J. F. HAVEMEYER.

REINFORCING MEANS FOR CONCRETE

APPLICATION FILED DEC. 15, 1909.

1,151,947. Patented Aug. 31, 1915.

Fig. 1

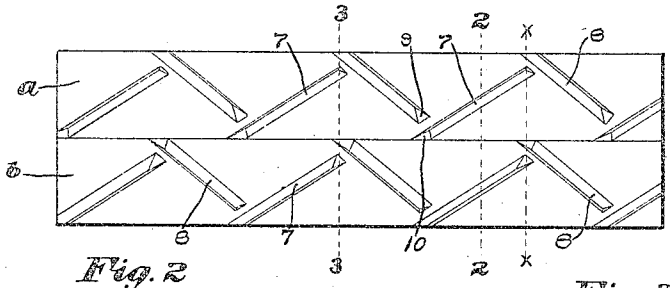


Fig. 2

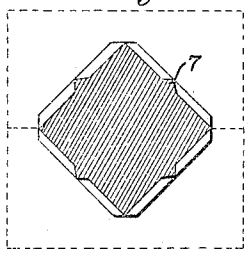


Fig. 3

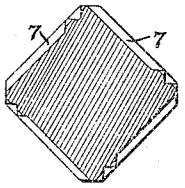


Fig. 4

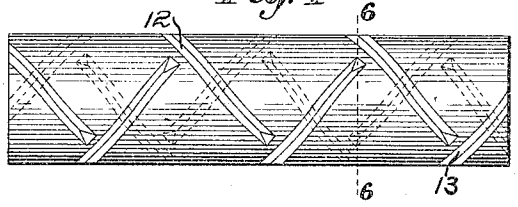


Fig. 6

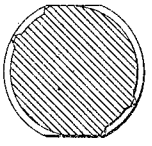


Fig. 5

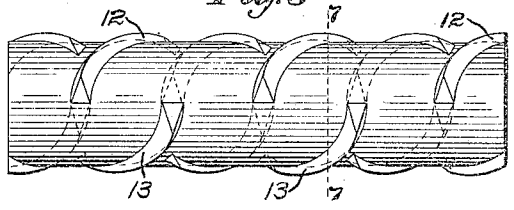
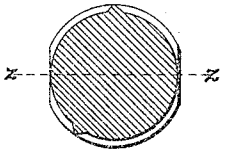


Fig. 7



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UNITED STATES PATENT OFFICE.

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REINFORCING MEANS FOR CONCRETE.

1,151,947. Specification of Letters Patent. Patented Aug. 31, 1915.

Application filed December 15, 1909. Serial No. 533,173.

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 Concrete, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

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

Among other objects, the invention is designed to provide a reinforcing bar, suitably deformed to afford effective bonds to engage the concrete, which shall be economical in manufacture and have uniform cross-sectional area throughout such part of its length as may be desired.

It has been attempted heretofore to use reinforcing bars having projecting bonds, of which adjacent projections on the same or contiguous surfaces of the bar merged into one another, more or less. Such a construction presented serious disadvantages, familiar to those skilled in the art; for instance, intersecting bonds are difficult to roll accurately, since the roll at the point of intersection of the individual bond grooves is likely to distort improperly the material of the reinforcing bar, so that the juncture of the intersecting bonds presents either a surplus of material which is wasted, aggregating a substantial value in the great quantity of material used in these bars, or else a lack of sufficient material to form the intersecting portions of the bonds, such lack leaving a weakness in the bar by reason of the diminished cross section at the point where the fault occurs. The present invention obviates all difficulties arising from such causes as have been suggested.

Another difficulty heretofore experienced in many types of bars has been caused by the fact that adjacent portions of mating rolls, which coöperate to form between them a deformed bar, have been required to shape or form projections or depressions on the bar by the conjoint action of said adjacent surfaces. It is a matter of common experience in rolling mills that the opposed coöperating rolls become offset in relation one to another, in such manner that forming grooves or the like on their contiguous faces will not register, and therefore will fail utterly to act conjointly with any accuracy.

It is one of the objects of this invention to provide a bar of such construction that it can be rolled as conveniently and accurately as otherwise, with offset rolls.

The character of the invention may be best understood by reference to the accompanying drawings, in which,—

Figure 1 is a cornerwise view of a bar which is substantially square in cross section; Fig. 2, a section on the line 2—2 of Fig. 1; Fig. 3, a section on the line 3—3 of Fig. 1; Fig. 4, a side view of a bar embodying the invention, which is substantially circular in cross section; Fig. 5 is a top view of the bar of Fig. 4; and Figs. 6 and 7 are sections respectively on the lines 6—6 and 7—7 of Figs. 4 and 5.

