No. 778,422. PATENTED DEC. 27, 1904.

F. MELBER.

CONCRETE CONSTRUCTION.

APPLICATION FILED JULY 11, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

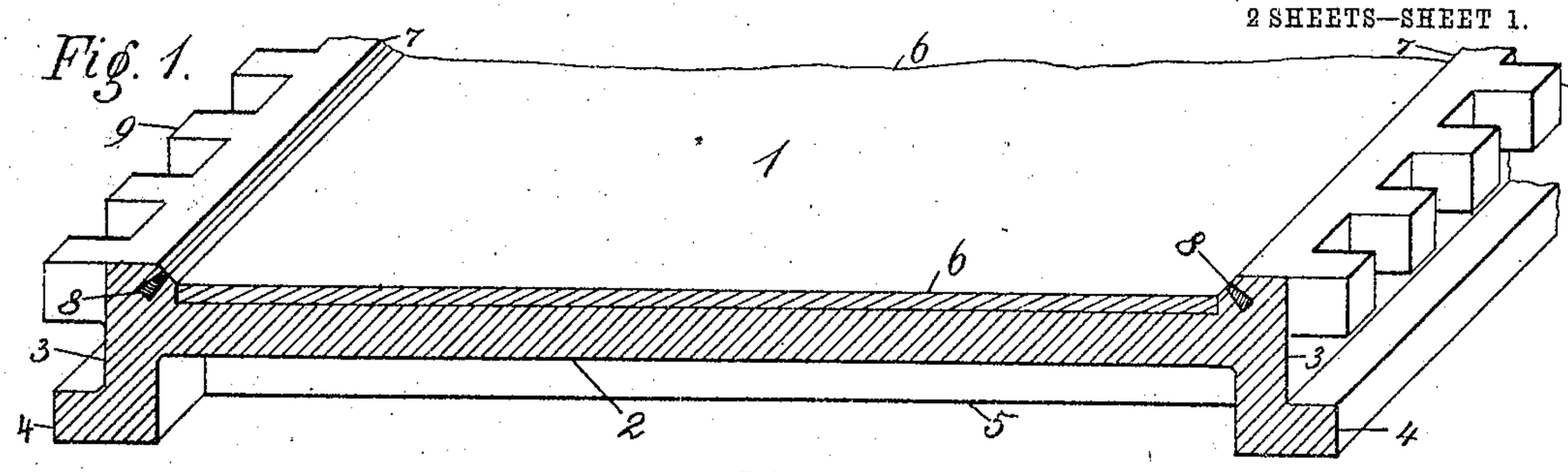

Fig. 2.

