Dec. 13, 1938. H. A. FABER 2,140,283

MONOLITHIC SLAB FLOOR CONSTRUCTION

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Fig. 1.

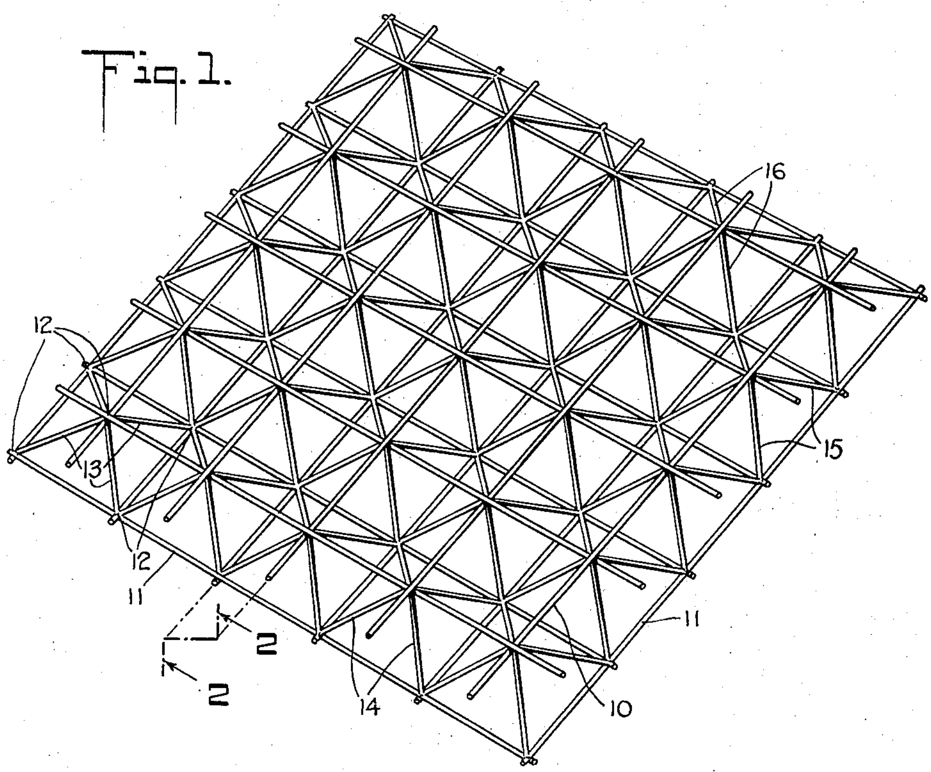

Fig. 2.

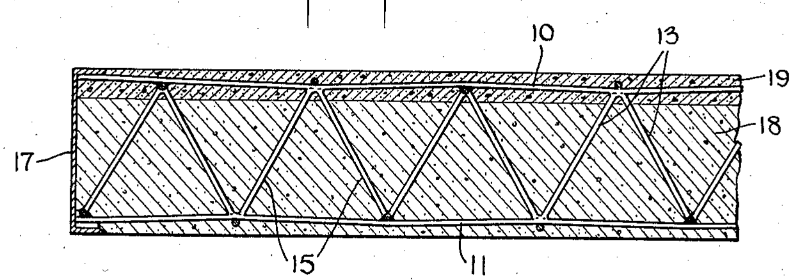

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Fig.3.

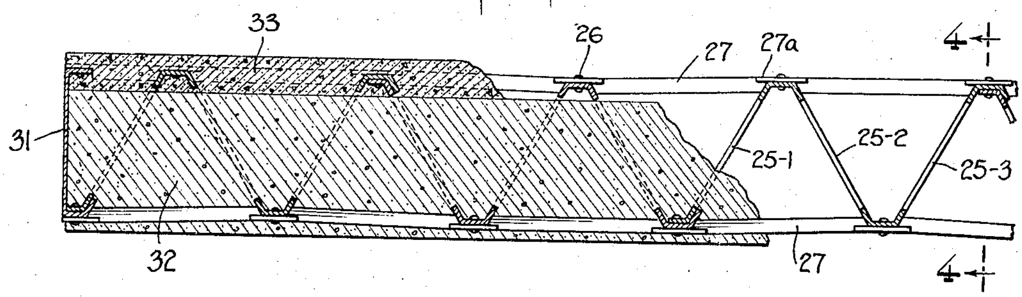


Fig.4.

