L. PATTERSON.

REINFORCED CONCRETE FLOOR CONSTRUCTION.

APPLICATION FILED FEB. 25, 1909.

948,824.

Patented Feb. 8, 1910.

2 SHEETS—SHEET 1.

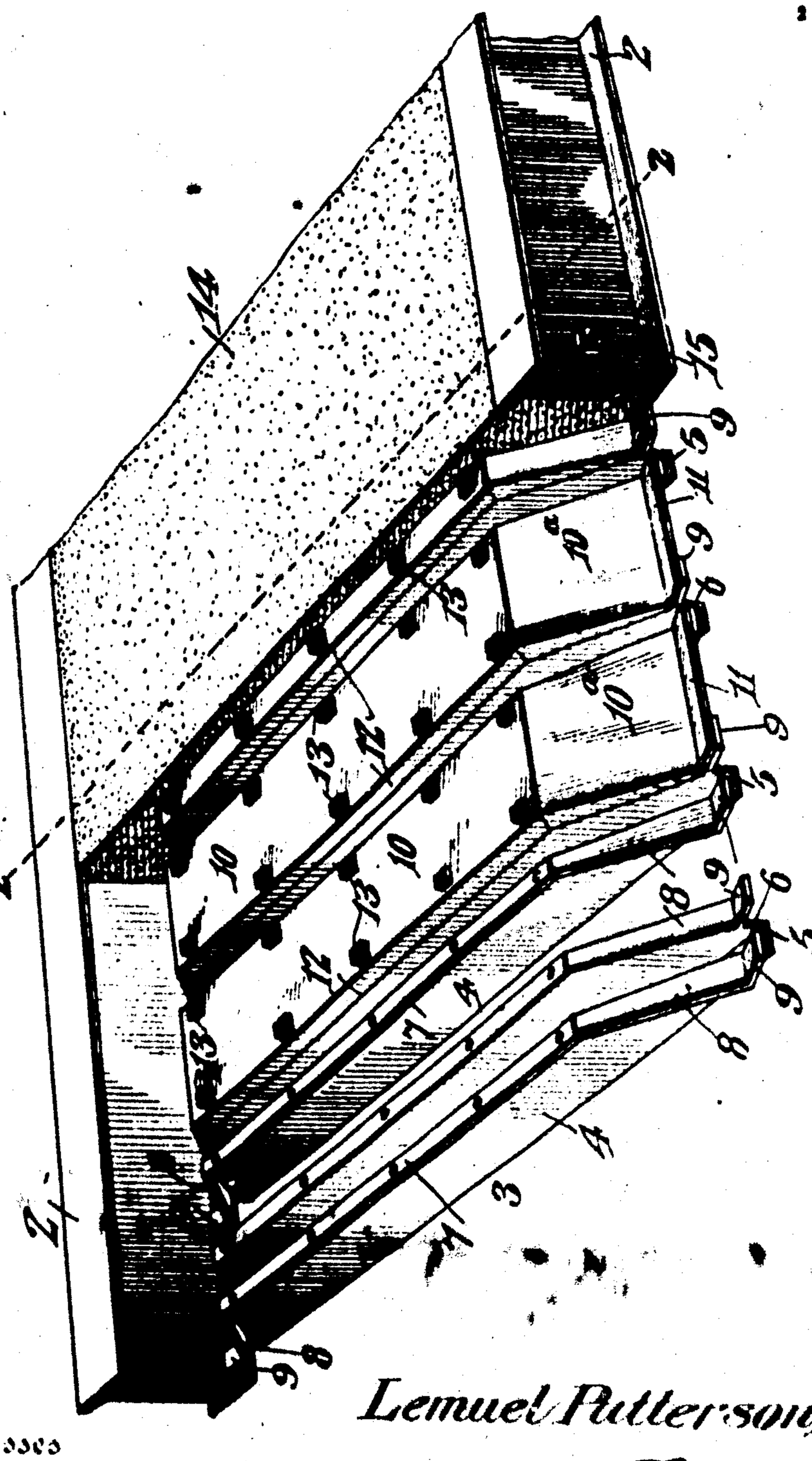

Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

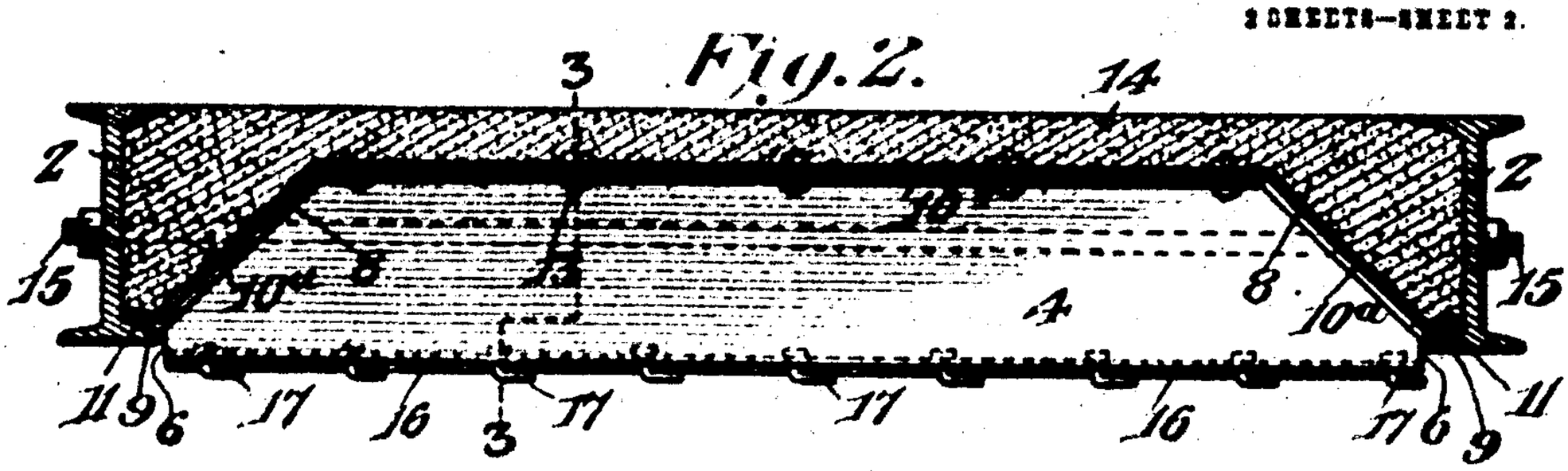


Fig. 3.