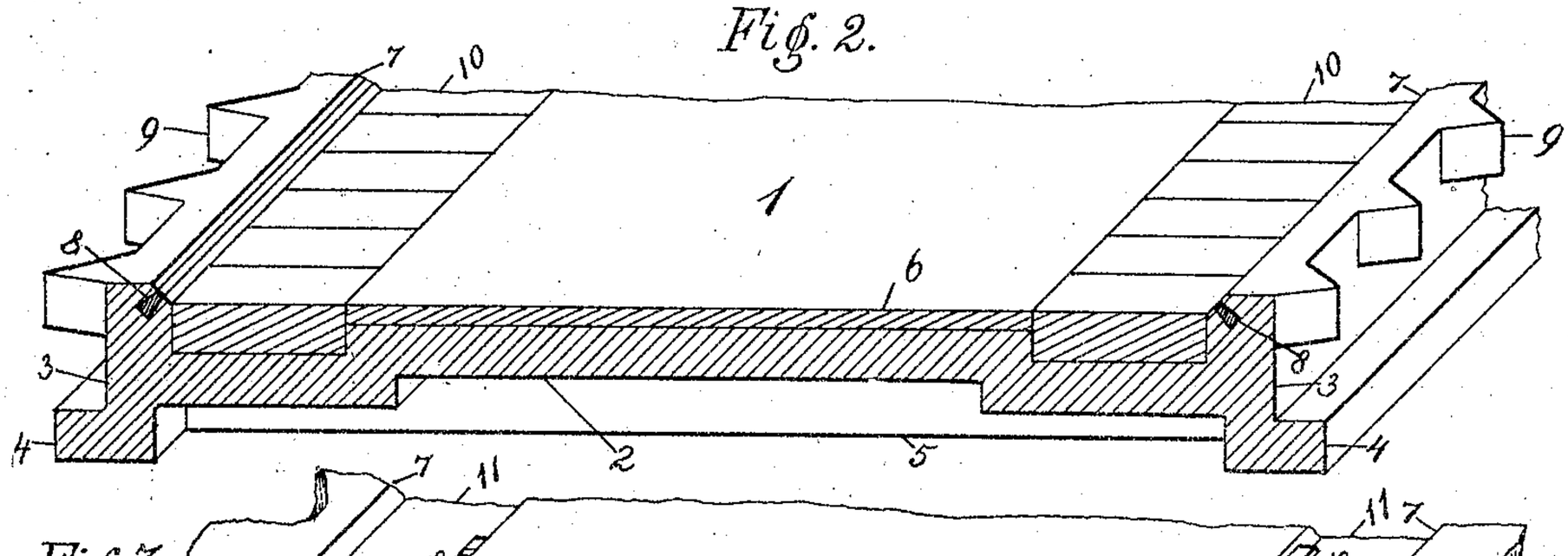

Fig. 3.

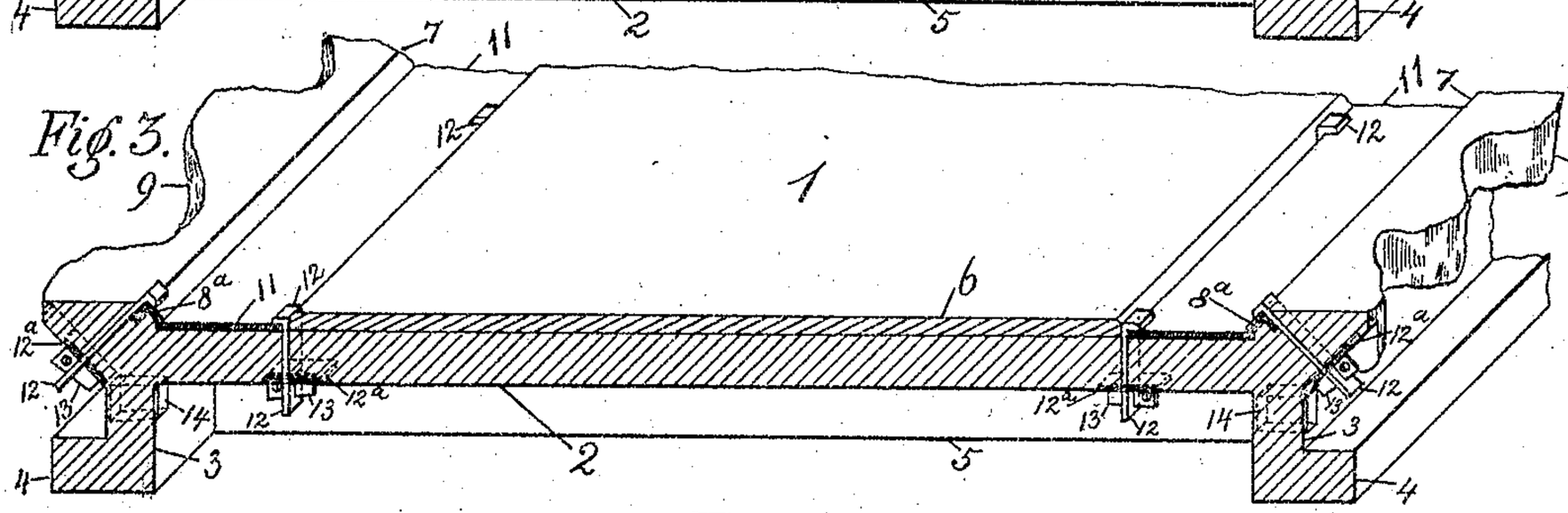

Fig. 4.

