No. 872,127. PATENTED NOV. 26, 1907.

J. F. HAVEMEYER.

REINFORCING MEANS FOR COMPOSITE STRUCTURES.

APPLICATION FILED JULY 20, 1907.

Fig. 2.

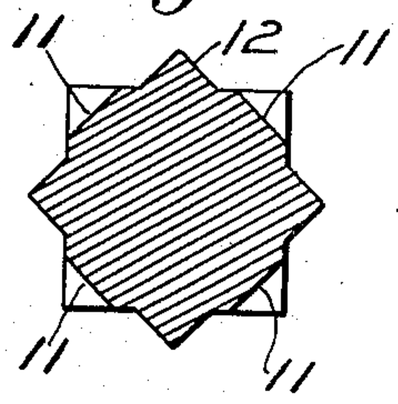


Fig. 1.

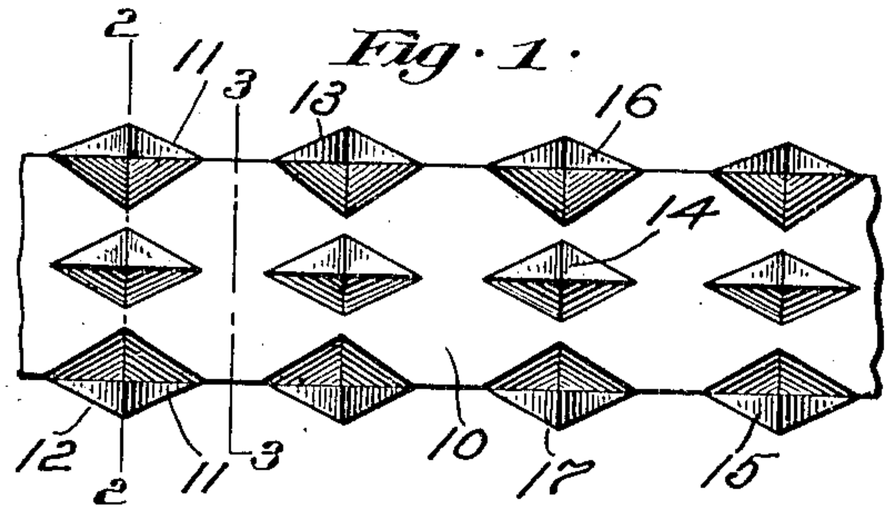


Fig. 3.

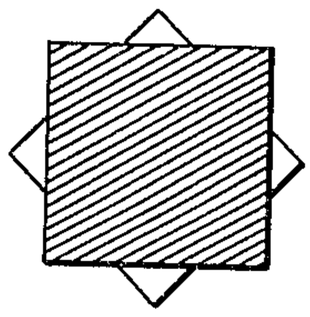


Fig. 5.

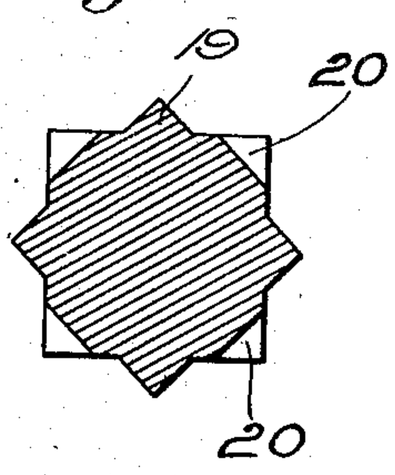


Fig. 4.

