

No. 867,776.

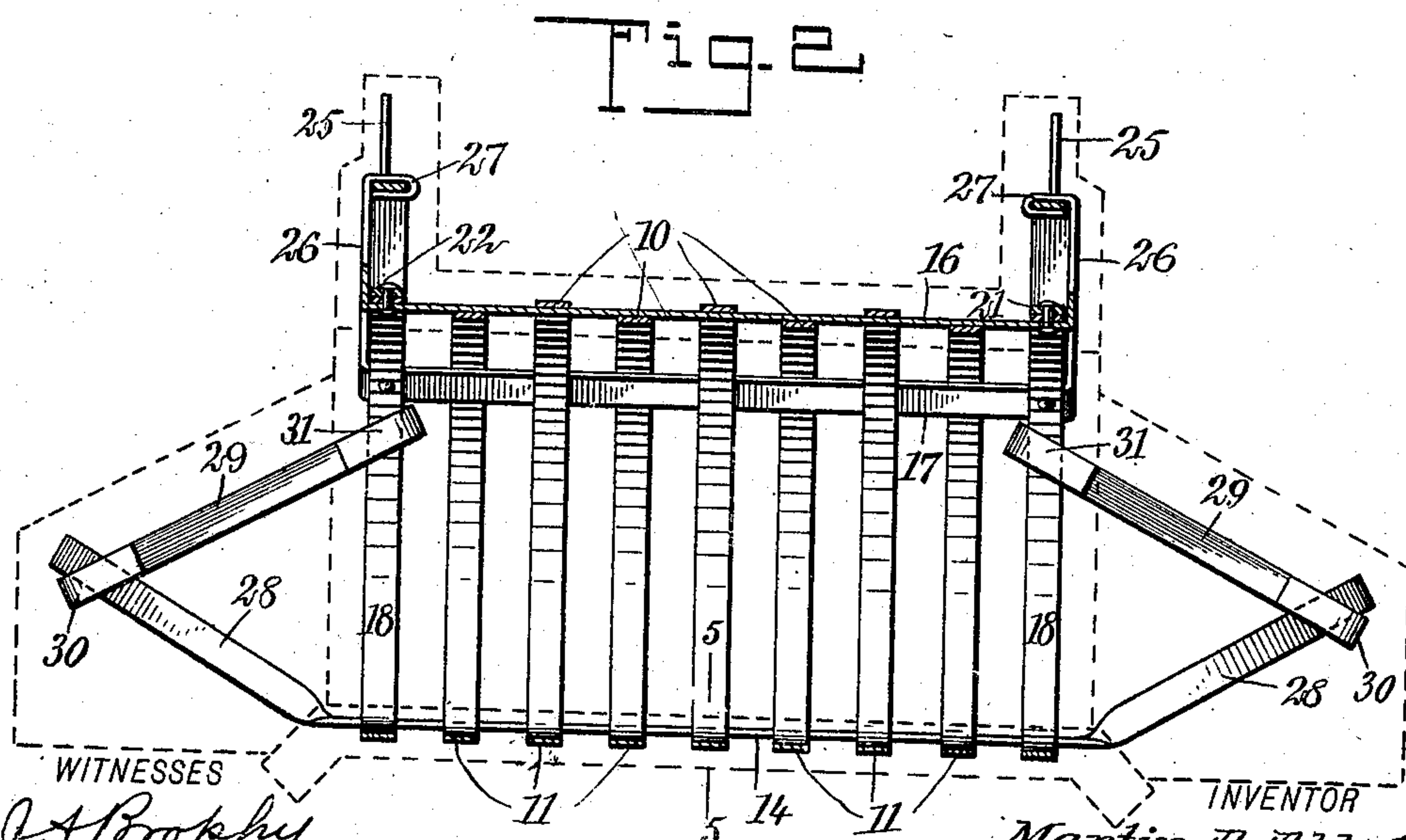