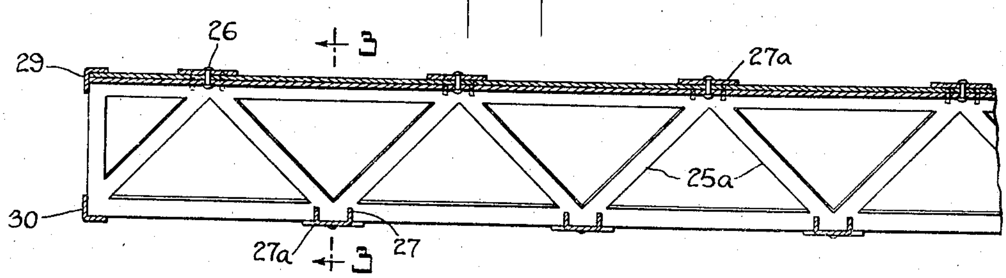
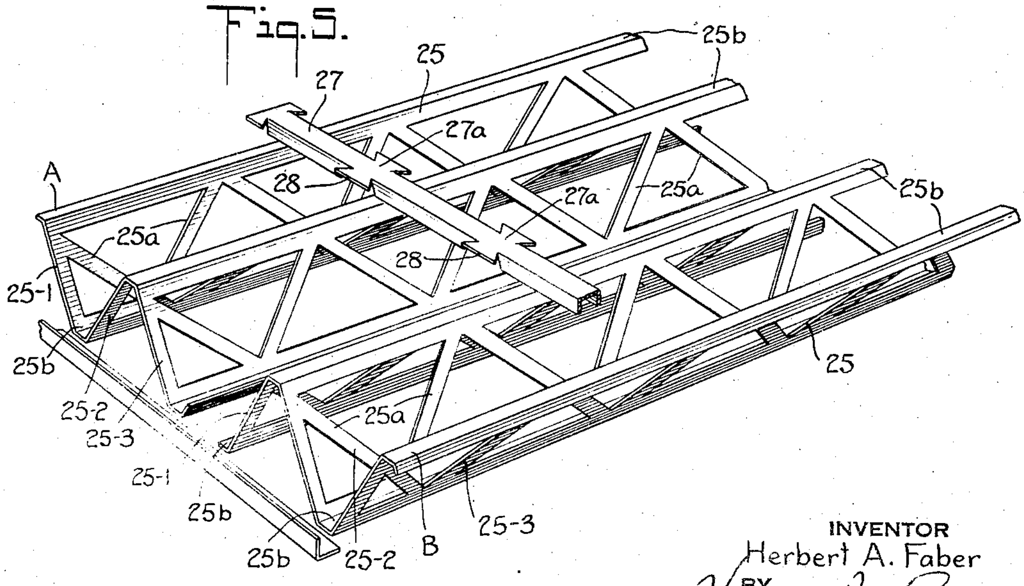


Fig.5.



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MONOLITHIC SLAB FLOOR CONSTRUCTION

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Application November 21, 1936, Serial No. 112,102

6 Claims. (Cl. 72—71)

My invention relates to floor construction, and more particularly to a monolithic slab floor embodying a network of structural members.

The invention has as its principal objects the provision of floor construction, that:

1. Combines unusual lightness with adequate load supporting characteristics for all ordinary purposes,
2. Is of monolithic slab formation.
3. Has incorporated therein a network of structural members which in itself affords support for floor loads.
4. Transmits the floor loads to contiguous walls along definitely defined truss members, and distributes such loads between all of the walls.
5. Is capable of construction on the job directly and completely from raw materials, or partially from prefabricated structural elements.
6. Is capable of simple and economical construction.

The structural network providing the skeleton of the monolithic slab floor may be fabricated according to a variety of general methods dependent upon the characteristics desired in the particular embodiment of floor construction. The type of material available at an advantageous price, the labor factor involved, and the particular structural characteristics desired for the floor will determine in any given instance the general type of structural network employed.

According to one of the herein described embodiments of floor construction pursuant to the present invention, a number of steel reinforcing rods or the like of suitable standard dimensions are assembled in three dimensional formation on the job, and are welded at juncture points to provide an integral reinforcing network characterized by truss formation extending longitudinally, latitudinally and diagonally of the floor for transmission of loads to all of the contiguous walls of the structure concerned.

According to another embodiment of floor construction pursuant to the present invention, a plurality of prefabricated structural elements are aligned side by side, adjacent elements being rigidly secured to each other, and the resulting network being further rigidly tied together by means of additional elements extending transverse to the length of the first stated elements and being secured thereto. The prefabricated structural elements are desirably stamped from sheet metal and bent to final configuration forming a plurality of trusses extending laterally in integral sequence. The stated transverse elements serve to retain the prefabricated structural elements in truss formation.

Preferably a light weight composition material having self-adhering characteristics is utilized as a filler for surrounding and almost completely covering the structural network in providing a monolithic slab. Any desired floor finishing composition may be applied to complete formation of the slab. The composition material functions necessarily only in the capacity of a filler. The structural network in itself supports and distributes floor loads.

The composition material, however, does add to the strength of the resulting construction by stiffening the structural network. It also effectively overcomes the tendency of the network to transmit sound.