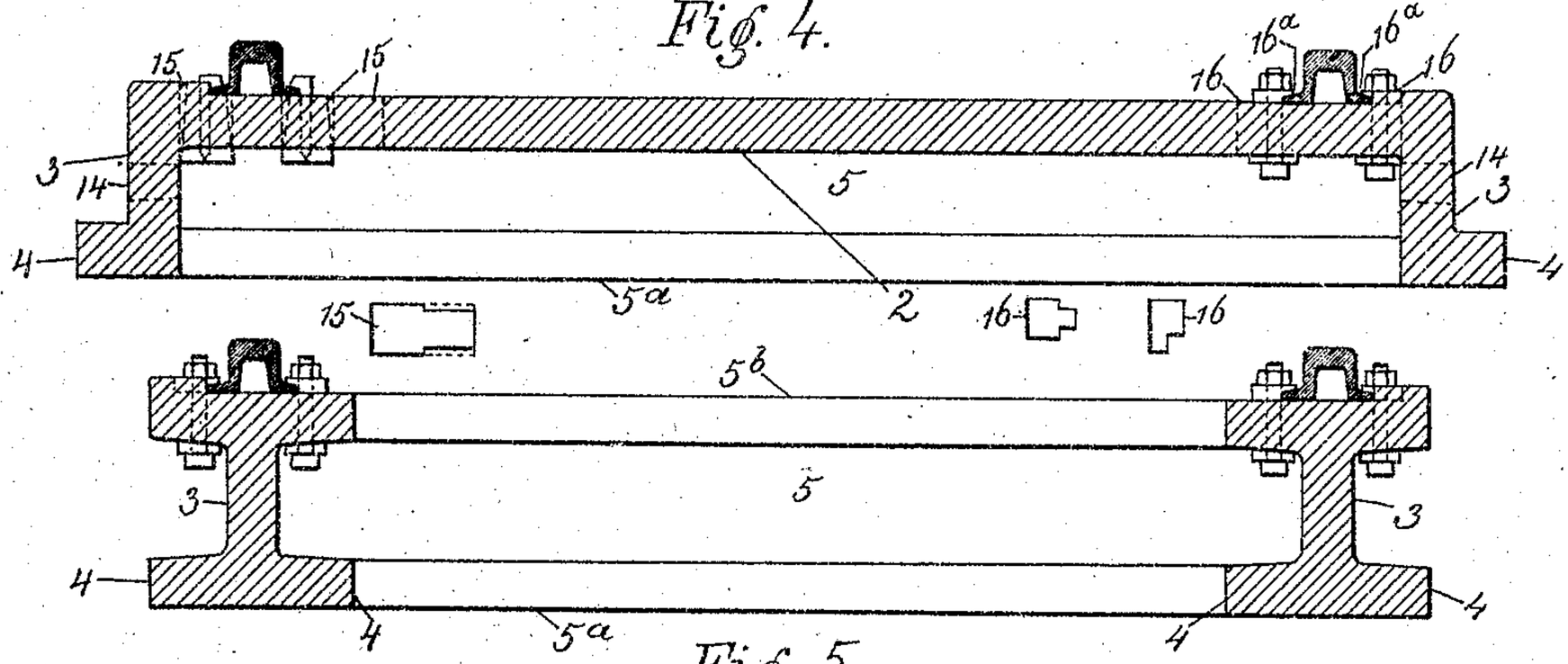

Fig. 5.

WITNESSES:

Geo. H. Harvey.

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INVENTOR:

Frederick Melber.

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F. MELBER.

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2 SHEETS—SHEET 2.

Fig. 6.

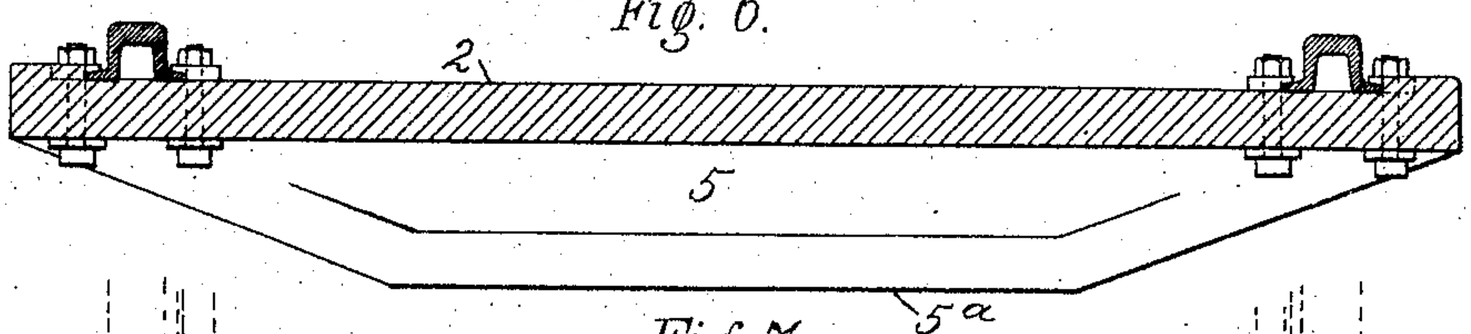


Fig. 7.

