an upper flange **3**, a median flange **5**, a lower flange **4**, and a body **2**. The lower flange **4** and the median flange **5** have a length L transversely of the beam element **1** and the upper flange has a length transversely of the beam element **1** $L'<L$. As necessary, beam element **1** can be provided with suitable reinformements, for instance, longitudinal reinforcements **6** and transverse stirrups **7**.

The flanges **3** and **4** and the median flange **5** preferably present a section so that their lateral sides are slightly convergent, for the purpose of facilitating industrial production. Indeed, according to a characteristic of the invention, these beams **1** will be, by preference, cast with their back portion **8** upwardly directed, in such a way that the stripping can be done by the inversion of the mold, the beam lying correctly and in a very stable manner, by the aforesaid back portion on the drying area.

This method of molding has also the advantage, that the described flanges **3**, **4**, and **5** stay the nearest possible to a vibrating table (not shown), which produces a beam element having a homogenized and tight texture, since the lateral sides of these parts of the beam are convergent in the direction of the said vibration table, it being understood that such beams will be by preference, executed by molding and vibration.

The shape represented in the FIGURE 1 may evidently undergo numerous modifications without however, deviating from the basic principles disclosed by the present description, constituted essentially by general shape in the form of the capital letter E with one of the flanges of

less length transversely of the beam element than the two others.

Other modifications can also intervene, particularly in providing at all convenient points, retracting or salient parts, in view of the particularities of the constructions to be realized. Thus in the lower portion inferior part, the beam can include heels or reentrant parts in view of fixing laths for nailing, especially to hang up ceilings or false ceilings. Also, the free longitudinal edge of the lower flange **4** can be provided with openings, perforations or parts which are cut out in such a way, that by the juxtaposition of such adjoining beams, one realizes ways, particularly for the arrangement of the mentioned means of air-conditioning or others.

According to a leading characteristic of the invention, floors, puggings or other similar constructions are realized in an extremely simple manner, as represented for example, in FIGURES 2 and 3, by the joined placing of the beam elements **1**, in such a way that the aforesaid beams be juxtaposed at their dorsal side or body portions **8** and in such a way too, that these same beams are two by two, juxtaposed by the free edges of the lower flanges **4** and flanges **5**.

In FIGURE 3 the suffix *b* has been added to certain of the parts corresponding to the structure in FIGURE 1 to avoid needless repetition.

Thus there is created automatically, a cellular construction, forming tubular passages or enclosures **9**, of which width D is substantially greater than the height H.

This very characteristic disposition determines, in the construction so realized, real layers of occlusive air, which is particularly favorable to the insulation.

Furthermore, the same beam elements **1***b*, so juxtaposed, determine on the top side of the resistance structure which they form, anchorage heads **10***b*, for the filling mass **11***b*. This one can be constituted of all kinds of appropriate materials, whether it has to contribute to the resistance of the construction, and/or to thermic or acoustic insulation.

Besides, one will be able to envisage perfectly a superposition of different kinds of layers, the whole in proportion to the constructions to be realized.

Turning to FIGURE 4, here again certain corresponding parts are given the same reference characters with the suffix *c*.

As it has been schematized in FIGURE 4, on this filling mass **11***c* can be directly or indirectly applied, respectively fixed, the walking surface **12**, also of appropriate material, which is well known. The aforesaid filling mass **11***c*, may also be provided with longitudinal and transversal reinforcements (not shown).

It may be pointed out, in respect to the reinforcements, that the constructions realized in this manner, are particularly favorable to their placing, because of the particular shape of the aforesaid beams in the form of the letter E.

Of course, ordinary reinforcements or prestressed reinforcements, could be eventually placed either between the flanges of the beam or in the foreseen spacings and gaps for this purpose. It is also to be observed that such beams lend themselves particularly well, not only to being prefabricated, but also to being prestressed either by adherance or by anchorage.

As it is schematized in FIGURES 5 and 6, again certain corresponding parts are given the same reference characters with the respective suffixes *d* and *e*. The combination of such floors or puggings with ceilings or false ceilings can easily be envisaged.

As it has been schematized in FIGURE 5, it would be sufficient, for example, to leave between the dorsal sides or body portions 2*d* of two adjoining elements, a certain space **13**, of which in the lower portion may be inserted laths **14** for nailing, the remainder of the aforesaid space being filled up with the filling material **11***d*. To said laths **14** may be fixed, by all known means, elements of ceilings or false ceilings **15**, solid or in fretwork in all adequate material.

Equivalent results may be obtained as schematized in the FIGURE 6, in maintaining the beams **1***e* perfectly jointed at their dorsal sides or bodies **8***e*. In this modification there may be seen at the lower portion, adjacent to the aforesaid dorsal faces **8**, a recess or gap **16** of appropriate shape, in such a way, that when the aforesaid beams **1***e*, are disposed jointed by their dorsal face, they delimit automatically a continuous groove of appropriate shape, for example, in a dovetail form in which is inserted a nailing lath **17***e*, of adequate form.

As these executions are not limited, one could easily adapt the beams in the essential purpose of the invention, to any kind of application in general.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art to which the present invention relates.

I claim:

1. In combination, at least two pairs of beam elements each of which is E-shaped in cross-section, the median and lower flanges in each pair being placed in contact and said pairs arranged so that the back surface of one beam element is jointed to the back surface of another; and a filling mass disposed directly above the median flanges and engaging the uppermost flanges.

2. Structure as claimed in claim **1** in which the filling mass is constituted by an agglomerate concrete.

3. Structure as claimed in claim **1** in which the filling mass is constituted by an insulation material.

4. In combination, a plurality of beams for the execution of floors, puggings and other similar constructions, each having a straight section substantially in the form of an E, which presents at least two lateral branches of the same length, the external faces of the aforesaid beams presenting gaps, laths engaged in said gaps, and a panel fixed on said laths.

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HARRISON R. MOSELEY, *Primary Examiner.*

J. K. BELL, *Assistant Examiner.*