G. H. REED.

REINFORCING MEMBER FOR CONCRETE STRUCTURES.

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**1,166,545.** Patented Jan. 4, 1916.

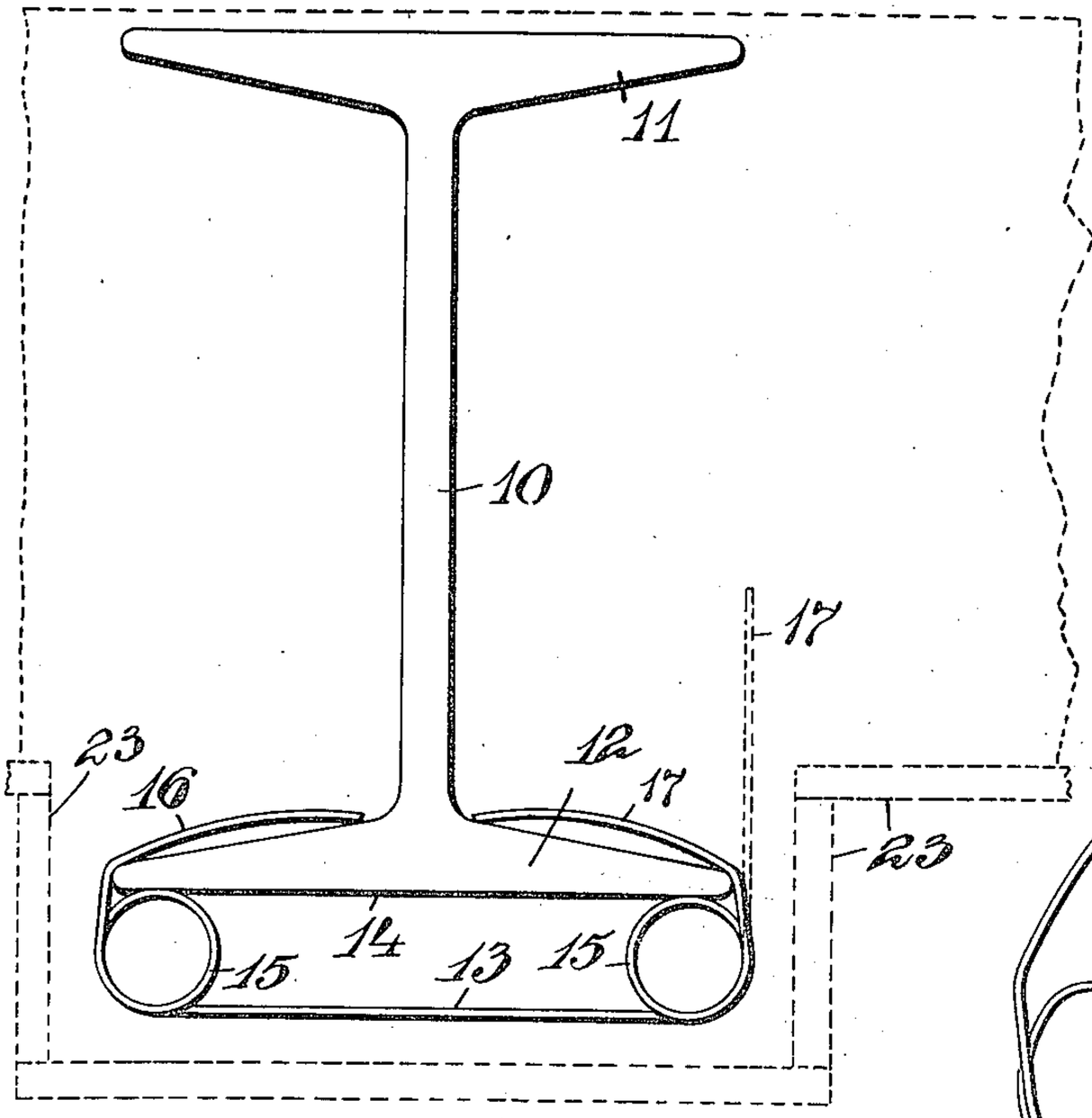


Fig. 1

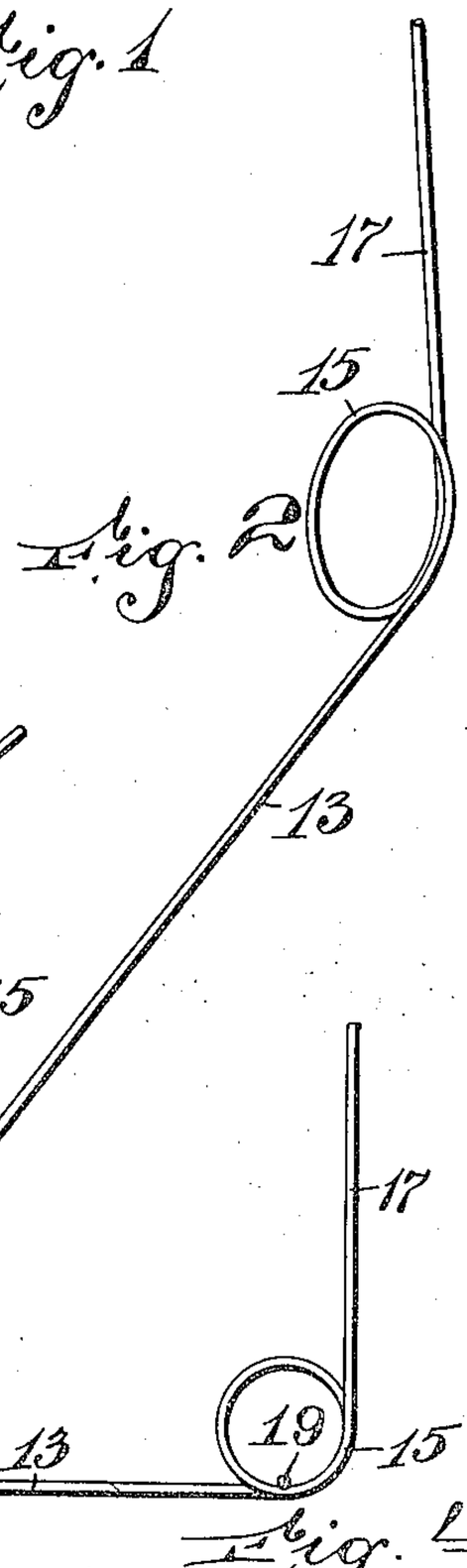


Fig. 2

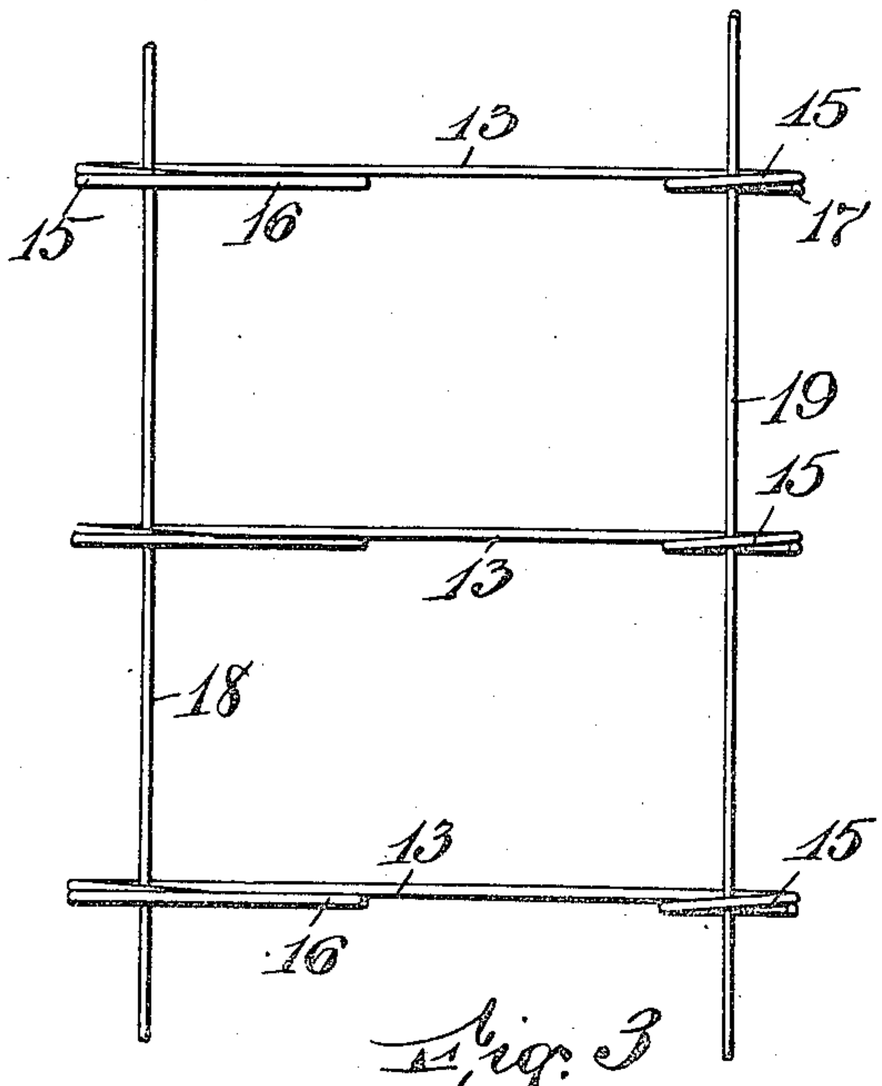


Fig. 3

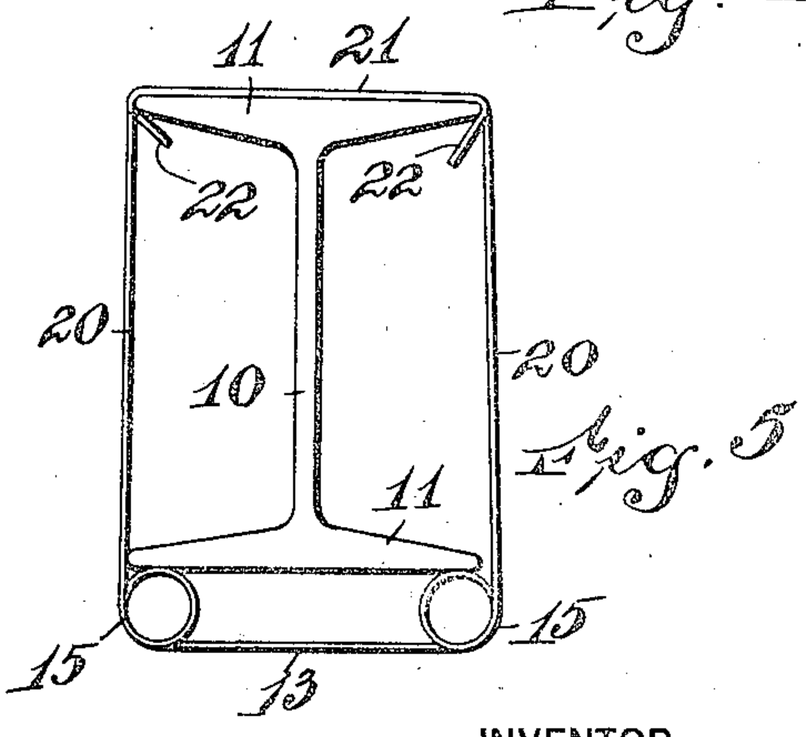


Fig. 5

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## REINFORCING MEMBER FOR CONCRETE STRUCTURES.

1,166,545. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed November 9, 1914 Serial No. 870,942.

*To all whom it may concern:*

Be it known that I, GEORGE H. REED, a citizen of the United States, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Reinforcing Members for Concrete Structures, of which the following is a specification.

This invention relates to a reinforcing member for concrete structures and is designed to be used in places wherever it is applicable, but it is particularly designed for use at the bottom of I-beams and the like for reinforcing concrete which covers the bottom and the lower portion of the sides of I-beams, thereby making a more stable structure, one less apt to crack and one in which the material is not apt to fall away from the beam.