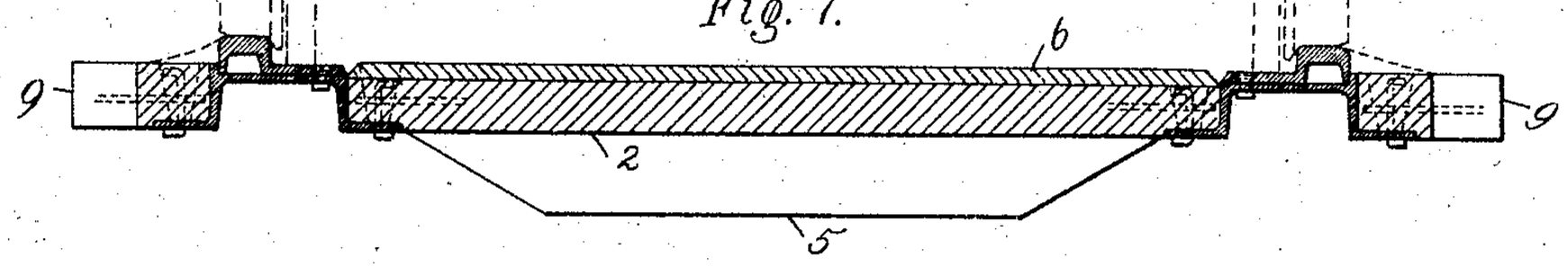


Fig. 8.

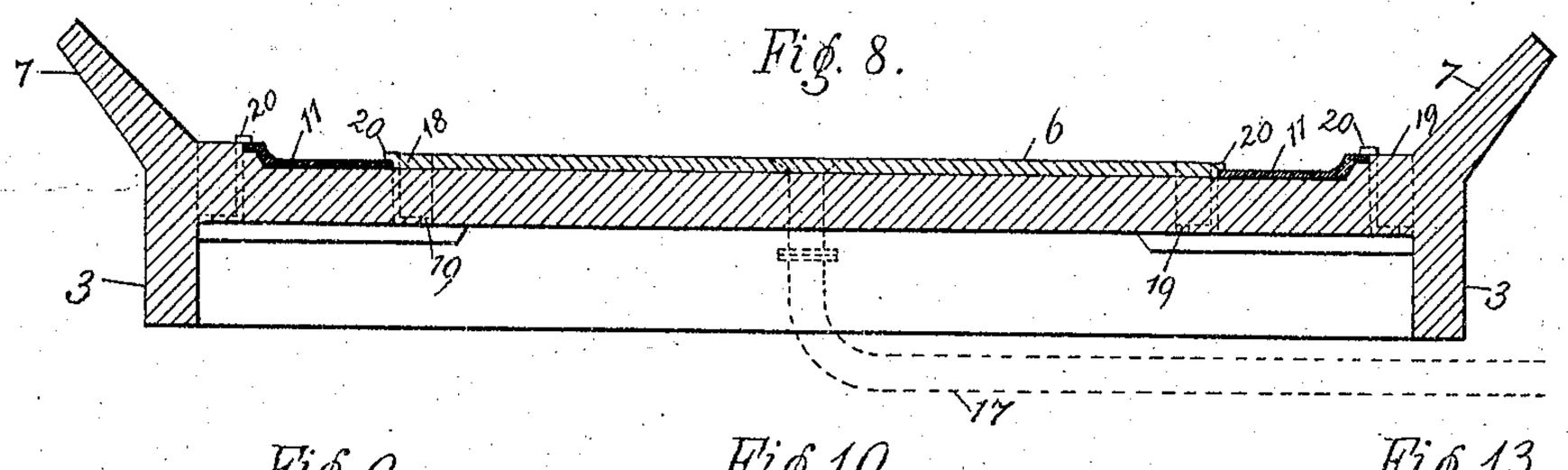


Fig. 9.

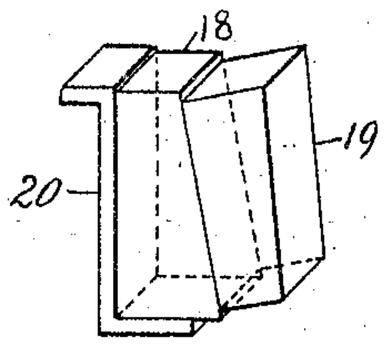


Fig. 10.

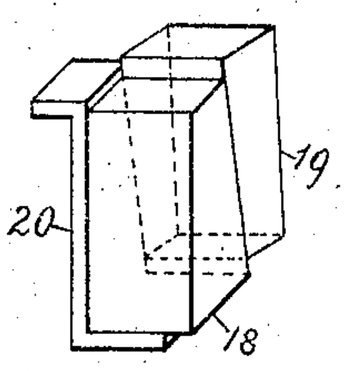


Fig. 13.

