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E. D. PITT & L. G. ROBINSON.

METALLIC REINFORCEMENT FOR CONCRETE STRUCTURES.

APPLICATION FILED DEC. 10, 1906. RENEWED JAN. 31, 1908.

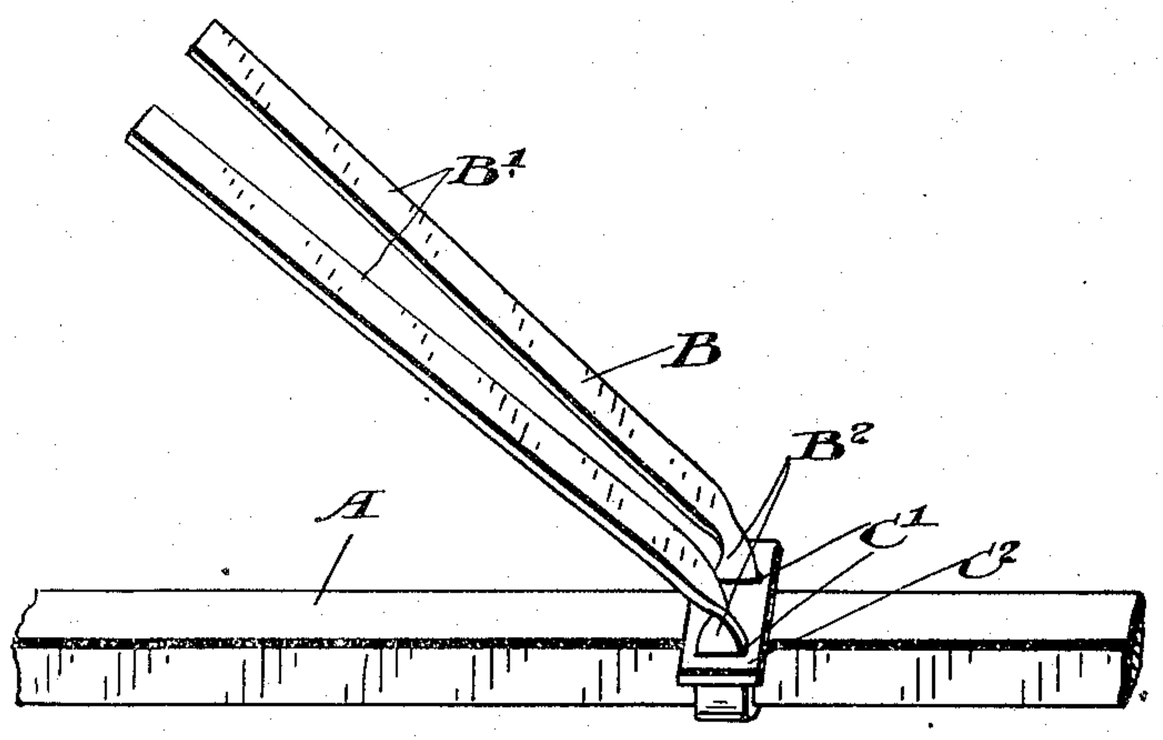

Fig. 1.

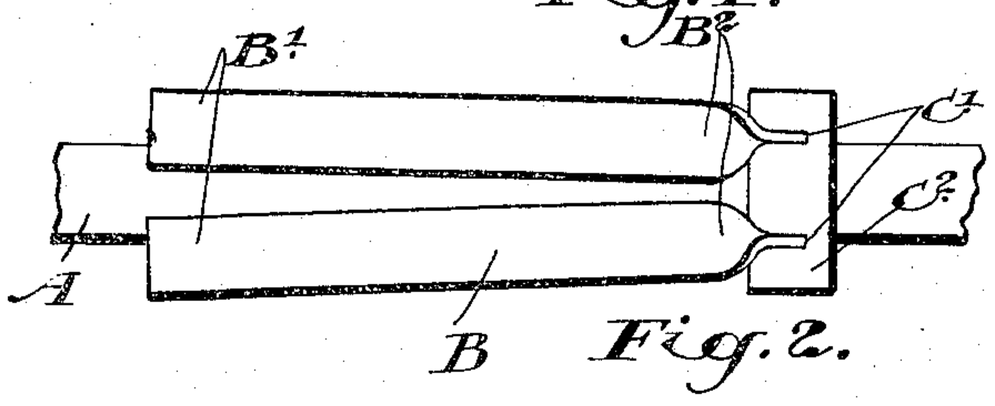

Fig. 2.