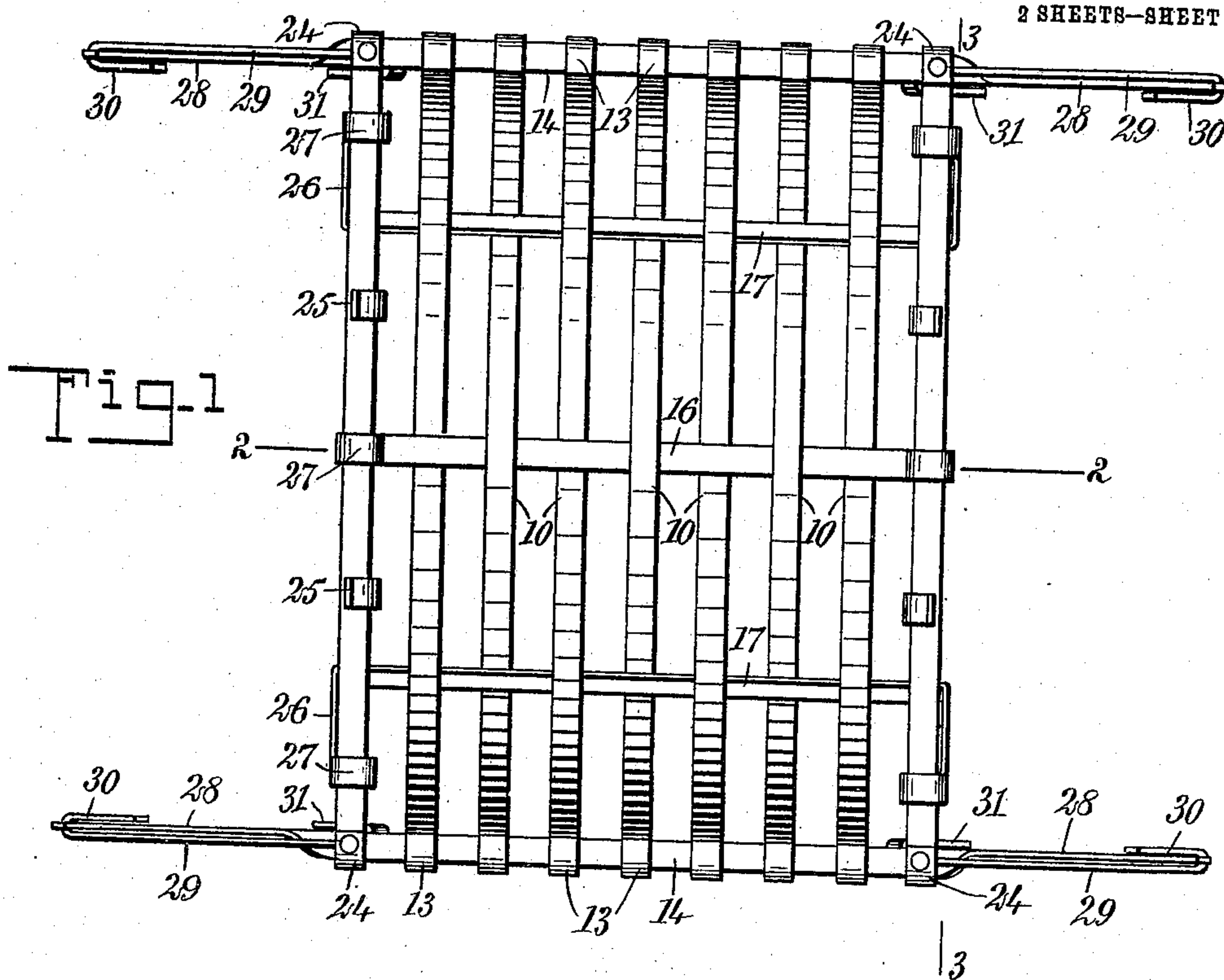
PATENTED OCT. 8, 1907.