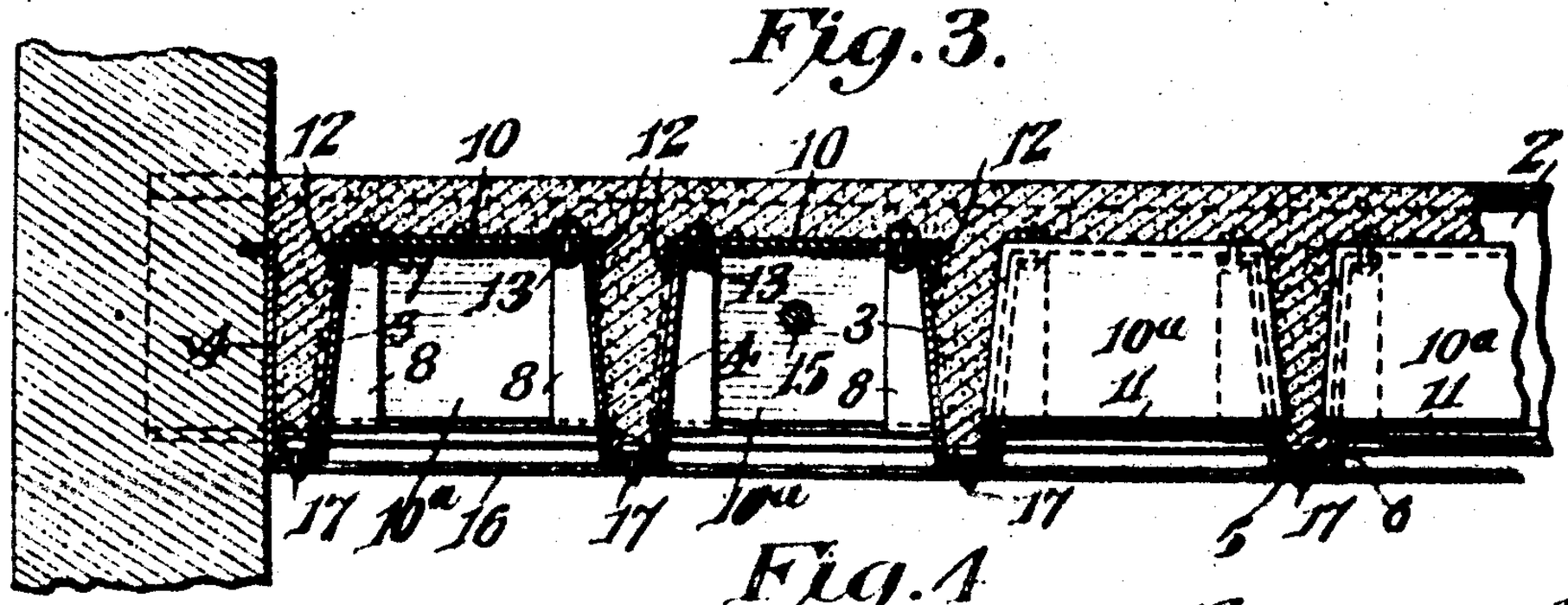


Fig. 1