The invention is designed to provide a member of this kind consisting of soft metal, preferably in the shape of wire, so that the ends can be easily bent to grasp the supporting element, such as the flange of an I-beam.

The invention is designed to provide independent reinforcing members which can be used separately and independently, and also relates to a means for securing separated members in spaced relation so that they can be supplied in the form of a strip and cut off in suitable lengths so that they can be used where desired. The strip of reinforcing members provides a means for holding the members in spaced relation and particularly when they are placed on inclined beams or girders, as in roofs, theater balconies and similar structures, where unconnected members are apt to be vibrated or shaken enough to cause them to be grouped near the base of the beam and to assume an uneven spacing.

The invention is designed to provide a member of this kind which insures the spacing of a part thereof from the beam to permit the concrete to fill in the space between the reinforcing member and the beam and to also be well seated within the folds or strands of the member so as to insure the stability of the concrete structure in the vicinity of the reinforcing member.

The invention is illustrated in the accompanying drawing, in which—

Figure 1 is an end view of an I-beam, one of the reinforcing members being shown in elevation at the bottom of the beam. Fig. 2 is a perspective view of the reinforcing member shown in Fig. 1, the member having one end illustrated in upright position before it is bent over to grasp the flange of the beam. Fig. 3 is a top view of a fragment of a strip made up of a series of members connected by tie wires. Fig. 4 is an end view of the construction shown in Fig. 3, and Fig. 5 is a smaller view illustrating the end of an I-beam with a modified form of reinforcing member, this member being designed to also provide strands which extend up on the sides of the beam to reinforce that part of the structure lying between the flanges.

It will be understood that the invention can be used in any place where it is applicable, but it is particularly adapted for use with I-beams and acts to support the bottom part of the concrete sheath or casing that is used in modern buildings to cover the lower part of the I-beam. In the drawings I show an I-beam 10 with the usual top flange 11 and the bottom flange 12. The reinforcing member is made up of a metal strip, usually round wire which is soft and can easily be bent by the workman without the use of tools, but is stiff enough to have sufficient tension to hold the material in place while it is being poured and tamped without the member becoming distorted or misshapen to destroy its usefulness as a reinforcing member.

In the form shown in Figs. 1 and 2 the reinforcing member is formed into a connecting strip 13, the ends of the connecting strip being shaped into loops which are spacing loops so that when the members are in position against the bottom face 14 of the I-beam, the connecting strip 13 will be spaced from the bottom face of the I-beam to provide plenty of room for the concrete to settle between the connecting strip and the I-beam. These spacing loops can be of different shapes, but I prefer to form them into closed loops 15, the illustration showing the loops formed by bending the wire through a little more than one entire convolution, the wire being closely wound so that there is not too much transverse space and forming ends 16 and 17. If desired, one of the ends can be bent over and the member supplied with the bent over end 16, and the

other end 17 can be left straight as shown in full lines in Fig. 2 and in dotted lines in Fig. 1, but this is not essential, and the wire being easily bent is folded over so as to lie on the top surface of the lower flange 14 so as to hold the reinforcing member in position.

If desired the members can be connected by tie wires so that they are formed into strips to be cut off in suitable lengths, these tie wires being disposed at any suitable point and being connected by any suitable means, such as soldering or brazing, to the members to permanently hold them in position in relation to the tie wires.

In the form shown I have illustrated two tie wires 18 and 19 which are connected to the members at any suitable point and in any suitable manner, but are illustrated as passing through the loops 15 and at a point on the opposite side to that side of the loop which will rest against the bottom face of the bottom flange of the I-beam. The spacing of the tie wires from the beam is desired as it gives plenty of room for the seating of the concrete between the tie wires and the bottom face of the flange of the I-beam, but I do not wish to be understood as limiting myself to the exact disposition and shape of the tie wires. I prefer, however, to arrange them in parallel relation, and substantially straight wires are satisfactory.

