

Jan. 30, 1962

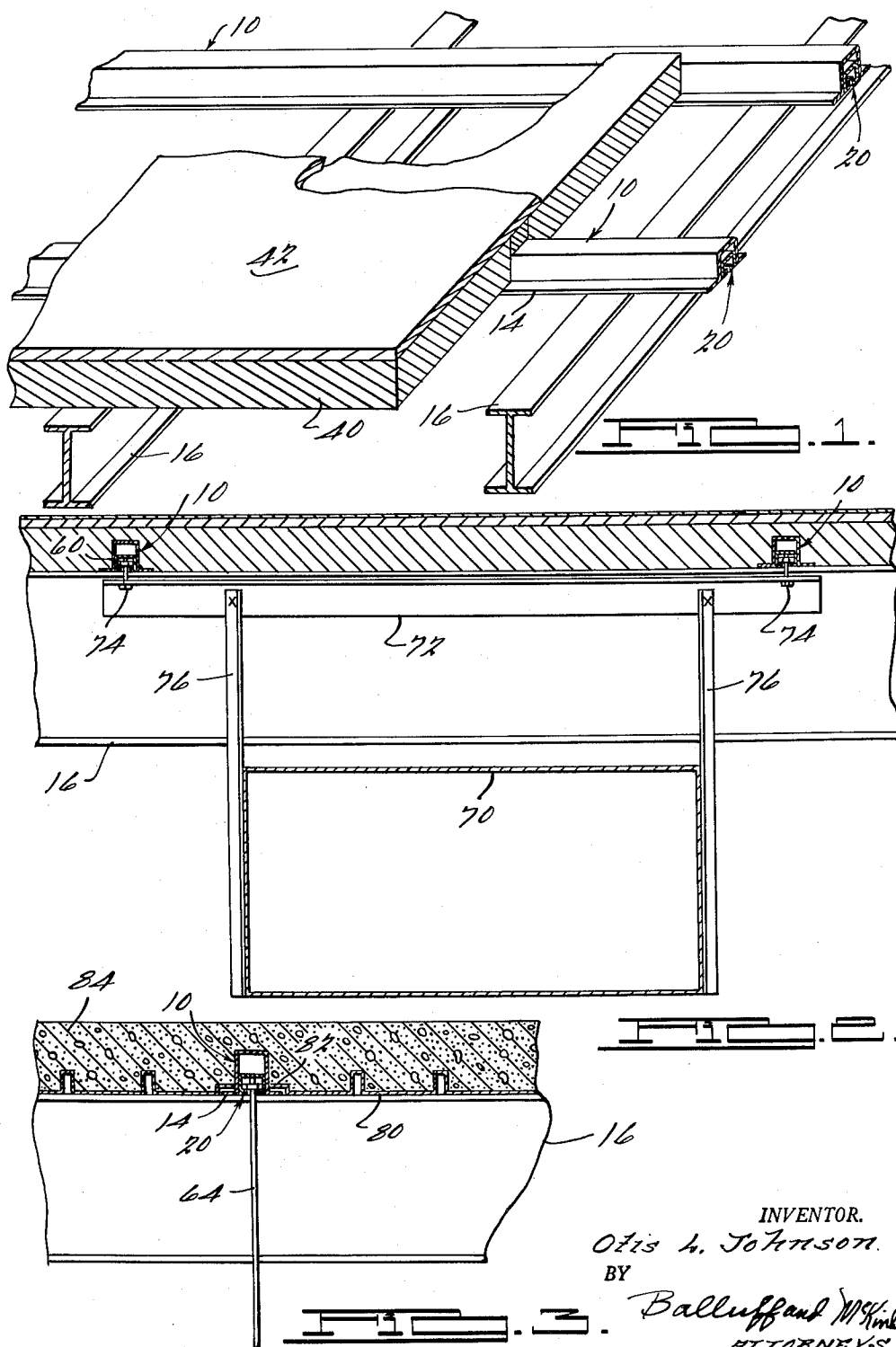
O. L. JOHNSON

3,018,860

STRUCTURAL ELEMENT FOR BUILDINGS

Filed Sept. 8, 1959

2 Sheets-Sheet 1



INVENTOR.  
Otis L. Johnson.  
BY  
Balluff and Winkley  
ATTORNEYS.



