

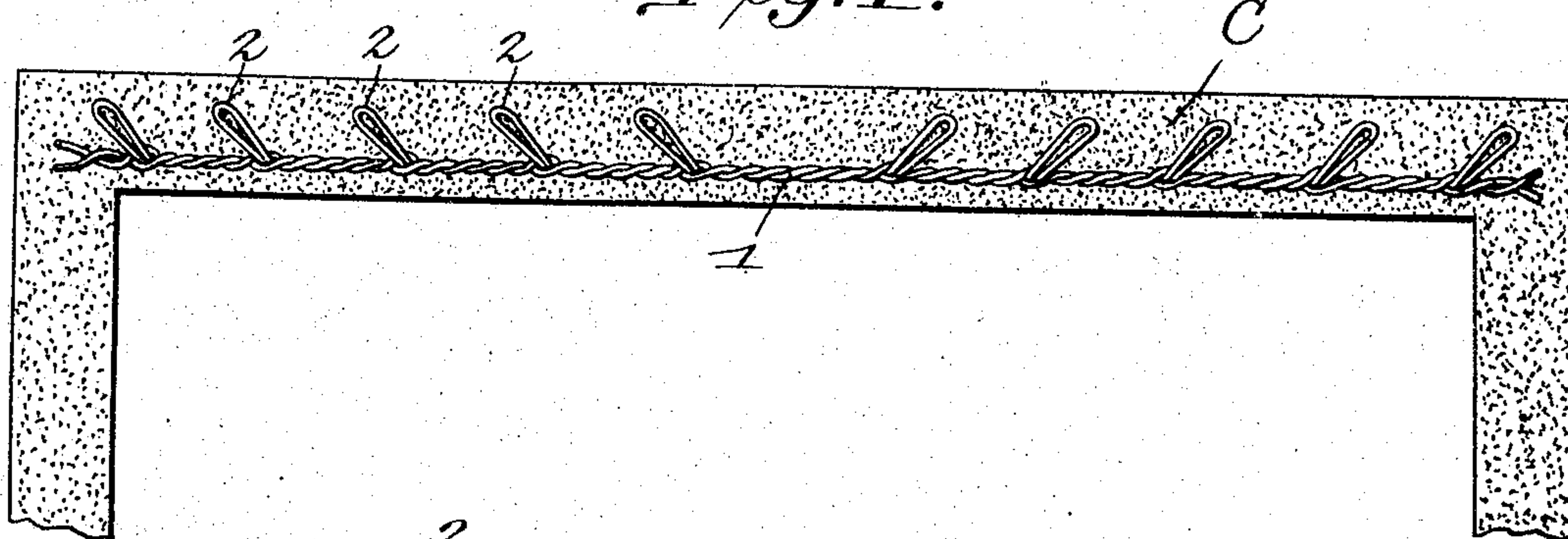
No. 781,086.

PATENTED JAN. 31, 1905.

