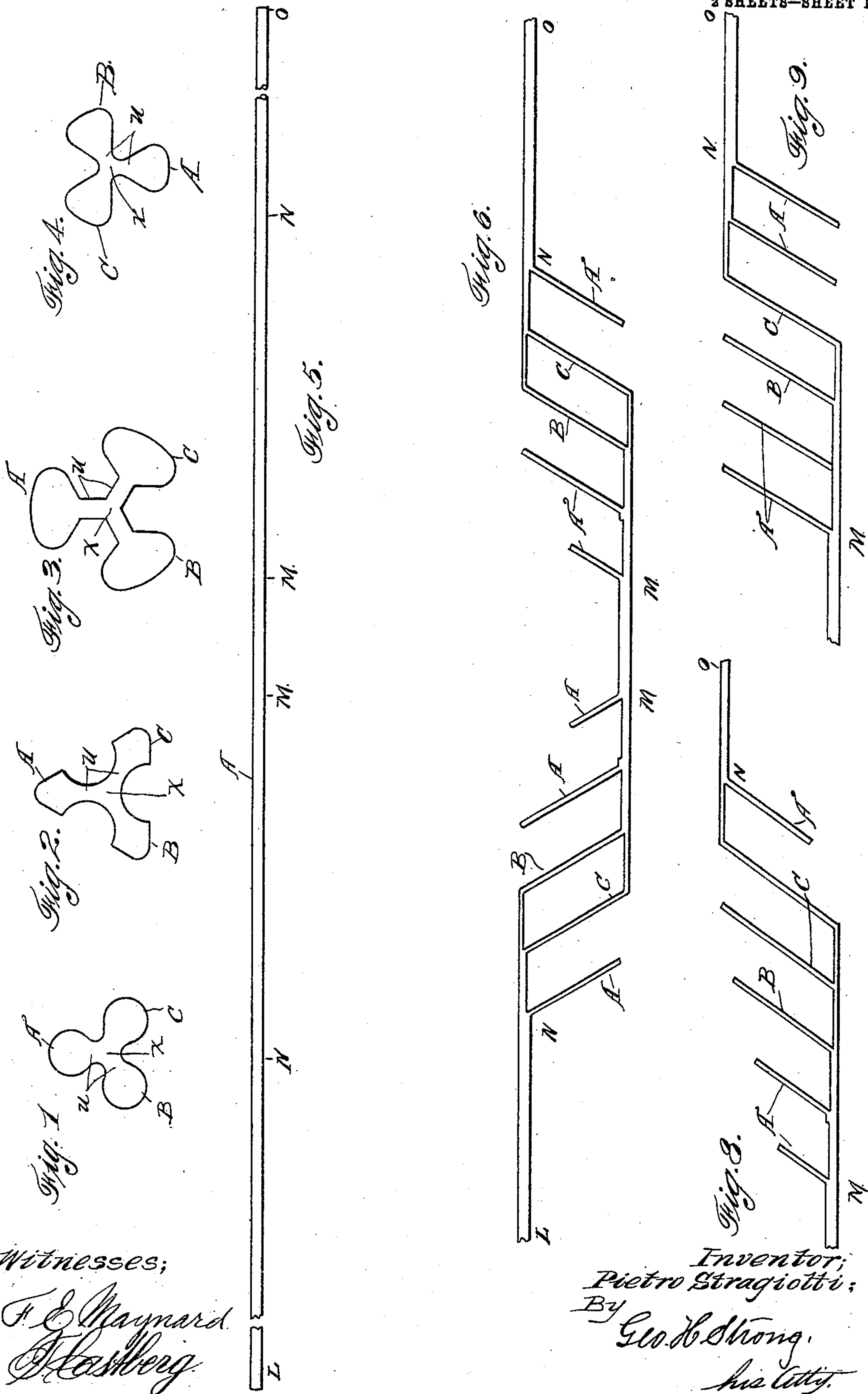


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 STRUCTURAL METAL SHAPE FOR REINFORCED CONCRETE CONSTRUCTION.  
 APPLICATION FILED MAY 27, 1909.

960,054.

Patented May 31, 1910.

