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R. A. CUMMINGS.

UNIT REINFORCEMENT FOR CONCRETE CONSTRUCTION.

APPLICATION FILED DEC. 27, 1906.

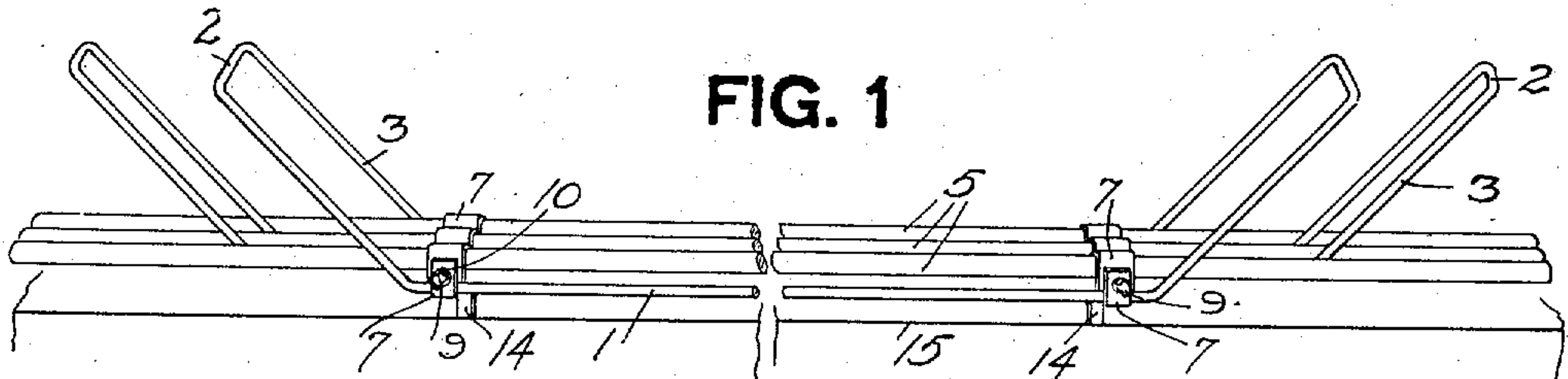


FIG. 1

FIG. 2

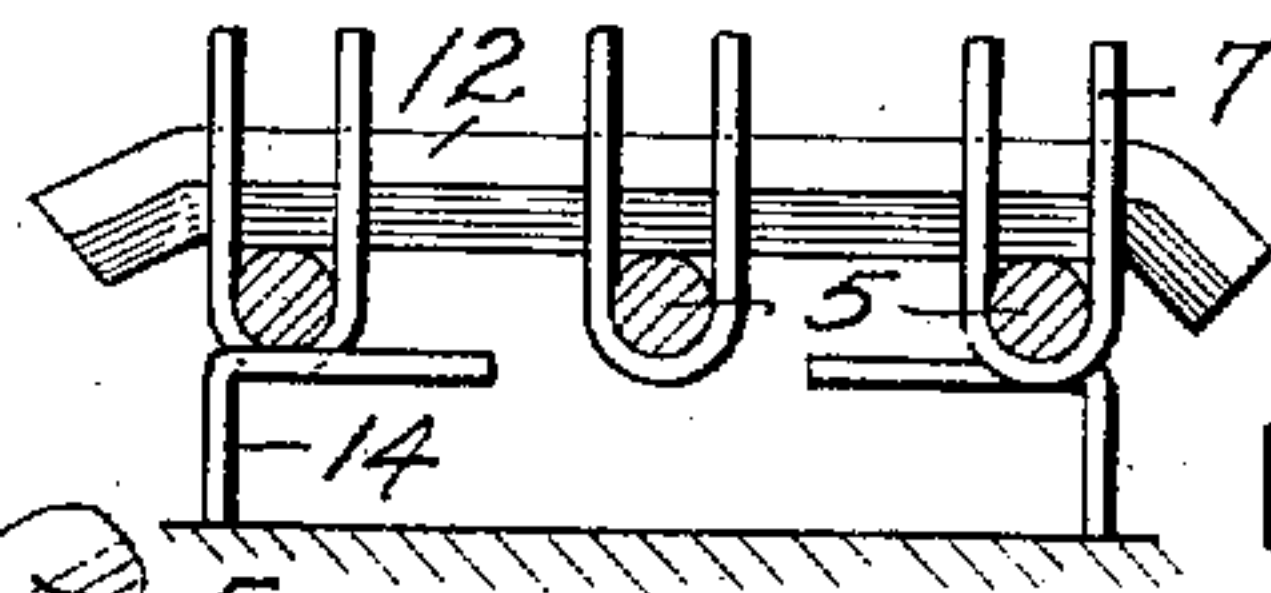
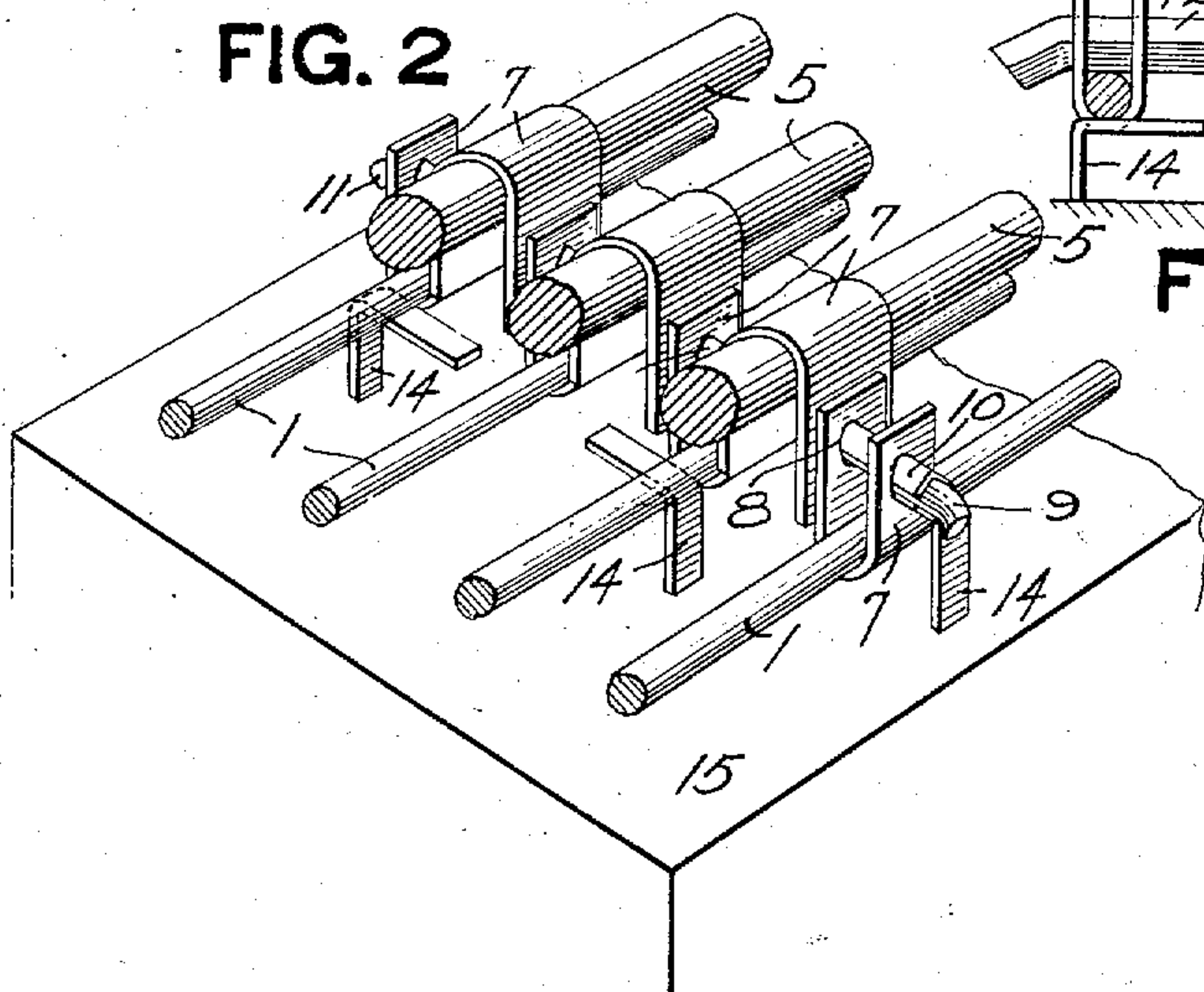


FIG. 3

FIG. 7.

