Feb. 9, 1932. O. S. BOWMAN 1,844,310

FIREPROOF FLOOR CONSTRUCTION

Filed Oct. 20, 1930 2 Sheets-Sheet 1

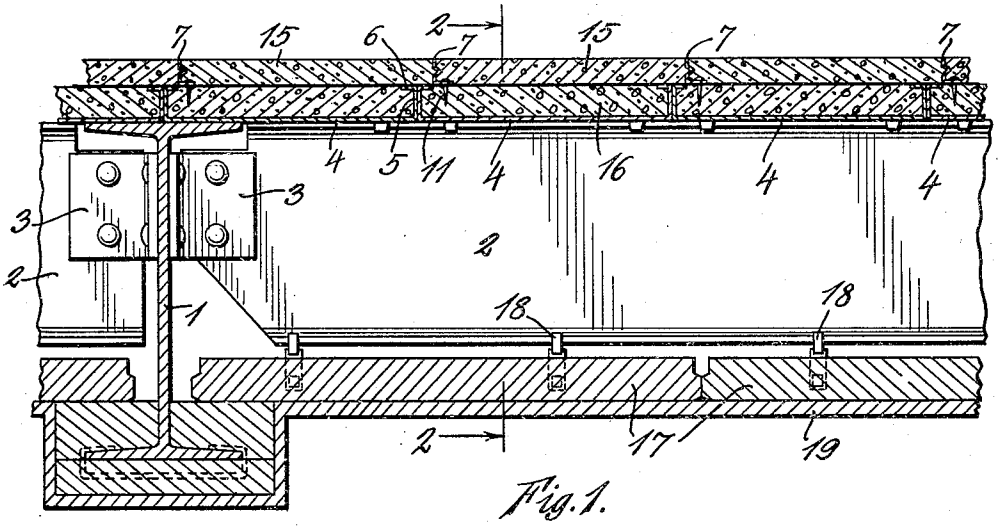


Fig. 1.

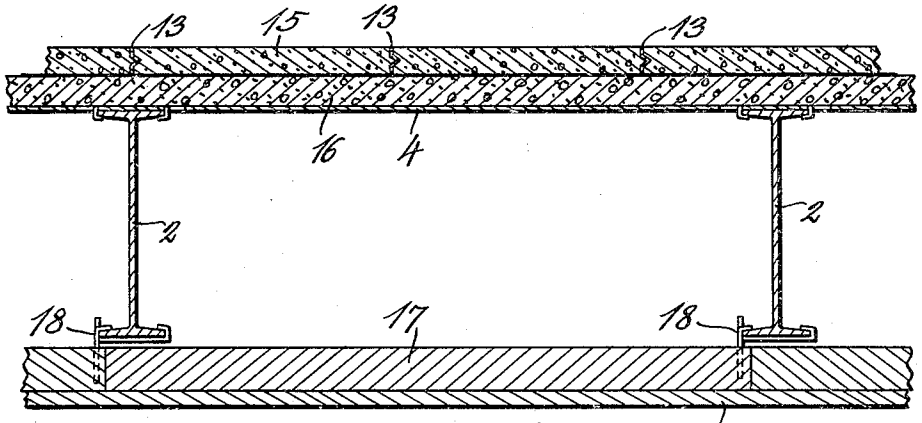


Fig. 2.

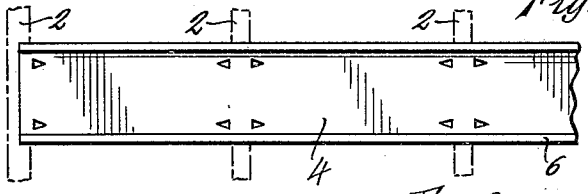


Fig. 3.

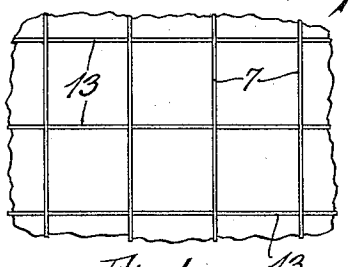


Fig. 4.