Referring to Figs. 1, 2 and 3, the bar there shown has preferably each of its faces provided with a plurality of projections 7—8, substantially isolated from each other in that each projection is formed upon, and entirely surrounded by, the surface of the bar, adjacent projections being separated by portions of the surface of the bar. With such an arrangement each projection is formed independently of the others by an isolated groove on the roll, and there being no intersection of such grooves, the difficulties pointed out above in respect to a roll of that character are entirely obviated.

Preferably each face of the bar has a plurality of projections 7—7, disposed obliquely to the length of the bar and parallel to each other; and also a plurality of projections 8—8 oblique to the length of the bar and parallel to each other, but staggered in relation to the projections 7—7. Preferably, also, the groups of projections 7—7 and projections 8—8 extend transversely to each other and both groups have substantially the same angular relation to the longitudinal median of their face. As a result of this construction, an endwise pull on the bar may cause a certain tendency to twist the bar by reason of the obliquity of one group, 7—7, which tendency will be corrected and compensated by an opposite tendency arising from the obliquity of the other group, 8—8.

It will be noted that each of the projections is formed wholly within the boundaries of a face of the bar; that is to say,

with particular reference to the polyhedral bar of Figs. 1, 2 and 3, none of the projections extends beyond a corner of the bar. In other words, one of the rolls for forming such a bar may have suitable grooves for the projections on one face, and those of an adjacent face may be formed by another roll independently of the first, there being no deforming of the bar by the conjoint operation of contiguous parts of the rolls. Thus the described construction of the bar permits the latter to be rolled in the manner illustrated by the dotted lines in Fig. 2, as accurately by offset rolls as by rolls which register with perfect accuracy.

In the illustrative construction of Figs. 1, 2 and 3 each projection contributes in some degree to the cross-sectional area of the bar. The projections, preferably in the form of ribs 7—7 and 8—8, are of equal and uniform cross-sectional areas throughout the greater parts of their lengths. At certain parts of the bar, however, as on the section 3—3 of Fig. 1, the cross section of the bar comprises part of the cross section of each of the projections 7 and 8, as shown in Fig. 3. In order to preserve uniformity of cross-sectional area at those points where such area includes parts of two or more projections, the latter are appropriately tapered as indicated at 9, 10. By an appropriate proportioning of the roll grooves, these tapers may be accurately so made that in any cross-sectional plane, the aggregate of the intercepted areas on the two tapers will equal the normal uniform cross-sectional area of the projections proper. By this arrangement it is provided, in the construction of Fig. 1, that the projections throughout the length of the bar contribute uniformly to the cross-sectional area of the bar as a whole, whether that cross-section be in a plane intersecting only a single projection on a face, or parts of two projections on a face. To express it differently, the volume of material projecting from a face in the Fig. 1 construction has uniform cross-sectional area throughout the length of the bar and this entirely independently of any other face or faces. This feature of construction permits the respective faces to be rolled, each independently of the others, and contributes to render it entirely immaterial that opposed rolls may be substantially offset and out of register.

Figs. 4, 5, 6 and 7 show the general construction and arrangement of Figs. 1, 2 and 3, as applied to a round bar. Assuming an axial plane *z*—*z* in Fig. 7, projections 12—12 and 13—13, preferably individually isolated, are disposed in the staggered groups already referred to, entirely on one side of the axial plane *z*—*z*; and corresponding groups may be disposed on the surfaces of the bar at the other side of said axial plane. This leaves an area throughout the length of the bar where the surface is intersected by said axial plane which may be entirely undisturbed in the rolling operation; that is to say, along those two diametrically disposed areas extending lengthwise the bar, no deformation takes place. This construction, as already explained, lends itself excellently to the rolling by opposed rolls, contiguous parts of which have only to preserve the undisturbed surfaces proximate the intersection of the axial plane *z*—*z*.

Each of the projections 12, 12 and 13, 13 has its ends appropriately tapered for the purposes already fully explained.

It will be evident to those skilled in the art that embodiments of the invention hereinbefore described for illustration possess many advantages not particularly pointed out.

Obviously, also, the invention is not limited to the precise constructions and organizations described; on the contrary, the invention may be variously embodied within the scope of the subjoined claim.

Claim:

A reinforcing bar having along its length and on one side of an axial plane thereof a plurality of separate groups of obliquely positioned projections, relatively staggered, each projection of one group transversely overlapping a projection of a group in staggered relation thereto and each projection being individually isolated by the normal surface of the bar, the overlapping and overlapped portions of the projections being shaped and relatively proportioned to preserve uniform cross-sectional area of projecting material on each side of the aforesaid axial plane.

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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