

No. 725,846.

PATENTED APR. 21, 1903.

P. H. JACKSON.
FLOOR, ROOF, OR LIKE CONSTRUCTION.

APPLICATION FILED DEC. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

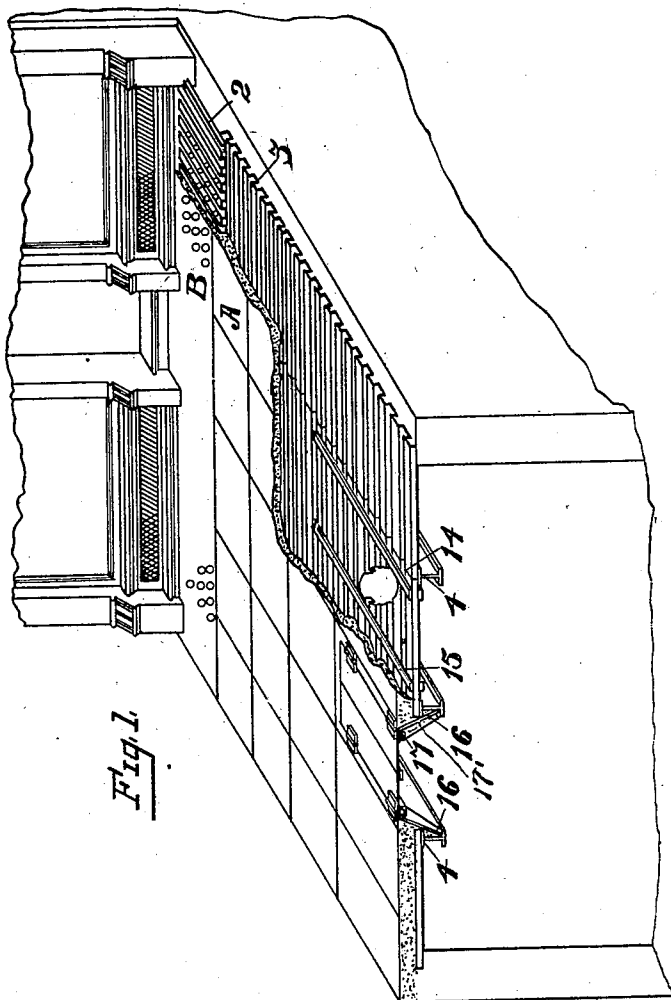


Fig. 1.

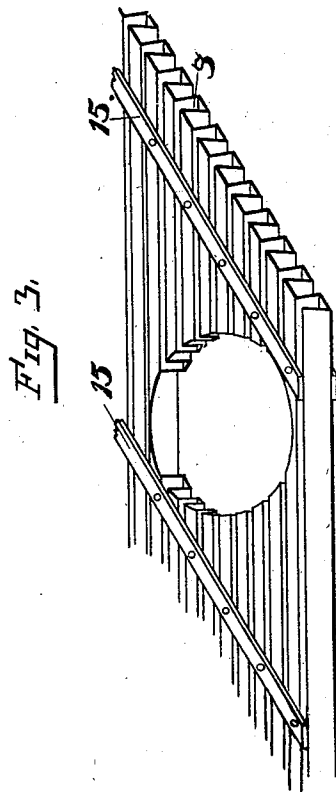


Fig. 3.

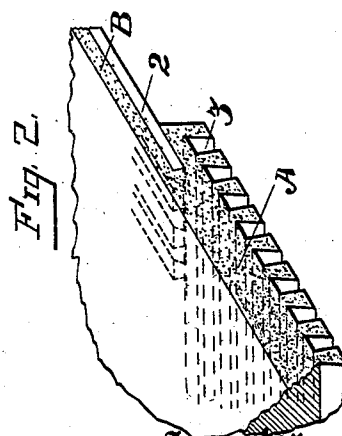


Fig. 2.