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FIREPROOF FLOOR CONSTRUCTION

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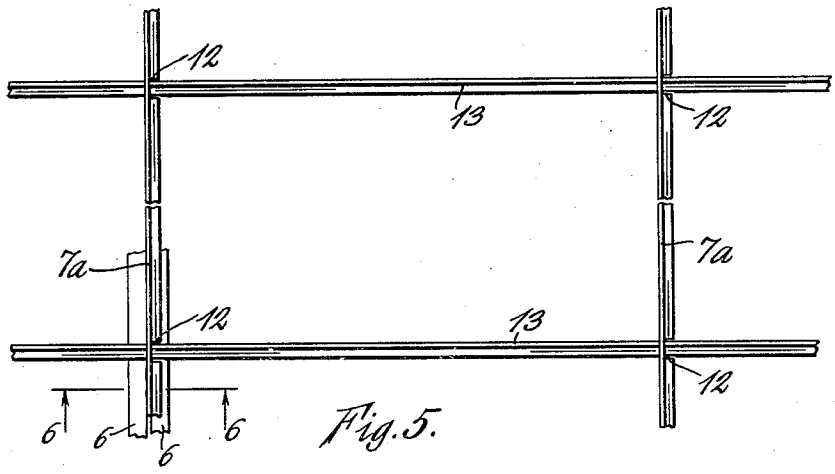


Fig.5.

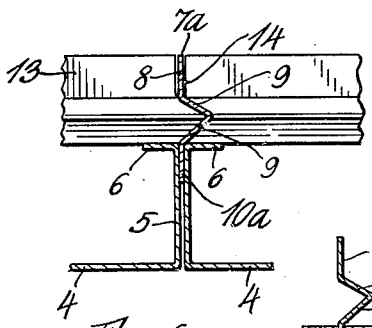


Fig.6.

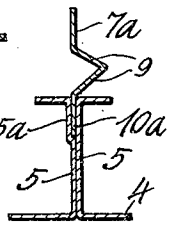


Fig.7.

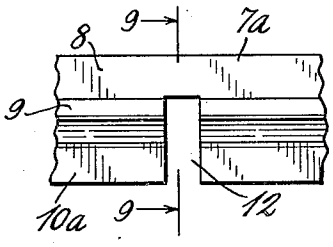


Fig.8.

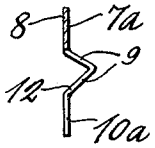


Fig.9.

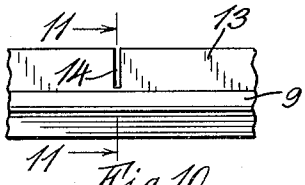


Fig.10.



Fig.11.

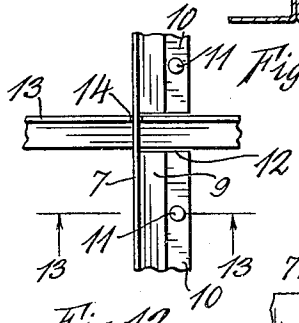


Fig.12.

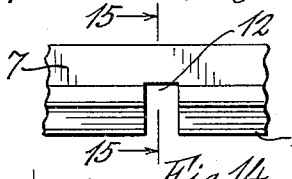


Fig.14.

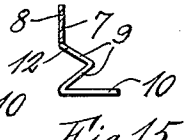


Fig.15.

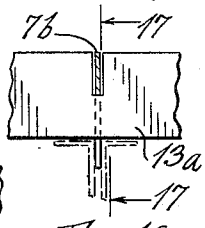


Fig.16.



Fig.17.

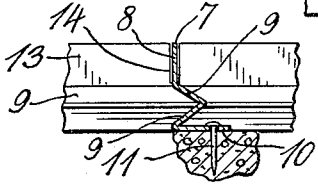


Fig.13.

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UNITED STATES PATENT OFFICE

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FIREPROOF FLOOR CONSTRUCTION

Application filed October 20, 1930. Serial No. 489,800.

