W. F. SCOTT.

REINFORCED CONCRETE.

APPLICATION FILED MAR. 15, 1910.

1,001,462. **Patented Aug. 22, 1911.**

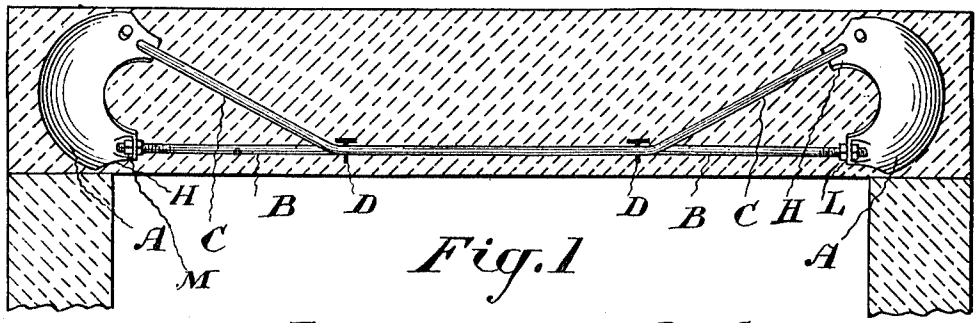

Fig. 1

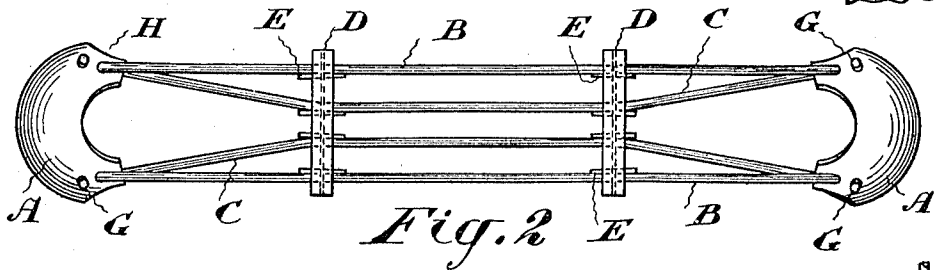

Fig. 2

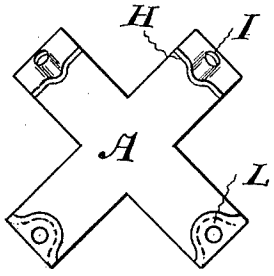

Fig. 3

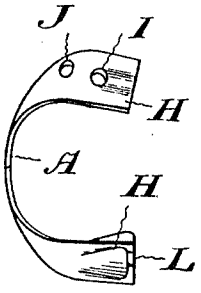

Fig. 4

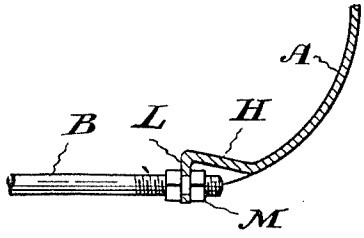

Fig. 7

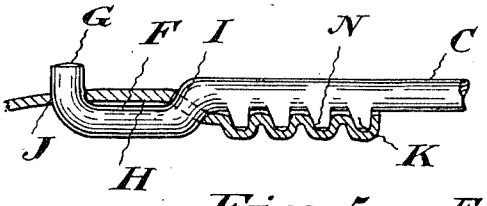

Fig. 5

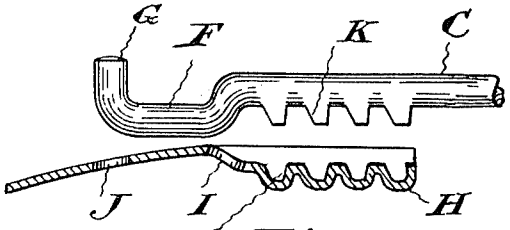

Fig. 6

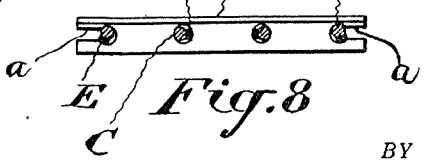

Fig. 8

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REINFORCED CONCRETE.