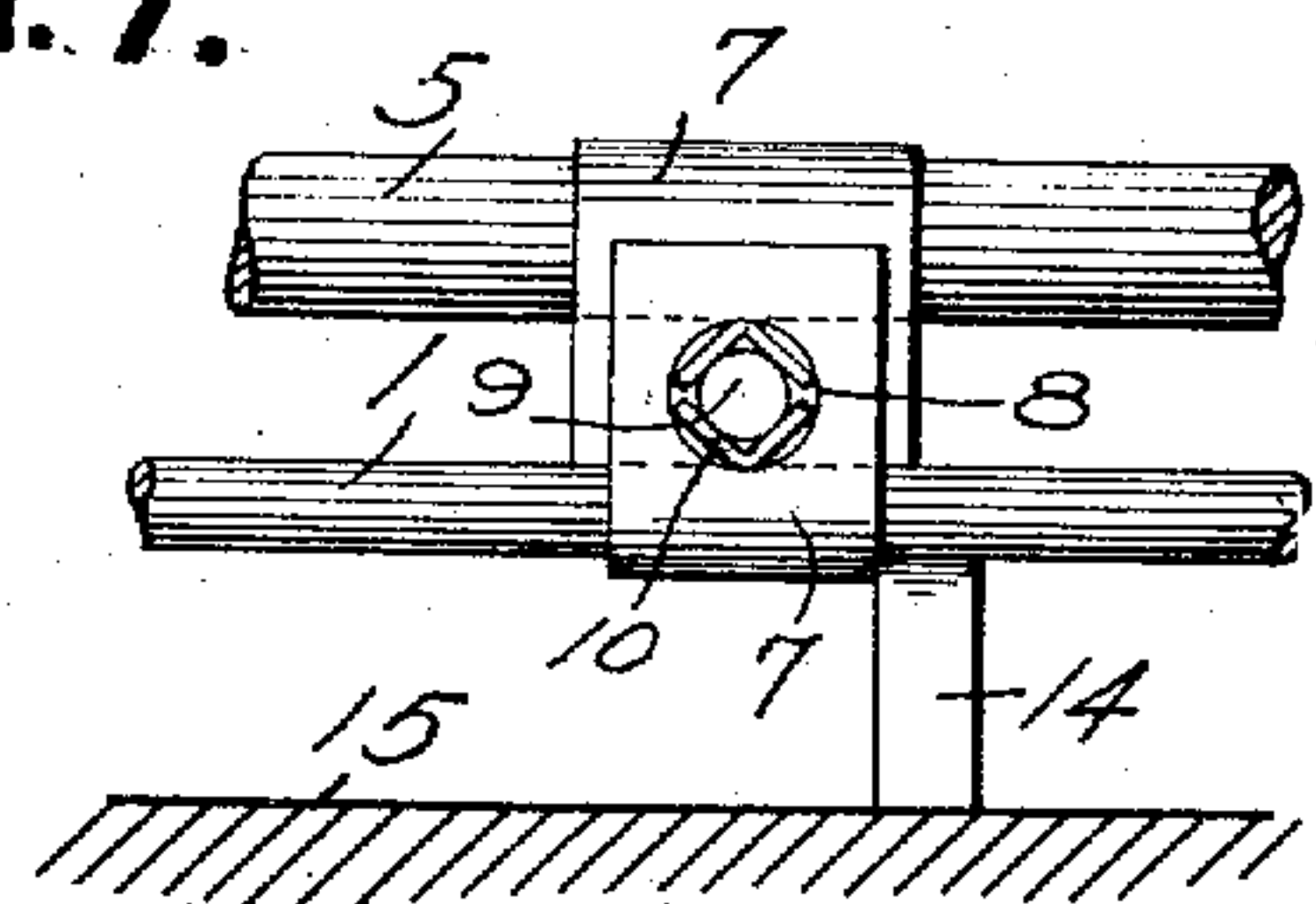


FIG. 4