1

3,018,860

## STRUCTURAL ELEMENT FOR BUILDINGS

Otis L. Johnson, Detroit, Mich., assignor to Farnworth-Johnson Corporation, Detroit, Mich., a corporation of Michigan

Filed Sept. 8, 1959, Ser. No. 838,573

2 Claims. (Cl. 189-34)

This invention relates to building structures and more particularly to a structural element for use in flooring or roofing constructions. The novel structural element comprising this invention is characterized by the fact that it not only forms a load bearing element of the floor or roof in which it is used but also is adapted to provide a supporting element for various structures or articles which are commonly suspended from a ceiling, such as air ducts, electrical fixtures, suspended ceilings, and other equipment, without necessitating any alteration or penetration of structural materials, such as concrete, gypsum, or the like, which are commonly used as roofing or flooring materials. The structural member is further characterized by the fact that it is capable of use in a wide variety of roof or floor constructions, is of inexpensive construction, and greatly reduces the labor and cost of installation of any of the equipment or structures to be supported therefrom.

A principal object of the invention is to provide a new and improved structural element for the roof or floor of a building.

A further object of the invention is to provide a structural member of the type described which is of inexpensive construction and which forms an integral part of a floor or roof structure and may also be used to suspend various equipment below the floor or roof of the building in which it is used.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are two sheets, which by way of illustration show preferred embodiments of the invention and what I now consider to be the best mode of applying the principles thereof. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

FIG. 1 is a fragmentary perspective view of a floor or roof construction in which the improved structural member is used;

FIG. 2 is a sectional view illustrating a roof construction embodying the present invention;

FIG. 3 is a sectional view of a floor construction illustrating a further use of the structural element of the present invention;

FIG. 4 is an enlarged sectional view illustrating further details of the invention; and

FIGS. 5 and 6 are sectional views illustrating further modified forms of the invention.

In the drawings, the structural element constituting this invention is indicated by the numeral 10 and comprises an elongated channel-shaped member 12 having laterally extending flanges 14 at the ends of the opposing sides of the channel. The reference character 16 designates a series of I-beams or girders which extend in parallel relation across the building and constitute the principal load bearing elements of the floor or roof. The structural members 10 extend perpendicularly across and are supported on the beams 16. The flanges 14 of the members 10 engage the top flanges of the beams 16 and may be welded thereto or otherwise rigidly secured in properly spaced and parallel relation.

Referring to FIG. 5, the lower open end of the channel

2

member 12 is closed by an elongated strut 20 which is coextensive in length with the channel member 12 and is confined between and secured to the opposing vertical sides of the member. The strut 20 is generally rectangular in cross section and has its top wall 22 extending parallel to and spaced from the upper wall 24 of the member 12 so as to define an enclosed elongated tunnel 26. The side walls 28 of the strut 20 may be welded to the sides of the channel member 12. The strut 20 is provided with a longitudinal slot 30 in its underside and the opposing side edges of the slot 30 are bent upwardly to provide upwardly extending flanges 32 which extend throughout the length of the strut 20. The bottom wall 34 of the strut is preferably flush with the flanges 14 on the channel member 12.

The structural elements 10 are suitably secured in spaced relation either by the supporting beams 16 or in any other suitable manner and are adapted to support the flooring or roofing material.

In FIG. 1 the elements 10 are shown in use in a roofing construction consisting of a series of insulating boards 40 and a composition roof covering 42 on top of the insulating boards or panels 40. The panels 40 are supported at their side edges on the flanges of the members 10, and the roofing composition is then laid over the surface of the panels 40.

FIG. 4 illustrates a modified form of the invention in which the strut 20 is of identical construction to that previously described but in which the channel member 12 is replaced by a pair of angle members 50 which are welded to the sides of the strut. FIG. 4 also illustrates a roofing construction consisting of a series of insulating boards 40 supported on the laterally extending flanges of the angle members 50 and a composition roof 42. In this modification a series of anchor straps 52 consisting of sheet metal straps may be welded to the top of the strut 20 and extend transversely of the strut beyond the sides thereof. The boards 40 are cut out as indicated at 54, and a filler strip 56 is laid in the space defined by the cut-outs 54. The roofing composition 42 is then laid over the boards 40 and the filler strips 56.

FIG. 4 also illustrates the manner in which the strut 20 is adapted to provide a suspension member for suspending various equipment from the roof of the building. As shown in FIG. 4, a nut 60 is provided on one face with parallel grooves 62 which are adapted to receive the upwardly turned flanges 32 on the strut 20 to hold the nut against turning. A hanger rod 64 is threaded into the nut 60 and may be used for supporting various structural elements, such as a suspended ceiling, air ducts, electrical conduits, pipes or other equipment.