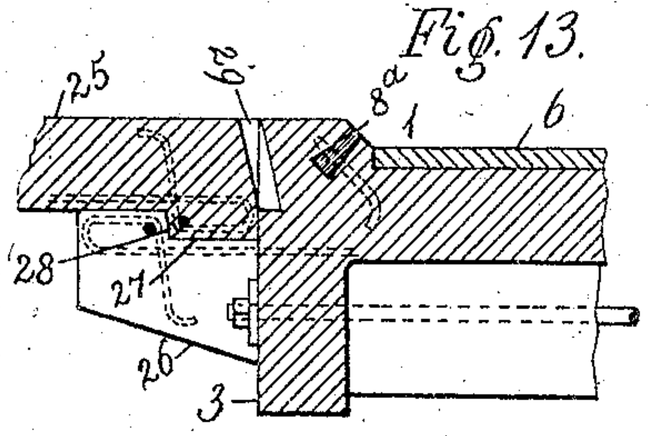


Fig. 14.

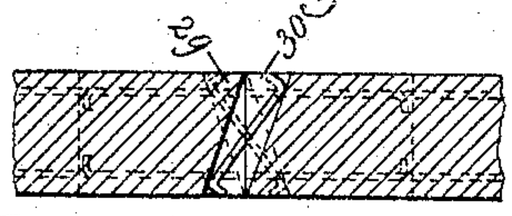


Fig. 11.

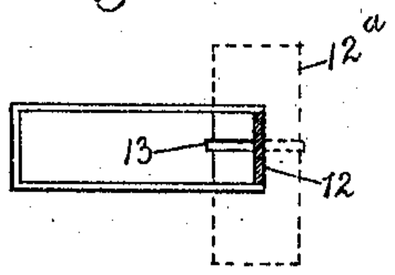


Fig. 12.

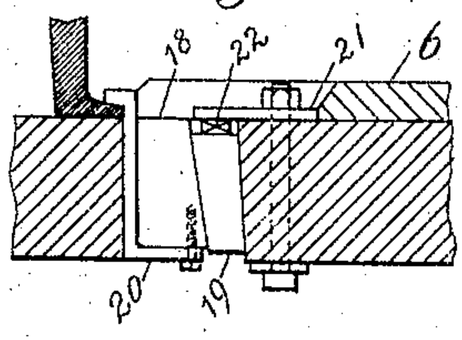
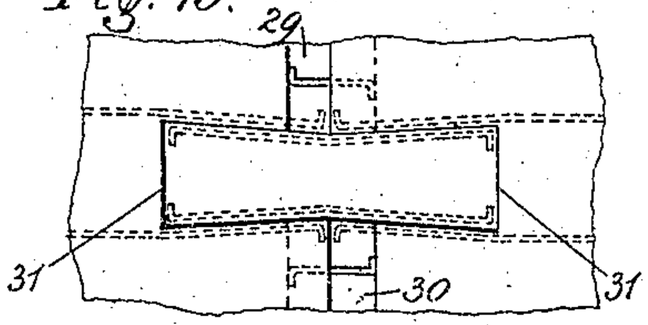


Fig. 15.



WITNESSES:

Geo. H. Harvey.

Chas. G. Beale.

INVENTOR:

Frederick Melber.

BY Edward A. Laurence.

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No. 778,422. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

FREDERICK MELBER, OF ROSS TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA.

CONCRETE CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 778,422, dated December 27, 1904.

Application filed July 11, 1903. Serial No. 165,089.

To all whom it may concern:

Be it known that I, FREDERICK MELBER, a citizen of the United States, residing in Ross township, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Concrete Construction, of which the following is a specification.

In the accompanying drawings, Figure 1 is a perspective of my invention, partly in section, transverse to the road-bed. Figs. 2 and 3 are like views showing modifications thereof. Fig. 4 is a transverse section showing the same adapted to street-car traffic, and Figs. 5, 6, and 7 are like views showing modifications thereof. Fig. 8 is a transverse section showing my invention adapted for use in wet or swampy country. Figs. 9 to 12 are detail views showing means for fastening together portions of my invention; and Figs. 13 and 14 are vertical sections, and Fig. 15 a plan, showing methods of uniting together units or sections of my invention.