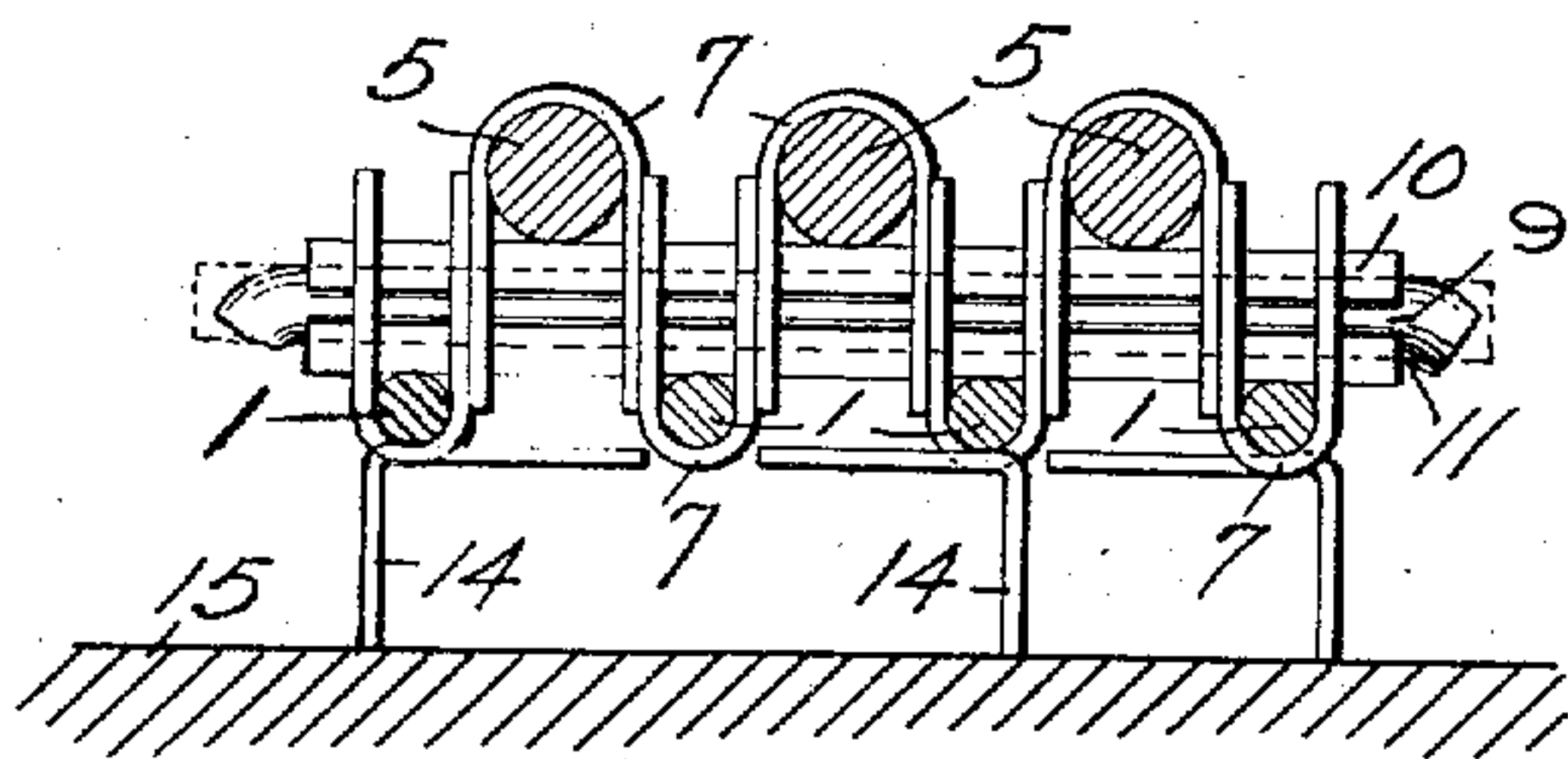


FIG. 5

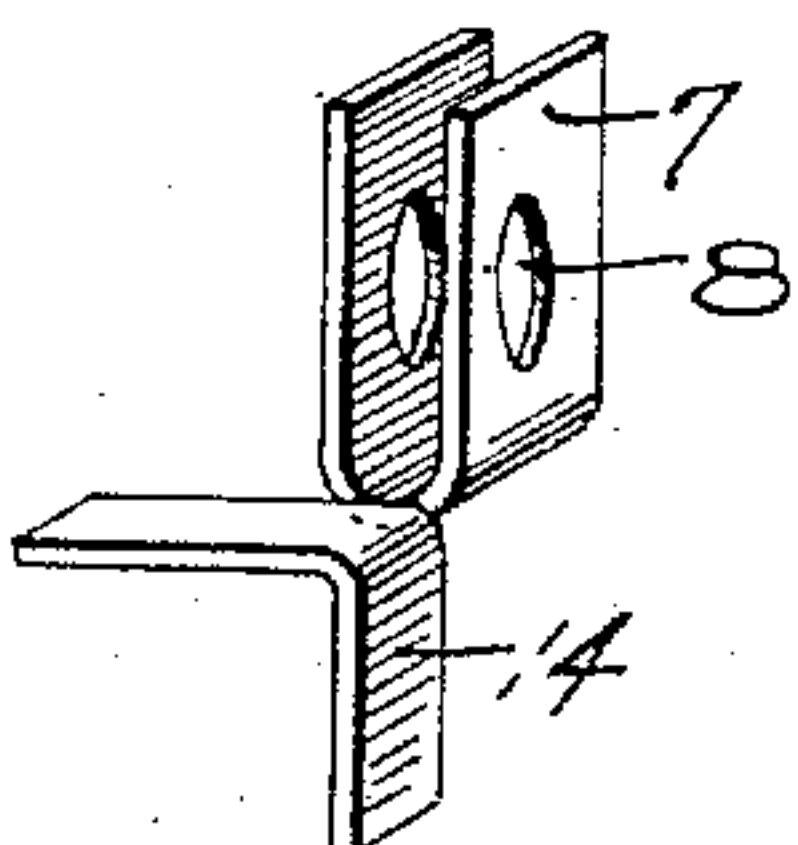