This invention relates to improvements in fireproof floor constructions, and has reference more particularly to the construction of a floor which shall have great strength and which can be easily and cheaply installed.

In modern fireproof buildings it is customary to employ concrete floor constructions which require special forms and which have concrete arches between the beams, whereby the construction becomes very expensive and heavy.

It is an object of this invention to produce a floor construction that shall be of light weight and which shall have sufficient strength to withstand the most severe uses to which it will be subjected, and which at the same time shall be cheap and of such construction that the floor surface will not crack if it is overloaded to such an extent that it will flex.

This invention is, to some extent, a continuation and part of application Serial No. 442,218, filed April 7, 1930, and differs from this in several particulars to which reference will be directed as the description proceeds.

This invention briefly described consists in supporting on parallel beams a plurality of steel pans that are placed side by side, transversely of the beams, with their open sides upward. These pans are filled with a cinder concrete, or some similar concrete mixture, that is placed in the pans in plastic condition and allowed to harden in place. The mixture used for filling the pans should be of such a nature that it is possible to drive a nail into it. The upper surface of the concrete in the pans is covered with a coating of asphaltum for the purpose of producing a smooth surface to which the top layer of the floor will not adhere. Secured to the upper surface of the cinder concrete are separator strips that extend transversely of each other so as to form compartments that are then filled with a mixture of Portland cement and sand and marble in such a way as to form a hard upper surface that can be troweled or ground so as to give it a suitable finish.

Having thus briefly described the invention the same will now be described in greater detail, and for this purpose reference will be had to the accompanying drawings in which the invention has been illustrated and in which:

Fig. 1 is a longitudinal section through my improved floor construction;

Fig. 2 is a transverse section taken on line 2—2, Fig. 1;

Fig. 3 is a top plan view of one of the pans showing the same in place on the supporting beams;

Fig. 4 is a plan view showing a portion of the finished floor surface;

Fig. 5 is a top plan view showing the separator strips in assembled position;

Fig. 6 is a section taken on line 6—6, Fig. 5;

Fig. 7 is a section similar to that shown in Fig. 6, but showing a slightly modified form of construction;

Fig. 8 is a side elevation of a portion of one of the separator strips;

Fig. 9 is a section taken on line 9—9, Fig. 8;

Fig. 10 is a side elevation showing a portion of the other separator strips;

Fig. 11 is a section taken on line 11—11, Fig. 10;

Fig. 12 is a top plan view showing the crossing of two separator strips, one of which is constructed in a slightly different manner;

Fig. 13 is a section taken on line 13—13, Fig. 12;

Fig. 14 is a side elevation showing a portion of the anchoring separator strip;

Fig. 15 is a section taken on line 15—15, Fig. 14;

Fig. 16 is a section taken at the crossing of two separator strips of a slightly different design, and

Fig. 17 is a section taken on line 17—17, Fig. 16.