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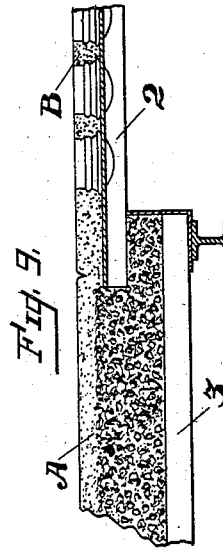
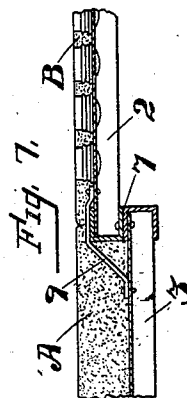
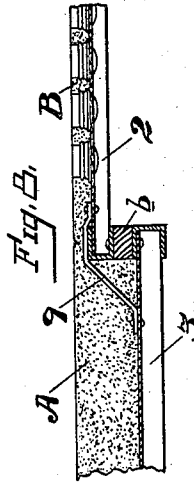
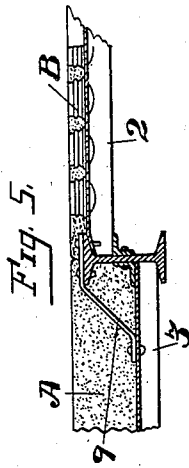
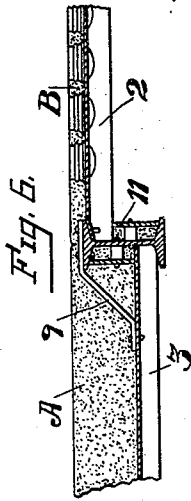
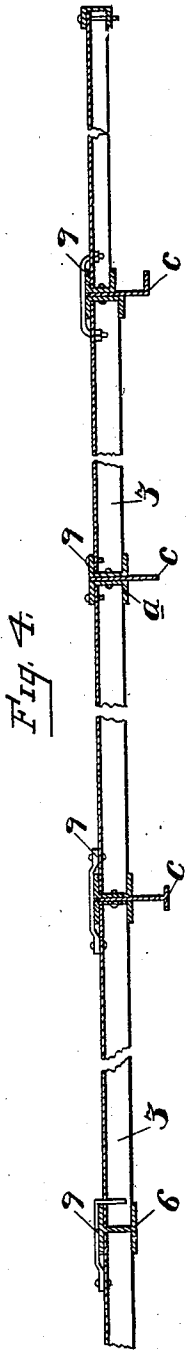
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2 SHEETS—SHEET 2.



Witnesses,
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UNITED STATES PATENT OFFICE.

PETER H. JACKSON, OF SAN FRANCISCO, CALIFORNIA.

FLOOR, ROOF, OR LIKE CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 725,846, dated April 21, 1903.

Application filed December 11, 1902. Serial No. 134,864. (No model.)

To all whom it may concern:

Be it known that I, PETER H. JACKSON, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Floor, Roof, or Like Construction; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in the construction of floors, roofs, sidewalks, and the like; and it consists especially in an improved method for rapidly laying and fixing the corrugated-metal-sheet bottoms which form the first portion of the structure; secondly, in a means for securing them in place and in laying said bottoms at different levels, so that the thinner portions which hold the glass illuminating-lights will form a continuous surface with the thicker plain portions which are a part of the structure.

It also comprises a means for forming a continuous upper surface of richer and finer cement surrounding the glass and extending over the plain portion and the bottom of the deeper plain portion made of a different quality and in so marking or lining the surface of the plain portion as to prevent cracks by reason of unequal expansion and contraction.

My invention also comprises details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a perspective view of my invention. Fig. 2 is a perspective view in part showing joint of bottoms at different levels. Fig. 3 is a perspective view showing reinforcement for coal-holes and the like. Fig. 4 is a section of bottom, showing different modes of connecting ends. Figs. 5, 6, 7, 8, and 9 are sections showing different forms of joints between glazed and plain portions.

In the laying of sidewalks, floors, roofs, and like structures a lower base or support is formed of corrugated-metal plates or sheets either made dovetail, rectangular, V, or other suitable shape, and upon these is a superposed thickness of Portland or other cement mixture forming an artificial stone or concrete which is applied in a plastic state and in time adheres to the corrugated-metal bottom and hardens, so as to practically become

integral with it. In certain portions of such sidewalks or floors it is customary to fit transparent-glass disks, which serve to light the basement beneath, and this portion is usually continuous with a plain portion having no glass in it. The portion in which the glass is placed must be made of a thickness equal to that of the glass disk or lens, and as the depth of these lenses are approximately seven-eighths of an inch to one inch in thickness a very slight depth of concrete or cement mixture is introduced between and around the lenses. On account of its slight depth this must be made of the richest possible material to give it strength and to resist abrasion, and is usually made of equal portions of Portland cement and gravel, with a surface finish of Portland cement. This material if subjected to considerable variations of heat and cold and if unrestricted continually expands and contracts; but the lenses extend down into the holes made in the corrugated-metal bottoms which support the glass, are thus fixed in place, and the artificial stone filling the small spaces between them is so anchored and interlocked that the contraction and expansion is limited and restricted and is practically prevented from cracking. It is usual, however, to connect with the light portion a very considerable space of the floor or sidewalk in which there are no lights, and this plain surface if continued of the same thickness with that portion containing the lights would be subjected to such considerable expansion and contraction that it would crack and become disfigured. In order to prevent this, it is necessary to make the plain portion of considerably greater depth or thickness than that in which the glass is used, and to overcome this difficulty is one of the objects of this invention. In carrying it out the thickness of the plain portion is increased to about double that of the glass portion, more or less. It is usually made about four and one-half inches in thickness, and the top portion, which may be from one-half to three-fourths of an inch in thickness, is made of the rich material heretofore described as being laid between the glass lenses—that is, usually of equal portions of Portland cement and gravel—with the top finish of cement, this being necessary for hardness to resist abrasion and for

