No. 795,899. PATENTED AUG. 1, 1905.

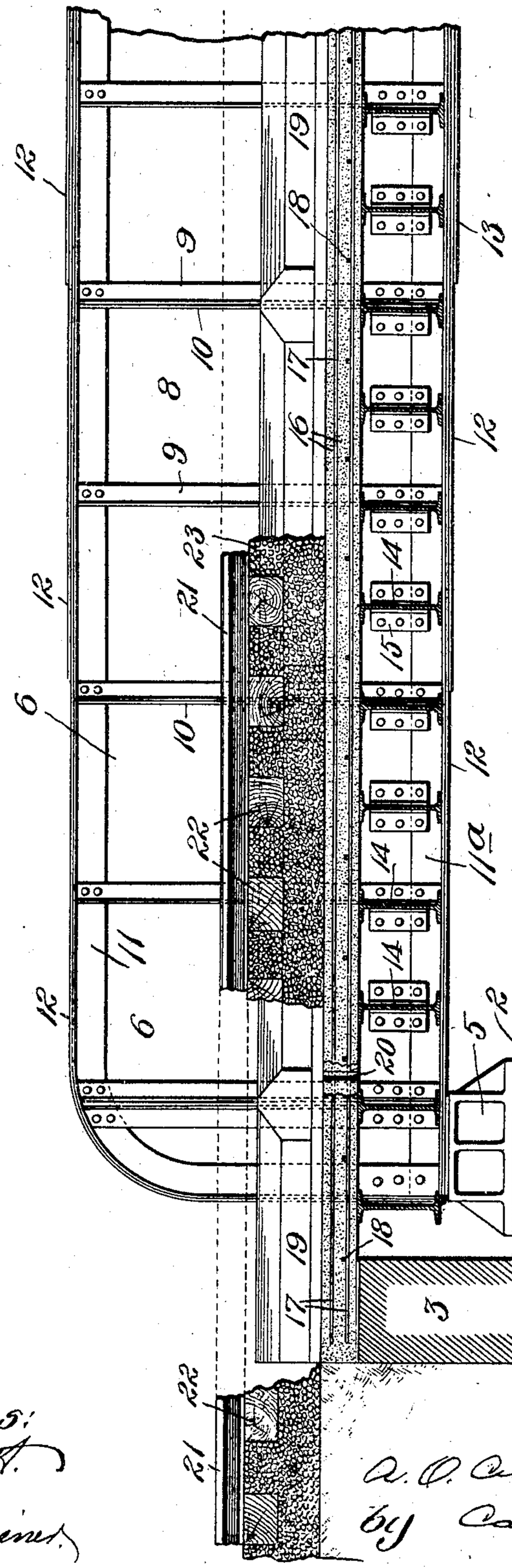
A. O. CUNNINGHAM.

BRIDGE.

