A. E. LINDAU.

REINFORCING BAR.

APPLICATION FILED DEC. 6, 1907.

931,322. **Patented Aug. 17, 1909.**

Fig. 1.

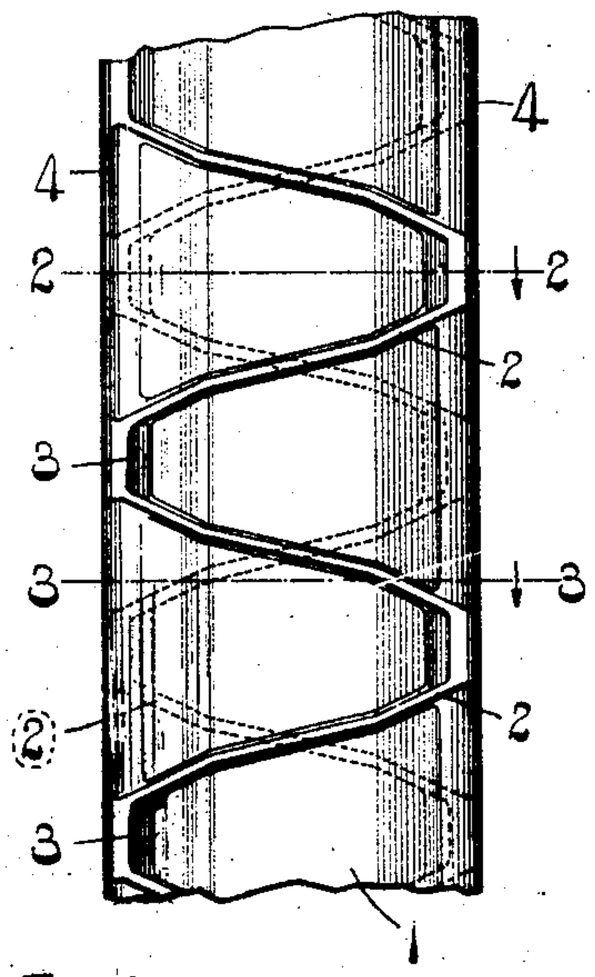


Fig. 2.

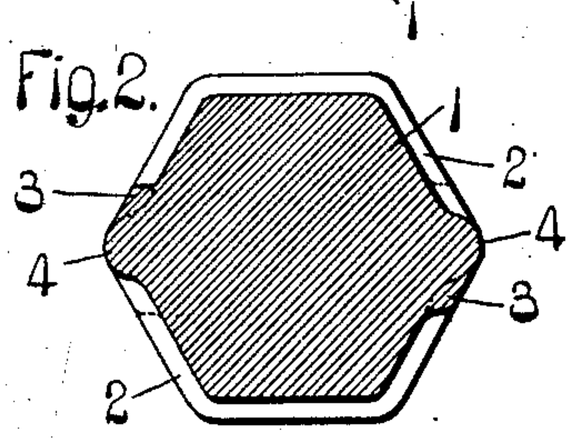


Fig. 3.

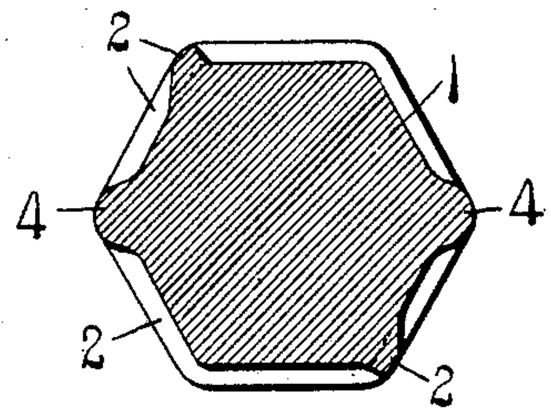


Fig. 4.