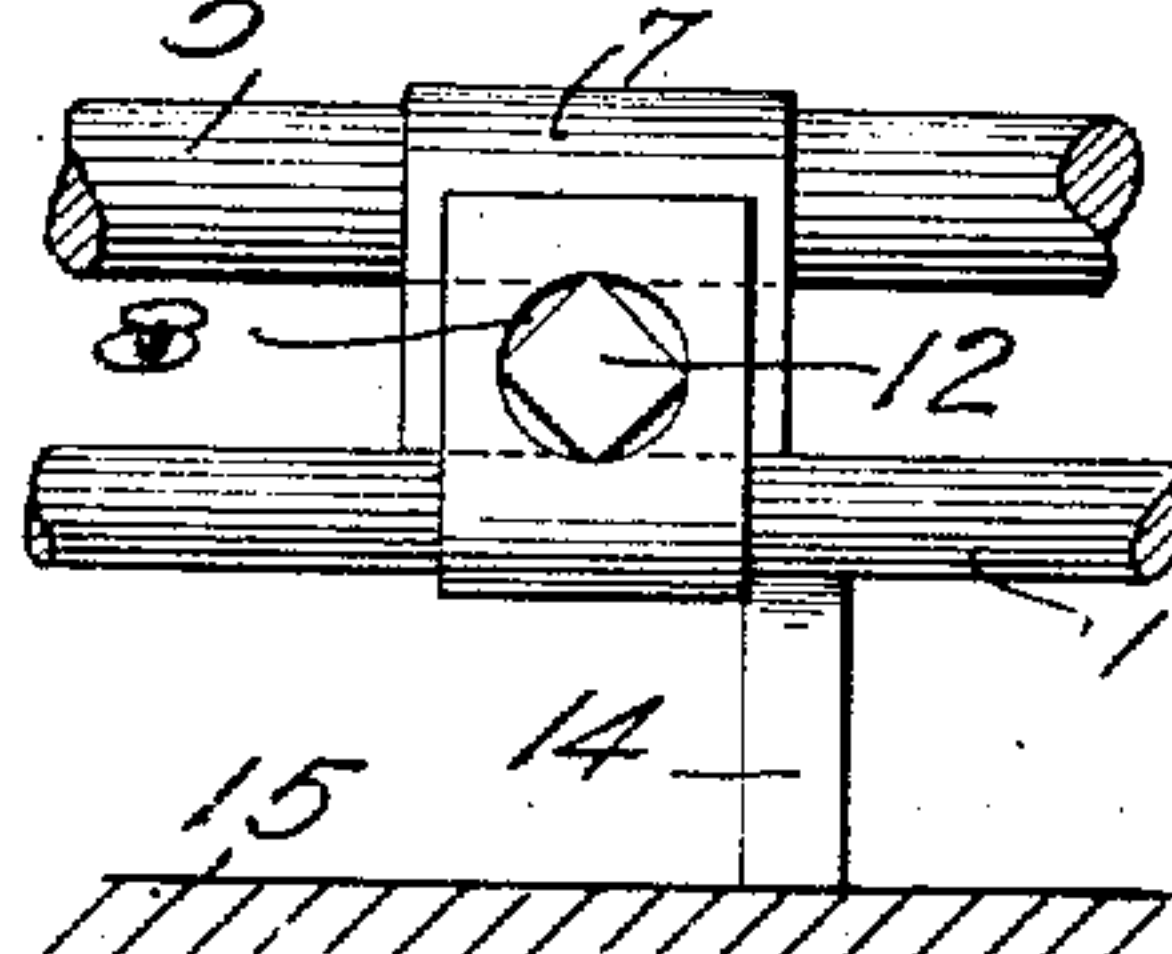