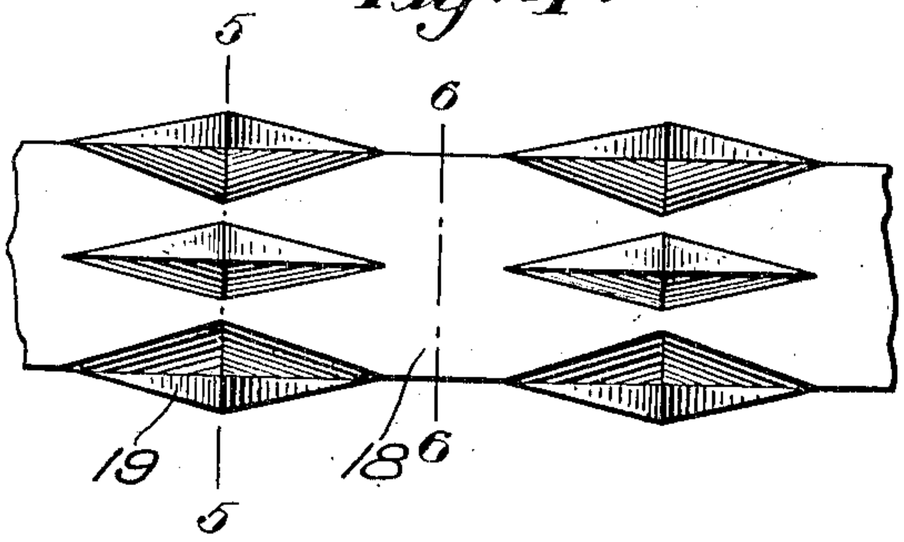


Fig. 6.

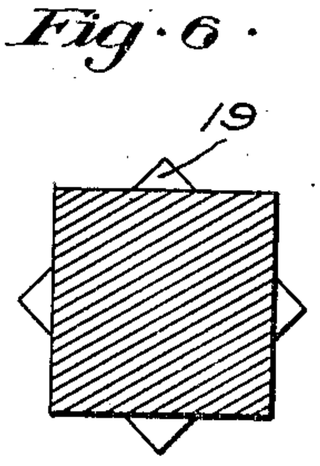


Fig. 10.

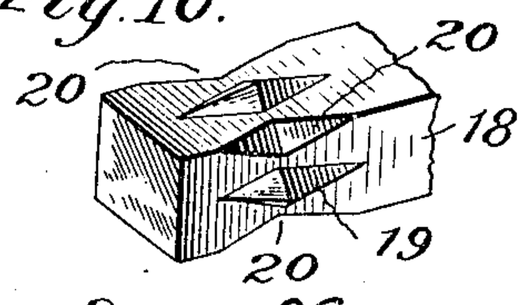


Fig. 8.

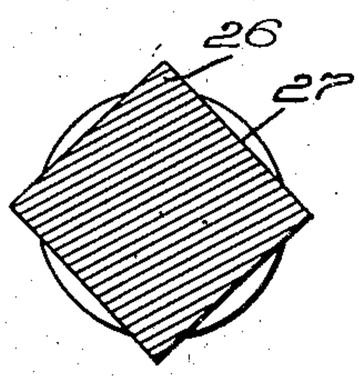
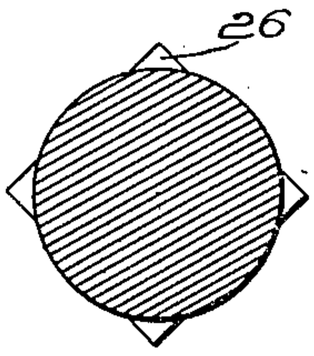


Fig. 9.