In the drawings:

Fig. 1 illustrates in top perspective a portion of a skeleton net-work of structural members according to one preferred form of the invention preparatory to filling to slab status by composition material;

Fig. 2 represents a vertical section taken through a fragmentary end portion of a completed floor construction pursuant to the form of the invention illustrated in Fig. 1;

Fig. 3 represents a vertical section taken through a fragmentary end portion of a partially completed floor construction pursuant to another form of the invention. The section is taken on the line **3—3**, Fig. 4;

Fig. 4 represents a vertical section taken on the line **4—4**, Fig. 3;

Fig. 5 illustrates in top perspective prefabricated structural elements preparatory to assembly into the reinforcing network of the form of the invention illustrated in Figs. 3 and 4.

Referring to the drawings and particularly to Figs. 1 and 2, thereof: —

Illustrated in Fig. 1 is a fragmentary portion of an assembled structural network preparatory to filling by a composition material.

The illustrated network is preferably fabricated on the job from structural steel reinforcing rods or the like of any suitable standard size. It may comprise an upper reticular layer **10** desirably having square meshes and a lower reticular layer **11** also desirably having square meshes similar in dimension to the meshes of the reticular layer **10**. The two reticular layers are spaced apart from each other a distance approximating the desired thickness of the finished floor slab, and are disposed relative to each other such that the locations of juncture, see **12**, of rods or the like of one layer are respectively positioned substantially centrally of a mesh of the other layer.

In practice the meshes may be dimensioned to suit the particular need. A satisfactory floor for general purposes is had by making each mesh square and approximately 8 inches to a side, and spacing the upper and lower reticular layers 10 and 11, respectively, approximately 8 inches apart.

From each juncture location, 12, intermediate shear-rods 13, or the like, are run to the four corners of the mesh upperly or lowerly thereof, and are rigidly secured at their ends, as for instance, by welding, to the respective upper and lower reticular layers at locations of intersection therein.

Accordingly, a rigid 3 dimensional structural network is formed comprising trusses extending latitudinally, as at 14, longitudinally as at 15, and diagonally as at 16, throughout the extent of the floor construction, the trusses terminating and being supported at closely spaced locations around the periphery of the floor. Channel elements 17, Fig. 2, may be rigidly secured at locations of truss termination, i. e., around the periphery of the network, and in turn may be secured to the walls of the structure concerned in any suitable conventional manner.

The floor is brought to monolithic slab status by completely surrounding the skeleton structural network, including filling of the interstices thereof, with a composition filler material. This may be accomplished by erecting a temporary shoring below the network, or by suspending a sheet of plywood or the like from the network, and filling to the desired level from above.

A light weight porous composition material 18, as for instance a mixture of gypsum and sawdust, advantageously provides the main body of the slab. It desirably extends below the structural network a short distance, say one-half inch, for providing a smooth finish surface and adding rigidity to the lower reticular layer 11. The material 18 preferably fills the structural network to a point short of the top reticular layer 10, and a composition material 19, such as concrete for providing a hard finish flooring is added to complete formation of the slab.

The structural network acts in itself as the support for floor loads, and transmits same through the trusses 13, 14 and 15 to all of the contiguous walls of the structure concerned. The composition filling material 18 and 19 serves to give body to the floor in effecting formation of the monolithic slab, and enhances in some degree the strength of the complete structure as well as overcoming the tendency of the network to transmit sound. The upper layer of concrete or the like increases the compressive strength of the structure.

Referring now to Figs. 3, 4 and 5, illustrating a floor construction, pursuant to another form of the present invention:—at 25, see Fig. 5, are illustrated prefabricated structural elements employed in the assembly of the structural network.

The elements 25 are preferably stamped from sheet metal to provide sets of shear members 25*a*, extending in truss formation longitudinally of the blank. Advantageously there are three sets, 25—1, 25—2, and 25—3 of shear members 25*a* defined longitudinally of the blank by solid strip portions 25*b*. The blank is bent along longitudinal lines to practical truss formation as illustrated, forming two V-shaped troughs having a wall in common, and one being inverted with respect to the other. The solid strip portions 25*b* become the tension and compression members of the resulting element 25.

Those tension and compression members 25*b* forming the free lateral ends of the elements, indicated at A and B respectively, are configurated for interlocking cooperation with like members of like elements. For this purpose one of the stated tension or compression members, see A, is of straight flange formation, and the other, see B, is of channel flange formation.

The elements 25 are assembled in side by side relation, the straight flange A of one element fitting into the channel flange B of the immediately adjacent element. The flanges A and B of respective contiguous elements may be rigidly secured to each other in any suitable manner, as for instance, by bolting, see 26, Figs. 3 and 4.

