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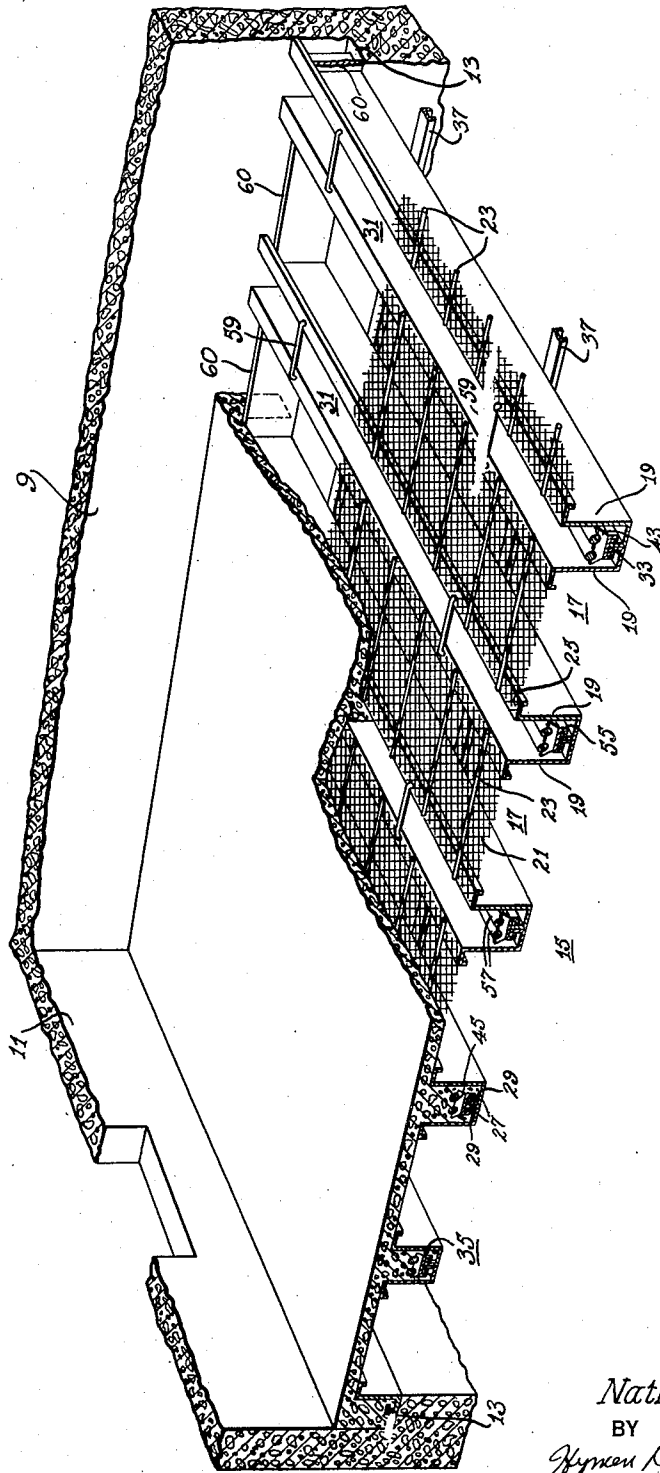
N. LEEBOV