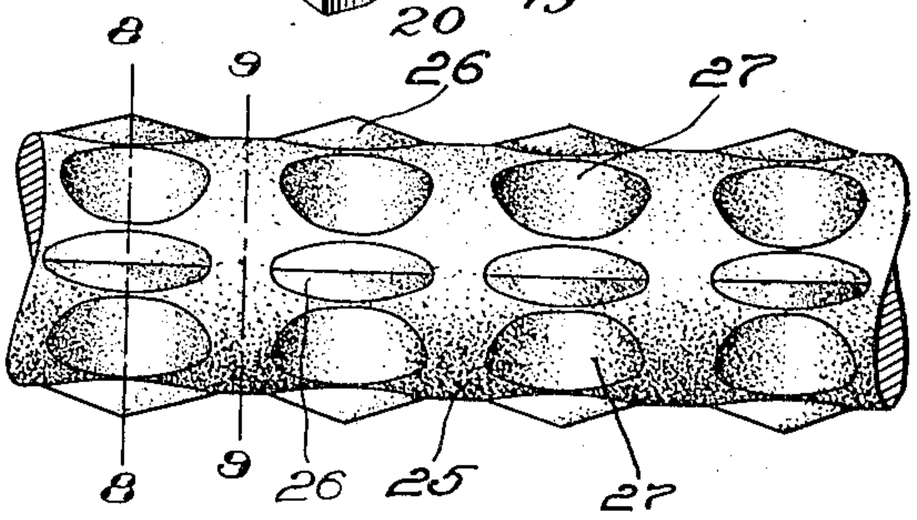


Fig. 7.

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Attys.

UNITED STATES PATENT OFFICE.

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REINFORCING MEANS FOR COMPOSITE STRUCTURES.

No. 872,127. Specification of Letters Patent. Patented Nov. 26, 1907.

Application filed July 20, 1907. Serial No. 384,757.

To all whom it may concern:

Be it known that I, JOHN F. HAVEMEYER, a citizen of the United States, and a resident of Ardsley-on-Hudson, in the county of Westchester and State of New York, have invented an Improvement in Reinforcing Means for Composite Structures, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to reinforcing means intended to be embedded in concrete and the like to contribute to the strength of the composite structure.

The invention consists in improved features of construction whereby reinforcing means may be given the requisite strength, may be conveniently manipulated, and economical in manufacture.

The character of the invention may be best understood by reference to the accompanying drawings, showing three different forms of bar or bond embodying the invention.

In the drawings,—Figure 1 is a side elevation of one embodiment of the invention; Figs. 2 and 3, transverse sections thereof on the lines 2—2 and 3—3, respectively; Fig. 4, a side elevation of a second embodiment; Figs. 5 and 6, transverse sections thereof on the lines 5—5 and 6—6, respectively, of Fig. 4; Fig. 7, a side elevation of a third embodiment; and Figs. 8 and 9, transverse sections thereof on the lines 8—8 and 9—9, respectively, of Fig. 7. Fig. 10 is a detail perspective, somewhat reduced in size, of the bar shown in Fig. 4.

Referring to Figs. 1, 2 and 3, a polyhedral bar 10 has, on one or more of its faces, projections 12, 12 produced by molding, compression, rolling or by any suitable process or means. Said bar is provided also with depressions 11 11 produced by any similar or other practicable process or means. The projections 12, 12 and depressions 11, 11, whether produced simultaneously or by separate, distinct processes or means, are so disposed and proportioned that the bar may remain of substantially uniform cross-sectional area throughout its length, the projections being mere adjuncts to the body, formed without necessary squeezing, twisting, flattening or otherwise distorting the greater part of the material of the bar; and being in every case compensated for by one or more depressions so as to maintain uniformity of cross-section and consequent uniformity of tensile strength. Thus the projections may contribute to the uniform strength of the bar, while obviating the wasteful use of material provided merely to form bonding projections, which is substantially superfluous so far as strength is concerned. Moreover, a bar of the character described may be formed by manipulating only a small proportion of the entire volume of the bar; and consequently the condition of the bar as a whole may be preserved, if desired, substantially unchanged whatever the process, or means, or state of the material employed.

By comparison of Figs. 2 and 3, it will be observed that successive cross-sectional areas along the length of the specific bar may be of polygonal form, each section having its sides disposed at an angle to the sides of the next. In this manner, the bar may be given a series of spirally arranged projections without twisting the bar, as, for example, by having projections such as 13, 14 and 15, and succeeding projections in the same line, disposed in a spiral series. At the same time, if desired, a plurality of projections, as 16, 14 and 17, may be arranged in the same perpendicularly transverse plane so that in the line where said plane intersects the inclosing concrete the bar will bind the latter at a plurality of points, as, for example, at the four points shown. Also, a plurality of projections, as 11, 13 and 16, may be disposed in the same longitudinal plane to provide various points of engagement between the bar and concrete where said plane intersects the latter.