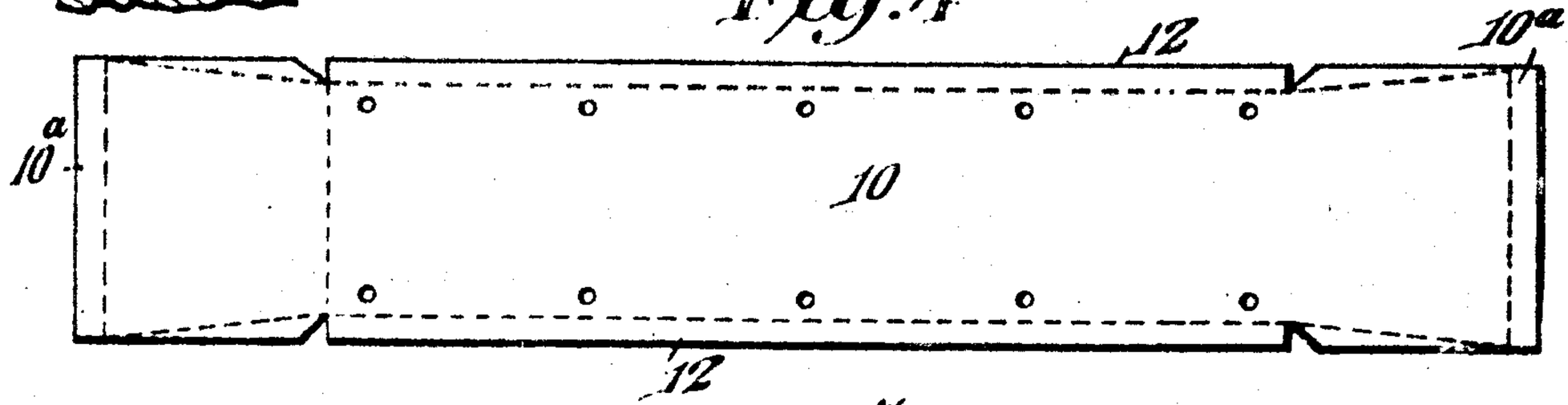
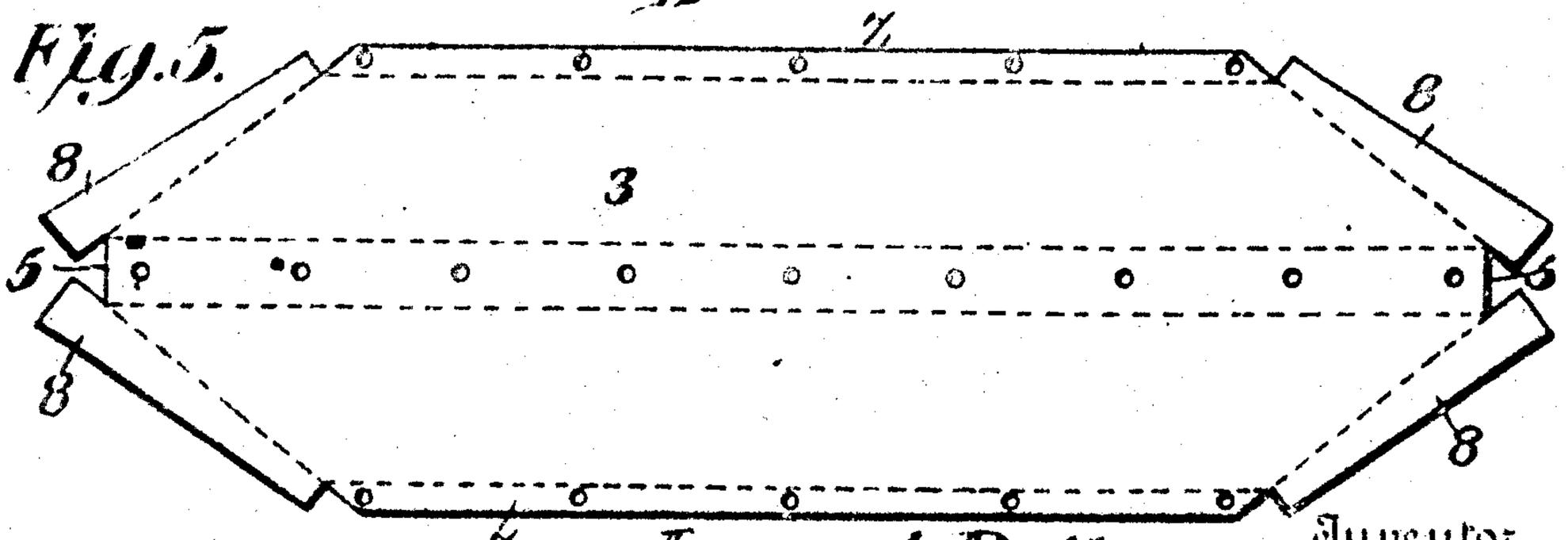