FIG. 6



WITNESSES.

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UNIT REINFORCEMENT FOR CONCRETE CONSTRUCTION.

No. 884,010.

Specification of Letters Patent.

Patented April 7, 1908.

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To all whom it may concern:

Be it known that I, ROBERT A. CUMMINGS, a resident of Beaver, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Unit Reinforcements for Concrete Construction; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to a reinforcement unit for concrete and similar structures and more especially a reinforcement unit for girders, beams and the like.

The invention also relates to a connecting and spacing member for such reinforcement unit.

In reinforced concrete work, the practice most generally followed is to ship the various reinforcing members in separate or unconnected condition, these being set up on the job by the workmen employed. Frequently it is impossible to get sufficiently skilled labor to set up the reinforcement properly, and in any event it is difficult, with the appliances available on the job, to so position the parts and hold them in proper position, to develop the maximum efficiency of the reinforcement. It has also been proposed to assemble the reinforcement at the factory and ship the same in that condition, but in all prior practice of this kind, as far as I know, the assembled parts have been bulky and liable to bending and other damage in handling and shipping, so that when put in place the various members, and especially the tension and shearing rods, are not in such exact relative positions as to develop the maximum efficiency.

In the development and perfection of reinforced concrete work, it is being demonstrated that in order to secure maximum efficiency of the metal in combination with the concrete, it is necessary that the metal parts be not only of the desired size and weight but that they have exact positions in the body of concrete. Any distortion of the members or any material displacement of them from their required location decreases the efficiency of the reinforcement to a degree entirely out of proportion to the amount of distortion or displacement. It is, therefore, desirable that the reinforcing members be not distorted or bent and that they be located practically at the exact theoretical position for maximum efficiency.

The object of the present invention is to provide a reinforcement unit which can be

built up at the factory, or elsewhere or on the job if advisable, in a manner that will insure the members being held in the exact proper relative positions while the concrete is being deposited, which is compact and can be shipped without danger of distortion or injury to the members, and which is provided with means permitting it to be placed in the job by unskilled labor and with the assurance that the main members thereof will be in such location as to develop their maximum efficiency.

The invention comprises a reinforcing unit together with connecting members therefor, arranged to adjust themselves so as to compensate for variations in the size of the main members in order to bring the latter to their exact proper relative positions. The invention also comprises a connecting member or clip of simple construction, easy application and which adjustably connects the main members as well as providing means for spacing the main members the required distance from the centering or casing.

In the accompanying drawing, Figure 1 is a perspective view of a reinforcement unit for girders embodying my invention; Fig. 2 is a perspective view of a portion of the same on an enlarged scale; Fig. 3 is a side view of the same; Fig. 4 is a cross section of the unit; Fig. 5 is a perspective view on an enlarged scale of one of the connecting members; Fig. 6 is a side view like Fig. 3 showing a modification; and Fig. 7 is a cross section similar to Fig. 4, showing a modified form of unit.

The reinforcement unit shown in Figs. 1 to 6 comprises main longitudinal members and connecting and spacing means therefor. The longitudinal members comprise a plurality of bars or rods 1 preferably formed into loops by having their ends united as at 2 to form the loops, and having the end portions bent upwardly as shown at 3, Fig. 1, said upwardly bent end portions taking care of the shearing strains at the end of the girder. Associated with these loop members are a plurality of rods or bars 5 preferably of larger cross sectional area than the rods or bars 1. The rods or bars 5 are placed in a different plane from that in which the rods or bars 1 are placed, the particular arrangement shown being above the rods 1, but if desired they may be below the rods 1. The construction and locations of these parts is substantially the same as shown in Fig. 1 of my Patent No. 764,884, July 12, 1904. The connecting