2 SHEETS—SHEET 1.



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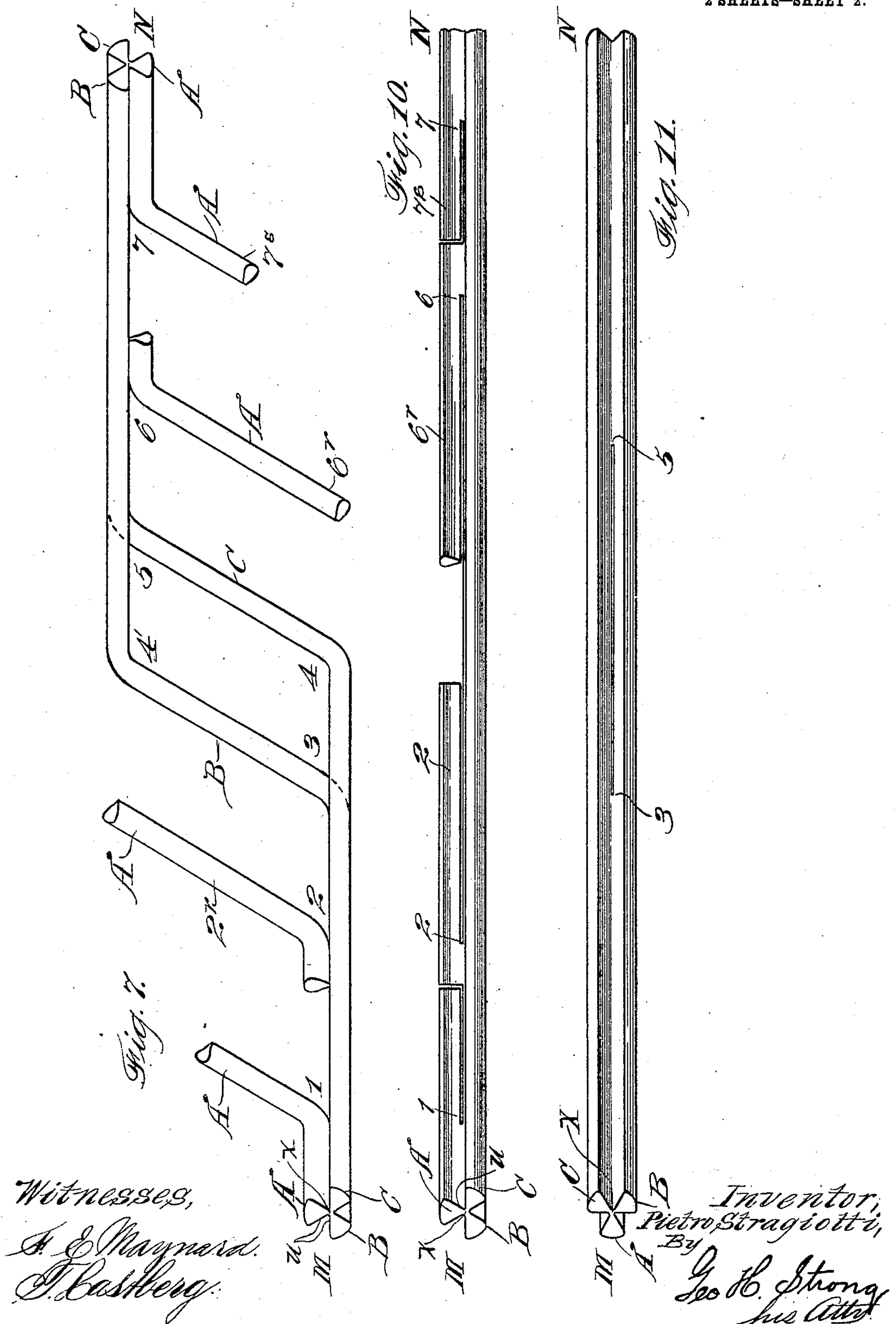
# STRUCTURAL METAL SHAPE FOR REINFORCED CONCRETE CONSTRUCTION.

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**2 SHEETS--SHEET 2.**





# UNITED STATES PATENT OFFICE.

PIETRO STRAGIOTTI, OF HURLEY, WISCONSIN.

STRUCTURAL-METAL SHAPE FOR REINFORCED CONCRETE CONSTRUCTION.

960,054.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed May 27, 1909. Serial No. 498,621.