In the drawings reference numeral 1 represents the frame beams to which other

beams 2 are secured by means of suitable angle brackets 3. The upper surfaces of the beams 2 are in the same plane as the upper surfaces of beam 1, in the manner shown in Fig. 1. The beams 2 form the floor joists and secured to their upper edges are shallow steel pans 4. These pans have their edges bent upwardly as indicated by reference numeral 5 to form parallel sides, whose upper edges are preferably bent inwardly at an angle of 90 degrees as indicated by reference numeral 6. The bottoms of the pans have tongues cut so as to form lugs that can be bent downwardly underneath the upper flanges of the joists in the manner shown in Fig. 2. The pans are placed side by side as shown in Fig. 1 and form the support for the fireproof floor construction. After the pans have been put into place they are filled with a mixture of Portland cement and some aggregate, such as cinders, whereby a cinder concrete is produced which is applied in plastic condition and allowed to harden in place. The aggregate may be some other material than cinders, but the concrete, after it has hardened, should be of such nature that it is possible to drive nails into it for the purpose of attaching the separator strips 7. These strips have a cross section like that shown in Fig. 13, from which it will be seen that the upper one-half of the width of the strip is straight as indicated by reference numeral 8, and below this there is a longitudinal corrugation comprising two inclined sides 9, the lower of which terminates in a flange 10 that is bent at right angles to the part 8, and perforated for the reception of nails 11 by which it is attached to the cinder concrete as shown in Figs. 12 and 13. The strips 7 extend in the direction of the length of the pans and are secured to the cinder concrete adjacent the edges 6 of the sides of the pans, as shown in Fig. 1. Strips 7 are provided with notches 12 that are large enough to receive the transverse separator strips 13. These strips are of the same shape and size as strips 7 with this exception that the flanges 10 have been omitted. The upper straight portions of strips 13 have narrow notches 14 for the reception of the parts 8 of strips 7. When the strips are assembled in the manner shown they form rectangular compartments in the manner indicated in Fig. 5, and within these compartments the concrete mixture that forms the upper and finished floor surface is poured in plastic condition and allowed to harden in place. For the purpose of preventing the upper concrete layer 15 from adhering to the cinder concrete 16, the upper surface of the latter is first coated with a paint-like material, such as asphaltum, which gives it a smooth surface that prevents bonding between the two layers of concrete. When the top layer is separated from the lower layer by this paint-like material, it will not crack as readily as it would if the two surfaces of the separate layers of concrete were interconnected as they would be if the top layer were applied directly to the upper surface of the lower layer. The separation of two layers of concrete, used in a floor construction, by means of asphaltum, or some other equivalent substance, is of great importance as it permits the floor surface to flex to a greater extent than otherwise would be possible without producing cracks in the finished floor surface. Since the concrete in the pans is of a different composition than the top layer, there may also be an unequal expansion due to temperature changes and when the two layers are separated as above described, this expansion can take place without the production of severe strains as would be the case if the two layers of concrete were bonded or interconnected.

In Figs. 6, 7 and 8 a slightly modified form of separating and anchoring strips has been shown. The strip 7*a* corresponds to strip 7 in Fig. 13, but differs from it in this respect that the part marked 10 in Fig. 13, and which has been indicated by reference character 10*a* in Fig. 6 extends downwardly in the plane of the upper portion 8, and instead of being nailed to the concrete in the pans, the part 10*a* is interposed between the adjacent sides of the pans in the manner shown in Fig. 6, and is held in place by the friction between the sides and when necessary can be spot-welded, in which case it will be firmly attached to the pans so as to positively anchor the strips against removal. It will be seen from Fig. 8 that strips 7*a*, like strip 7, are provided on their lower edges with notches 12 for the reception of the transverse strips 13, which, in turn, are provided on their upper edges with notches 14 into which the parts 8 of strips 7*a* extend. Since notches 12 are on the lower side of strips 7, it is evident that strips 7 will be anchored to the pan assembly by the action of the strips 13.

In Fig. 7 I have shown a construction in which one of the sides of each pan is provided with an offset portion 5*a* into which the part 10*a* of the anchoring strip extends, and this permits the sides of the pans to be placed in contact with each other as distinguished from the construction shown in Fig. 6 where the pans are spaced the thickness of the anchoring strip. In Figs. 10 and 11 I have shown respectively a side elevation and a transverse section of strips 13, which shows that their construction is the same as that of strips 7 and 7*a* with this exception that no portion extends below the inclined side 9, and that instead of having wide notches 12 they are provided with narrow notches 14.

Attention is called to the fact that the separator strips are provided with longitudinally extending corrugations with which the con-

crete becomes interlocked, and which serve to anchor the concrete composing the upper layer of the floor and to hold it in place.

In Figs. 16 and 17 slightly different forms of separator strips have been shown. In the embodiment shown in these figures, the strips are transversely flat instead of being provided with corrugations. The strip that corresponds to strip 7 has been designated by reference character 7*b* and the one that corresponds to strip 13 has been designated by reference character 13*a*. The strips have inter-engaging notches so that they may cross each other, and the lower edge of strip 7*b* extends between the sides of the pans and serves to anchor the assembly to the pans.

