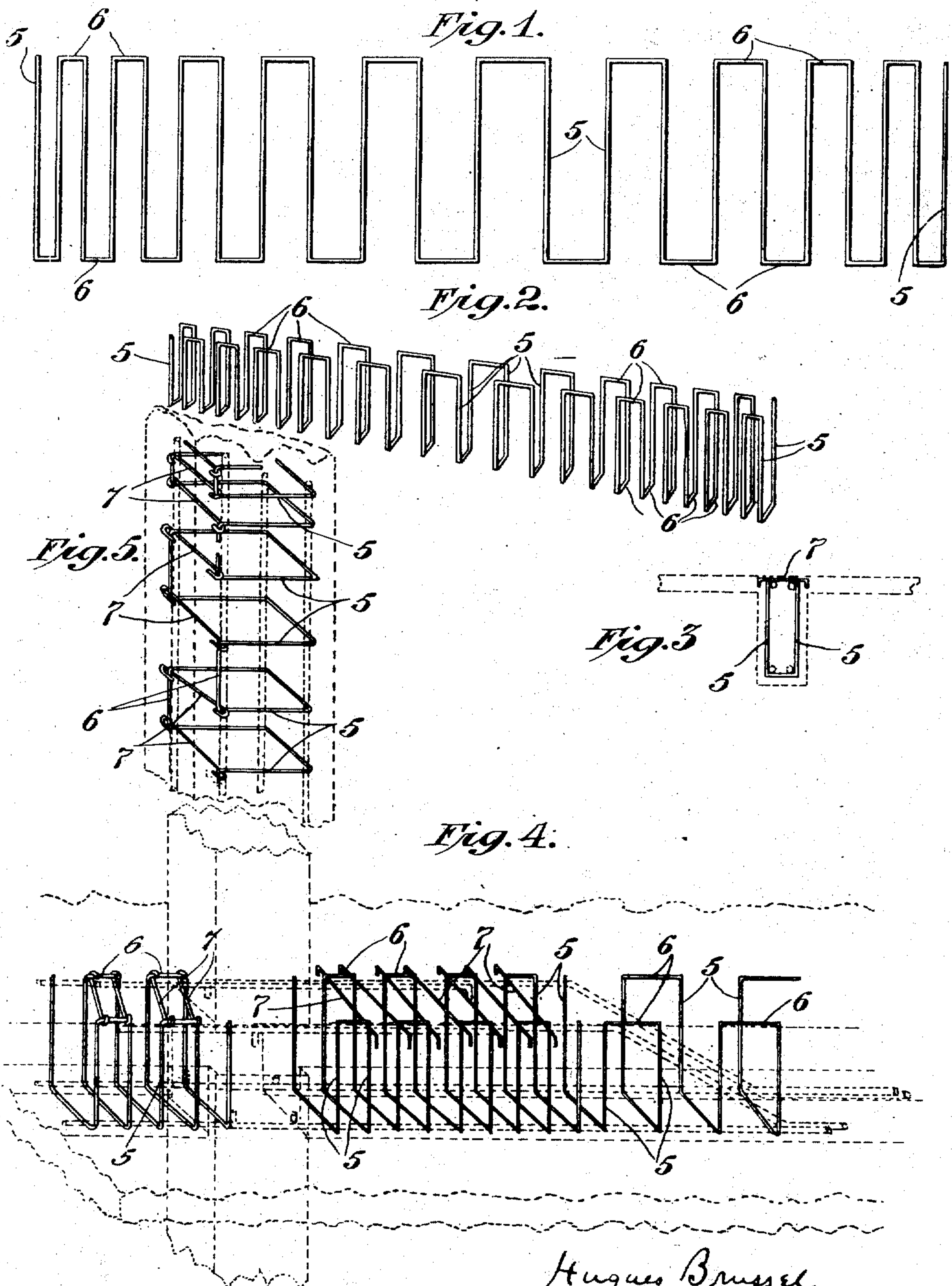


H. BRUSSEL.  
REINFORCEMENT FOR CONCRETE CONSTRUCTIONS.  
APPLICATION FILED MAR. 5, 1910.

994,091.