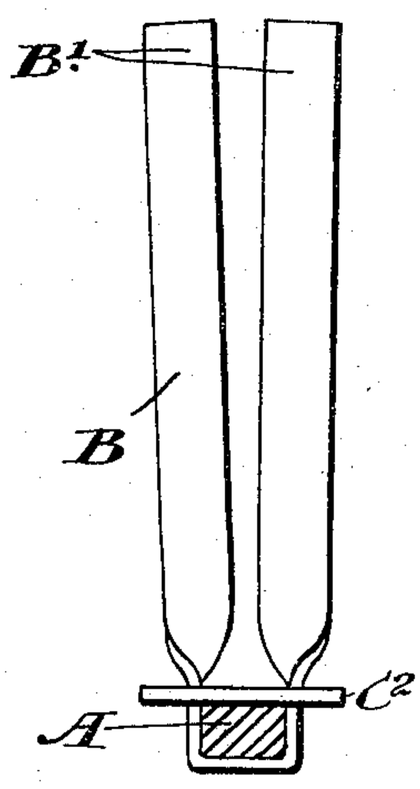

Fig. 3.

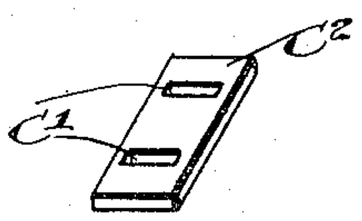

Fig. 4.

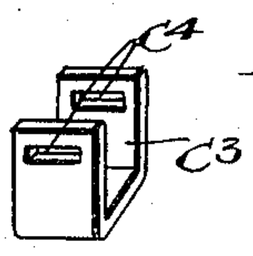

Fig. 6.

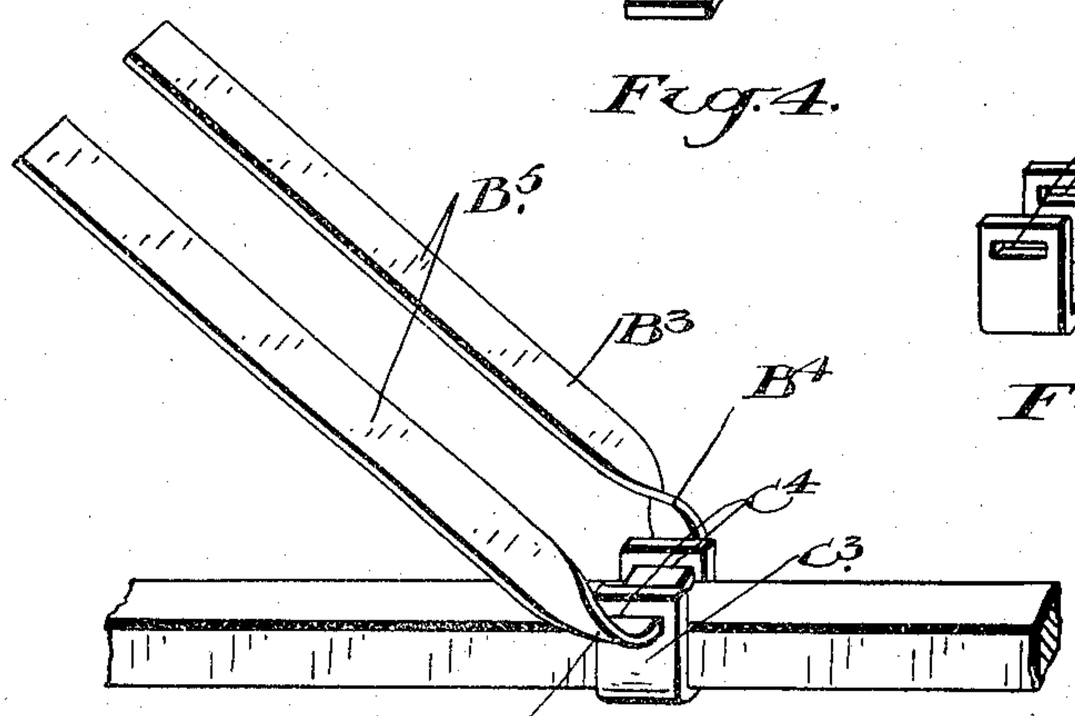

Fig. 5.

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UNITED STATES PATENT OFFICE.

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METALLIC REINFORCEMENT FOR CONCRETE STRUCTURES.

No. 881,617. Specification of Letters Patent. Patented March 10, 1908.

Application filed December 10, 1906, Serial No. 347,227. Renewed January 31, 1908. Serial No. 413,615.

To all whom it may concern:

Be it known that we, ETHELBERHT DOTY PITT, of the city of Niagara Falls, in the county of Welland, in the Province of Ontario, Canada, and LAFOREST GEORGE ROBINSON, of the city of Plattsburg, in the county of Clinton, in the State of New York, United States of America, have invented certain new and useful Improvements in Metallic Reinforcements for Concrete Structures, of which the following is the specification.

Our invention relates to improvements in metallic re-inforcements for concrete structures, and the object of the invention is to devise a re-inforcement, which may be made of commercial steel or other metal in which the section of the main bar or member is constant throughout its length and not weakened or injured by the attachment of the shearing member or members.

A further object is to so construct the shearing member, so that when the stress is exerted thereon it will tend to more securely bind it in position on the main member or bar.