M. A. ABBOTT.

## REINFORCEMENT FOR CONCRETE ARCHES.

APPLICATION FILED APR. 26, 1907.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 5

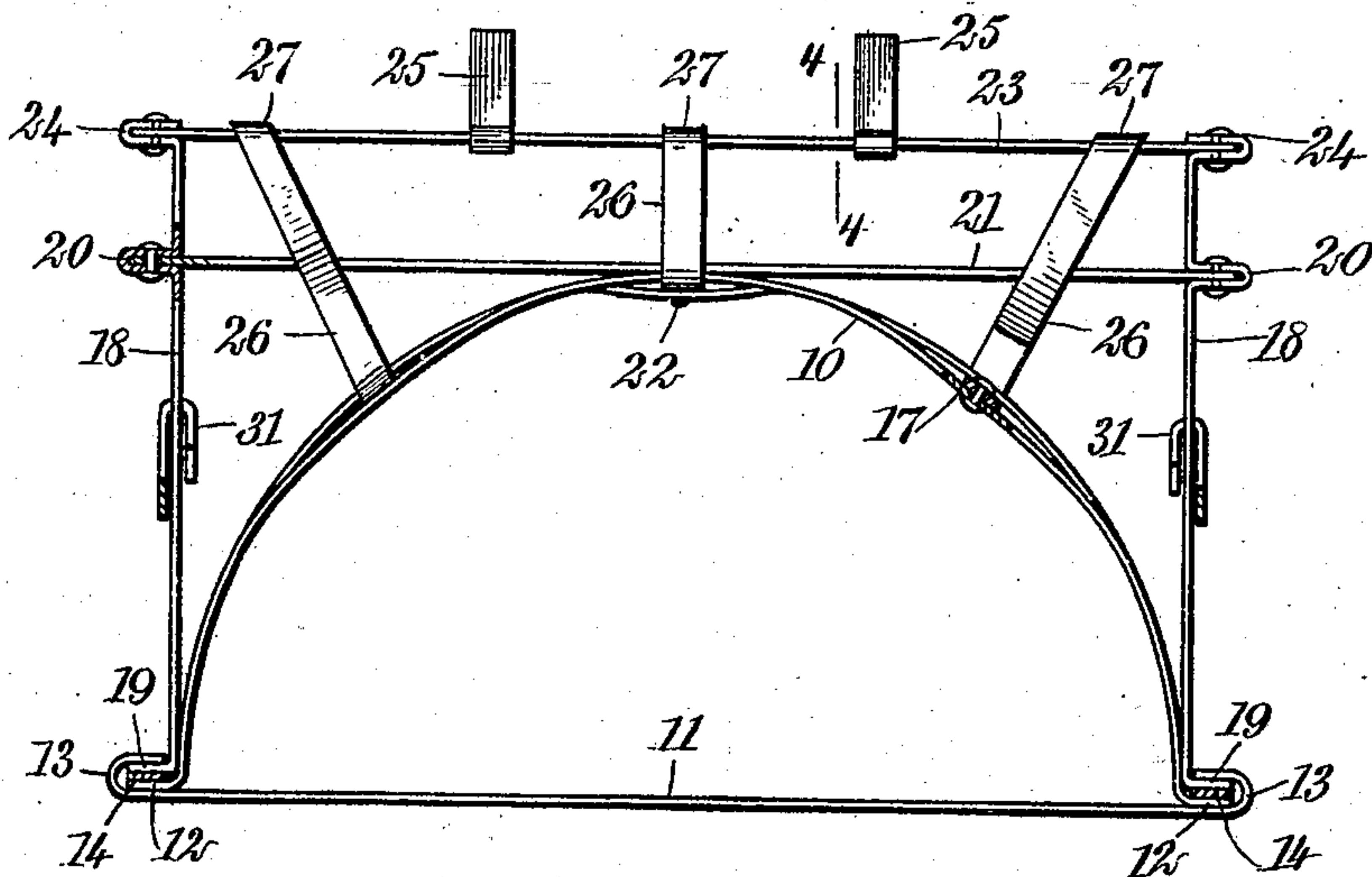


Fig. 4

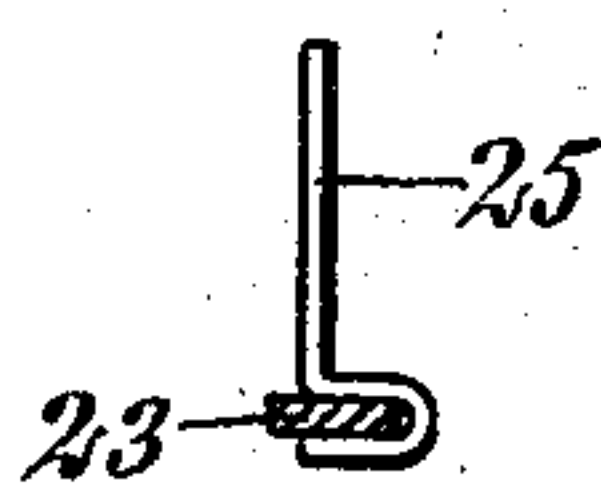
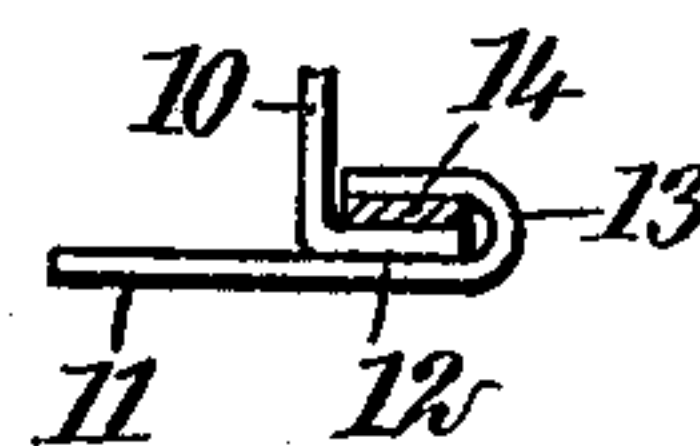


Fig. 5



**WITNESSES**

WITNESSES:  
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# UNITED STATES PATENT OFFICE.