Patented May 30, 1911.



Attest:  
*W. Mitchell*  
May Frevert

Huques Brussel  
Inventor  
by *W. B. Whitney*  
Atty



# UNITED STATES PATENT OFFICE.

HUGUES BRUSSEL, OF ST. LOUIS, MISSOURI, ASSIGNOR TO REINFORCED CONCRETE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

## REINFORCEMENT FOR CONCRETE CONSTRUCTIONS.

994,091.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed March 5, 1910. Serial No. 547,398.

*To all whom it may concern:*

Be it known that I, HUGUES BRUSSEL, a citizen of the Republic of France, and resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Reinforcements for Concrete Constructions, of which the following is a specification.

My present invention relates to improvements in reinforced concrete constructions—more particularly, to the stirrups which are used as transverse or web reinforcement in concrete girders, beams, floor-slabs, and the like, to bind the longitudinal reinforcement in the tension chord to the concrete forming the compression chord and to carry the shearing stresses to which such structures are subjected, and to the transverse or hoop members which are used to tie together the longitudinal reinforcement of concrete columns.

The stirrups heretofore used in the reinforcement of horizontally disposed concrete structures have consisted of single lengths of strap-iron or wire, or of doubled lengths of wire having the two strands spaced a short distance apart, which have been bent into shape and have had their ends bent over at an angle to afford them an anchorage in the concrete; and these stirrups were either placed individually in the molds and there held in position while the concrete was being poured or were bonded in advance to the longitudinal reinforcement so as to form with it a skeleton frame-work which was handled as a unit and which held the parts in proper position in the molds.

The object of my invention is to provide reinforcement of the character indicated, adapted for use as stirrups, column hoops, or otherwise, which can be made more cheaply, which can be handled collectively or in sections without being bonded to the other reinforcement, and which possesses other features of advantage over that previously known and used for similar purposes.

To this end the invention consists, broadly, in what may be called a continuous transverse reinforcement, the construction

and features of which will clearly appear from the following description, having reference to the accompanying drawings in which—

Figure 1 is a view either in plan or elevation illustrating the blank which is formed as the first step in the construction of one form of a continuous stirrup; Fig. 2, a perspective view of a completed stirrup made from the blank shown in Fig. 1; Fig. 3, an end view of the said completed stirrup, showing a short cross-rod as used in combination therewith to form an inverted stirrup; Fig. 4, a broken view, in perspective and on a somewhat enlarged scale, of a slightly modified form of the invention; and Fig. 5, a broken view, also in perspective and on an enlarged scale, illustrating another modification adapted for use either in a concrete beam or column.

As illustrated in the drawings, a strip of suitable material of any desired section, preferably cold-drawn steel wire without oil or grease and taken from a spool as required, is first bent back and forth in one plane into a blank of zigzag or rack form, comprising parallel transverse sections 5 and intermediate connecting sections 6 alternating on the two opposite sides, and then the sides of this flat blank are bent up into planes usually at right angles thereto, as shown.

The parallel transverse sections 5 of the blank, which form the individual stirrup or hoop members of the continuous reinforcement, are made of the length required for the purpose, while the connecting members 6 are given such lengths as to properly space the stirrup or hoop members, which, in the case of stirrups, are usually placed progressively nearer one another toward each end of a girder or similar structure in order to offer a proportionately increasing resistance to the vertical shearing stresses which, when the structure is uniformly loaded, increase from zero at the center of its span to a maximum over the supports.