Generally speaking, my invention consists in certain new and useful improvements in cement or concrete construction, and is especially applicable to road-beds of various character—such as wagon, street-car, or railway use—where a firm and durable structure of cheap and rapid construction is desired. I prefer to use for this purpose concrete or cement reinforced with metal, which serves to assume the strains which cannot be safely assumed by the concrete or cement; but it is understood, if desired, that such metal reinforcement may be omitted. I may mix and mold my "concrete," which term I will hereinafter use to designate all material of similar character, on the ground where the finished structure is to be located in one continuous construction, or I may mold the material into sections or units at any convenient place and transport the same to the site selected, where they are joined into an integral whole, either by the means hereinafter set forth or by any other convenient method, such as that already patented by me in United States Patents Nos. 672,175 and 672,176. Where the amount or nature of the traffic demands, I provide the road-bed with wearing-surfaces of metal or other hard material, which assume the rough usage, while the bed takes care of the strains incident to carrying the loads. I also show novel means for attachment of such wearing-surfaces or other structures to my construction and methods of reinforcing the adjacent portions of the concrete against wear.

The following is a description of my invention as set forth in the drawings.

In the form of my invention set forth in Sheet 1 of the drawings I show my invention in the form of a road-bed made continuously or in transverse sections or units of concrete extending across the full width of the road. These units or sections may be united together into an integral whole by any suitable method or as described below. As illustrated, these units consist in a horizontal load-bearing portion 2, the unit being indicated by the numeral 1, and vertical supports 3, which are preferably provided with outwardly-extending bottom flanges 4 to provide a steadier bearing for the structure. I also prefer to provide at suitable intervals, regulated by the loads to be carried, cross-ribs connecting the vertical supports 3 3 and extending up to and integral with the horizontal portion 2, these ribs being marked 5. These ribs may be provided with laterally-extending bottom flanges 5^a, if desired, to further steady the structure. In Fig. 6, wherein I omit the central horizontal portion 2, I also provide said ribs with a strengthening top flange, as shown, 5^b. The units 1 are placed end to end along the site of the road and suitably connected together, the ground having been dug away and leveled for their reception. The soil or other material is then filled up level with the top of the construction, with the proper declination away therefrom to provide proper drainage, covering flange 4. The central portion of portion 2 may be depressed, if desired, as shown in Fig. 1, and a wearing-surface of asphalt, macadam, or other suitable material 6 placed thereon. This enables the road-surface to be renewed without disturbing the horizontal portion 2 of the unit 1.

I prefer at all times to have a raised edge

7 at each side of the roadway to retain the wheels on the road-bed. To prevent these raised edges from being worn away from the friction of traffic or by the wheels of vehicles mounting onto the road-bed obliquely across said edge, I prefer to provide said edge with a metal wearing-surface, which I have here shown to consist of a bar of metal of rhomboidal cross-section, which is embedded in the concrete with its larger face within to prevent displacement and its smaller face presented to wear, as shown in Fig. 1. This bar I mark 8. In Fig. 13 I have shown said bar provided with holes through which pass rods or bars of metal embedded in the concrete. This method is especially beneficial to prevent displacement of the bar 8 while the concrete is hardening. Along the lateral edges of the roadway I construct a series of lateral projections integral therewith, which enable a vehicle to mount onto my roadway from the side with ease. The tendency is for traffic alongside of my road-bed to wear ruts in the softer material adjacent to the side of the units 1. A vehicle-wheel which was engaged in such a rut would be drawn up onto my road-bed with difficulty unless some means for assistance is provided. The lateral projections 9 above mentioned serve to engage the wheel and raise the same to the level of the roadway, so that the vehicle may be easily drawn over into the wheel-tracks. In Fig. 1 I show these projections rectangular, in Fig. 2 triangular, and in Fig. 3 of irregular shape, either of which forms or variations thereof will serve the desired end.