1,001,462. Specification of Letters Patent. **Patented Aug. 22, 1911.**

Application filed March 15, 1910. Serial No. 549,443.

To all whom it may concern:

Be it known that I, WILLIAM FRY SCOTT, of the city of Toronto, Province of Ontario, Canada, have invented certain new and useful Improvements in Reinforced Concrete, of which the following is a specification.

This invention relates to improvements in a reinforcement for concrete such as described in Canadian Letters Patent No. 119,533 dated July 20, 1909, and U. S. application No. 485,181 dated March 23, 1909. In this patent and application I described and claimed a reinforcement comprising a tension member of simple nature and compact section connected at each end to the ends of bowed plates. In this former construction the bowed plates were curved only in the direction of their length but in this present construction I aim to carry the principle of bowing to its logical conclusion and therefore use plates bowed with more than one axis of curvature, that is, approximating a dished form, which, in addition to any advantage they possess in virtue of their more or less complete embodiment of the bowing idea lend themselves particularly well to use with a plurality of tension members. I have also found that carrying the underlying principle of the bowed form of plate to its logical conclusion demands further the making of all the ends of the tension members tangents to the curves of these portions of the plates to which they are connected, and the second purpose I have in view in the present invention is the provision of means for connecting the bowed plates and the tension members in the manner referred to.

I accomplish the ends I have in view by the constructions hereinafter described and illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal section of a beam provided with my reinforcement. Fig. 2 is a plan view of the reinforcement. Fig. 3 is a front view of a modified form of anchor. Fig. 4 is a side view of the same. Fig. 5 is an enlarged detail of the connection between the tension member and anchor plate shown at the upper part of Fig. 1. Fig. 6 is a similar view with the tension member disengaged. Fig. 7 is a detail of the connection between the tension member and the anchor plate shown at bottom of the plate at G Fig. 1, and Fig. 8 is a detail of one of the bars connecting the rods of the tension members.

In the drawings like letters of reference indicate corresponding parts in the different figures.

In Figs. 1 and 2 I show the complete embodiment of the bowed anchor plate as hereinbefore referred to. In these views the anchor plate A is of a dished form being shown as forming substantially a segment of a spheroid. That is to say, it possesses an infinite number of axes of curvature. For most purposes, however, it is not necessary to use a complete segment, as parts may be cut away to develop a form such as shown in Figs. 3 and 4 which in many cases will be sufficient to properly develop the full strength of the tension members with which it is employed. In this form it will be seen there are in effect only two axes of curvature, one for each pair of arms, yet there is clearly embodied therein the evolution of the bowing idea from the simplest form with one axis of curvature, such as shown in the prior patent and application referred to, toward the complete embodiment such as shown in Figs. 1 and 2 of the present application, and it is very evident that many other intermediate forms are possible which would fall within the scope of the present invention.

The present constructions are particularly adapted for use with a plurality of tension members which are connected to the anchor plates at points situated at the angles of an imaginary angular figure. In the drawings I show two tension members each formed of two rods B, C. The rods B are connected with the lower parts of the anchor plates while toward their ends the rods C are upwardly turned and connected with the anchor plates toward their upper sides.

The rods forming the tension members preferably pass through holes in the angle bars D and are tightened in the holes by means of the wedges E. Slots *a* are preferably provided leading into the outer holes so that the outer rods may be slipped into place after the anchor plates have been properly connected with the tension member. The rods forming the tension bars being four in number the imaginary angular figure at the angles of which the tension

members are connected to the anchor plates is a square, but it will be evident that if a greater or smaller number of rods were employed in the tension members the said imaginary figure would vary accordingly.

Leaving for the present the description of the method of connecting the tension members to the anchor plates, it will be seen that if the parts are properly connected that a construction has been produced which is best adapted to completely receive the main compression stresses in the beam and resolve them into tensional stresses in the tension members. It will be noted that as the imaginary square at the corners of which the tension members are connected to the anchor plates is positioned with its sides parallel to the sides and top and bottom of the beam that the upper rods of the tension members interfere to the smallest possible extent with the proper transmission of compression stresses in the beam directly to the anchor plates.