APPLICATION FILED FEB. 10, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

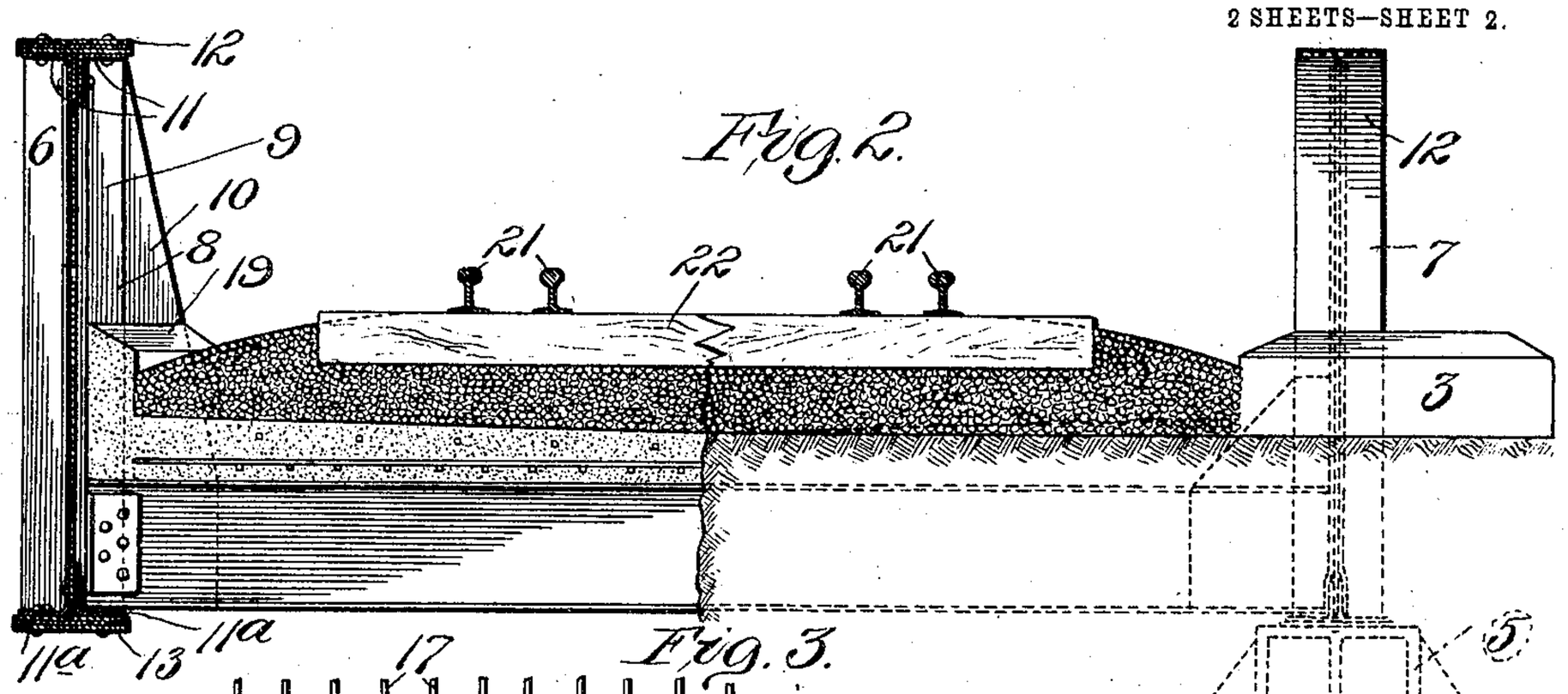
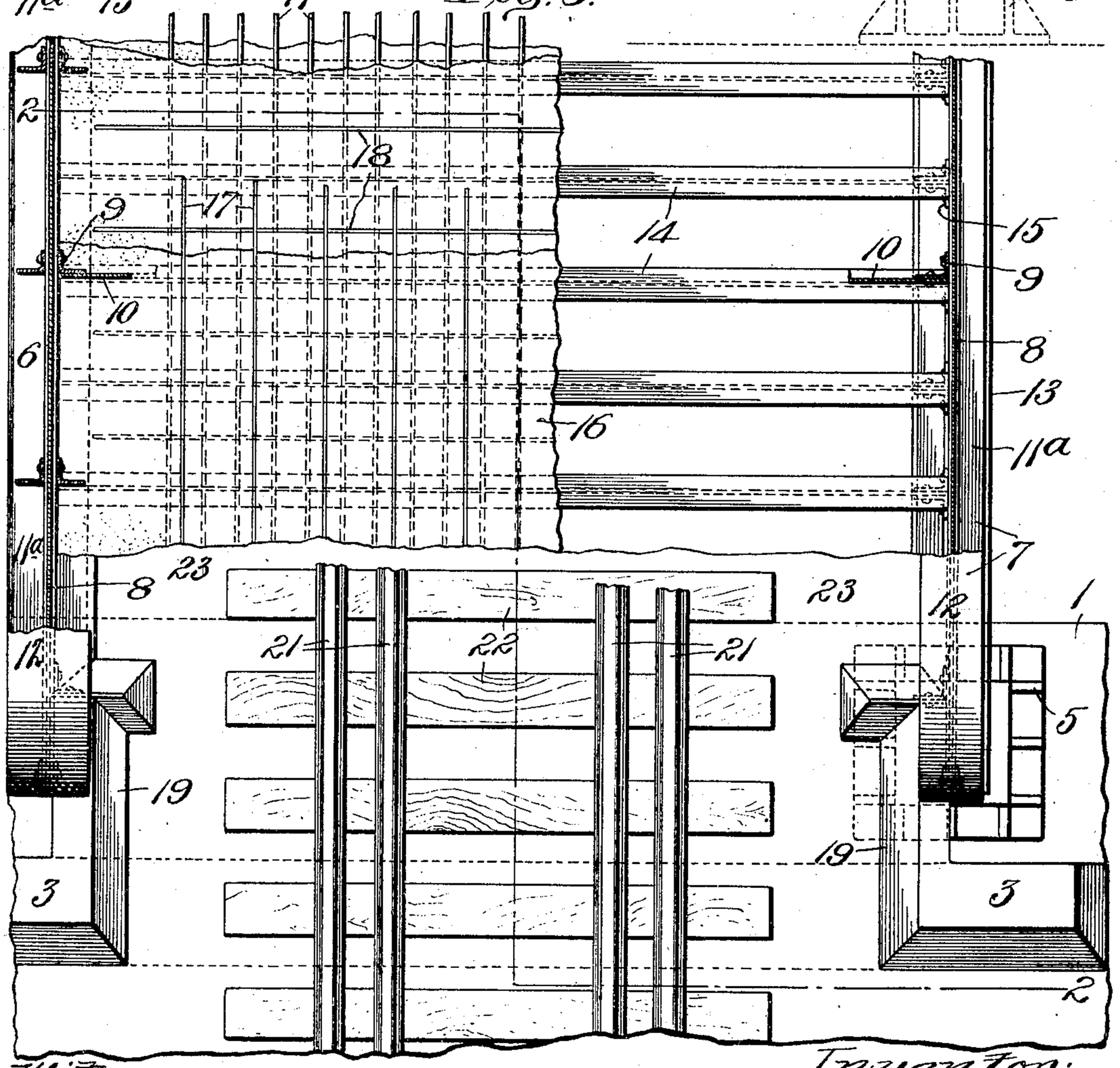


