Jan. 14, 1941. J. H. YOUNG ET AL 2,228,650

FIREPROOF METAL CEILING

Filed May 13, 1938

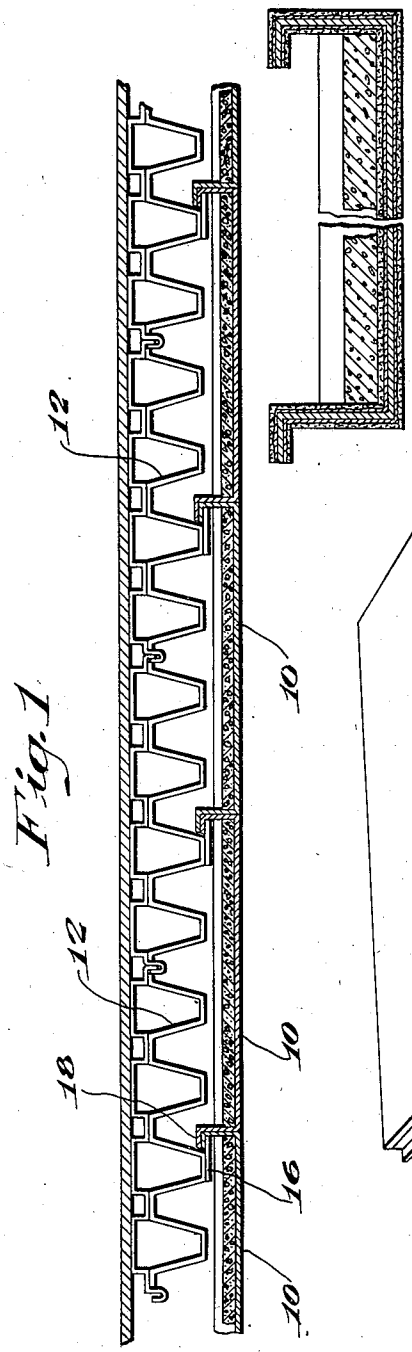


Fig. 1

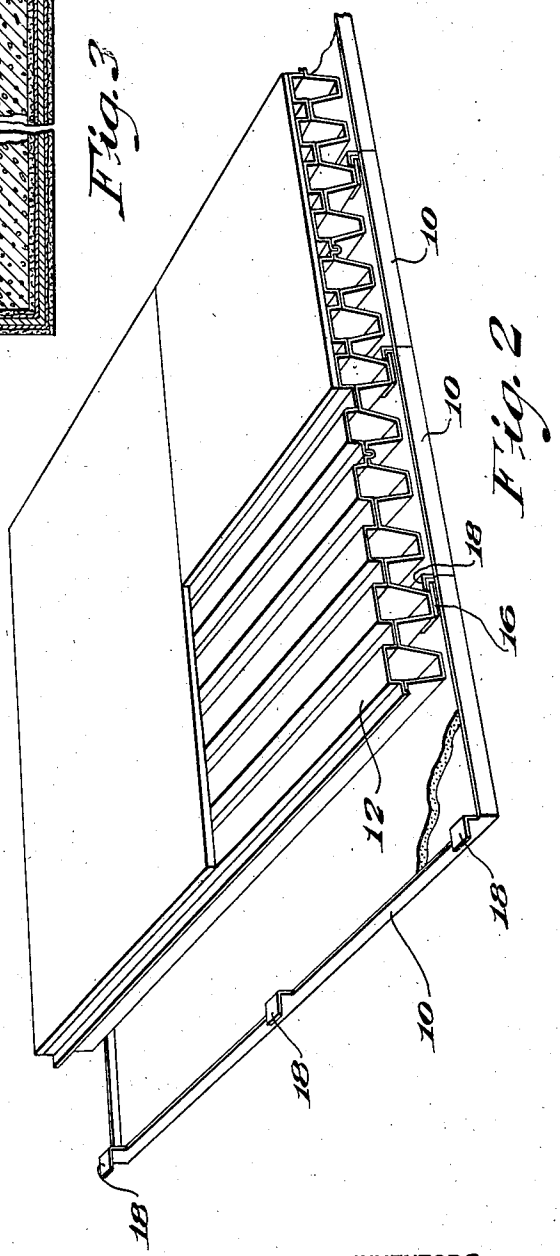


Fig. 2

Fig. 3

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Patented Jan. 14, 1941 2,228,650

UNITED STATES PATENT OFFICE

2,228,650

FIREPROOF METAL CEILING

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Application May 13, 1938, Serial No. 207,722

4 Claims. (Cl. 189—86)

This invention relates to a fireproof ceiling construction.

The object of the invention is to provide a novel ceiling structure which may be erected in a simple economical manner and which provides efficient fireproofing for the load bearing floor members from which the ceiling is preferably suspended.

With this general object in view, and such others as may hereinafter appear, the invention consists in the ceiling structure hereinafter described and particularly defined in the claims at the end of this specification.

In the drawing illustrating the preferred embodiment of the invention, Fig. 1 is a cross-sectional view of the present ceiling structure; Fig. 2 is a perspective view of a portion of the floor and ceiling structure shown in Fig. 1, and Fig. 3 illustrates a modified form of pan used in the present ceiling structure.