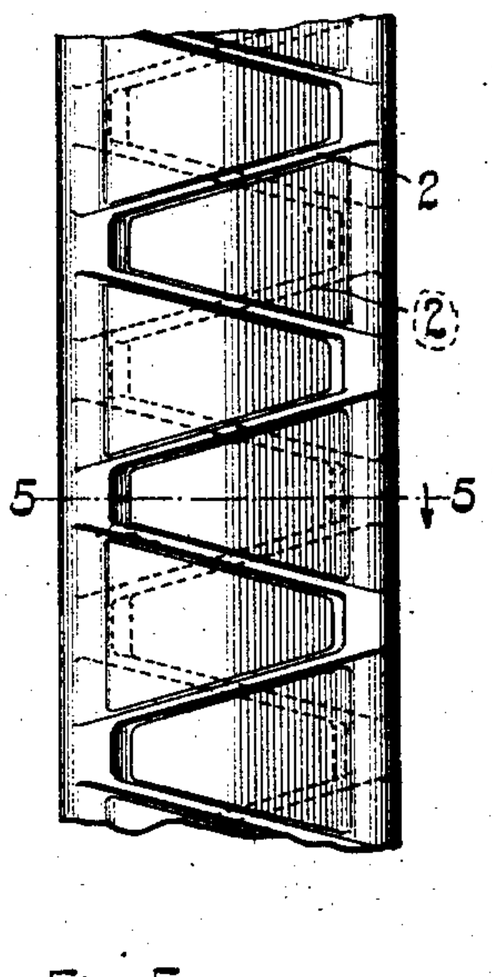


Fig. 5.

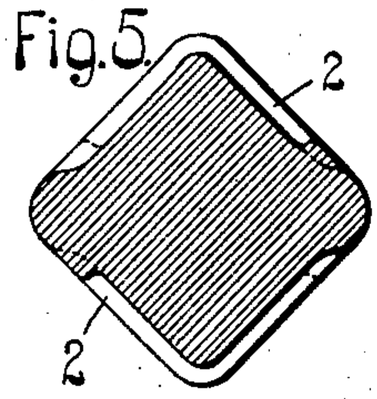


Fig. 6.

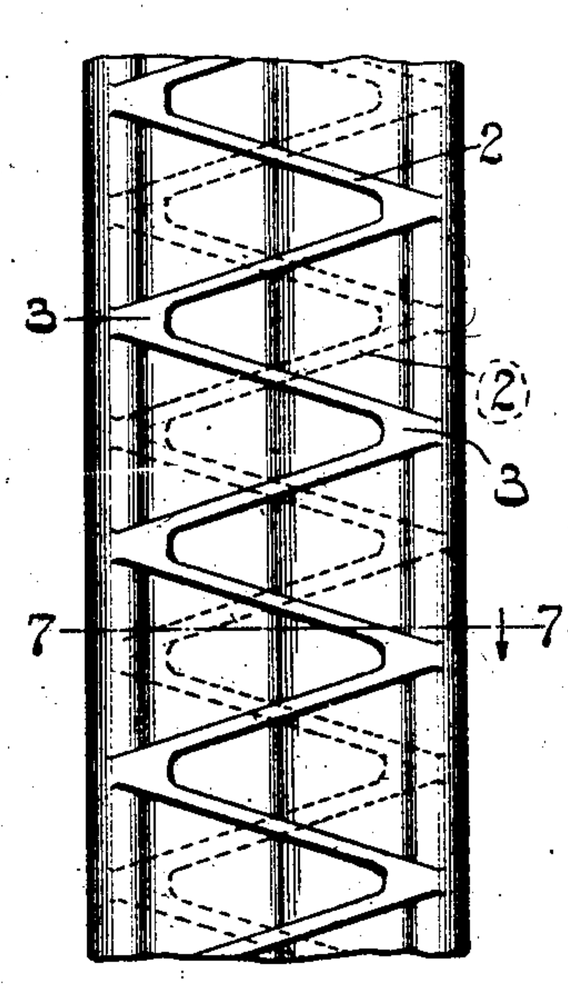


Fig. 7.

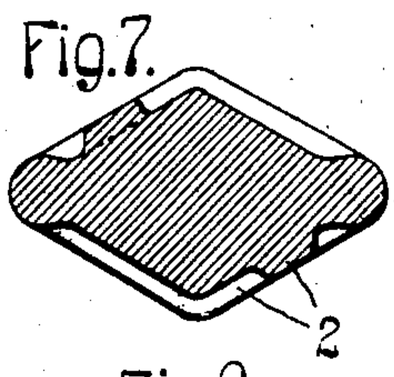


Fig. 8.