MARTIN ALLEN ABBOTT, OF CHRISNEY, INDIANA.

## REINFORCEMENT FOR CONCRETE ARCHES.

No. 867,776.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed April 26, 1907. Serial No. 370,446.

*To all whom it may concern:*

Be it known that I, MARTIN A. ABBOTT, a citizen of the United States, and a resident of Chrisney, in the county of Spencer and State of Indiana, have invented  
5 a new and useful Reinforcement for Concrete Arches, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in metal reinforcements for concrete arches, and the object of the invention is to provide a structure easily  
10 and quickly assembled, readily bent to the desired form, and provided with means to restrain it in place while the concrete is being applied and hardening.

A further object of the invention is to provide a reinforcement for arches, comprising a single structure of  
15 metal bars, which forms not only the arch but the spandrels, balustrades, wing walls, and floor.

The invention consists in certain features of construction and combination of parts, all of which will  
20 be fully set forth hereinafter and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in  
25 all the figures, and in which

Figure 1 is a plan view of the complete reinforcing structure; Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1, and showing in dotted lines the outlines of the concrete to be applied thereto; Fig. 3 is an end  
30 view, parts being shown in section on the line 3—3 of Fig. 1; and Figs. 4 and 5 are sectional details taken on the lines 4—4 and 5—5 of Figs. 3 and 2, respectively.

In my improved reinforcement, I provide a plurality of reinforcing rings 10 curved to the form required for  
35 the arch, and having a plurality of floor straps 11 extending across the base of the arch to form a chord of the arc and prevent the base of the reinforcing rings 10 from spreading apart. The lower end 12 of each reinforcing ring is preferably bent outward to lie in a substantially horizontal plane, and each end of each floor  
40 strap 11 is bent upward and backward to form a hook 13 to receive the horizontally disposed end of each reinforcing ring and effectively prevent the ends of the rings 10 from spreading apart. To hold the rings in  
45 substantially parallel positions, and prevent lateral movement thereof while the concrete is being applied, I provide a plurality of longitudinally disposed bars 14 lying adjacent the ends 12 of each ring and also inclosed within the hook-shaped ends 13 of the floor  
50 straps 11, as is clearly illustrated in Fig. 5. The intermediate reinforcing rings need not necessarily be riveted or bolted, but may be held from lateral movement by mere frictional engagement with the bars 14. In addition to the longitudinally disposed bars 14 at  
55 the ends of the reinforcing rings, I preferably provide a longitudinally disposed bar 16, extending along the

top of the arch, and one or more longitudinally disposed bars 17 intermediate the top and base of the arch upon each side thereof. These last mentioned reinforcing bars are preferably secured only to the end re-  
60 inforcing rings and are woven between the other rings to be held by frictional engagement, as is clearly indicated in the drawings.

To form the spandrels and the balustrades, I preferably provide uprights 18 adjacent each end of each  
65 terminal reinforcing ring 10, and for holding the same in place I preferably bend the lower end thereof to form a laterally disposed portion 19 adapted for engagement within the hook end 13 of the floor straps 11 and be rigidly held in place thereby. These up-  
70 rights 18 at the level of the top of the arch are provided with outwardly bent portions 20 serving to form recesses within which are rigidly secured two lateral bars 21, and the ends of the uprights extend a short distance above these bars to the height desired  
75 for the balustrade. The bars 21 serve to prevent the uprights 18 from spreading apart intermediate their ends, and as each is secured to the top of its corresponding reinforcing ring by means of a rivet or bolt 22, the two uprights 18 are held in vertical positions  
80 and symmetrical in respect to each other. A second lateral bar 23 is supported directly above and parallel to each lateral bar 21, and serves to form a reinforcement for the balustrade and to hold the upper ends of the uprights in the desired position. Preferably,  
85 the upper end of each upright is bent outward and then inward to form a recess 24, as indicated in Fig. 3, and serving to receive the ends of the bars 23. For increasing the height of the balustrade, I preferably provide small vertically disposed reinforcing bars 25,  
90 having hook-shaped lower ends adapted to inclose and frictionally engage with the bars 23 and extend upward to a distance determined by the desired height of the balustrade. Any number of these balustrade reinforcing bars may be employed, and by  
95 securing them to the lateral bars 23 in the manner illustrated in Fig. 4, I avoid the necessity for the use of any bolts or rivets. For holding the lateral bars 23 in the desired position, I preferably provide each of the longitudinally disposed reinforcing bars 16 and 17  
100 with end portions bent at right angles thereto and extending upward radially from the reinforcing rings 10. These end portions 26 have their upper ends provided with inwardly turned hooked portions 27 inclosing the bars 23 and frictionally engaging there-  
105 with, as is more clearly indicated in Fig. 2.

