G. E. DALE & E. A. TUCKER.

DEFORMED BAR FOR REINFORCED CONCRETE CONSTRUCTION.

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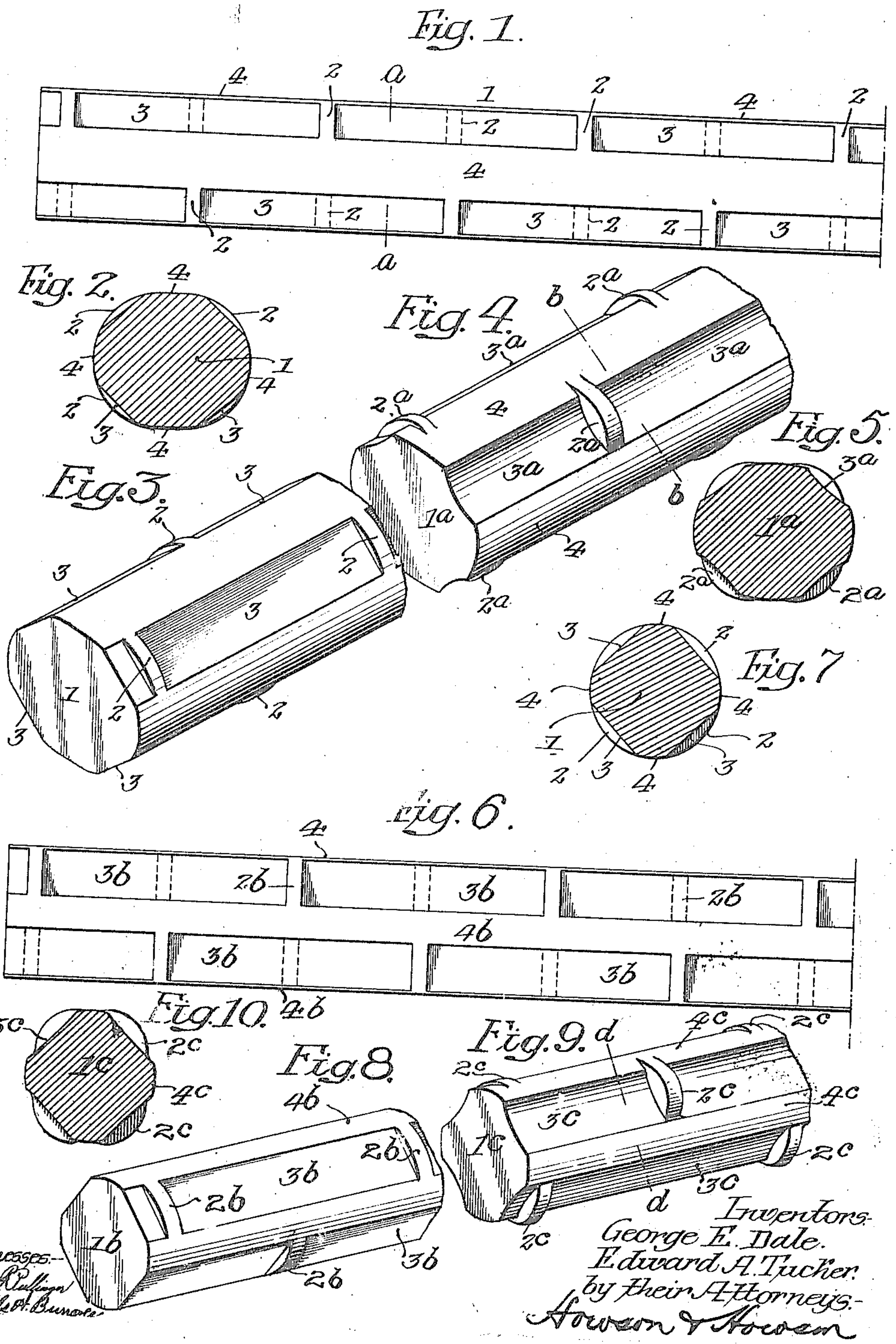

Witnesses:-

Inventors:
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by their Attorneys:-
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UNITED STATES PATENT OFFICE.

GEORGE E. DALE, OF TRENTON, NEW JERSEY, AND EDWARD A. TUCKER, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO PHILADELPHIA STEEL & WIRE CO., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

DEFORMED BAR FOR REINFORCED CONCRETE CONSTRUCTION.

1,164,477. Specification of Letters Patent. **Patented Dec. 14, 1915.**

Application filed September 9, 1913. Serial No. 788,829.

To all whom it may concern:

Be it known that we, GEORGE E. DALE and EDWARD A. TUCKER, citizens of the United States, and residents of Trenton, Mercer county, New Jersey, and Boston, Suffolk county, Massachusetts, respectively, have invented certain Improvements in Deformed Bars for Reinforced Concrete Construction, of which the following is a specification.

Our invention relates to reinforcing means for concrete construction, and it consists of certain improvements in deformed bars or rods, more fully described hereinafter and shown in the accompanying drawings, in which:

Figure 1, is a view in elevation of one form of bar embodying our invention; Fig. 2, is a cross sectional view of the same on the line *a—a*, Fig. 1; Fig. 3, is a perspective view of an end of the bar shown in Fig. 1; Fig. 4, is a similar perspective view of a slightly modified construction; Fig. 5, is a sectional view on the line *b—b*, Fig. 4; Figs. 6, 7 and 8, are views similar to Figs. 1, 2 and 3, of another form of bar within the scope of our invention; Fig. 9, is a perspective view illustrating a slight modification of the bar shown in Fig. 8, and Fig. 10, is a sectional view on the line *d—d*, Fig. 9.