2,233,291

BUILDING STRUCTURE

Filed Oct. 14, 1939

2 Sheets-Sheet 1



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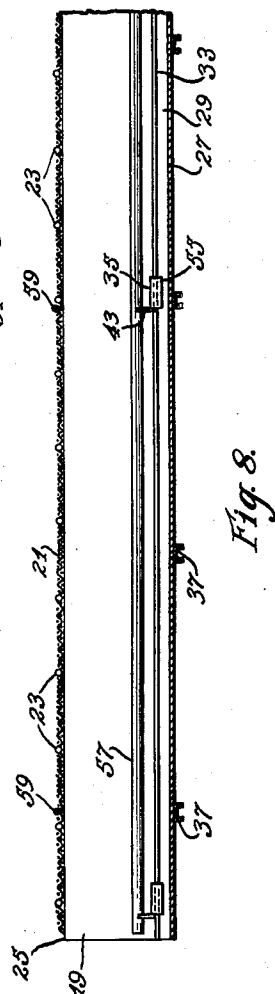
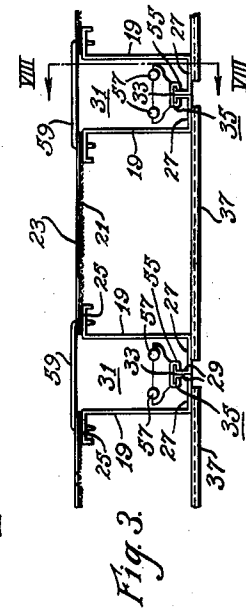
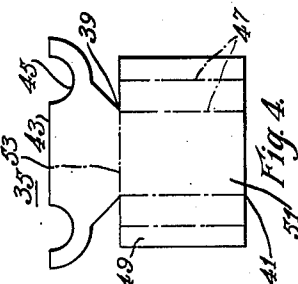
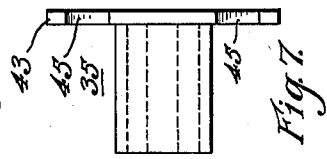
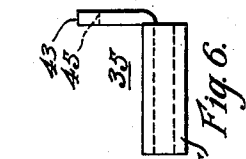
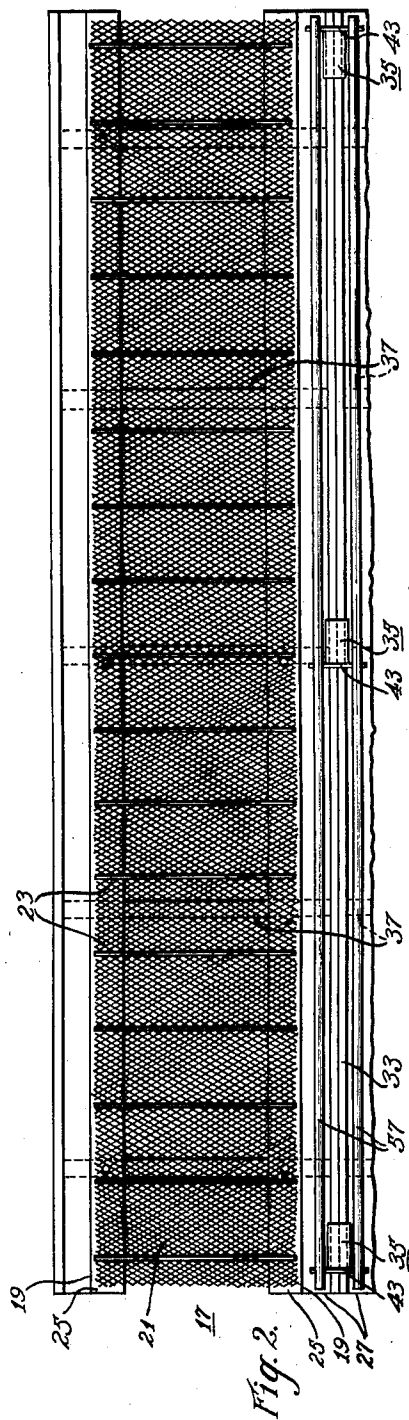
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BUILDING STRUCTURE

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2 Sheets-Sheet 2



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BUILDING STRUCTURE

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7 Claims. (Cl. 72-70)

My invention relates to building construction and has particular relation to floor structures.

In constructing a floor according to the teachings of the prior art, of which I am aware, cement, concrete or any other suitable plastic material, which hardens when exposed to the atmosphere, is poured on a suitable form. The latter is a framework composed of a plurality of beams bridged by plates and carried by the walls and structural frames of the building. The form is erected manually of individual beams and plates on the skeleton of the building. The plastic material is of course poured only after the form or framework has been completed.

In the prior art constructions, excessive expense and delay is frequently encountered. To completely erect the framework at the building site, a number of high-priced, skilled workers must be employed for a substantial length of time. In addition, the other work on the building is delayed because the plastic material cannot be poured until the framework is available.

It is, accordingly, an object of my invention to provide a low cost floor structure.

Another object of my invention is to minimize the manual labor which is required in the construction of a floor.

A further object of my invention is to provide a floor structure, the erection of which shall consume substantially less time than is taken up in erecting the present structures.

A further object of my invention is to provide a low cost form for the plastic material in a floor.

An ancillary object of my invention is to provide a prefabricated structural unit particularly adapted for use in the construction of low cost floors.

Another ancillary object of my invention is to minimize the quantity of plastic material required in a floor structure.

A further ancillary object of my invention is to provide a simplified ceiling framework in constructing a floor.

More concisely stated, it is an object of my invention to provide a low cost floor structure, the erection of which shall require a minimum of time and labor.

According to my invention, I provide prefabricated structural units each comprising a plurality of beams bridged by a suitable surface. An open-work surface is used in the preferred practice of my invention and has substantial advantages over other surfaces. However, in its broader aspects, my invention contemplates the use of a surface of any other type such as cor-

rugated sheet. The prefabricated structural units are mounted on the walls and structural frame of the building and a rigid framework is formed by clamping the beams of adjacent units together. A plastic material, such as concrete, is poured over the surfaces and between the beams.

