J. E. MANDEVILLE.

REINFORCED CONCRETE BRIDGE.

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954,750.

Patented Apr. 12, 1910.

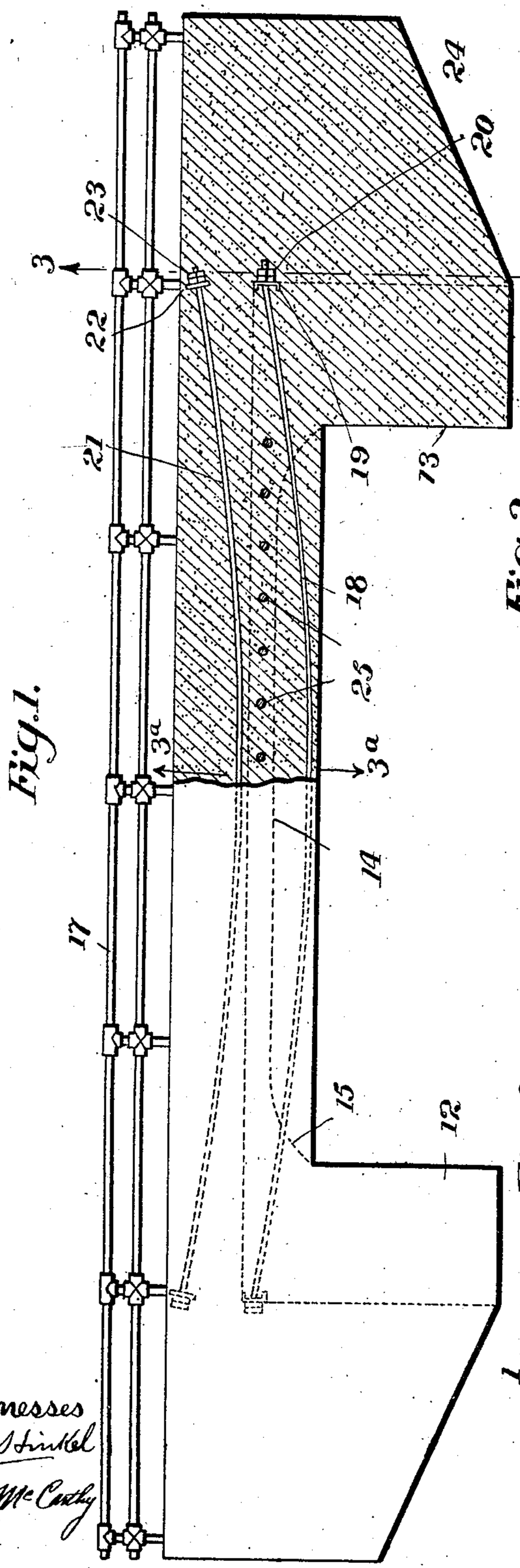

Fig. 1.

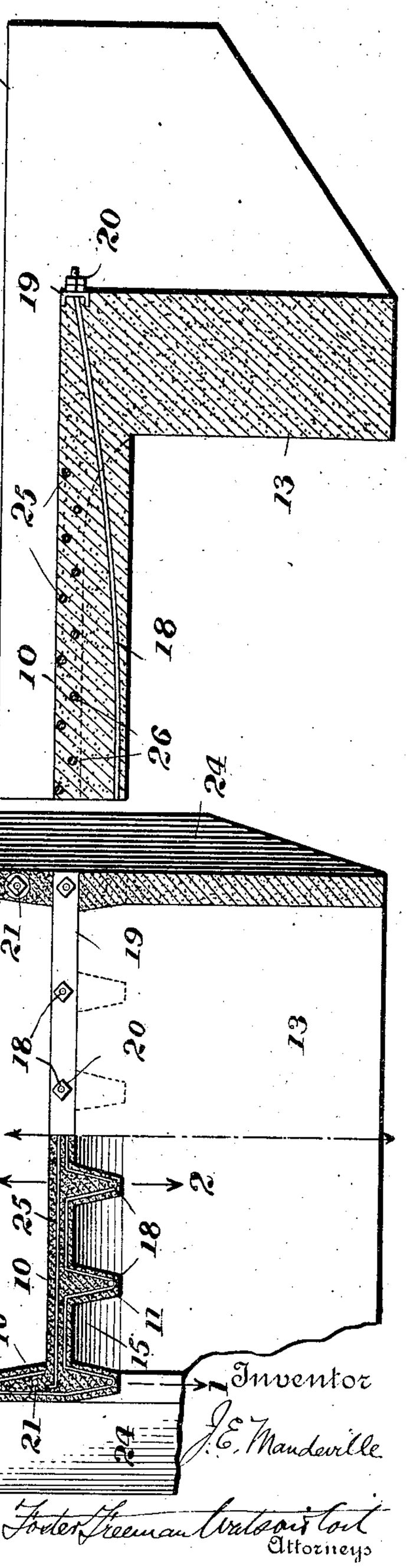

Fig. 2.

Fig. 3

Witnesses

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JOHN E. MANDEVILLE, OF HAWLEY, PENNSYLVANIA.

REINFORCED-CONCRETE BRIDGE.

954,750. Specification of Letters Patent. **Patented Apr. 12, 1910.**

Application filed February 15, 1909. Serial No. 477,880.