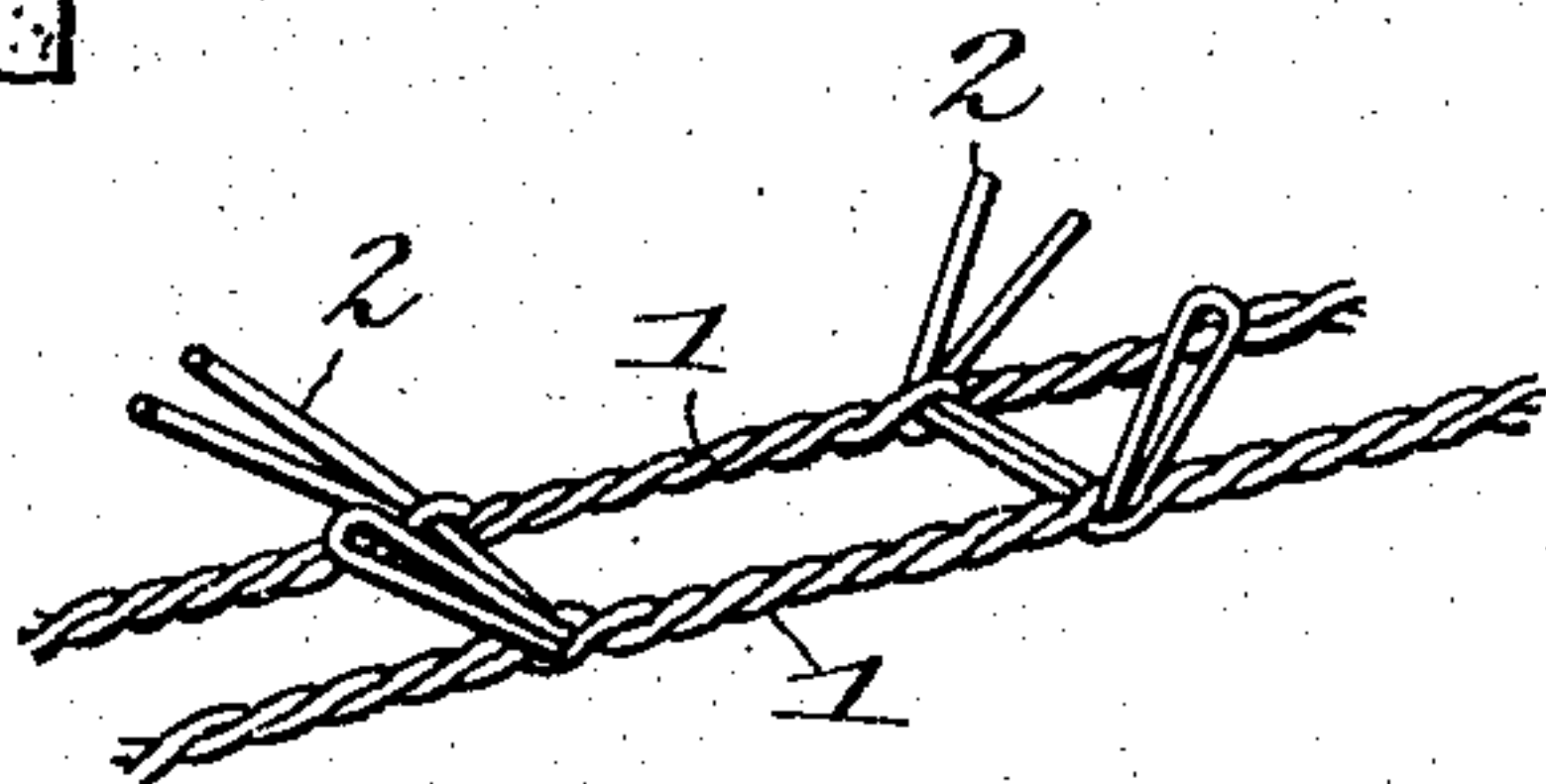
R. C. NEWHOUSE.  
REINFORCED CONCRETE STRUCTURE.

APPLICATION FILED APR. 8, 1904.