In general, the present invention contemplates a metal ceiling structure comprising a series of shallow pans suspended from the load bearing members of a floor. The under surfaces of the metal pans cooperate to form in effect a continuous ceiling surface and the individual metal pans may and preferably will be provided with sufficient unexpended vermiculite so that when exposed to fire conditions, a substantial thickness of expanded vermiculite is produced between the metal pans and the floor members whereby to efficiently fireproof and insulate the same.

The present ceiling structure is particularly suitable for use in fireproofing a metal floor of the type now sold under the name of "Robertson Keystone Floor" and which may be of a structure illustrated in the patent to Young, No. 1,867,433. The improved ceiling structure comprises a series of shallow metal pans 10 suspended from the load bearing members 12 of a floor. The floor 12 may, as above stated, comprise the cellular metal floor forming the subject matter of the Young patent above referred to. As herein shown, the side walls of the metal pans 12 may be extended and bent to form hook members 18 by which the metal pans may be suspended upon supporting members 16 welded or otherwise secured to the bottom of the metal cells constituting the load supporting beams or members of the floor structure. The metal pans 10 are each provided with a sufficient quantity of unexpanded vermiculite either in a dry form or in the form of a slab comprising unexpanded vermiculite and a binder such as gypsum, so that when the ceiling structure is exposed to fire conditions, a body of expanded vermiculite of substantial thickness is produced in the space between the ceiling formed by the pans 10 and the load supporting members 12 of the floor, thus efficiently insulating the floor from the fire and effectively fireproofing the same. The shallow metal pans 10 are preferably suspended from the floor at a sufficient distance to afford room for the expansion of the vermiculite under fire conditions and the production of the desired thickness of the insulating and fireproofing vermiculite member between the ceiling and the floor.

It has been found that the fire resistance period of the ceiling structure above described is limited by the resistance of the metal of the pans through oxidation under the fire conditions. Ordinary black steel as the material for the pans has been found to be satisfactory for fire exposures of considerable duration. Chromium steels and the like which are resistant to high temperature oxidation may be used to extend the fire-resistive period. Among the various non-inflammable materials with which I have experimented, a composite or laminated sheet comprising an asbestos felt layer attached by a metallic coating as a terne coating to the exposed surface of a steel sheet in accordance with the process set forth in the Coffman Patents Nos. 1,862,332 and 2,073,334, has been found to offer substantial resistance to oxidation and to be particularly economical for use in the production of the present ceiling structure to provide a resistive surface of improved appearance.

The present invention contemplates the combination of a metal pan ceiling construction and unexpanded vermiculite as a fireproof cover for floor members, and particularly steel floor members. One type of metal ceiling construction now commercially used comprises a series of perforated metal pans backed by a sound-absorbing element. In accordance with the present invention, the fire-resistive period of this type of acoustical ceiling may be improved by the use of unexpanded vermiculite in conjunction with the sound-absorbing element, thereby providing a fireproof, as well as acoustical, cover for steel floor members. In practice, a sufficient quantity of unexpanded vermiculite will be contained in the pans so that upon fire exposure, the vermiculite may expand independently of the sound-absorbing element to produce a relatively thick layer of expanded vermiculite between the metal ceiling and the floor members.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. The combination with load supporting members of a floor, of a metal ceiling suspended below the floor and comprising a series of shallow metal pans, and a sufficient quantity of unexpanded vermiculite contained within said pans to produce under fire exposure a relatively thick layer of expanded vermiculite between the metal ceiling and the floor members, said pans being of a depth greater than the thickness of unexpanded vermiculite contained therein whereby upon expansion the expanded vermiculite is retained in operative position by said pans.

2. The combination with a cellular metal floor and a series of shallow metal pans suspended below and at a distance from the floor and cooperating to form a substantially continuous ceiling, said metal pans being provided with a sufficient quantity of unexpanded vermiculite to produce under fire exposure a relatively thick layer of expanded vermiculite between the metal ceiling and the floor whereby to fireproof the same, said pans being of a depth greater than the thickness of unexpanded vermiculite contained therein whereby upon expansion the expanded vermiculite is retained in operative position by said pans.

3. The combination with the load bearing members of a floor, of a series of shallow metal pans suspended therefrom with the bottom of the pans forming a substantially continuous metal ceiling, each metal pan comprising a laminated structure of an underlying asbestos layer secured to the metal of the pan by a terne coating, said pans containing sufficient unexpanded vermiculite to permit the production of a relatively thick layer of expanded vermiculite under fire conditions, said pans being of a depth greater than the thickness of unexpanded vermiculite contained therein whereby upon expansion the expanded vermiculite is retained in operative position by said pans.

4. The combination with the load bearing members of a floor, of a series of shallow metal pans suspended therefrom with the bottom of the pans forming a substantially continuous metal ceiling, each metal pan comprising a laminated structure of an asbestos layer secured to the metal of the pan by a metallic coating, said pans containing sufficient unexpanded vermiculite to permit the production of a relatively thick layer of expanded vermiculite under fire conditions, said pans being of a depth greater than the thickness of unexpanded vermiculite contained therein whereby upon expansion the expanded vermiculite is retained in operative position by said pans.

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