To all whom it may concern:

Be it known that I, JOHN E. MANDEVILLE, a citizen of the United States, and a resident of Hawley, in the county of Wayne and State of Pennsylvania, have invented certain new and useful Improvements in Reinforced-Concrete Bridges, of which the following is a specification.

This invention relates to improvements in details of construction of that class of concrete bridges in which metal tension members are used, commonly called reinforced concrete construction.

The invention will be described in connection with the accompanying drawing, in which,

Figure 1 is a side elevation of a concrete bridge partly in section, on the line 1—1 of Fig. 3; Fig. 2 is a partial longitudinal vertical section on the line 2—2 of Fig. 3, and Fig. 3 is a vertical transverse section partly on the line 3—3 and partly on the line 3^a—3^a of Fig. 1.

Referring to the drawing, it will be seen that my improved bridge comprises a roadway 10 and girders 11 extending downwardly from the roadway, the roadway slab and girders being formed integral. The girders are in the form of ribs running longitudinally of the bridge from one of the abutments 12 to the other 13. The under surface 14 of the roadway or slab 10 between the ribs, is preferably slightly crowned excepting at the ends 15 where it is curved downwardly to meet the abutments, as shown by the dotted lines in Fig. 1 and shade lines in Fig. 3. At each side of the bridge and integral therewith, I preferably form a parapet 16. As shown in the drawing, this parapet is about as large in cross section and height as one of the ribs 11. Railings 17 may be secured to posts anchored in the parapets if desired.

I secure great strength and carrying power in the bridge by embedding metal tension members 18 in the ribs or girders 11. These tension members are quite close to the lower surfaces of the ribs at the middle of the span and curve upwardly to their ends which are preferably located approximately in the plane of the slab or floor and at the rear of the abutments. The corresponding ends of the several tension rods 18 are passed through a common plate or beam 19, which as shown, is a channel bar. The ends of the rods are threaded and each end is preferably provided with two nuts 20, with which the rod can be tightened and locked. After the concrete has set the nuts 20 are turned until the tension rod is placed under considerable strain, which adds greatly to the rigidity of the structure and enables me to make a span of maximum length for the amount of material used.

I preferably treat the parapet 16 as a girder and embed in it a tension rod 21, similar to the rod 18, the rods 21 having plates 22 at their ends and having each end provided with adjusting and locking nuts 23 similar to the nuts 20. The nuts 23 are also turned up tightly after the parapet proper has set and before the wing-walls 24 are constructed.

To prevent any longitudinal splitting or cracking of the roadway slab 10, I preferably embed therein a series of transverse rods 25 which are properly anchored at their ends in the parapets or side girders, and I also provide rods 26 which extend transversely of the bridge through the parapets, or girders, and the roadway slab, tying them all securely together.

I have found in actual practice that a bridge constructed according to the foregoing specification, is exceedingly strong considering the amount and nature of material used and that such bridges are sufficiently cheap to be used on the lines of country roads and at other places where traffic will not warrant the construction of expensive bridges.

It will be understood that the metal parts of my improved bridge are embedded and entirely covered and protected by concrete when the bridge is finished, with the exception of the railings.

It will be seen that the roadway slab 10 forms a continuous compression member for the several ribs or girders 11 and that the anchor plates 19 for the tension members are in the plane of said slab. The anchor plates are therefore very securely spaced apart and give the best possible support to the tension members 18, and these members in turn are so situated that they resist the tension in the lower edges of the girders. It will also be seen that the arched form of the roadway slab at its ends adds considerably to the strength and stiffness of the bridge.

Having described my invention, what I

claim and desire to secure by Letters Patent is:

1. A reinforced concrete bridge comprising abutments, a roadway slab extending between the abutments and ribs or girders extending between the abutments on the under side of the roadway slab, said roadway slab, ribs and abutments being integral, metal tension members embedded in each rib, said members being located at the lower edges of the ribs near the middle of the bridge and extending upwardly to the plane of the roadway slab at the ends of the bridge, the ends of said tension members being threaded and provided with threaded nuts, anchor plates extending transversely of the bridge in the plane of the roadway slab and through which the threaded ends of the tension members extend, said nuts being adapted to be turned up against the anchor plates to tighten the tension members, and metal rods extending across the bridge and embedded in the roadway slab and ribs, said rods being anchored in the parapets for the purpose set forth.

2. A reinforced concrete bridge comprising abutments, a roadway slab extending between the abutments, parapet walls at the sides of the bridge extending upwardly from the roadway slab, longitudinal girders extending downwardly from the roadway slab, the side girders being in the vertical planes of the parapet walls, said abutments, slab, girders and parapet walls being an integral structure of concrete, tension members extending longitudinally through the girders, said members being located near the bottom of the girders at the middle of the bridge and extending upwardly at each end, transverse abutment plates at each end through which the ends of the tension members pass, means bearing on the abutment plates for tightening the tension members, additional tension members arranged in the parapet walls, means for tightening said additional members after the concrete in which they are embedded has set, and metal rods extending across the bridge at intervals, said rods being embedded in the roadway slab and extending into the girders, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN E. MANDEVILLE.

Witnesses:
HARRY J. ATKINSON,
W. B. AMMERMAN.