For maintaining the elements 25 in practical truss formation and for adding rigidity to the individual truss members, reinforcing strip elements 27 are positioned transversely of the length of the associated elements 25 in spaced preferably mutually parallel relation at the top and bottom thereof. They are secured to the elements 25 at locations of intersection with the tension or compression members 25*b*.

Advantageously the reinforcing strip elements 27 are in the form of sheet metal channels. The walls of the channels are scored in suitable configuration at locations of ultimate intersection with the tension or compression members 25*b* in a manner permitting outward bending of opposite portions of the channel walls to provide receiving recesses 28 at spaced intervals in the reinforcing strip elements adapted for the reception of the respective tension and compression members 25*b*. Such provision of recesses 28 results in the formation of wing portions 27*a* extending from opposite sides of the channel bottom and affording extended contact area between the reinforcing strip elements 27 and the respective tension and compression members 25*b* at locations of mutual intersection. Rigid securement of the reinforcing strip elements to the truss elements at locations of mutual intersection may be accomplished by the aforesaid bolting indicated at 26.

The resulting skeleton network of structural elements is preferably reinforced peripherally by an enclosing frame. Conveniently, angle strips of sheet metal are rigidly secured along the top edge, see 29, Fig. 4, and along the bottom edge, see 30, Fig. 4, of the sides of the network in which the trusses terminate. Channels of sheet metal, substantially coextensive in height with the height of the elements 25, may be secured, respectively, as indicated at 31, Fig. 3, to the lateral free edges A or B of the respective terminal elements 25 of the skeleton network to complete the enclosing frame.

Disposition of the skeleton network between walls of the structure concerned may be accomplished in any suitable conventional manner. The network is filled to monolithic slab status in a manner similar to that described in reference to Figs. 1 and 2, a light weight composition material 32 providing the major portion of the slab and a comparatively hard facing of concrete or like material 36 providing a floor facing.

It will be noted that the skeleton network, made up of prefabricated elements 25, is comparatively light in weight by reason of its sheet metal formation. Its inherent rigidity enhanced by the surrounding slab material, provides a floor construction of light weight but of considerable load supporting ability.

To give added rigidity to the prefabricated elements **25**, and to enhance the load supporting characteristics of the combination of elements, the lateral edges of the shear members **25***a* may be bent, preferably at right angles to the body of the shear member, to provide lateral flanges (not illustrated) therefor; or any form of crimping suitable for the purpose may be employed. It is preferred to accomplish such bending or crimping during, and desirably as a part of, the cutting and stamping operation.

Whereas this invention has been described with reference to a particular form thereof, it is to be distinctly understood that a variety of changes may be made therein without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A floor construction comprising a monolithic slab of composition material having embedded therein a three dimensional network of structural members extending from end to end of the floor construction and secured peripherally to contiguous walls of the structure concerned, said composition material comprising a light weight frangible mass forming the body of the slab and a mass of heavier weight and comparatively hard finish forming the floor surface of the slab.

2. In a building construction, a skeleton structure comprising a plurality of structural elements secured side by side and extending substantially parallel lengthwise, said structural elements each comprising a plurality of sheet members parallel lengthwise and extending laterally in integral sequence in alternate V and inverted V configuration, the said sheet members being perforated to impart truss formation thereto and being sequentially interconnected by longitudinal tension and compression members, and strip elements extending transversely of said structural elements at spaced intervals along the top and bottom thereof and secured thereto at locations of intersection forming a three dimensional network of structural members, said skeleton structure being completely embedded in composition material which comprises a mass of light weight frangible material.

3. A floor construction, comprising a monolithic slab of composition material having embedded therein a skeleton structure as recited in claim 2, said composition material comprising a mass of light weight frangible material forming the body of the slab and a mass of heavier weight and comparatively hard finish forming the floor surface of the slab.

4. A structure as recited in claim 2 wherein the strip elements are of channel formation, and portions of the flanges of such channel strips are displaced at locations of intersection of the channel strips with the structural elements to enable the webs of the channel strips to fit flush against the V-vertices of the structural elements which they traverse.

5. A three dimensional structural network comprising structural elements assembled side by side sequentially, the said structural elements each comprising a sheet of metal bent to form two V-shaped troughs having a wall in common and being disposed coextensively lengthwise, one being inverted with respect to the other, and the side walls of the V-shaped troughs being perforated to impart truss formation thereto, said assembly of structural elements resulting in a series of alternate V-shaped and inverted V-shaped troughs, and channel shaped strips extending transversely of the said V-shaped troughs at spaced intervals along the top and bottom of the said assembly of structural elements, portions of the flanges of said channel shaped strips being displaced at locations of intersection thereof with the structural elements, enabling the webs of the channel shaped strips to fit flush against the V-vertices of the structural elements for securement thereto.

6. A floor construction as recited in claim 1, wherein the light weight frangible mass comprises a mixture of gypsum and sawdust.

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