strength to resist compression under loads which might deflect the surface. Directly below this hard and richer portion is the main and thicker portion of the plain surface, which is usually of one part of Portland cement to six or seven parts of crushed rock and sand or gravel. This mixture becomes cemented to the metal bottom, filling the corrugations, and provides strength to support any load likely to be placed upon the surface. Experiments have shown that a covering made in this manner four inches in thickness and six and one-half feet between supports will be broken by an average of two thousand two hundred pounds distributed per square foot. This lower and less rich portion of the covering expands and contracts but very little, and being in a manner protected by the thinner and richer surfacing the metal is subjected to very little, if any, movement due to changes in temperature. The top portion, however, is so susceptible to contraction and expansion on account of its exposure that some means must be provided for preventing it from becoming cracked and disfigured. I therefore lay this portion off in suitable small squares or other forms by cutting incisions or grooves to the depth of about three-eighths of an inch or more below the surface. These grooves allow this upper surface to practically expand and contract in small individual sections between the incisions, so that the grooves may become a little narrower or a little wider, and by this method cracks or separation of the surfaces between the grooves is prevented. In order to support the surface thus formed, the plain and thicker portion of the structure is made to underlap the portion in which the glass is set. These thicker and thinner parts are here indicated by the letters A and B, and each has a corrugated bottom, as at 2 and 3, the part 2 being perforated at proper intervals to receive the glass lenses for the admission of light, while the other portion, 3, may be made continuous and without openings. The cement filling in each case enters the corrugations and when hardened is held in place so as to be practically integral with the bottom. These bottoms are supported by bearers, as 4, and when the corrugations of the plain portion extend at right angles with the corrugations of the glazed portions the extension of the corrugations 3 beneath those shown at 2 serve as a support for the outer ends of the latter, and they also serve to prevent any leaks at the junction of the two. If the corrugations of the glazed portion and the plain portion extend in the same direction, then the bearer should be placed beneath the overlapping and connected portions, as shown at 5, the ends resting upon suitable supports.

In the drawings I have shown the corrugated bottoms 2, forming a part of the glazed surface, as extending outwardly from the building-front, while the corrugated bottoms 3 extend parallel therewith and project be-

neath the outer ends of the bottoms 2. It will be manifest that the direction of the corrugations in the plates 2 and 3 may be changed so that the corrugations in 2 will lie parallel with the building and in 3 may extend outwardly therefrom, or both may extend in the same direction, in which case the meeting or overlapping ends of the corrugated bottoms must have independent bearers or supports. These bearers may consist of I or T beams, channel-irons with their backs abutting and bolted closely together or to the I-beams, or variously arranged, as will be hereinafter described.

As shown in Fig. 4, the bearers consist of two channel-irons bolted or riveted together back to back, or, if obtainable, a small I-beam may be employed, as shown at 6, the distance between the upper and lower flanges of the beam being just sufficient to receive the ends of the corrugated bottoms, which are driven into the channels, extending at right angles therefrom.

As shown at 7, I have riveted or bolted two channel-irons together, one on top of the other, with the open channels facing in opposite directions, and the difference in the levels of these channels forms a very satisfactory support for the corrugated-metal bottoms, in which the glass lenses are fixed, these being secured in the upper channels, while the lower channel supports the bottom on which the thicker portion of the concrete surface is carried, as previously described. If the channels require a greater depth, a flat bar of iron may be riveted or fixed between the upper and lower channels, Fig. 8^b.