In order to form the wing walls, I provide the base longitudinally disposed bars 14 with end reinforcing rings, and, if desired, bent upward at any suitable  
110 angle to the plane of the floor straps 11. The outer ends of these end portions 28 are supported and held rigid by connecting links 29, each of which has one



end thereof provided with a hooked portion 30 inclosing the end 28, and a second hooked portion 31 inclosing the corresponding upright 18. These wing wall reinforcements 28 and 29 may lie in planes parallel to the axis of the arch, as indicated in Fig. 2, or may be bent outward at any desired angle thereto according to the nature of the banks of the stream over which the arch is constructed.

The entire reinforcement above described is formed of metal bars easily bent to the desired shape after arriving at the scene of operations, and as most of the parts are held in engagement with each other merely by frictional contact, very few bolts, rivets, or other securing means need be employed. The reinforcing rings are effectively held from spreading at their bases and are held from longitudinal movement by the interwoven bars 16 and 17. The spandrels are reinforced by the uprights 18 and the end portions 26 of the bars 17, while the balustrades are reinforced and supported not only by the uprights 18, but also by the end portions 26 of the longitudinally disposed bars, the lateral bars 23 and vertically disposed members 25 carried thereby.

After the structure above described is secured in place, concrete is applied thereto to form the arch, spandrels, balustrades, wing walls and floor, as is indicated in dotted lines in Fig. 2. The concrete may be applied to any thickness desired, and after having been allowed to harden is effectively reinforced in all these parts. The ends of the floor may be turned downward, if desired, as is indicated in Fig. 2, and the concrete forming the balustrades may be provided with any suitable ornamental design.

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

1. A reinforcement for concrete arches, comprising a plurality of reinforcing rings having horizontally disposed end portions, and a plurality of floor straps having inturned hook-shaped ends adapted to receive said horizontally disposed end portions of the rings to prevent the latter from spreading.

2. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, a floor strap having inturned ends adapted to engage with the ends of said rings for preventing the latter from spreading, and a plurality of longitudinally disposed reinforcing bars interwoven across said rings.

3. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, a floor strap having inturned ends adapted to engage with the ends of said rings for preventing the latter from spreading, and a plurality of longitudinally disposed reinforcing bars interwoven between said rings.

4. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, floor straps connecting the ends thereof, and a plurality of longitudinally disposed reinforcing straps interwoven between said rings.

5. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, and longitudinally disposed bars connecting the base portions of said rings, said longitudinally disposed bars having outwardly extending portions adapted to reinforce the wing walls.

6. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, longitudinally disposed reinforcing bars connecting the base portions of said rings and having outwardly and upwardly extending end portions, and links connected to said end portions and forming therewith reinforcement for the wing walls.

7. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, longitudinally disposed bars connecting said rings, uprights secured to the end portions of each of the end rings, and means connecting said uprights to form reinforcements for the spandrels.

8. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, uprights extending upward from the end portions of the end rings, lateral bars connecting said uprights, and balustrade reinforcements connected to said lateral bars.

9. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, uprights extending upward from the end portions of the end rings, lateral bars connecting said uprights, and a plurality of longitudinally disposed reinforcing bars connecting said rings and having end portions extending upward into engagement with said lateral bars for forming a reinforcement for the spandrels and balustrades.

10. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, laterally disposed bars connecting the base portions of said rings and having outwardly and upwardly extending end portions, uprights connected to the end portions of the end rings, and links connecting the said uprights and the end portions of said longitudinally disposed bars and forming a reinforcement for the wing walls.

11. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, a plurality of floor straps engaging with the ends thereof to prevent said rings from spreading, and a plurality of longitudinally disposed bars in engagement with said rings for preventing longitudinal movement thereof.

12. A reinforcement for concrete arches, comprising a plurality of reinforcing rings, a plurality of floor straps engaging therewith to prevent said rings from spreading, a plurality of longitudinally disposed bars in engagement with said rings for preventing longitudinal movement thereof, a plurality of uprights, lateral bars connecting said uprights, and extensions in engagement with said bars and forming reinforcement for the balustrades.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARTIN ALLEN ABBOTT.

Witnesses:

W. H. H. TAYLOR,  
F. M. HANCOCK.