Fig. 5.



Witnesses

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REINFORCED CONCRETE FLOOR CONSTRUCTION.

948,924. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed February 25, 1909. Serial No. 479,901.

To all whom it may concern:

Be it known that I, LEMUEL PATTERSON, a citizen of the United States, residing at Olean, in the county of Cattaraugus and State of New York, have invented a new and useful Reinforced Concrete Floor Construction, of which the following is a specification.

My invention relates to the construction of floors and ceilings wherein concrete is used associated with sheet metal reinforcing plates, and specifically to a floor or ceiling structure wherein a plurality of sheet metal forms is used supported on I beams, concrete or other artificial stone being filled into the space above said forms and between the I beams.

Generally speaking, my invention contemplates the use of a plurality of U-shaped sheet metal forming and reinforcing members, supported at the ends on the lower flanges of parallel I beams, said members being separated from each other but connected by intermediate plates. The space inclosed by the U-shaped members and the space above the connecting plates is filled in with an integral mass of artificial stone which hardens in place, the sheet metal sections thus forming initially a continuous form for the concrete and support for the same while it is hardening, and later forming reinforcements for the concrete and covering the lower face of the same.

In the drawings, Figure 1 is a perspective view of my floor structure, one of the beams being partly broken away, the concrete being also partly broken away and the covering plates being left off between two of the beam-forming members; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is a plan view of the blank used for making the connecting plates, and Fig. 5 is a plan view of the sheet metal blank used for the beam-forming members.

In the drawings 2 denotes the usual I beams found in constructions of this kind, these beams being placed parallel to each other and of course having the upper and lower flanges.

The main elements of my improved construction are the chambered transverse beam forms, designated generically by the numeral 3. These in cross section are approximately U-shaped and are formed with sides 4, and the connecting bottom web, 5. As seen from Fig. 2, the ends of the sides 4 are cut away at an inclination, these inclined ends extending down nearly but not quite to the bottom of the form 3 and from this point the end of the form is cut vertically downward as at 6. The upper edges of both the sides 4 are outwardly flanged as at 7, these flanges being continued down the inclined ends as at 8. As seen from Fig. 1, each flange 8 is wider at the bottom than at the top. The flange 8 does not extend downward on the straight portion 6 but is bent outwardly in line with the longer axis of the form as at 9 so as to provide feet or lugs adapted to be engaged with the lower flanges of the I beams so that the forms 3 may be supported therefrom. The elevation of these feet 9 above the bottom 5 allows the form 3 to project down beyond the bottom of the beams 2, as shown in Fig. 2.