means for these bars or rods is of such a nature as to hold them fixedly in their proper relative positions but so constructed as to be adjustable to compensate for variations in the sizes of the rods. The connecting members comprise some means for engaging the rods in a manner to prevent their spreading apart and having means between the rods which is adjustable to compensate for variations in size and which forces the rods outwardly against the retaining means. Various forms of connecting means will adapt themselves for this purpose and those shown in the drawings are intended to be largely illustrative of the principle although the form there shown is cheap and simple of construction and easy of application. These connecting members, as shown, comprise a series of looped clips 7 formed from bent bands or strips of metal of general U shape and being provided in their legs with openings 8, or notches, for receiving a transverse connecting member or rod 9. The clips are made of the necessary size to embrace the rods as shown in Fig. 4, those embracing the top rods having their legs projecting downwardly and those embracing the bottom rods having their legs projecting upwardly and the connecting rod 9 being inserted through the alining openings in the legs of the top and bottom clips, thus uniting the clips and thereby securing the rods or bars in position.

To compensate for variations in size of the rods or bars a certain amount of adjustability is required in order that each of the rods or bars may be forced outwardly, that is, either upwardly or downwardly, into close engagement with the loop of its clip. This is secured by providing a yielding and expansible member or members with the rod 9. Such yielding or expansible member may be an open-seam tube of thin sheet metal or in the form of sheet metal strips, as shown at 10, of somewhat trough shape, which are first inserted through the alining openings 8 in the legs of the clips after which the rod 9 is driven through between these strips, thus expanding the latter and as they do not conform exactly to the shape of the rod 9, portions thereof press against the rods 1 and 5 to force the latter tightly against the loops of the clips. If some one or more of the rods should happen to be somewhat over-sized, the thin sheet metal members 10 merely collapse or yield opposite such rod or rods to the desired extent. As a result, all of the rods are tightly held in the loops of their clips entirely irrespective of any slight variations in the size of the rods. The clips will of course be chosen of a size and with legs of a length so as to get the proper distance between the centers of the rods to secure maximum efficiency, and by means of the yielding resilient members 10 a sufficient adjustment is provided to compensate for any variations in the

size of the rods and insure the centers of the rods being brought to the desired proper position.

If desired, the ends of the rod 9 may, after insertion, be upset or bent as indicated at 11 in order to prevent displacement. Various forms of devices may be used in place of the strips 10. Fig. 6 shows a simple square rod 12, the corners of which will yield sufficiently to act in the same manner as the strips 10. This square rod can be drawn in with the flat faces horizontal and then turned to bring a diagonal axis to vertical position.

A sufficient number of connecting members will be provided to tie the longitudinal bars together with the necessary degree of security. Since these connecting members are built of a series of independent clips, it is obvious that the reinforcement unit can be made of any desired number of rods or bars, 1 and 5, by merely extending the number of clips sidewise. The parts can be easily assembled at the factory or elsewhere and the looped ends 2 of the bars 1 are preferably left straight, and in this form the unit is shipped to the place of use. Inasmuch as it is very compact, it occupies a minimum amount of space in shipping and the main members thereof are not liable to bend. On the job the looped ends of the bars 1 can be readily bent upwardly to the desired extent.

In order to insure the reinforcement being held a proper distance from the centering or casing, it is preferred to provide the connecting members with suitable projections for contacting with the centering or casing. This, as shown, is provided for by cutting tongues 14 from the U shaped clips, leaving the same united at the loop of the clip, and then bending one or both of said tongues outwardly, as shown in Figs. 2 and 4, to form a spacing member, resting on the centering or casing 15. The result is that the unit can be put in position by unskilled labor and with the assurance that when embedded in concrete it will develop maximum efficiency.

Fig. 7 shows the invention applied to a unit reinforcement having a single series of longitudinal rods 5, each of which has connected thereto a clip 7 with the limbs projecting upwardly, and a transverse rod 12 driven through the openings of these clips and serving to unite the longitudinal rods. The clips are also provided with the spacing fingers 14.

The connecting clips or members described are cheap of manufacture and easy to apply. They permit the building up of units of any desired size and are also capable of having their location relative to the longitudinal bars changed at will. These clips, when united in the manner described, form connecting members which securely and accurately hold the parts in position and which to some extent are adjustable to compensate

for variations in size or diameter. The unit is compact and can be readily handled and shipped and placed in position with the assurance that all of the parts are in such position as to develop the maximum efficiency.