In Fig. 2 I show the horizontal surface 2 provided with troughs or recesses along the wheel-tracks to permit the insertion of a track of harder material 10—as, for instance, brick or some other material. Thus the greater wear is taken off the concrete and assumed by material that can readily be removed and replaced when worn. In Figs. 3 and 8 I show the wearing-surface of the wheel-tracks made of metal, which will resist wear and be readily removed. The rails 11 may be flat, and therefore of ordinary shapes ready rolled in the market, or they may be of any cross-section. The rail 11 is placed in the recess provided for its reception in portion 2 and may be secured in place by any convenient means, a number of which I have shown and described below. The method of attachment employed in Fig. 3 is shown in detail in the plan view of Fig. 11. The inside of the rail in this case is secured by means of pins 12, set at proper intervals along the rail, which engage the edge of the rail with their upper hooked ends. Said pins 12 extend down through apertures left in the road-bed of sufficient size for access, and over the lower extremities thereof are slipped washers 12^a of sufficient size to engage the lower surface of the concrete on either side of the aperture. Keys 13 are now slipped through vertical slots in the shanks of pins 12 below the washers, forcing said washers up against the concrete and holding the rail tightly in place. The ends of said keys are provided with holes for the engagement of a tool inserted in through the aperture to withdraw said keys and loosen the pins. To drive up said pins and release the rail, I may insert a bar through hole 14 in the side of the structure. After pins 12 are fastened in place the apertures may be closed by means of wooden blocks or concrete, the blocks being preferable on account of their ready removal when repairs are needed. The outer edge of the rail is in this case held in place by means of an angle-iron 8^a, which takes the place of bar 8 in Fig. 1. The inside edge of said angle-iron rests upon the outside edge of the rail, and the outside edge of the angle-iron engages a slot, as shown in Fig 3, in the concrete. Said angle-iron is held in place by means of pins 12 passing through holes in said angle-iron and the adjacent concrete and whose ends are provided with washers and held in place by keys 13.

In Fig. 4 I show a metal wearing-surface which is adapted for street-car service.

I also show two additional methods of attaching the rail to the concrete structure. In the case of the left-hand rail I show apertures adjacent to each side of the rail, said apertures being marked 15, the outer portions of said apertures away from the rail being of vertical sides, while the portions of said apertures toward the rail taper upwardly, being of the same cross-section at the bottom as the remainder of the aperture. This is clearly shown in the small detail below the figure. A wooden block of correspondingly-tapering sides is pushed down through the larger portion of one of said apertures and forced up into the upwardly-tapering portion thereof next the rail by means of a bar inserted through aperture 14. While said block is so held in place wedged up in said aperture, the rail is attached to the structure by spikes driven down into said blocks. To release the rail, the spike is drawn and the block, if damaged, forced out by a downward blow of a hammer. In the case of the right-hand rail I provide apertures adjacent to the rail on each side of the cross-section shown in the small detail beneath the figure to the right, which apertures I mark 16, and have an enlarged portion away from the rail and a reduced portion toward the rail, as shown. A bolt is slipped head downward through the enlarged portion of said aperture 16, having thereon placed a suitable washer to give a wide bearing-surface greater than the diameter of the reduced portion of aperture 16. The bolt is now moved toward the rail into the reduced portion of aperture 16, so that said washer will prevent the head of the bolt from being pulled up through said aperture. A

washer 18 is now slipped on the head of the bolt, said washer being so formed as to engage the flange of the rail. The bolt is now screwed home, holding the rail firmly in place. To remove the rail, it is only necessary to remove the nut and washer 16^a. The apertures 15 and 16 may be filled with wooden plugs or concrete after the fastening means are in place, as desired, thus holding the mechanism steady and solid.

In Fig. 5 I have shown the central horizontal portion of the construction 2 omitted and the two beds for the rails connected by means of the cross-ribs 5, which in such case I prefer to provide with both a top flange 5^b and a bottom flange 5^a for additional strength. The space between said rail-beds may be filled with macadam material, asphalt, or similar filling, as desired. The method of rail attachment shown in Fig. 6 is the same as illustrated in the case of the right-hand rail in the preceding figure. The ribs 5 are placed apart at intervals determined by the amount of load to be carried and the consequent thrusts to be counteracted. If desired, the ribs need not come up level with the tops of the rail-beds, but may be considerably lower, so that their tops may be well protected by the material of the central road-bed.

In Fig. 6 I show a form of my road-bed wherein the vertical supports are omitted and the cross-rib 5 is brought up at its extremities to meet the sides of the road-bed proper. In this figure the rails are shown secured in place by the same means as in the preceding figure. I also show a shoulder on the sides of the bed against which the outside of the rail bears which is particularly advantageous on curves, whereby the thrusts there appearing are assumed by the shoulder and extra strength and security are obtained.

In Fig. 7 I show the outer edges of the road-bed distinct from the central portion and forming girders or stringers which are attached to the outside of the rail. The central road-bed in Fig. 7 is of concrete construction, as described above in connection with the preceding figures, and the attachment to the rail is the same as that described in connection with the right-hand stringer. The ribs 5 are here shown as slanting up at their extremities into the central road-bed.

In Fig. 8 I show my road-bed applied to use in swampy or wet country, where it is desirable to carry up the sides or edges 7 into outwardly-inclined flanges, which are supported by the weight of the displaced matter and prevent the overflow of water into the road-bed. 17 is a drain by means of which rain or overflow water may be lead away to be disposed of.