Each of the forms 3 is connected to the next adjacent form by a plate 10 having downwardly and outwardly inclined ends 10^a to fit over the inclined ends of the adjacent forms. At the lower ends the inclined portions 10^a are outwardly turned to form flanges 11, which fit upon the upper face of the adjacent feet 9. The side edges of the plate 16 are downwardly flanged as at 12, as shown clearly in Fig. 3. When in place the margin of the plate 10 overlaps the inner edge of the side 4 of the form and extends down against said side, the plate 10 being attached to the flanges 7 by bolts 13.

It will be seen that the construction above described provides a series of U-shaped troughs having the general form of plate beams connected at their upper edges by transverse plates, the adjacent forms 3 being bound to each other by said plates so as to form a complete series of connected plates bridging the space between the I beams 2. By inclining the ends 10^a of the plates 10 downwardly as shown, longitudinal channels are formed between the girders and the said inclined ends of the plates, and these channels communicate with the

chambers of the transverse beams, said channels being filled with concrete so as to form tight joints immediately at the girders.

When the forms 3 are in place and connected as above described, the space above the forms and plates is filled in with concrete or artificial stone, 11, as shown in Fig. 1 to a level even with the upper flange of the beams 2. While the concrete or stone is soft, the plates 3 and 10 support the concrete in shape and after the concrete hardens these plates form integral reinforcements. It will be seen that the peculiar combination of the flat plates 10 with the U-shaped forms 3, molds the concrete or artificial stone into the form of a series of beams depending from the inside of an integral block of concrete. It will thus be seen from Figs. 2 and 3 that the concrete body may be provided with a plurality of transversely-extending chambers in its bottom, and the said body is arched in a direction longitudinally and transverse of each chamber. A tie rod 15 may also be used at intervals passing through the inclined ends 10ª of certain of the plates 10, through the concrete at the ends of the structure and through the I beams 2, the ends of the rods being provided with the usual nuts for the purpose of adjusting it in place.

It will be seen that any downward pressure upon the floor acts not only against the concrete arch, which would be the case if the forms were taken away, but also act against the metallic arch formed by these forming plates and that thus the floor is made doubly strong. It has not only the strength of the concrete arch tied by the tie rods 15 but also the strength of the metallic arch, the members of which, because of their flanged edges, are particularly strong. Thus the beam forming member 3, though it may be made of comparatively thin metal, is yet so stiffened by the flanges 7 and 8 and by the fact that it has two parallel upstanding side walls that it would support of itself a considerable weight. The plates 19 connect these separate beam-like forming members 3, and thus all strain is distributed over a number of beam-like forming members. Again, while the beam-forcing members 3 each have the form of a complete girder open at the top, the combination of one of the sides 4 of the beam forming member with the side of the next adjacent member 3 and the plate 10 forms a hollow plate beam open at the bottom and entirely capable of supporting a considerable weight.

In addition to the fact that the concrete is held in shape while hardening and is reinforced by the use of these sheet metal forms, it is possible by the use of [illegible]

be of any desired construction, but is preferably of what is known as "expanded" metal, and is held to the under sides of the beam-forming members 3 by attaching means which is inserted through the web 5 prior to the filling in of the concrete 14. As shown this attaching means consists of headed pins 17, the shanks of the pins being passed through the expanded metal lathing and then bent upward as in Fig. 2. It will be seen that this forms a much more effective manner of attaching the lathing in place than where nails or other means are used which are driven into the concrete or attached to the metal reinforcing plates from the outside. This tends to disintegrate the concrete filling and to tear the metal and de-troy the integral character of the structure by bending the metal away from the concrete. By placing the attaching means in place and then filling in the concrete, the attaching means is held rigidly in position and the tongues may be afterward bent up without injuring the concrete filling or the metal of the form.