*To all whom it may concern:*

Be it known that I, PIETRO STRAGIOTTI, citizen of Italy, residing at Hurley, in the county of Iron and State of Wisconsin, have  
5 invented new and useful Improvements in Structural-Metal Shapes for Reinforced Concrete Construction, of which the following is a specification.

My invention relates to reinforced concrete construction, and pertains especially to  
10 a bar that is easily manufactured in the factory, afterward to be expanded, if desired, into a structural metal shape, and is particularly adaptable to a variety of uses  
15 in conjunction with concrete.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and  
20 claimed, having reference to the accompanying drawings, in which—

Figures 1, 2, 3 and 4 are end views of a bar suitable for making my structural shape. Fig. 5 is a plan view of a bar representing the manner of dividing it off prior to expanding it into the shape of Fig. 6. Figs. 6,  
25 7, 8 and 9 are illustrative of the method of expanding the bar to form the shape. Fig. 10 is a side view of the bar illustrated in Fig. 7, after being split and before being  
30 bent into the form shown in Fig. 7. Fig. 11 is a plan view of the bar of Fig. 10 viewed from below.

As shown in Fig. 1, the bar comprises essentially three longitudinally extending,  
35 symmetrical ribs or fins A—B—C situated radially with respect to the body X of the bar and at about 120° from each other around this bar as an axis. These ribs are connected to the body of the bar by the web  
40 portions *u* which are of reduced thickness, so that they can readily be severed or slitted for the purposes hereinafter stated.

A complete bar with its lateral ribs A—B—C looks in some respects like three bars  
45 rigidly connected by relatively thin bands; and it therefore results that each of these ribs is easily separated from the others, so as to render it more or less independent, but at all times integrally connected with the  
50 bar.

The shape in cross-section of the bar may be varied, as shown in Figs. 2, 3 and 4, but in all instances the principle is essentially the same. These bars may be used in any  
55 suitable manner, they may be plain and un-

slitted, if desired, as reinforcing members in a concrete structure; and manifestly a bar of this sort possesses marked advantages over the plain ordinary bar, whether the latter is twisted or not, by reason of the fact  
60 that the channels between the ribs A—B—C form pockets to give an unusually good anchorage to the concrete. This anchorage is enhanced by twisting my bar. Any desired number of ribs, with reduced interconnecting webs might be used, I prefer the present arrangement, both as to economy of manufacture, and ease of manipulation. In  
65 Figs. 5, 6, 7 and 8, I have shown a method of utilizing this bar in concrete beams, girders, and similar constructions. As shown in Fig. 5, the bar is divided off into five parts L—N, N—M, M—M, M—N, N—O, the part M—M forming the middle of the structure of Fig. 6, the parts N—M and  
70 M—N forming the transversal rods, and the parts L—N and N—O at the ends forming the attachments for the ends of the beam or girder; all these parts, represented in Fig. 6, being integral and made from the one bar  
75 represented in Fig. 5, this bar in Fig. 5, it being understood, corresponding to one or other of Figs. 1 to 4, inclusive. An advantage results from the fact that the bar may be considered as a compound of several  
80 bars simply by longitudinally slitting the webs *u* and cutting through the ribs A or B or C at suitable points and bending or twisting the slitted parts into the shape shown in Fig. 6.

The method of slitting is graphically illustrated in Fig. 7, representing the portion from M to N of Fig. 5. Fig. 7 shows how the different ribs A—B—C of this portion M—N of the bar are cut and bent. The  
85 ribs B and C remain integral, though separated and bent to form the elbows 4—4', while the rib A is not only slit at different points from the others, but it is cut transversely so that its parts may be bent in the  
90 manner shown. In providing the portion of the structure represented in Fig. 7, the points 1, 2, 3, 4, 5, 6 and 7 are laid out on the bar between M and N. From 1 to 2 there is a longitudinal cut in the band or web *u* that  
95 connects the rib A to the rest of the bar, and at 2 the rib A is cut transversely and bent outwardly, as shown. Near the point 2 the web *u* is left untouched for a short distance as much as is required to guarantee the  
100 110