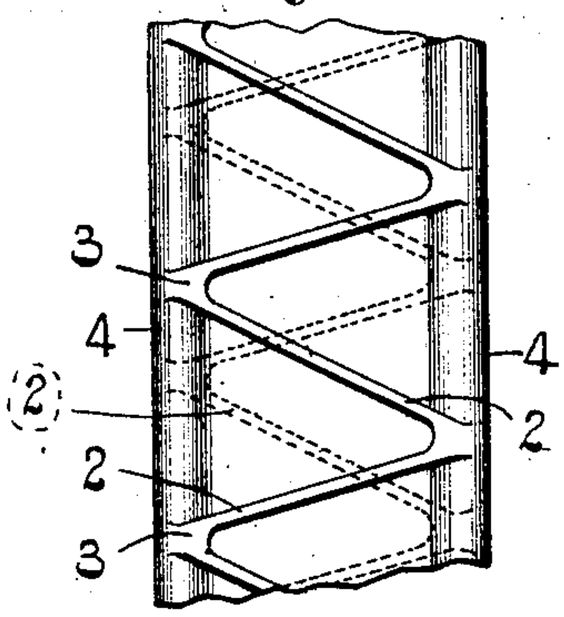
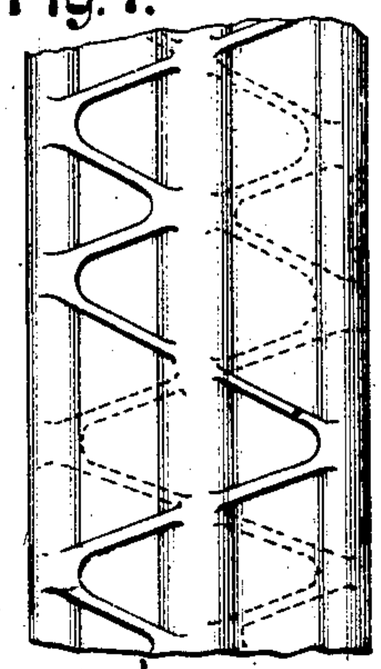


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

ALFRED E. LINDAU, OF ST. LOUIS, MISSOURI, ASSIGNOR TO CORRUGATED BAR COMPANY OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

REINFORCING-BAR.

No. 931,322. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed December 6, 1907. Serial No. 405,382.

To all whom it may concern:

Be it known that I, ALFRED E. LINDAU, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Reinforcing-Bars, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a reinforcing bar constructed in accordance with my invention; Fig. 2 is a cross sectional view of said bar taken on the line 2—2 of Fig. 1 and looking in the direction indicated by the arrow; Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 1; Fig. 4 is a side elevation of a bar of different shape in cross section from that shown in Fig. 1; Fig. 5 is a cross sectional view taken on the line 5—5 of Fig. 4; Fig. 6 is a side elevation of a slightly modified form of my invention; Fig. 7 is a cross sectional view taken on the line 7—7 of Fig. 6; Fig. 8 is a side elevation of another form of my invention; and Fig. 9 is a view similar to Fig. 4 of still another form of my invention.

This invention relates to reinforcing bars such as are used in concrete constructions for the purpose of strengthening same.

The main object of my invention is to provide a ribbed reinforcing bar that is of constant normal cross section throughout its entire length. To this end I have designed a metallic reinforcing bar that is provided on its exterior with ribs or projections which are so arranged that it will be impossible to sever the bar at any point without severing an equal number of ribs or projections on each side of the bar, thereby producing a bar in which there is an equal amount of material in each half of the bar. The ribs preferably extend diagonally of the longitudinal axis of the bar, and one-half of the ribs on each face or side of the bar are inclined oppositely to the other ribs on said side or face. The bar may be of any preferred shape in cross section and when a bar of non-circular shape in cross section is used each face of the bar may be provided with a set of ribs or each set of ribs can extend over several faces of the bar as hereinafter more fully described.

I have herein shown several bars of different shape in cross section and provided with ribs that are inclined at different angles but it should be understood that my invention is not limited to the constructions herein shown as the cross sectional shape of the bar and the angle at which the ribs are inclined is immaterial so far as my broad idea is concerned. It is preferable, however, to so arrange said ribs that their faces are inclined to the axis of the bar by an amount less than the angle of friction.

In Fig. 1 of the drawings I have shown a bar 1 of hexagonal shape in cross section provided on its two sides with sets of oppositely inclined diagonal ribs 2 that form a continuous bonding member, the ribs of each set extending across three faces of the bar and merging into fillets 3 that connect the ends of the oppositely inclined ribs of each set. The bar is also provided with two longitudinally extending beads 4 arranged at approximately the center of the bar and the ribs of each set extend continuously from the bead 4 at one edge of the bar to the bead 4 at the opposite edge of the bar. It will be noted that the bonding member forms a number of sinuses on the upper and lower half of the bar, and as said sinuses are open on one side air or water cannot become trapped in the sinuses on the under side of the bar during the operation of covering the bar with concrete. As shown in dotted lines in Fig. 1, the oppositely inclined diagonal ribs on one half or side of the bar are disposed oppositely to the ribs on the other half or side of the bar so that the bar will be balanced perfectly. That is to say, any particle of metal on a diameter is balanced by a symmetrical particle on the opposite half of the diameter. It is not absolutely necessary, however, that the sets of ribs on each half of the bar be arranged in alinement with each other for the bar would be just as strong if the set of ribs on one half of the bar were offset relatively to the set of ribs on the other half of the bar.