While I may construct the beam forming members 3 and the plates 10 in any desired manner that will accomplish the results above stated, yet I have found in practice that they are most conveniently constructed by using the blanks shown in Figs. 4 and 5, these blanks being cut out upon the edges as shown and bent upon the dotted lines to form the flanges and inclined surfaces of the forming members.

It will be seen that floors constructed in accordance with my invention will be extremely strong and rigid, and that the forming members themselves after being put in place and connected to each other, form a stiff and strong support for the concrete until it becomes hard, such support requiring no scaffolding. It will also be seen that the tamping down of the concrete into place will securely hold the beam forming members to the I beams and also securely hold the lath attaching means in position

The floor construction as above, will be particularly substantial, as the spaces between the side walls of the members 3 are filled from end to end or from I beam to I beam with concrete, and also that the concrete is filled firmly into place between the angular ends 10ª and the upper flange of the adjacent I beam, thus bracing the whole construction toward the center and making a truss support from and to each beam.

While I have shown what I believe to be the best form of my construction, I do not wish to be limited to the exact details thereof, as it is obvious that it may be modified [illegible]

ing material above the trough-shaped supporting members and the connecting plates. I wish it understood, however, that the word is used generically to include any artificial stone or like composition.

Having thus described my invention, what I claim as new and desire to secure by Letters-Patent, is:

1. In a floor construction of the character described, a plurality of parallel beam members having downwardly inclined ends, intermediate longitudinally arch-shaped chambered members connecting the beam members and having downwardly turned ends, and concrete filling the space above said members, in combination with girders having base flanges on which the ends of the chambered members bear, there being channels extending between the girders and ends of the members and connecting with the chambers of the intermediate members.

2. In a floor construction, the combination of spaced girders having laterally-extending base flanges, transverse hollow supporting members having their extremities resting on the flanges and each open at its top and ends to form an open chamber, the ends of the members sloping downwardly, plates extending between adjacent members for bridging the space between them and having terminal portions bent downwardly to conform to the ends of the members and to coöperate with the beams to form channels extending longitudinally along the sides of the girders, said channels communicating with the chambers of the supporting members, and a filling of concrete disposed between the girders and over the members and plates to fill the said channels and the chambers of the members.

3. In a floor construction, the combination of spaced girders having laterally-extending flanges, transverse supporting members having their extremities resting on the flanges, said members being of U-shaped cross section and having their ends sloping downwardly, a single continuous plate bridging the space between adjacent members and having its ends bent downwardly on the sloping ends of the members, the end edges of the members being formed into flanges extending over the flanges of the girders, the longitudinal edges of the plates being arranged in overlapping relation to the members, fastenings for securing the overlapping portions of the plates and members together, coextensive in length with the same and having downwardly inclined ends, and concrete filling the trough shaped members and the space above said connecting plates.

5. In a floor construction, the combination with two parallel main girders, of a plurality of transverse trough-shaped upwardly opening supporting members having downwardly and outwardly inclined ends provided with projecting flanges resting upon said main girders, a connecting plate of approximately the same length as and located between each two adjacent trough shaped members having downwardly inclined ends, and concrete filling said trough-shaped members and the space above the connecting plates.

6. In a reinforcing member for concrete structures, a beam consisting of a pair of spaced connected plates having longitudinal marginal flanges extending from opposite sides of the beam, the extremities of the flanges extending beyond the ends of the plates to form a pair of support-engaging lugs at each end of the beam.

7. In a floor construction, the combination with two parallel main girders having lower flanges, of a plurality of transverse trough-shaped upwardly opening supporting members having downwardly inclined ends and outwardly projecting marginal flanges, said members resting upon the lower flanges of the main girders, a connecting plate extending longitudinally of and between each two adjacent trough-shaped members and attached to the marginal flanges thereof, said connecting plates having inclined ends extending downward to the lower flanges of the girders, and concrete filling the trough-shaped members and the space above the connecting plates.

8. In a floor construction, the combination with two parallel main girders having flanges, of a plurality of transverse sheet metal trough-shaped upwardly-opening members having inclined ends extending downward nearly to the bottom of the trough shaped members and there provided with outwardly projecting flanges engaging with the flanges of the main girder, a connecting plate bridging the space between each two adjacent trough-shaped members and having downwardly and outwardly inclined ends, and concrete filling the trough-shaped members and the space above the connecting plates.