The structural units are made up by mass production methods in the usual manner and the work which would otherwise be necessary in assembling them on the building is eliminated. In setting up the framework, the workmen need only clamp the adjacent beams together. This is a relatively simple operation because the beams may be so formed as to expedite the clamping. A substantial saving in the time required for erecting the framework and a saving in the cost of construction is thus effected.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which

Figure 1 is a view in perspective partly in section showing an embodiment of my invention;

Fig. 2 is a view in top elevation showing prefabricated structural units in accordance with my invention;

Fig. 3 is a view in end elevation of a portion of a framework in accordance with my invention;

Fig. 4 is a view showing the development of a clamp used in the practice of my invention;

Fig. 5 is a view in end elevation of the clamp;

Fig. 6 is a view in side elevation of the clamp shown in Fig. 5;

Fig. 7 is a view in top elevation of the clamp shown in Fig. 5; and

Fig. 8 is a view taken along the line VIII—VIII of Fig. 3.

In Fig. 1, two walls 9 and 11 forming a corner of a building in accordance with my invention is shown. The walls 9 and 11 are provided with the usual ledge 13 and a floor framework 15 is carried by the ledge by the intermediate structural skeleton of the building (not shown). The framework 15 is made up of a plurality of prefabricated structural units 17 which are clamped together.

Each unit 17 comprises a pair of parallel beams 19 of Z-cross-section. The beams are preferably made up of sheet steel or any other suitable material. A wire screen 21 through which a num-

ber of parallel metal ribs 23 are distributed is disposed between the beams 19. The ribs 23 are spot welded to the upper flanges 25 of the beams and in this manner, the screen is rigidly secured to the beams. The units 17 are manufactured by the usual mass production methods and are available for installation in the building as rigid structures. The manual labor which would be involved in assembling such units on the building is, therefore, eliminated.

The lower flange 27 of each beam 19 is bent over twice at right angles, so as to form a hook-shaped cross-section. The units 17 are mounted on the ledge 13 and the skeleton of the building with the vertical portions 29 of the hook cross-section of adjacent beams abutting, so that the beams 19 of two adjacent units form a trough 31, along the center of which a strip 33 of T-shaped cross-section extends. The structural units 17 are rigidly secured by clamps 35 which extend over the tops of the T-section strips 33. A suitable number of the clamps 35 may be moved along the strip until they are properly positioned and then fastened by suitable pliers. A plurality of channel sections 37 are secured to the lower surfaces of the troughs 31. The channels 37 form a framework for supporting the usual metal lath (not shown) used for ceilings. In the preferred practice of my invention, the channels 37 form a part of the prefabricated units 17 and are spot welded or riveted to the Z-section beams 19 when the units are manufactured. The channels 37, when forming a part of the units, substantially strengthen them mechanically.

The detail structure of the clamps is shown in Figs. 4 to 7. Each clamp is made up of a sheet metal blank 39 comprising a lower rectangular portion 41 from one side of which a trapezoidal projection, having grooves 45 uniformly disposed about its center, extends. The rectangular portion 41 of the blank 31 is first bent over twice at right angles along lines corresponding to the vertical dash-dot lines 47 in Fig. 4. In the final form of the rectangle 41, the small rectangles 49 at their ends are disposed below the central rectangle 51 and parallel thereto. Next the trapezoidal projection 43 is bent about a line corresponding to the horizontal dash-dot line 53 in Fig. 4, so that its final position is perpendicular to the central rectangle 51. The completed structure is shown in Figs. 5, 6 and 7 and comprises a jaw-shaped lower portion 55 from which the vertical trapezoidal projection 43 having the downwardly convex grooves 45 extends. The jaws 55 are engaged tightly with the T-section strip 33 and in this position of the clamps 35 the grooves 45 are in planes perpendicular to the longest horizontal axes of the troughs 31.

A plurality of horizontal metal rods 57 are disposed in the grooves 45. The rods 57 may be wired to the clamps 35 or the strip 33 or they may be otherwise secured. It is to be noted that while the specific clamp shown herein has certain advantages, clamps of other structures may be used in the practice of my invention.

Between the beams 19 of adjacent structural units 17, spreader ties 59 are mounted. The ties 59 are of C-section and engage suitable openings provided in the upper flanges 25 of the beams 19. They function to prevent the framework 17 from being distorted under weight so that the workmen may pass over the surface of the screens 21 and perform the necessary operations without being subjected to the danger that the framework will collapse.