FIG. 2 illustrates how the structural elements 10 may be employed for suspending an air duct 70 beneath the I-beams 16. In this form of the invention an angle member 72 is secured to two adjacent structural elements 10 by bolts 74 threadedly engaging the nuts 60 within the struts. Additional angle members 76 are welded or otherwise secured to the angle member 72 and air duct 70 is carried by the angle member 76.

FIG. 3 illustrates a further use of the structural elements 10 in which they are employed in a concrete floor. In this construction the elements 10 are supported on I-beams 16 in the manner previously described. Between each adjacent pair of elements 10 is a sheet metal form 80 having its side edges 82 resting upon the lateral flanges 14 of the channel member 12. The metal forms 80 may be of any configuration or may consist of corrugated sheet metal. The concrete floor 84 is poured after the forms 80 are in place. As in other modifications, the struts 20 may support suitable anchor rods 64 or other devices for suspending equipment below the I-beams 16.

Referring again to FIG. 5, it will be seen that the

3

tunnel 26, which is defined by the channel member 12 and the strut 20, provides a convenient location for electrical conduits 36 for lighting equipment, telephone facilities, or the like. FIG. 5 illustrates the use of the structural elements 10 in a precast concrete roof construction which consists of concrete slabs 37 supported at their side edges on the flanges 14 of the channel member 12 and then a layer of rigid insulating boards 40 covered by a roofing composition 42.

FIG. 6 illustrates a further modification of the invention as used in a concrete floor construction. In this form of the invention the structural members 10 are of the type previously described but include a series of anchor straps 90 which may be welded or otherwise secured to the channel member 10 and extend laterally therefrom so as to be embedded in the concrete floor 92. The flanges 14 on the channel member 12 support the side edges of corrugated sheet metal forms 94.

From the foregoing description it will be seen that the structural element provided by this invention is adapted for a wide variety of uses in either roofing or flooring constructions and that it provides an equipment suspension system which is an integral part of the structural framework of the floor or roof, thus eliminating the necessity of drilling or nailing into the flooring or roofing material. The hanger rods 64 or other supporting fixtures may be suspended from the struts 20 at any point along their length. It will be apparent that the struts 20 may also be employed as track elements for supporting trolleys in applications where it is desirable to support equipment for movement below the supporting beams.

While I have illustrated and described preferred embodiments of my invention, it is understood that these are capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a roof or floor construction for a building including a series of parallel supporting beams; a load-supporting structural element adapted to extend across and be supported on said beams, said structural element comprising an inverted U-shaped member having laterally outwardly extending flanges at the lower ends of the vertical sides of said member, an elongated strut at the

4

open side of said U-shaped member, said strut being parallel to said member and confined between and secured to the vertical sides of said member, said strut being of rectangular cross section and having a longitudinal slot in its lower wall extending throughout the length of said strut and upwardly extending flanges defining the longitudinal edges of said slot, said strut having its upper wall disposed in spaced parallel relation to the top wall of said member to define therewith an elongated enclosed tunnel for containing electrical conduits or the like, said lateral flanges on said member being adapted to support the side edges of construction material, a nut within said strut and engaging the flanges on said strut to prevent turning of said nut, and a hanger rod threaded into said nut for suspending equipment below said beams.

2. In a roof or floor construction for a building; a load-supporting structural element comprising a U-shaped channel member, the opposing sides of said member having laterally outwardly extending flanges, and an elongated strut at the open side of said U-shaped member, said strut being parallel to said member and confined between and secured to the sides of said member, said strut being generally rectangular in cross section and having one side thereof parallel to and in the plane of the flanges on said U-shaped member, said strut having a longitudinal slot in said one side extending throughout the length of said strut and inwardly turned flanges defining the longitudinal edges of said slot, said strut having the side opposite said slot disposed in spaced relation to the connecting web of said U-shaped member to define therewith an elongated enclosed tunnel for containing electrical conduits or the like, said lateral flanges on said U-shaped member being adapted to support the side edges of construction material, said inwardly turned flanges on said strut being adapted to support a nut at a selected position along the length of said slot whereby a bolt may be threaded into said nut for suspending articles from said structural element.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

|           |               |               |
|-----------|---------------|---------------|
| 849,817   | Smith         | Apr. 9, 1907  |
| 1,750,841 | Hopper et al. | Mar. 18, 1930 |
| 2,191,161 | Romanoff      | Feb. 20, 1940 |