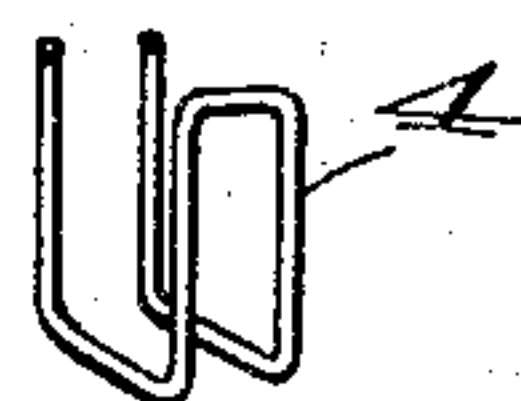
*Fig. 1.*



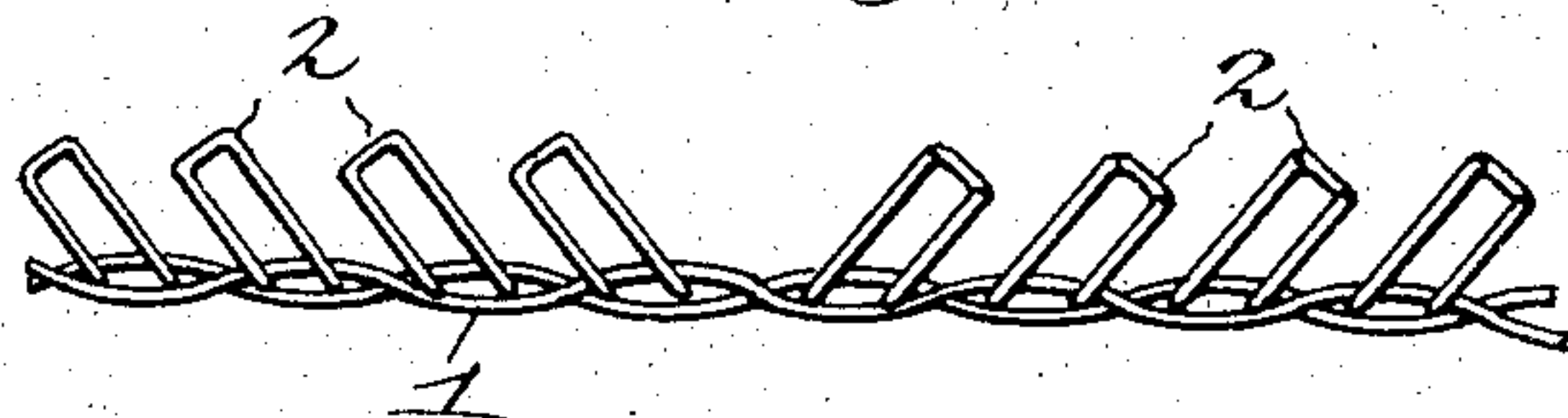
*Fig. 2.*



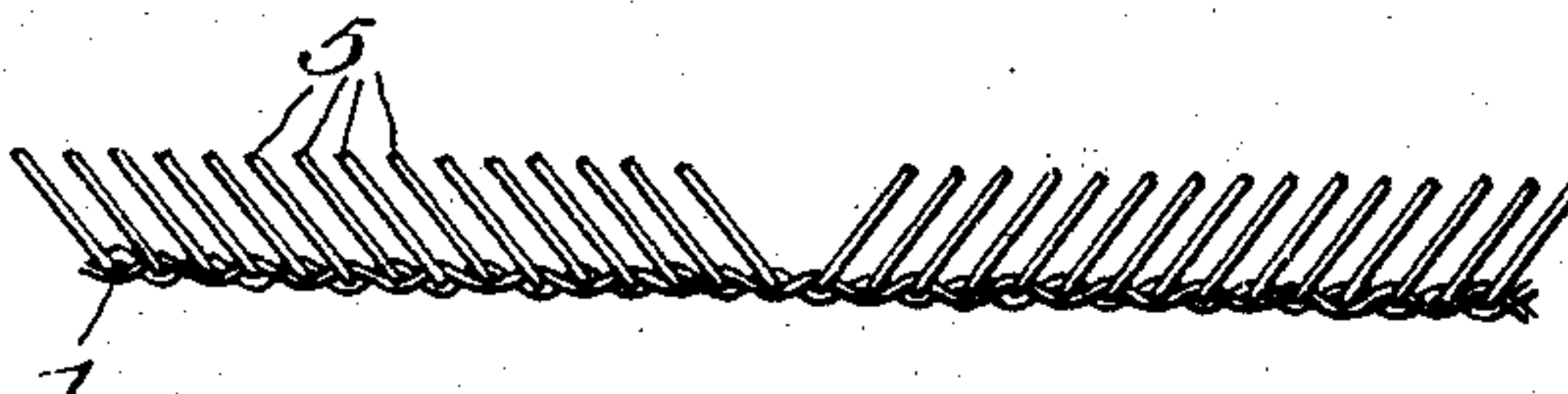
*Fig. 5.*



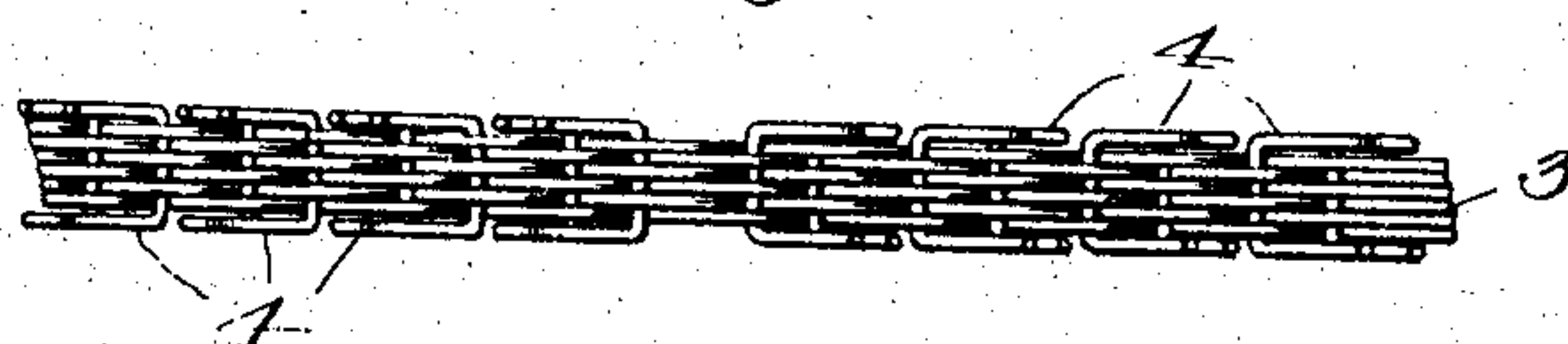
*Fig. 3.*



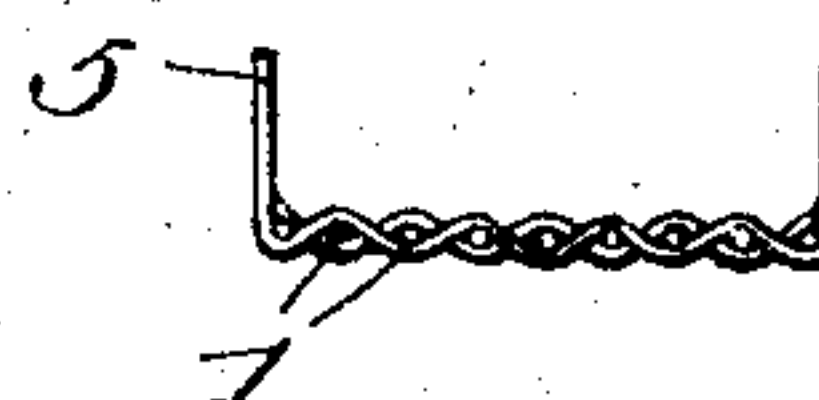
*Fig. 6.*



*Fig. 4.*



*Fig. 7.*



Witnesses:

*R. M. Elliott*  
R. M. Elliott.

*Ray C. Newhouse,*  
Inventor,  
by *C. A. Snow & Co.*  
Attorneys.



# UNITED STATES PATENT OFFICE.

RAY C. NEWHOUSE, OF COLUMBUS, OHIO, ASSIGNOR OF ONE-HALF TO  
SILVIO A. CASPARIS, OF COLUMBUS, OHIO.

## REINFORCED CONCRETE STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 781,086, dated January 31, 1905.

Application filed April 8, 1904. Serial No. 202,258.

*To all whom it may concern:*

Be it known that I, RAY C. NEWHOUSE, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Reinforced Concrete Structure, of which the following is a specification.

This invention relates to reinforced concrete structures.

The objects of the invention are in a thoroughly feasible and practical manner to increase the resistance of such structures against yielding under weight; to augment their tensile strength without objectionable addition to their weight; to obviate shear of the tension members; to render it possible without detracting from the strength of the structure, but on the contrary increasing its stability, to employ lighter tension and shear members, thereby reducing the cost of manufacture, and generally to improve structures such as defined.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of a reinforced concrete or other structure, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there are illustrated three forms of embodiment of the invention, each capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof, and in these drawings—

Figure 1 is a view in section exhibiting the manner in which the reinforce of the present invention is combined with a concrete beam. Fig. 2 is a perspective detail view of a portion of the reinforce shown in Fig. 1. Fig. 3 is a view in side elevation of another form of reinforce. Fig. 4 is a view in plan of a portion of the reinforce shown in Fig. 3. Fig. 5 is a perspective detail view of one form

of shear that may be employed in connection with either of the above tension members. Fig. 6 is a view in side elevation of another form of reinforce. Fig. 7 is a transverse section through Fig. 6.

As will hereinafter appear, by the novel arrangement of the tension and shear members employed there is positive provision made for preventing shearing at the ends of the structure.