The construction of the reinforcing means, as, for example, the projections and depressions described, is preferably such that no acute recesses are presented, into which it might be difficult to mold or otherwise apply the concrete or other enveloping material. For example, the surfaces of the illustrative bars shown in the drawings, including both projections and depressions, present only obtuse surface angles to the surrounding material. They therefore may not only provide for ready application of concrete or the like but may tend also to wedge themselves into firmer contact therewith in use.

Referring now to Figs. 4, 5 and 6, a bar 18, similar to the bar 10 of Figs. 1, 2 and 3, has somewhat elongated projections 19, 19 and

depressions 20, 20 which may serve the same purposes and be formed in the same manner as those hereinbefore described. The properties of the bar shown in Fig. 4 are substantially those of the bar shown in Fig. 1.

Referring to Figs. 7, 8 and 9, the main body of the bar 25 is shown as cylindrical, having its material manipulated to form projections 26 and depressions 27. As illustrated in Figs. 8 and 9, these alternating depressions and projections may give some cross-sectional areas intersecting them an angular form, as for example, the form of a square. When this occurs, however, it need not materially alter the linear dimensions or areas of the cross-sections since the average radius of the square section shown in Fig. 8 may exactly or approximately equal the radius of an adjacent circular section shown in Fig. 9.

It will be observed in the illustrative embodiment of the invention shown in the drawings that the original shape of the bar may be substantially preserved in spite of the distortions; that is to say, the bar is preferably not laterally extended to any extent whatever, as by hammering, compressing, squeezing or flattening the body of the bar, so as materially to distort its original shape. This is of advantage for reasons which will appear to those familiar with the art; for example, the flexing strength may remain substantially uniform to resist a force of any direction.

It will be observed in the illustrative embodiment shown in the drawings that adjacent deformations are separated by a surface which is itself separate from either deformation. When projections and depressions are thus separated more or less, the intervening surface may present a bonding wall or shoulder additional to those supplied by the deformations themselves. Also, such separation may to a greater or less degree permit a part of the original surface of a bar to be preserved against distortion with the resulting increased stress upon the distorted fibers. This is of material advantage, since it contributes to provide a maximum degree of uniformity and reliability in the strength of the bar.

It is to be understood that the scope of the invention is not essentially limited to the details of construction shown; nor is it indispensable that all the features of the invention be employed collectively since they may be used to advantage separately.

Reinforcing means embodying this invention may be used in forming composite structures in any usual or practicable manner, as by molding concrete about one or more of them.

Claims:

1. A reinforcing bar of any cross-section having along its length a plurality of groups of deformations, each group comprising a plurality of compensating depressions and projections arranged transversely of the bar, parts of projections and depressions in a group being separated transversely one from another by surfaces separate from the walls of either a projection or depression.

2. A reinforcing bar of any cross-section having along its length a plurality of groups of deformations, each group comprising a plurality of compensating depressed and projecting deformations arranged transversely of the bar, parts of projections and depressions in a group being separated transversely one from another by a portion of the original surface of the bar.

3. A reinforcing bar of any cross-section having a plurality of groups of deformations, each group comprising a plurality of compensating depressions and projections arranged thereon and partly separated transversely of the bar, the projections of adjacent groups being separated by a portion of the original surface of the bar.

4. A reinforcing bar of any cross-section having along its length a plurality of groups of deformations, each group comprising a plurality of compensating depressed and projecting deformations arranged transversely of the bar and on adjacent parts of the bar, each projection and each depression being surrounded by the original surface of the bar.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN F. HAVEMEYER.

Witnesses:
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HARRY L. MCGEE.