Further objects are to economize metal in the construction of the truss or re-inforcement, to dispose the metal in convenient form throughout the length of the bar or main member as will be most efficient under all conditions of load, make the re-inforcement of such a width that it can be conveniently placed in the beam and of such a depth as the load requires and to provide for the ready adjustability of the shear or shear members as may be required to take up the shear stress. To these ends I have constructed the main member of the truss for re-inforcing concrete preferably of a steel bar of suitable cross section and the shear member likewise of a steel strip or bar of suitable cross section in a double form connected to the main bar by a suitable clip, the two portions of the shear member being twisted to hold them and the clip in position on the main member and being disposed, so that they lie obliquely or in any suitable convenient relative position to the main bar.

Figure 1, is a perspective view of portion of a truss constructed in accordance with my invention. Fig. 2, is a plan view. Fig. 3, is a vertical section. Fig. 4, is a detail of the clip shown in Figs. 1, 2 and 3 Fig. 5, is a perspective view of a modification. Fig. 6, is a detail of the clip used in Fig. 5.

In the drawings like letters of reference indicate corresponding parts in each figure.

During several years past concrete has been used as a substitute to a large degree for stone and steel in building construction. It, however, cannot be depended upon for tensile strength, which is small as compared with its compressive strength. For this reason steel has been used as a re-inforcing agent to take up the tensile stresses of the structure. The internal stresses of structural members of an edifice are somewhat complex and structural engineers have striven to solve the most economical manner of depositing the steel in the concrete to obtain efficient results from the members as a whole. One after another solutions have been advanced, accepted and then retired by other solutions, which in turn enjoy their brief term of popularity until at present there are more than twenty solutions or systems in common use, and more or less successful. At first the steel employed to take up the tensile stresses was inordinary commercial form and placed judicially in concrete without much idea as to economy. Then as competition grew keener there came a demand for greater economy and efficiency. It was soon found that if the shear stresses were well taken care of by the proper placing of the steel the strength of the unit would be greatly increased, hence many of the systems developed were worked out with this end in view, but required a special treatment of the steel to give a special form to the bar allowing of greater adhesion of the concrete to it. In another form the bars were rolled with wings and sheared on the line of connection of the wings to the bar to give a diagonally placed shear member. These special rolled bars were expensive, are difficult to procure at times and in many respects are very unsatisfactory for general use.

My invention is particularly designed to overcome the objections herebefore experienced and provide greater elasticity of application at all points and in all ways.

In referring to Figs. 1, 2, 3 and 4 A is the main or longitudinal member and B the stirrup or shear member, which is shown in these figures in a double form bent intermediately to extend around the major portion of the main member A and passing through slots C′ in the clip C². The two upper portions B′ of the member B are twisted at B² B²

a quarter turn or as may be desired at the point immediately where they emerge from the slots C′, thereby serving to cramp or lock the stirrup in position upon the bar, although not sufficiently so as to prevent longitudinal movement thereon for the purpose of adjustment.

The portions B′ are shown in the drawing placed with their faces flatwise or on a plane obliquely to the plane of the top face of the main member or bar, and it will also be seen that the two portions B′ are disposed substantially parallel to each other. It will, however, be readily understood that the disposition of the portions B′ of the stirrup may be disposed as may be most conducive to take up the shearing stress, this depending, of course, upon the nature of the structure in which they are placed.

In Figs. 5 and 6, we show the clip C^3 in U-shape form and also the stirrup itself and provided with slots C^4 through which the stirrup B^3 extends crosswise of the main member or bar lying close to it and the sides of the U-shape clip are designed to cramp the main bar or member. This cramping is effected by the quarter turn or other twist B^4 given to the lower end of the stirrup B^3 immediately outside of the slots of the clip C^3. In these figures the portions B^5 of the stirrup are disposed similarly to that in which the portions B′ are disposed in Fig. 1, and likewise in this construction the disposition of the portions B^5 taking up the shearing stresses may be altered to suit the particular structure.

By the use of a re-inforcement such as we describe both the tensile and shearing strains or stresses are taken up when embedded in concrete and the stirrups are most securely held in their position on the main bar or member by means of the very stress, which is exerted on them, which has a tendency to tip the clip and make it securely grip the bar and hold the shearing member from longitudinal displacement on the main bar. In other words the holding power of the connection between the shearing member and the main member is directly proportional to the intensity of the stress when embedded in the concrete. It will be, however, understood that the shearing member may be readily adjusted longitudinally on the main member or bar as the frictional grip upon the main member by the shearing member is such that it may be forced along by striking with a hammer the clip at the point of connection to the bar or main member.

What we claim as our invention is.

In metallic re-inforcement for concrete structures the combination with the main member, of a flat shear member doubled around said main member and extending at right angles thereto, a cross bar lying on the main member and having two slots through which the two ends of the shear member extend, said shear member being twisted and inclined at the points where it emerges from the slots of the cross bar.

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