A continuous stirrup can be made either in entire span lengths, as shown in Fig. 2, or, as has been found convenient in practice,



in sections of from two to four feet in length, in which latter case the stirrup members may, for convenience, be given a uniform spacing throughout a section and a different spacing in the different sections, as illustrated in Fig. 4. For example, sections may be made in lengths of two feet with stirrup members spaced three inches apart, sections three feet in length with stirrup members spaced six inches apart, and sections four feet in length with stirrup members spaced one foot apart; and, by using one or two of the long sections in the middle of a span and one or two of the intermediate and of the short sections at each end thereof, the sections can be made to fill out structures varying considerably in length. These sections are usually bent up into the flat zigzag form, properly spaced, in the shop, and are shipped in that form to the place where they are to be used and there bent up into stirrup form.

The short rods 7, placed across the upper ends of the stirrup members so as to pass beneath the spacing connections 6 on either side, as illustrated in Figs. 3 and 4, serve as inverted stirrups to crown and so hold down in place in the concrete the ends of the longitudinal reinforcing rods, which in structures designed to act as continuous girders are carried up into the upper chord thereof over and adjacent to the supports, and may also serve as tensile reinforcement in the flanges of T-beams and girders. When the reinforcement is to be used in columns, the ends of these short rods are preferably bent back and hooked around the spacing connections, as illustrated in Fig. 5, thus tying together and completing the hoop members; and the same means may advantageously be used for tying together the upper ends of the stirrup members used in reinforcing certain types of girders and beams, especially such as are reinforced in their compression as well as tension chords. As thus connected together to form a continuous transverse reinforcement, the individual stirrup or hoop members can not only be handled collectively, as a unit, but will always retain their proper position and spacing when placed in the mold and may serve as guides and supports for the other reinforcement while the concrete is being poured. The longitudinal spacing connections not only provide convenient means for securing or to which to secure such cross rods as may be used to form inverted stirrups or to tie together the ends of the hoop members, as the case may be, but also afford the necessary anchorage for the upper ends of stirrup members, without other bending, while at the same time providing a series of inverted stirrups extending continuously throughout

the length of a girder beneath which the ends of the uniformly spaced rods usually used in reinforcing the floor-slabs may be passed and by which they will be held down in position in the concrete.

While I have shown and described my invention in detail as it has actually been practiced and in what I now regard as the best form for its application, it will, of course, be understood that these details may be variously modified without departing from the spirit or sacrificing the advantages thereof. Thus, as examples of such modifications as will be obvious to any one skilled in the art, the longitudinal spacing connections may be curved either upwardly or outwardly instead of being straight; the transverse stirrup or hoop members may be bent up at either an acute or obtuse angle or may be given a curved or round form; and stirrup members, instead of being made of a width to embrace all of the longitudinal reinforcement used in the structure, can be so made as to embrace only a single longitudinal rod or single pair of straight and bent rods and as many continuous stirrups used as there are rods or pairs of rods in the structure. Such other modifications may also be made as fall within the scope of the appended claims.

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

1. A continuous unitary stirrup reinforcement for concrete beams and like structures, comprising a plurality of U-shaped stirrup members each of which consists of a transverse middle portion and two substantially parallel sides and is integrally connected with the adjoining stirrup members by spacing members joining the end of one of its sides and the end of a side of an adjoining stirrup member and forming a longitudinal cradle which is open along one side and is adapted to be placed in position in a mold independently of and to receive the longitudinal reinforcements.

2. A continuous stirrup reinforcement for concrete beams and like structures, comprising a plurality of independent sections each of which contains a plurality of parallel U-shaped stirrups and longitudinal spacing members integrally connecting one end of each stirrup with an end of an adjoining stirrup and forming a longitudinal cradle open along one side, said spacing members being shorter in the end sections than in the intermediate section or sections.

3. A continuous transverse reinforcement for concrete structures, comprising a plurality of parallel transverse members adapted to embrace the longitudinal reinforcement of the structure and integrally connected together by longitudinal spacing

members joining one end of each transverse member with an end of an adjoining transverse member and forming a longitudinal cradle which is open along one side and  
5 transverse tie-rods closing the open side and binding together the two ends of each transverse member.

In witness whereof, I have signed my name in the presence of two witnesses.

HUGUES BRUSSEL.

Witnesses:

JOHN P. WALSH,  
L. VITERBO.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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