By arranging the ribs in the manner shown in Fig. 1 I produce a bar of constant normal cross section throughout its entire length for the same number of ribs on each half of the bar will be severed when the bar is cut or severed at any point as shown in Figs. 2 and 3 which are cross sectional views of the bar shown in Fig. 1. The ribs 2 not only strengthen the bar but also form bear-

ing faces in the concrete, thereby producing a substantial bond between the bar and the concrete in which it is embedded. Another advantage of a reinforcing bar of this construction is that it has no tendency to turn or rotate in the concrete for the ribs on one-half of each face or half of the bar are disposed oppositely to those on the same face or half of the bar.

The bar shown in Fig. 4 is of substantially the same construction as that shown in Fig. 1 except that the bar is square in cross section, the set of oppositely inclined diagonal ribs 2 on each half of the bar extending over two faces of the bar.

Fig. 6 shows a bar that is of approximately diamond-shape in cross section and the oppositely inclined diagonal ribs 2 on said bar merge into each other and have short fillets 3 interposed between their meeting ends.

Fig. 8 shows a square bar provided on its four corners with beads 4 and having a set of oppositely inclined diagonal ribs 2 extending over each face of the bar, the ends of the ribs merging into said beads and also being connected together by short fillets 3. As shown in dotted lines in said figure, the ribs on one half or side of the bar are offset relatively to the ribs on the other half of the bar. While I have herein shown the ribs on each half or side of the bar arranged at the same angle it will, of course, be obvious that the ribs on one half of the bar could be arranged at a different angle from those on the other half of the bar without departing from the spirit of my invention. In such a construction, however, it would be necessary to thicken the ribs of the greatest inclination to compensate for the increase in area cut by the normal plane as the angle between the diagonal rib and the normal plane decreases.

I also desire to have it understood that in my improved bar the ribs on one half of the bar do not form a continuation of the ribs on the other half of the bar; such for example, as would be produced if the bar were provided with a long spirally wound rib. Furthermore, it is not necessary that each face of the bar be provided with the same number of ribs. In Fig. 9 for example I have shown a square bar in which each half is provided with a set of long oppositely inclined diagonal ribs extending over two faces of the bar and a set of short oppositely inclined diagonal ribs extending over one face of the bar and arranged between the long ribs.

I prefer to form ribs on each face of the bar but if desired some of the oppositely disposed faces of the bar could be formed smooth and the other oppositely disposed faces provided with oppositely inclined diagonal ribs.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A metallic reinforcing bar for concrete structures provided with a plurality of longitudinally extending zig-zag ribs that lie on opposite sides of the bar, said ribs being staggered relatively to each other so that the inclined portions of one of said zig-zag ribs lie intermediate the inclined portions of the other zig-zag rib instead of in transverse alinement therewith; substantially as described.

2. A reinforcing member for concrete structures consisting of a metal bar provided with longitudinally extending beads, and long zig-zag ribs on opposite sides of the bar, each of said long zig-zag ribs being located between two of the longitudinally extending beads and the zig-zag rib on one side of the bar being arranged staggered relatively to the other zig-zag rib; substantially as described.

3. A metallic reinforcing bar for concrete structures provided with a plurality of longitudinally extending beads that divide the surface of the bar into independent sections or faces, a long zig-zag rib extending longitudinally of the bar on each of said faces between two of said beads, and fillets connecting the ends of the inclined portions of said ribs together, the zig-zag rib on one face of the bar being staggered relatively to the zig-zag rib on the opposite face of the bar; substantially as described.

4. A reinforcing member for concrete structures, consisting of a metal bar provided with longitudinally extending beads that divide the surface of the bar into independent sections or faces, and a long zig-zag rib on each face of the bar arranged between said longitudinal beads, the zig-zag rib on one face of the bar lying substantially midway and parallel to the zig-zag rib on the other face so that said ribs are entirely removed from each other; substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this fourth day of December 1907.

ALFRED E. LINDAU.

Witnesses:
WELLS L. CHURCH,
GEORGE BAKEWELL.