safety of the connection of the following portion 2<sup>r</sup> of the rib A remaining. From this point the cut on the web goes as far as point 6, but the transverse cut on rib A this time is at a point intermediate of points 2 and 6 to produce the two tension members 2<sup>r</sup>—6<sup>r</sup> which are bent oppositely, as represented. From point 3 to point 5 there is another cut or slit to separate rib B from C, these ribs then being bent in parallelism, as shown, and having the elbows 4—4' and determining the space between the upper and lower parts of the reinforcing shape. From 6 to 7 there is another longitudinal and also a transverse cut of rib A to obtain the tensional member 7<sup>s</sup>. It is to be observed that while the lower horizontal portion M of the shape is supposed to be in the position represented in Fig. 1, the upper horizontal portion of the shape, represented at N, is supposed to be in the position of Fig. 4; this being obtained by suitably twisting the two ribs B and C from 2 to 6 to get the desired shape. Figs. 8 and 9 represent other shapes which may be obtained from the same bar; and manifestly the character and number and form of these shapes can be varied indefinitely. However, in all instances the entire shape, comprising both the upper and lower horizontal members thereof, and the connecting bent portions and all shearing members are integral. The shapes which result in the forms of Figs. 6, 7, 8 and 9, or their analogues, are essentially expanded metal shapes, and with all upper and lower tension members and diagonal or transversal members integral.

The great advantage of this system of reinforce is that the reinforcing shape is one entire piece, without any auxiliary connections whatsoever. Consequently it can be relied upon for absolute safety, and no disconnection of the parts can occur. This results in the maximum of economy and ease in construction, handling and assembling of the material. By this reinforce the amount of steel at the bottom of the beam gradually decreases from the center of the span toward the ends, where it again becomes consolidated to form a solid, rigid anchorage. The steel follows a continuous line very close to the true lines of tension.

The ends of the shape where it is attached to the support may be made very solid, from the fact that not only the tensional members, but the attaching parts themselves are connected into one continuous piece, so that a continuous tensional line may be traced, never going out of the same piece of steel. Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A structural metal shape for reinforcing concrete construction, the central portion of said shape constituting a bar having a

plurality of ribs radiating from a common center, said central portion of the bar being in a plane parallel with and at one side of the plane of the remaining portion of the bar, and the central and end sections being longitudinally split and the split portions bent to form the ribs which integrally connect the said central and end portions.

2. A structural metal shape for reinforcing concrete construction, the central and the end parts of which are constituted by a bar provided with several ribs radiating from a common center, said central part being on a lower line, while the end portions are above on an upper line; said central and end parts being connected by tie-members, the several parts being integral to each other.

3. A structural metal shape for reinforcing concrete construction, said shape having its central part constituting a bar and having ribs radiating from a common center, said central portion being in a plane substantially parallel with and at one side of that of the end portions of the shape and the said ribs connecting the central and end portions to form tension members of the latter, said shape being longitudinally and transversely slitted and the slitted portions being bent to form said ribs, the ribs being spaced from each other and made integral with said central and end portions.

4. A structural metal shape for reinforcing concrete construction, the central part of which is constituted by a bar provided with several ribs radiating from a common center, said central part being on a lower line, while the end portions are made of tension members directed upward, which are obtained by means of longitudinal slits to separate each rib from the other together with transversal cuts on the ribs at the external end of each slit and by consequent bending upward of the ribs.

5. A structural metal shape for reinforcing concrete construction made in a single piece from a bar composed of ribs radiating from a common center and having reduced web portions connected to each other, said reduced web portions being slitted in longitudinal lines, the ribs remaining attached to the bar at one end of said slits, and said shape being obtained by expanding so that the end portions of the bar are in a different line from the central part, the end parts being connected to the central part by means of the bent ribs which act as tie-members.

6. A structural metal shape for reinforcing concrete construction made in a single piece from a multiple bar composed of ribs radiating from a common center, the middle and the end portions of said shape being on two parallel lines and constituted by said multiple bar, while the intermediate portions are obtained by separating the ribs from



each other by means of suitable longitudinal  
slits and of transversal cuts; said ribs act-  
ing either as tie-members between said mid-  
dle and end parts or as simple tension mem-  
5 bers connected at one end and free at the  
other, all members being integral to each  
other.

In testimony whereof I have hereunto  
set my hand in presence of two subscribing  
witnesses.

PIETRO STRAGIOTTI.

Witnesses:

ALBERT R. TAYLOR,  
JOS. J. FREDERICKSON.