After the framework is assembled on the building skeleton, a plurality of plates 60 are interposed between the walls 9 perpendicular to the structural units 17 and the units. Thereafter, a suitable plastic material 61, such as concrete is poured over the framework and into the troughs 31. The plates 59 prevent the material from flowing out through the space between the wall 11 and the framework 15. The plastic material is ordinarily of the type that has a low tensile stress limit and must, therefore, be reinforced. The reinforcement is provided by the rods 57 which are supported by the clamps 35. The plastic material is relatively viscous and partly flows through the openings in the screen 21 and the screen is partially imbedded in it when it hardens. The plastic surface 61 over the open-work surface 21 is therefore reenforced by the latter surface.

The structure in accordance with my invention has the additional advantage that it makes possible a substantial saving in plastic material. The form 15 must be heavy enough to support the material when soft and therefore has substantial strength in itself. Accordingly, for the usual building requirements, smaller thicknesses of material than would be necessary in the prior art structures can be used and this comes with the advantage that smaller reinforcing rods may be used.

The channels 31 used in the practice of my invention have a substantial advantage over corresponding prior art structures. In the prior art arrangements, the ceiling framework is secured to the floor form after the latter is erected. In the present case, the channels 37 which form a part of the prefabricated units 17 are in place when the floor form is erected and the ceiling lath need only be added.

Although I have shown and described a certain specific embodiment of my invention, many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. A floor structure for a building comprising a plurality of beams, each of said beams having at least one flange, which is bent over at its end, extending from its web and said beams being arranged in pairs with the bent over portions of the beams of each pair abutting to form a floor framework made up of a plurality of U-shaped troughs, clamping means engaging said abutting bent-over portions and surfaces extending between the rims of said troughs.

2. A floor structure for a building comprising a plurality of beams, each of said beams having at least one flange, which is bent over at its end, extending from its web and said beams being arranged in pairs with the bent over portions of the beams of each pair abutting to form a floor framework made up of a plurality of U-shaped troughs, clamping means engaging said abutting bent-over portions, reinforcing rods for a plastic material having a low resistance to tensile stress disposed on said clamping means, surfaces extending between the rims of said troughs and a plastic material having a low resistance to tensile stress extending over said surfaces and in said troughs.

3. A floor structure for a building comprising a plurality of beams, each of said beams having at least one flange, which is bent over at its end, extending from its web and said beams being

arranged in pairs with the bent over portions of the beams of each pair abutting to form a floor framework made up of a plurality of U-shaped troughs, clamping means engaging said
5 abutting bent-over portions, said clamping means having grooves which are concaved towards the opening in said trough, rods for reinforcing a plastic material which has a low tensile stress limit disposed in said grooves, surfaces extend-
10 ing between the rims of said troughs, and a plastic material having a low tensile stress limit extending over said surfaces and in said troughs.

4. A floor structure for a building comprising a plurality of beams, each of said beams having
15 at least one flange, which is bent over at its end, extending from its web and said beams being arranged in pairs with the bent over portions of the beams of each pair abutting to form a floor framework made up of a plurality of U-
20 shaped troughs, clamping means engaging said abutting bent-over portions, reinforcing rods for a plastic material having a low resistance to tensile stress disposed on said clamping means, open-work surfaces extending between the rims
25 of said troughs and a plastic material having a low resistance to tensile stress extending over said surfaces and in said troughs.

5. A floor structure for a building comprising a plurality of beams, each of said beams having
30 at least one flange, which is bent over at least twice at its ends to form a hook-shaped cross section, extending from its web and said beams

being arranged in pairs with the bent over portions of the beams of each pair abutting to form a floor frame-work made up of a plurality of U-shaped troughs, clamping means engaging said
5 abutting bent-over portions and extending over the rims of said hook cross section and surfaces extending between the rims of said troughs.

6. A floor structure for a building comprising a plurality of Z-section beams, one of the flanges of each of said beams being bent over at its end
10 and said beams being arranged in pairs with the bent-over portions of the beams of each pair abutting to form a floor framework made up of a plurality of U-shaped troughs, clamping means engaging the abutting bent-over portions and
15 surfaces extending between the flanges of said beams extending from the rims of adjacent troughs.

7. A floor structure for a building comprising a plurality of Z-section beams, one of the flanges of each of said beams being bent over at least
20 twice at its end to form a hook-shaped cross section and said beams being arranged in pairs with the bent over portions of the beams of each pair abutting to form a floor framework made
25 up of a plurality of U-shaped troughs, clamping means engaging the abutting bent over portions and extending over the edges of the hook shaped cross section and surfaces extending between the flanges of said beams extending from the rims
30 of adjacent troughs.

NATHAN LEEBOV.