As above stated, one of the objects of the present invention is to lighten the structure without detracting from its tensile strength or reducing its power to resist compression or yielding. This is effected by the employment of ordinary wire or rods, but by preference hard drawn steel wire or other metal, as it is well known that a drawn wire possesses much greater strength than a rolled bar of the same section. The metal used in the present instance is divided into several elements, and in case of a defect it is not at all probable that it will be found in more than one element at the same time, whereas if a solid bar were used a defect might extend entirely across the bar, and thus weaken the structure at that point. It is also well known that several small sections or elements have a higher tensile strength than one large bar of the same cross-section, and, further, that a steel wire with a cross-section of, say, one-eighth of a square inch has a relatively higher tensile strength than a bar of the same quality of steel with a cross-section of one square inch. These well-known facts are utilized in the present invention and result in the production of a structure that is lighter than those in ordinary use, but has greater power of resisting tensile strain, compression, and shearing. Furthermore, a much greater surface for the adhesion of the concrete is presented in proportion to weight and area, and owing to the fact that the elements composing the tension members are twisted or interwoven there is absolutely no chance whatever to slip when embedded in the concrete.

The term "concrete" is herein used in a generic sense to cover any kind of a compres-



sion member, it being understood that it is intended to include brick or stone and still be within the scope of the invention.

Referring to the drawings and to Figs. 1, 2, and 3 thereof, 1 designates the tension members, in this instance two in number, and 2 the shear members. Each tension member is constructed of a plurality of twisted wires or bars of metal, between the twists of which the shear members are secured, the latter being approximately rectangular in form and having their two arms disposed at an angle approximating forty-five degrees to the tension members and arranged at oppositely-disposed inclined angles with relation to each other from the center to the terminals of the tension members. The horizontal portion of each shear member, or that disposed between the tension members, constitutes a tie or brace for holding the tension members properly disposed with relation to each other, and the arms constitute anchors which coact with the tie members in taking a firm hold on the concrete or other material to be reinforced, and thus in a practical manner secure the function designed. The shear members may be constructed of a single piece of wire or bar of metal bent to the appropriate shape; but to present the greatest surface possible to the concrete or compression member C for adhesive purposes with a minimum of weight each of the shear members is formed by doubling the wire or bar upon itself and then bending it to the appropriate shape, the elements thus formed being spaced apart to permit the concrete to enter between them, and thus effect positive anchorage. By having the shear members inclined away from the center and toward the ends of the tension members shearing at the ends of the structure is positively prevented, and these parts are thus reinforced and rendered more stable than would be possible if the shear members were disposed at right angles to the tension members.

In the form of embodiment of the invention shown in Figs. 4 and 5 the tension member is constructed of a plurality of horizontally-disposed crimped or sinuous wires or bars 3, between which the spaces formed by the crimps of which are arranged the shear members 4, the latter being of the shape shown in Fig. 5, which is also the form used in connection with the structure shown in Fig. 3. By this man-

ner of assembling the shear members with the tension member the elements of the latter are positively held against separation, and the shear members are also positively held against detachment from the tension members, so that all of the members are interlocked and rendered thoroughly effective in use.

In the form of embodiment shown in Figs. 6 and 7 the tension member and shear members are formed from woven metallic fabric, the ends of what would be the filler in an ordinary woven fabric being turned up at the sides to form the shear members 5. This latter form of combined shear and tension member will be found particularly advantageous to use in light structures; but by making the wires sufficiently heavy it may be employed in any position where the form of device shown in Figs. 2 and 4 is employed.

It will be seen from the foregoing description that by constructing the tension member of twisted or otherwise assembled wires or bars danger of fracture of the members is reduced to a minimum, inasmuch as if one of the elements of the tension member be defective it is not probable that others will be, so that danger of yielding or breakage under strain is reduced to a minimum. Furthermore, added strength is imparted to the concrete structure with a minimum of weight, the manufacture of the structure is facilitated, and its cost materially lessened.

Having thus described my invention, what is claimed is—

A reinforce for concrete or other structures comprising a tension member composed of a pair of interwoven or twisted elements, and shear members each composed of a length of wire bent upon itself and formed into an open-sided rectangle, the sides of which constitute anchors and the base a tie, the tie being interlocked or interwoven with the tension members, and the anchors being wholly disposed at inclinations and oppositely from the center of the reinforce toward its terminals.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

RAY C. NEWHOUSE.

Witnesses:

E. C. WENDT,  
THOS. S. BROOKS.