The tie wires act as reinforcing strips substantially parallel to the longitudinal edges of the beam and this is a feature that is highly desirable and insures stiffness that is continuous and also relatively close to the corner or edge of the concrete. The spacing and connecting of the reinforcing members by a tie wire or tie wires insure the members being held in their proper places on the beam and prevent their being grouped or assembled in an undesirable manner, such as when the members are placed on inclined beams or girders without tie wires, in which case the vibration, due to the passing of workmen over the beams and shakes to which the structure is subjected in its building, and also contact with the members by workmen stepping on them, soon causes the members to slide down inclined beams, and in a case, for instance, where there would be forty strips on a beam, by the time they would be ready to put the concrete in place thirty of the members might be close to the lower end of the beam and the remainder scattered at wide and uneven intervals along the rest of the beam. With the spacing wires this is not possible and much time is saved and better work is done. The tie wires furthermore assist in fastening the members in place, since the members can be secured to the top of the beam by the workmen on the beam and it is not necessary to erect scaffolding underneath the beam to put the members in place, and in addition thereto it must be remembered that the tie wires have the function of assisting in the reinforcing, since they supply a longitudinal binding or reinforcing strand close to the corner or lower sharp edge of the concrete where it is highly desirable and where other reinforcing members do not provide stiffness.

In Fig. 5 I show a form of reinforcing member similar to that shown in the other figures, but with the ends 20 beyond the loops 15 being made long enough to pass up on both sides of the I-beam and to be secured to the top flange thereof, the manner of so securing them illustrated in the drawing consisting in simply folding over the two ends 21 and at their extremities bending them down as at 22 to any desired extent to form a binding end or hook that fits over the ends of the top flange 11 of the I-beam. In this structure it will be noted that the reinforcing member acts to add to the stability and permanency of the concrete below the I-beam and also acts to reinforce that part of the concrete that lies on both sides of the I-beam.

It is usual to form molds or forms, usually doing this by putting together boards 23 which are shown in dotted outline in Fig. 1 and then pouring the concrete into the mold, and when it has set, removing the mold and the concrete is suspended in place. When the concrete or cement is molded around the I-beam and my type of strengthening member is used, the concrete has no difficulty in passing underneath the I-beam and becoming solid underneath it and to fill the space between the connecting strands 13 and the bottom of the I-beam.

The reinforcing member above described is cheap and is of a construction to insure its quick attachment to an I-beam or similar structure, and is constructed so as to prevent the exposing of said member when concrete is being placed about it.

Having thus described my invention, I claim:

1. A reinforcing means for concrete structures and the like comprising a longitudinal tie wire, transverse reinforcing members rigidly secured to and spaced along said tie wire and being formed with spacing loops thereon to hold said transverse members on the tie wire at a distance from an element to which the reinforcing means is secured, the transverse members having bendable projecting ends for securing the reinforcing means to an element.

2. A reinforcing means for concrete structures comprising tie wires spaced apart, transverse reinforcing members rigidly secured to and spaced along the tie wires whereby the tie wires are held apart and the reinforcing members are held apart, and

bendable projections on said reinforcing means for securing said reinforcing means to an element.

3. A reinforcing means for concrete structures and the like comprising spaced tie wires, and reinforcing members rigidly secured to and spaced along said tie wires and acting to hold them apart and in turn being held apart thereby, the reinforcing members having spacing loops thereon and being formed on the side of said loops opposite the tie wires with bendable projections.

4. A reinforcing member for concrete structures consisting of substantially parallel tie wires, and spacing members secured at intervals to said tie wires, said spacing members comprising a strip of soft metal forming a connecting strand having separated closed loops, said closed loops surrounding the tie wires and being secured thereto, the ends of the loops projecting from the loops in a direction away from the connecting strand, said ends forming bendable fastening means.

5. A reinforcing strip for concrete structures comprising a series of soft metal strips bent into loops near the ends and forming beyond said loops bendable fastening means, and a tie wire extending across and joining said above described members and being secured thereto to space them apart.

In testimony that I claim the foregoing, I hereto set my hand, this 5th day of November, 1914.

GEORGE H. REED.

Witnesses:
WM. H. CAMFIELD,
JULES P. BOUVIER.