When the floor has been finished it has the appearance shown in Fig. 4, where the upper edges of the strips, which have been ground down to the same level as the floor, form separator lines that divide the floor into squares and when the strips are made of brass, the floor will have a very rich and pleasing appearance.

In Figs. 1 and 2 a ceiling has been shown attached to the underside of the floor frame work, and this ceiling is constructed in the ordinary manner. Although the ceiling construction does not form part of this invention, a short description of the same will be made. The ceiling is formed from steel sheets, such as have been indicated by reference numeral 17, and these are secured to the beams 2 by suitable anchors 18. A layer of plaster 19 forms the finishing coat of the ceiling.

In the foregoing part of this specification I have called attention to the fact that if the cinder concrete, or other concrete mixture, in the pans has its upper surface coated with a coat of paint-like material, such as asphaltum or any other kind of paint, or even with material that cannot be classed as a paint, but which prevents bonding between the two layers, then the upper layer will not crack as readily as if it were bonded to the under layer. If the under layer cracks the crack will not be extended into or through the upper layer because of the spacer of non-bonding material.

From the above description it will be seen that I have produced a floor construction of a simple and substantial design that is of very light weight, and which has great strength, and which is also adapted to withstand heavy bending strains without cracking.

Having described the invention what is claimed as new is:

1. A floor construction comprising a plurality of elongated metal pans adapted to be placed side by side on a support, a cinder concrete, or the like, filling the pans and hardened in place, a coat of paint-like material covering the upper surface of the concrete, separator plates secured to the concrete so as to form compartments and a cementitious top floor material in the compartments.

2. A floor construction comprising a plurality of elongated metal pans adapted to be placed side by side and secured to the top of spaced supporting beams, a cinder concrete, or the like, filling the pans and hardened in place, a coat of paint-like material covering the upper surface of the cinder concrete, a plurality of separator strips secured in place above the cinder concrete so as to form compartments and a top floor material filling the compartments and hardened in place.

3. A fireproof floor construction comprising spaced supporting beams, shallow steel pans supported on the beams, the pans having upwardly extending sides and adapted to be placed in contact, means for securing the pans to the beams and separator strips having their lower edges projecting downwardly between the sides of the pans, whereby they will be held in place.

4. A fireproof floor construction comprising spaced supporting beams, shallow steel pans supported on the beams, the pans having upwardly extending sides and adapted to be placed in contact, means for securing the pans to the beams, separator strips having their lower edges projecting downwardly between the sides of the pans, whereby they will be held in place, and other separator strips extending transversely of the first, whereby compartments are formed, the two sets of strips having inter-engaging notches whereby they will be held in position.

5. A floor construction comprising spaced supports, a plurality of pans resting on the supports and placed side by side with their open ends upward, and separator strips extending in the direction of the length of the pans, the lower edges of the strips projecting downwardly between the sides of adjacent pans, whereby they will be positively positioned with respect to the pans and held against removal.

6. A floor construction comprising spaced parallel supporting beams, a plurality of shallow pans extending transversely of the beams, means for securing the pans to the beams, separator strips extending transversely of the pans above the latter and combined anchor and separator strips extending in the direction of the pans, the lower edges of the last named strips being positioned between the walls of adjacent pans, whereby they will be held in alignment with the pans, the strips being provided with inter-engaging notches for receiving portions of the strips that cross them.

7. In a floor construction having spaced parallel supporting beams and shallow pans extending transversely of the beams with their open sides upward, separator strips carried by the pans and extending above the top of the pans, one set of strips extending

transversely of the pans and the other set longitudinally of the pans, both sets of strips having corrugations extending longitudinally and each set having one edge provided with notches for the reception of the strips of the other set.

8. Supporting devices for use in fireproof floor construction comprising elongated pans having flat bottoms and parallel sides extending vertically from opposite edges of the bottom, one of the sides having a portion near its upper edge offset inwardly so as to lie in a plane slightly closer to the center of the pans.

In testimony whereof I affix my signature.

OLIVER S. BOWMAN.