What I claim is:

1. A reinforcement unit for concrete and like structures, comprising a plurality of longitudinal members arranged in different planes, and connecting members therefor comprising retaining or confining means for preventing movement of the longitudinal members relatively to each other, and means for forcing and holding said rods against said retaining or confining means, said connecting members including a yielding element.

2. A reinforcement unit for concrete or like structures, comprising a plurality of longitudinal members arranged in different planes, and connecting members therefor comprising retaining or confining means arranged to engage the longitudinal members externally and prevent them from spreading apart, and means between the rods for forcing and holding the same against the exterior restraining means, said connecting members including a yielding element.

3. A reinforcement unit for concrete and like structures, comprising a plurality of longitudinal members, and connecting means therefor comprising clips, one such clip engaging each of said longitudinal members, and a transverse rod connecting said clips, said connecting means including a yielding element.

4. A reinforcement unit for concrete and like structures, comprising a plurality of longitudinal members, and connecting means therefor comprising a plurality of independent clips, each clip being U shaped and provided with alining openings in its legs, one such clip embracing each longitudinal member and having the holes in the legs spaced from the loop of the clip a distance less than the diameter of the longitudinal member embraced by such clip, said plurality of clips being placed with the legs substantially parallel, and a transverse rod extending through the openings in said clips and binding together the clips and longitudinal members.

5. A reinforcement unit for concrete and like structures, comprising a plurality of longitudinal members, and connecting means therefor comprising U-shaped clips provided with alining openings in their legs, one such clip embracing each of the longitudinal members, and a transverse rod extending through the openings in said clips, said connecting means including a yielding element.

6. A reinforcement unit for concrete and like structures, comprising a plurality of longitudinal members arranged in two different planes, and connecting means therefor comprising a plurality of clips, one such clip engaging each longitudinal member and the

clips of the members in the two planes being reversely arranged, and a transverse rod connecting said clips.

7. A reinforcement unit for concrete and like structures, comprising a plurality of longitudinal members arranged in two different planes, and connecting means therefor comprising a plurality of clips, one such clip embracing each of the longitudinal members and the clips of the longitudinal members in the two planes being reversely arranged, and a transverse rod connecting said clips, said connecting means including a yielding element.

8. A reinforcement unit for concrete and like structures comprising a plurality of longitudinal members, and connecting means therefor comprising loop members embracing the members and provided with openings, a transverse rod extending through said openings, and a yielding and expanding member also extending through the openings and located between the longitudinal rods and transverse connecting rod.

9. A reinforcement unit for concrete and like structures comprising a plurality of longitudinal members, and connecting means therefor comprising U shaped clips arranged to embrace the longitudinal members and provided with openings in their legs, a transverse rod extending through said openings, and a yielding and expansible member also extending through the openings and located between the transverse rod and the longitudinal members.

10. A reinforcement unit for concrete and like structures comprising a plurality of longitudinal members, and connecting means for the same comprising a plurality of independent clips, one such clip embracing each longitudinal member, and a member extending transversely of the longitudinal members and connecting said clips, some of the clips being provided with outwardly extending projections to contact with the casing.

11. A reinforcement unit for concrete and similar structures, comprising a plurality of longitudinal members, and connecting means therefor comprising a plurality of independent clips, one such clip embracing each such longitudinal member and being provided with a loop for engaging the longitudinal member, and a transverse member connecting said clips, some of said clips being provided with outwardly extending projections to contact with the casing.

12. A reinforcement unit for concrete and similar structures, comprising a plurality of longitudinal members, and connecting means therefor comprising a plurality of independent clips, one such clip embracing each such longitudinal member and being provided with a loop portion engaging the longitudinal member and with openings at right angles to said loop, some of said clips being provided with

outwardly projecting tongues to contact with the centering or casing, and a transverse rod extending through the openings in said clips.

- 5 13. A reinforcement unit for concrete and similar structures, comprising a plurality of longitudinal members, and connecting means therefor comprising clips arranged to embrace the longitudinal members and provided with openings, a transverse member
10 extending through said openings, said con-

necting means including a yielding element, and some of said clips being provided with outwardly projecting tongues to contact with the centering or casing.

In testimony whereof, I the said ROBERT A. CUMMINGS, have hereunto set my hand.

ROBERT A. CUMMINGS.

Witnesses:

F. W. WINTER,
JOHN F. WILL.