Fig. 3.



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UNITED STATES PATENT OFFICE.

ANDREW O. CUNNINGHAM, OF ST. LOUIS, MISSOURI, ASSIGNOR TO ALBERT L. JOHNSON AND DANIEL E. GARRISON, OF ST. LOUIS, MISSOURI.

BRIDGE.

No. 795,899. Specification of Letters Patent. Patented Aug. 1, 1905.

Application filed February 10, 1905. Serial No. 245,089.

To all whom it may concern:

Be it known that I, ANDREW O. CUNNINGHAM, a citizen of the United States, and a resident of the city of St. Louis and the State of Missouri, have invented a new and useful Improvement in Bridges, of which the following is a specification.

My invention relates to bridges, and especially to railway-bridges. It has for its principal objects to provide a bridge having an impervious floor to prevent the dripping of liquids and dust through it, to drain the bridge toward escapes near the abutments or ends of the bridge, to provide a bridge for a ballasted railway, to minimize the cost of the maintenance and repair of railways at bridge-terminals, to minimize the noise in passing over bridges, to diminish the usual depth of the floor systems of girder-bridges, to reduce the cost of steel for the floor systems of bridges, and other objects hereinafter appearing.

My invention consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a longitudinal sectional view of the bridge. Fig. 2 is a transverse sectional view on the line 3 3 of Fig. 3; and Fig. 3 is a broken plan view of one end of the bridge, the elements of the construction being shown in successive planes.

At each end of the bridge an abutment 1 is built, having a bridge-seat 2 and a parapet 3 back of the bridge-seat. The abutment is preferably a hollow abutment of the type shown and claimed in my copending application, filed July 5, 1904, Serial No. 215,215. Wing-walls 4 extend from the sides of the abutment. They are only partially shown in the accompanying drawings, as they form no essential feature of the present invention. Chairs or shoes 5 of any usual type are located on the bridge-seats 2. Upon the shoes the ends of plate-girders 6 7 rest. The plate-girders are built up from plates, angle-irons, and gussets. The plates 8 are stiffened by vertical angle-irons 9, riveted to them, and by gussets 10. Angle-irons 11 11^a are riveted to the top and bottom, respectively, of the plates and form, together with outer plates 12 13, the top and bottom flanges of the girder. I-beams 14 extend from one girder to the other, resting upon the bottom flanges thereof. They are further secured to the girders by means of angles 15, riveted to both I-beams and girders. The I-beams are spaced at short intervals, and thus the spans for the concrete from beam to beam are short. This makes it possible to make the concrete slab thinner than would otherwise be possible. Notwithstanding the considerable number of these floor-beams the total cost of the floor system is less than that of the hitherto-known floor systems, as there is little machine-work, the I-beams all being rolled. A concrete slab 16, reinforced by longitudinal bars 17 and transverse bars 18, is supported on the floor-beams 14. The slab extends from girder to girder and from one end of the bridge to the other, reaching over the parapets 3. The slab and parapet being both concrete are firmly united. Walls 19 extend above the upper surface of the slab proper, along the girders, and around the gussets. Thus the slab and its walls together form a trough. The upper surface of the slab slopes downwardly from the sides toward the longitudinal center line and from the transverse center line toward the ends. Thus the upper surface of the slab consists substantially of four warped surfaces. Near the ends of the longitudinal medial line of the slab, preferably near the faces of the abutments, holes 20 are provided, which extend entirely through the slab. The water falling on the bridge will be carried to the ends of the bridge and can escape through said holes. Thus dripping from the middle portions of the bridge is avoided, a result that is desirable when the bridge extends across a driveway or walk, and also to protect the floor-beams from getting wet, and consequently rusting.