In Figs. 13, 14, and 15 I show means for attaching together adjacent units of concrete of any kind by means of which I may indefinitely lengthen or widen my structure. Supposing that an additional unit 25 is to be attached to unit 1, I provide the abutting extremity of said last-mentioned unit with a rib 26, provided with a recess 27, which is engaged by projection 28 on unit 25. I cut wedge-shaped recesses in the abutting faces of the units, so as to form when said units abut a recess of uniform cross-section, but slanting downward toward unit 1. Into this recess I drive a block of wood or fill the same with concrete, preferably reinforced with metal rods or bars. This recess I mark 29.

It will be readily seen that any downward pressure on the opposite extremity of unit 25 or upward pressure on the opposite end of unit 1 would not tip either slab on account of the slant of union 29, and if a similar union 30, adjacent to the above, but slanting in the opposite direction, be provided upward pressure on unit 25 or downward pressure on unit 1 would be likewise counteracted. As an additional precaution against lateral or longitudinal displacement I provide in the upper surfaces of the units two recesses registering with each other and preferably tapering toward each other. These I may fill either with a wooden plug, a made-up cement plug cemented in place, or fill the same with a mass of concrete suitably reinforced with metal, as at 31, Fig. 15. When I use this last union, I prefer to do away with rib 26 and projection 28.

I find it advantageous to paint my metal parts with a preparation of cement with enough sand mixed therewith to prevent the same from cracking when dry. I add enough water to make the substance easily applicable with a brush. I prefer about equal parts sand and cement; but it will be understood that only enough sand is to be added to prevent the cracking of the cement. Such a preparation prevents rusting of the metal parts, especially where two metal surfaces abut.

It will readily be seen that I have provided a complete system of building road-beds of any nature whatever which produces a substantial easily built and repaired structure at small cost. When applied to vehicle-roads, it will effect a saving of a great proportion of the cost of ordinary macadamized or asphalt beds and render greater and longer service with a minimum of repairs.

Although I have described minutely the application of my invention to the above uses, I do not wish to limit myself thereby; but

I claim broadly—

1. In concrete construction, a road-bed consisting of a traffic-bearing portion, upright supports extending along the lateral edges thereof and horizontal foundational bearing portions integral with said upright supports, substantially as described.

2. In concrete construction, a road-bed consisting of a traffic-bearing portion, upright supports therefor extending along the lateral

edges thereof, horizontal foundational bearing portions integral with said upright supports and transverse strengthening-ribs connecting said upright supports.

3. In concrete road-bed construction, sections consisting of a traffic-bearing portion extending from side to side of the road-bed, vertical supporting portions extending downward from said traffic-bearing portion along the lateral edges thereof and means for uniting said sections together, substantially as described.

4. In concrete road-bed construction, sections consisting of a traffic-bearing portion extending from side to side of the road-bed, vertical supporting portions extending downwardly from said traffic-bearing portions along the lateral edges thereof, horizontal foundational portions extending laterally from said vertical portions and means for uniting said sections together, substantially as described.

5. In concrete construction, a union for adjacent units consisting of a recess in the abutting ends of each of said units and a rigid filling for said recess, substantially as described.

6. In concrete construction a union for adjacent units consisting of registering recesses in the abutting ends of each of said units and a rigid filling for said recesses.

7. In concrete construction, a union for adjacent units consisting of an outwardly-tapering recess in the abutting ends of said units, said recesses adapted to register when said units abut, and a rigid filling for said registering recesses, substantially as described.

8. In concrete construction, a union for adjacent units consisting of a rib on one of said units, a recess in said rib and a projection on the other unit adapted to engage said recess, substantially as described.

9. In concrete construction, a union for adjacent units consisting of a rib on one of said units, a recess in said rib, a projection on the other unit adapted to engage said recess, recesses reversely tapered in the abutting faces of said units and a rigid filling for said recesses, substantially as described.

10. In concrete construction, abutting units, registering recesses cut into the material of said units and an integral rigid filling for both of said units.

11. In concrete construction, abutting units, registering recesses cut into the material of said units, said recesses being outwardly tapered, and an integral rigid filling for both of said recesses.

12. In concrete construction, abutting units, registering reversely wedge-shaped recesses in the material of said units and an integral rigid filling for said recesses.

Signed at Pittsburg, Pennsylvania, this 3d day of July, 1903.

FREDERICK MELBER.

Witnesses:
J. BOYD DUFF,
EDWARD A. LAURENCE.