By experiment I have demonstrated the absolute importance of connecting the tension members with the anchor plates at a tangent to the curve of the plate at the point of connection. It is also essential that the actual bearing surfaces between the two should be as extensive as possible to avoid the necessity of thickening the plate to enable it to resist the strain to which the connections are subjected.

In the upper part of Figs. 1 and 2 and in Figs. 5 and 6 I show a modification of the connections shown in the prior patent and application hereinbefore referred to. The tension member has its end F bent out of alinement with the adjacent parts and a teat G is formed at the extreme end. Each anchor plate at each point where the rod of a tension member is to be connected is preferably provided with a connecting piece H extended in the direction of the rod. This connecting piece has two holes I and J formed therein through which the end of the tension member is hooked in the manner shown particularly in Fig. 5. Beyond the hole I the part H is preferably channeled by suitably bending the metal to partly receive the tension member to bring its end as nearly as possible into a tangential relationship with the curve of the anchor plate. At the bottom of this groove I provide one or more recesses N adapted to engage the projections K formed on the tension member.

It is important that there shall be no looseness in any of the connections in my reinforcement and I therefore preferably make the recesses N with inclined rear walls so that by engagement with the projections K they tend to draw the tension member in the direction of the strain to which it is subject while in position, thus bringing it firmly in contact with the anchor plate at their points of engagement.

A convenient arrangement for connecting the lower rods B to the anchor plates is shown particularly in Fig. 7. The part H is bent outwardly in a direction normal to the curve and through this outwardly bent portion L the rod B of the tension member passes. The part H is recessed to receive the nut M screwed on to the end of the rod B. The latter may thus lie in a position tangential to the curve of the anchor plate.

It will be seen that with the connections thus described the possibility of local crushing at the points of connection between the tension members and the anchor plates is completely avoided as owing to the theoretical perfection of the tangential connection there is absolute uniformity of pressure between the concrete and all points of the intrados of the anchor plate.

It will be understood, of course, that while I have shown certain more or less complete embodiments of the principle of bowing in the present application, any other intermediate forms embodying the same principle of the employment of a more or less complete spheroidal segment would fall within the scope of my invention.

What I claim as my invention is:

1. A concrete beam provided with a metallic reinforcement comprising a tension member with forked ends, and anchor plates of large face area relative to the cross sectional area of the tension member, to which plates the ends of the tension member are connected, each of said plates being of substantially a dished, or cup-shaped form to partly inclose a mass of concrete and set with its concave side toward the center of the beam.

2. In a metal reinforcement for concrete beams the combination of a metal tension member; a bowed metal plate having a hole formed near one edge, the said tension member being tangential to the curve of the plate and bent to pass through the hole in the plate and lie against the surface of the plate; and a projection on the tension member adjacent the edge of the plate, the plate providing means to engage the said projection.

3. In a metal reinforcement for concrete beams the combination of a metal tension member having forked ends; a bowed metal plate having a hole formed near one edge, one of the said forked ends being bent to pass through the hole in the plate and lie against the surface of the plate; a projection on the tension member adjacent to the bent end thereof, the plate providing means to engage the said projection; and means securing the other end of the fork of the tension member to the plate tangential to the curve thereof.

4. In a metal reinforcement for concrete beams the combination of a metal tension member; a teat formed on the end thereof; a metal plate having two holes formed therein the said tension member passing through one hole in the plate and the teat engaging the other hole; a projection on the tension member, the plate being provided with a recess to receive the projection, having an inclined edge engaging the projection.

5. In a metal reinforcement for concrete beams the combination of a metal tension member; a metal plate having a hole formed near one edge, the said tension member passing through the hole in the plate and lying against the surface of the plate; and a projection on the tension member, the plate being provided with a recess to receive the projection, having an inclined edge engaging the projection.

Toronto, this 11th day of March 1910.

WILLIAM FRY SCOTT.

Signed in the presence of—
J. EDW. MAYBEE,
D. S. TOVELL.