On the trough-like floor described above, the road-bed is connected in the same manner as on the earthen bed of the road. The rails 21 are secured to ties 22, which rest upon the usual rock ballast 23. In other words, the bridge is an unbroken continuation of the road-bed. Thus the rails and ties on the bridge will settle in substantially the same manner as the rails and ties on the earthen approaches. This makes it possible to keep the track level at the meeting-point of the bridge and its approaches. In all previously-existing bridge constructions this was impossible, for the ballast-supported ties would settle, while the ties supported on the rigid

bridge, would not settle. Hence there was always a shock in passing on and off the bridge, and constant resurfacing of the approaches and renewal of the rails at these points were necessary. By use of the ballasted bridge described above the road-bed at the meeting-points of the bridge and its approaches needs practically no more attention than at other parts of the road.

The presence of the heavy slab of concrete, the ballast, rails, and ties on the bridge serves to damp or prevent secondary vibrations in the bridge construction, and thus the usual noise made by passing trains is avoided. Ordinary ties can be used on the bridge, and hence the use of the usual large and costly bridge-ties is unnecessary.

Obviously the bridge is capable of considerable modification within the scope of my invention, and therefore I do not wish to be limited to the specific construction shown and described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A bridge comprising a concrete floor the upper surface of which slopes from the sides toward the longitudinal center line and provided with holes therethrough located near the lowest point of the surface to permit the escape of liquids, ballast on said floor, ties set in said ballast and rails secured to said ties.

2. A bridge comprising a concrete floor the upper surface of which slopes from the sides toward the longitudinal center line and from the transverse center line toward the ends and provided with holes substantially in the transverse center line and near the ends of the bridge, ballast on said floor, ties set in said ballast and rails secured to said ties.

3. A bridge for railroads comprising abutments adapted to support embankment-approaches, a supporting structure mounted on said abutments, a concrete slab on said structure extending from end to end of the bridge and from one approach to the other, ballast on said slab and extending onto the approaches, ties set in said ballast and rails secured to said ties.

4. A bridge comprising abutments each having a bridge-seat and a parapet back of said bridge-seat, girders supported by said bridge-seats, floor-beams mounted on said girders, a concrete slab on said floor-beams and extending over said parapets, ballast extending from end to end of said slab, ties set in said ballast and rails secured to said ties.

5. A bridge comprising abutments each having a bridge-seat, girders supported by said bridge-seats, transverse floor-beams mounted on said girders, a concrete slab reinforced by metal bars, supported on said floor-beams and extending over said parapets, the upper surface of said slab sloping from the sides toward the center, and said slab being provided with holes therethrough near the lowest portions of its surface and near the faces of said abutments, ballast on said slab extending from end to end thereof, ties set in said ballast and rails secured to said ties.

6. A bridge for railroads comprising abutments adapted to support embankment-approaches, a metallic supporting structure supported by said abutments, a concrete slab reinforced by metallic bars on said metallic structure extending from end to end of the bridge and from one approach to the other, ballast on said slab and extending onto said approaches, ties set in said ballast and rails secured to said ties.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 7th day of February, 1905.

A. O. CUNNINGHAM.

Witnesses:
JAMES A. CARR,
J. B. MEGOWN.