In some cases it may be found more convenient to bolt angle-iron ribs upon I-beams of sufficient depth so that the upper surface of the angle-iron projecting beneath the upper flange of the I-beam on one side forms a support for the bottom 2, and the other angle-iron, bolted upon the opposite side of the I-beam with its flange a sufficient distance from the lower flange of the I-beams, forms a support for the corrugated bottom 3. The ends of the corrugated bottoms are in either case driven into the spaces or channels thus formed, which are sufficiently narrower than the depth of the corrugations to compress the latter when they are driven in and to hold them there firmly. In order to more completely lock these bottoms in place, I have shown ties or braces, as at 9, which may extend over and be bolted to the top of the I-beam or the channel-iron, when the latter is used, and the other ends, extending diagonally downward, are bolted or riveted to the corrugated sheets. They may also be secured by pins dropped through holes made coincidentally in the straps and the flanges of the beams. It will be understood that these tie-bars may also be bent so as to clasp the tops of the beams or angle-irons, and where the ends of the corrugated bottoms abut upon opposite sides of the supporting-beams at ap-

proximately the same level these tie-bars may extend over the top of the supporting-beam and be bolted to the upper part of the corrugated bottoms or may be bent so that their ends will extend through holes therein, and they may be threaded to receive nuts, by which they are secured.

In Fig. 6 I have shown vertical plates fixed parallel with the web of the beam or bearer and of sufficiently less depth, so that the upper or lower edges serve to make the space between the flanges and said edges to receive the ends of the corrugated bottom plates. These vertical plates 11 are secured to the web by bolts and wedges, or similar pieces are introduced to hold the plates at a proper distance from the web. The space between the plates and the web may then be filled with concrete or cement, so as to make a solid structure. By these means the bearers and corrugated-metal sheets may be rapidly laid up. The bearers and channel-irons being first laid in position, the end of the corrugated sheets are fitted and forced into the channels. Then the channel-iron is forced upon the corrugations of the other end of the sheet, and so on, the flexible ends of the corrugated sheets being bent or compressed and interlocked with the supports, making a very stiff and secure bottom.

Where the corrugated sheets are upon the same level, it is sometimes convenient to interlock or lap them upon the top of the supporting-bearer, as shown at 14.

Holes must be made in the sidewalks for coal-hole covers, basement-ventilators, and for other and like purposes, and also in floors and roofs for illumination, ventilation of the apartment beneath, for hot-air registers, pipes, &c., and this necessitates cutting across the corrugated sheet metal either round or square openings at points in the sheets intermediate of the ends, and these cut portions must necessarily be properly supported to give them the requisite strength. I therefore employ bars, as at 15, which may be flat or of other suitable shape and extend transversely across the corrugations at each side of the openings, one bar being preferably located above and the other located beneath the corrugated sheet. These bars are then riveted, bolted, or otherwise secured together so that the portion of the corrugated sheet lying between each pair of bars is strongly clamped between them, and thus partakes of the added strength of the bars. The top bar is preferably made of greater length than the lower and extends a considerable distance over and beyond the opening, resting upon the undercut portion which supports it. It will be understood that for large openings a plurality of bars thus arranged in pairs may be employed upon each side of the opening.

Without especially naming the particular form of corrugated plate which may be employed it will be understood that the devices heretofore described may be employed with

plates the corrugations of which are dovetail, V-shaped, rectangular, or of serpentine outline in cross-section.

It is frequently the case that the steel beams or bearers supporting this combined sidewalk and vault-ceiling are too far apart to properly support the sidewalk trap-doors when the latter are of less width than the open space between the beams, and in such cases provision must be made to make all parts surrounding the doors of sufficient strength and to also make them waterproof. In order to effect this, the doors with the surrounding frame may be temporarily blocked up in position. I then take strong pieces of flat or other shaped iron cut to proper length and width, as shown at 16, and these are so placed that the lower edges rest in the angle of the web and lower flange of the beam. The other end inclining outward supports the angle of the door-frame, as at 17, thus providing the necessary direct support between the beam and the frame. After the frame and bars are in place I take boards, as shown at 17', and support them at an incline, as shown, fixing them temporarily in position outside of the supporting-irons 16, and I then fill in the space between these boards and the beams with well-compacted concrete, which surrounds the bars or braces 16 and fills the whole space between the boards and the web and flanges of the beams. When this concrete is hard and strong, the boards are removed, thus leaving a waterproof and solid surrounding beneath the door-frames and around the supporting-bars. The sidewalk is then completed around the frame, as previously described. If the channel-beams are not of sufficient strength for the larger spans or distances between supports, they may be reinforced by either T-angle, flat, or other shaped iron having sufficient depth for the purpose. (Shown in Fig. 4^c.)