The purpose of metallic reinforcing means is thought to be so well known as to require no extended discussion herein, and the object in using deformed bars is to increase the resistance to separation of the reinforcing bar from the mass of concrete under the strains of tension.

Our invention comprehends the use of bars of substantially the same cross-sectional area throughout their length with projections or fins to provide the necessary bond and offer the desired resistance to longitudinal movement in the mass of concrete. These projections may be disposed at staggered intervals throughout the length of the bars. In the bars shown, the projections are disposed in four rows at substantially diagonally opposite points with respect to the cross-sectional contour of said bars, and said projections may be and preferably are rounded. This construction offers no difficulty in the rolling of the bar with the projections formed integral therewith, although in practice, in the process of manufacture, the disposition of said projections may not always be at regular intervals throughout the length of the bars.

In the forms shown in Figs. 1, 2, 3, 4 and 5, the bar 1 is oval or substantially so in cross section, and the projections 2 are formed, in the type of bar shown in Figs. 1, 2 and 3, by the provision of flattened portions at intervals as indicated at 3, which surfaces may be at diagonally opposite points and may be at right angles to each other; paralleling the longitudinal axis of the bar. In the form of bar 1^a shown in Figs. 4 and 5, the projections 2^a are somewhat more pronounced due to the concaving of portions 3^a of the bar between the projections; the faces of said concaved portions paralleling the longitudinal axis of the bar. It will be noted that the projections 2, shown clearly in Figs. 2 and 3, follow the oval contour of the bar, while the projections 2^a shown clearly in Figs. 5 and 10, are slightly offset with respect to the concavities across which they extend. It may be noted that Figs. 1, 2 and 3, indicate an ideal condition, while Figs. 5 and 10, indicate a condition incident to the exigencies of actual manufacture. In either instance, the projections serve the desired function.

In Figs. 6, 7 and 8, a rounded or substantially circular bar 1^b is shown, and the projections 2^b of the same are formed in the same manner as those shown in Figs. 1, 2 and 3, the bar being provided with plane surfaces 3^b between the projections, which plane surfaces may be at right angles to each other and parallel the longitudinal axis of the bar.

In Figs. 9 and 10, a rounded or substantially circular bar 1^c is shown having the same general shape or contour and provided with projections 2^c; such bar differing from the bar shown in Figs. 6, 7 and 8, in the same manner that the bar shown in Figs. 4 and 5, differs from the bar shown in Figs. 1, 2 and 3.

In the form of bar shown in Figs. 1, 2, 3, 6, 7 and 8, the projections 2 and 2^b follow the oval or rounded contour of the bar and blend with longitudinally extending curved surfaces 4 and 4^a lying between the lines of the flattened portions 3 and 3^b.

In the forms of bar shown in Figs. 4, 5, 9 and 10, the projections 2^a and 2^c are offset slightly with respect to the oval or rounded contour of the bar, overlying in one part the curved surfaces 4^a and 4^c lying between the lines of the concaved portions 3^a and 3^c, and not meeting the other curved surfaces of the bars.

Since all of the bars are of substantially uniform cross sectional area throughout their length and have the friction producing means in the form of projections providing an added amount of metal, there is no difficulty presented in the operation of bending the same to form truss members, or danger of fracture during such bending, and either form of bar may be bent equally well around any axis. The disposal of the projections or lugs in the manner indicated, on planes at substantially forty-five degrees (45°) to the main axis of the bar, provides the necessary amount of frictional resistance to longitudinal movement and places said projections or lugs in the best position to develop and maintain the maximum bond with the concrete, without excess of metal.

Our improved form of bar has the increased perimeter which a square bar has, as compared with a round bar, and therefore, for a given area, a greater bonding surface than a round bar; without being open to the objection of the squared edges of a square bar. The elimination of squared edges avoids the formation of pockets and cracks in the concrete.

We claim:

1. A bar for reinforced concrete construction having its entire surface formed of alternating sections which are convex and concave, each forming a substantial portion of the periphery of the bar, with projections in staggered relation disposed at diagonally opposite points with respect to the same across the concave sections, the convex sections being substantially uninterrupted throughout the length of the bar.

2. A bar for reinforced concrete construction having its entire surface formed of alternating sections which are convex and concave, each forming a substantial portion of the periphery of the bar and extending longitudinally of the same, with projections in staggered relation disposed at diagonally opposite points with respect to the same across the concave sections, said projections overlying certain of the convex sections.

3. A bar for reinforced concrete construction of substantially oval cross section and having its entire surface formed of alternating sections which are convex and concave, each forming a substantial portion of the periphery of the bar, with projections in staggered relation disposed at diagonally opposite points with respect to the same across the concave sections, said convex surfaces having substantially the same superficial area as the concave surfaces and disposed between the same; all of said surfaces paralleling the longitudinal axis of the bar.

4. A bar for reinforced concrete construction of substantially oval cross section having its entire surface formed of alternating sections which are convex and concave, each forming a substantial portion of the periphery of the bar, with projections in staggered relation, said projections lying across certain of the surfaces transversely to the longitudinal axis of the bar and being of such dimensions as to overlap an adjoining surface at one end and stop short of an adjoining surface at the opposite end; said concave and convex surfaces having substantially the same superficial area and paralleling the longitudinal axis of the bar.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

GEORGE E. DALE.
EDWARD A. TUCKER.

Witnesses to the signature of George E. Dale:

M. M. GARRISON,
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Witnesses to the signature of Edward A. Tucker:

HENRY H. FOLSOM.
WALTER POWERS.