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The improvement in sidewalk, floor and like structures consisting of sections formed of corrugated-metal bottoms having different levels, at their meeting edges, and a filling of concrete or cement having a level upper surface.

2. A sidewalk, floor or like structure composed of corrugated-metal bottoms, the meeting edges of which are at different levels, supports for said meeting edges, a filling of concrete covering and uniting with the bottom of the lower level and of less than the ultimate depth required, and a covering of richer concrete or cement laid upon and uniting with said primary body and extending over and uniting with the higher bottom so as to form a continuous wearing-surface over the entire structure.

3. A sidewalk floor or like structure consisting of corrugated-metal bottoms, one having perforations to receive glass lights or

lenses and the other being continuous and unperforated, said second section being supported at a lower level than the first, beams or supports for the meeting ends of said sections, a filling of ordinary concrete or cement covering the unperforated and lower section to approximately the level of the upper section, and a supplemental filling of richer and harder cement covering the said primary filling and forming an entire filling between the glasses of the perforated section to form a continuous wearing-surface on the level of the illuminating-lenses.

4. A sidewalk floor or like structure composed of a corrugated bottom perforated for illuminating lights or lenses and an unperforated structure on a lower plane than the perforated one, supports by which the meeting edges of said surfaces are united and upborne, a covering of ordinary concrete or cement spread upon and united with the unperforated and lower section of the structure to approximately the level of the upper and perforated portion, a second covering of richer and harder cement material adapted to resist compression and abrasion, said second covering constituting the entire filling between the illuminating-lights of the perforated portion to the level with the tops of said lights and continued upon the same level over the previously-laid concrete on the unperforated structure so as to form a continuous surface, said surface which extends over the unperforated structure having incisions or grooves made transversely thereon whereby the cracking disintegration of said surface by expansion or contraction is prevented.

5. A sidewalk, floor or like structure consisting of corrugated-metal bottoms laid at different levels and having a concrete filling and surface laid upon and uniting with both portions and forming a continuous top wearing-surface, bearers for said bottoms and means for uniting the bottoms at different levels consisting of channels formed upon opposite sides of the bearers and adapted to receive and support the ends of the corrugated sheets.

6. Means for supporting sidewalk, floor or like structures which are formed of corrugated sheets consisting of beams or bearers laid at intervals transversely of the corrugations of the sheets, channels formed upon opposite sides of said bearers into which channels the ends of the corrugated sheets are forced and compressed and a covering of concrete or cement filled into and uniting with the corrugations of the sheets and forming a smooth upper surface.

7. A sidewalk, floor or like structure composed of corrugated-metal sheets having bearers or supports for their contiguous ends and

a surface formed of concrete or cement spread upon and united with said sheets, openings formed through said sheets between the supports and supplemental supports consisting of bars extending in pairs above and below the sheets upon each side of and contiguous to the openings, said pairs of bars being bolted or riveted together.

8. A sidewalk, floor or like structure consisting of corrugated-metal sheets, the metal sheets of one section being laid at a lower level than those of the other, and the upper section overlapping the lower section, bearers or supports for the meeting edges of said sections and a filling of concrete laid upon the lower section extending beneath the upper section and a second filling of concrete or cement laid upon the upper section and continued over the concrete filling of the lower section to form a continuous waterproof and wearing surface for the whole structure.

9. A sidewalk, floor or like structure consisting of corrugated bottoms, beams or bearers having channels formed upon opposite sides into which the contiguous ends of the corrugated bottoms are forced and compressed and straps or bars uniting said bottoms with the supporting-beams or with each other whereby any separation is prevented.

10. A sidewalk, floor or like structure composed of corrugated iron bottoms with means for uniting and supporting the contiguous ends of the bottom sections, doors and frames therefor fitted into open spaces formed through the bottoms between the supports, brace-bars having the lower ends resting in the angles between the webs and lower flanges of the bearers and the upper ends against the outer angles of the frame whereby the latter is supported and a filling of concrete resting upon the lower flanges of the bearers and enclosing and surrounding the supporting-bars and a superposed filling of concrete covering and uniting with the metal structure and forming a hermetically-sealed upper wearing-surface.

11. A sidewalk floor or like structure consisting of corrugated-metal bottoms, bearers formed of channel-irons on opposite sides into which the contiguous ends of the corrugations are forced and compressed, T, flat, angle or other shaped irons riveted or bolted in the upper portion between the channels, and extending beneath to a required depth for strength and extended spans.

In witness whereof I have hereunto set my hand.

PETER H. JACKSON.

Witnesses:

S. H. NOURSE,
JESSIE C. BRODIE.