K. R. SCHUSTER.

METAL BAR OF CURVED CROSS SECTION.

APPLICATION FILED MAY 2, 1921.

1,428,561. Patented Sept. 12, 1922.

Fig. 1.

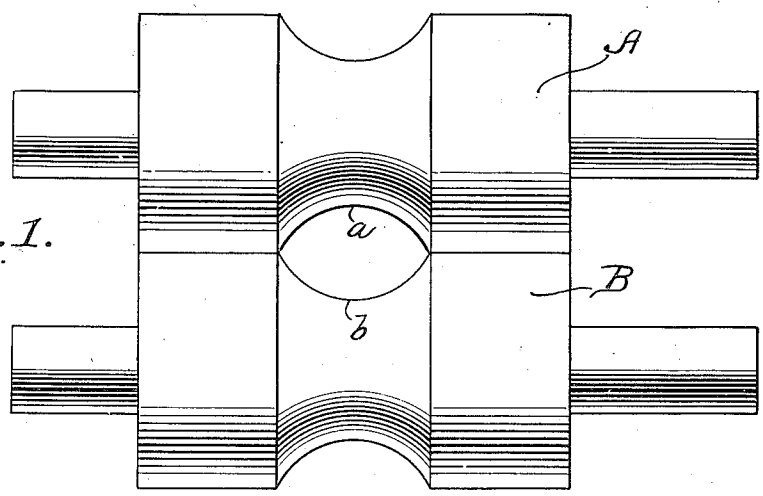


Fig. 2.

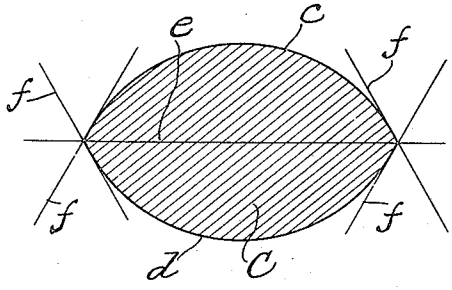


Fig. 3.

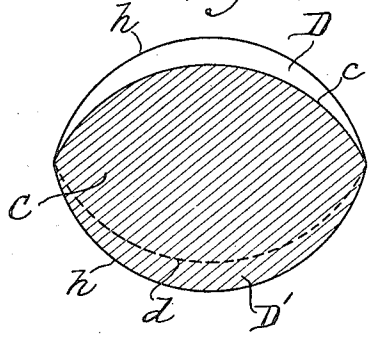
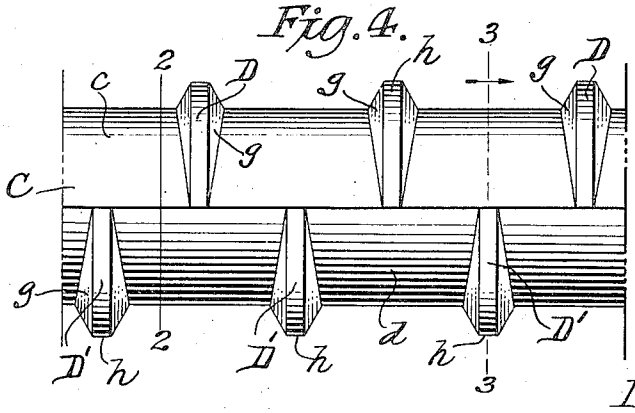


Fig. 4.



Inventor,

Karl R. Schuster

By N. J. Bernhard Attorney.

Patented Sept. 12, 1922. 1,428,561

UNITED STATES PATENT OFFICE.

KARL R. SCHUSTER, OF NEW YORK, N. Y.

METAL BAR OF CURVED CROSS SECTION.

Application filed May 2, 1921. Serial No. 466,037.

To all whom it may concern:

Be it known that I, KARL R. SCHUSTER, a resident of the city of New York, borough of Manhattan, county and State of New York, have invented certain new and useful Metal Bars of Curved Cross Section, of which the following is a specification.

My invention pertains to metal bars which are essentially curved in cross section, and it involves a bar of novel cross section adapted to be rolled without binding in the pass of the rolls due to the undesirable frictional contact of the metal with the surfaces of the roll pass.

The bar is useful, more particularly, in structural work and for reinforcing concrete building materials, the specified utility requiring a bar which possesses a certain tensile strength, the surface of which bar permits the more or less plastic material to pass or flow freely beneath said bar when installed in a horizontal, or approximately horizontal, position so as to become embedded within the concrete material, and the surfaces of which bar present deformations of a character requisite to secure a desired bonding effect with the concrete material within which the bar is embedded, partially or wholly, as required by the work in hand.

Heretofore in the art of rolling bars of circular cross section it has been found that the metal binds in the roll pass adjacent the meeting surfaces of the rolls owing to the fact that the contact between the surface of the metal bar and the surface of the roll grooves next to the meeting surfaces of said rolls are on lines perpendicular to the horizontal axis of the bar being produced, and the foregoing objection applies, also, to bars of elliptical cross section.

The object of this improvement is to produce a bar especially adapted for structural purposes which is adapted to be rolled without the difficulty of the metal binding within the roll pass due to an undesirable frictional contact of such metal within the roll pass adjacent the meeting surfaces of said rolls.

The bar rolled by the action of appropriate rolls is characterized in cross section by two reversed curves which meet or intersect each other in the plane of the major axis of the bar, the contact of the rolled metal with the surfaces of the roll pass adjacent the meeting surfaces of the roll being of such a form that a tangent to the curves is inclined at an angle to the major axis of the roll pass. This formation of the roll pass enables the bar to be rolled without the metal having undue frictional contact with the surfaces of the pass in the rolls in the regions adjacent the meeting surfaces of the rolls, as a result of which the bar is given the required cross sectional form and dimensions without the metal binding in the roll pass adjacent the meeting surfaces of said rolls.

The rolled bar of the required cross section is provided with deformations to have the required bond in the concrete material. Said deformations take the form of ribs, the outer surfaces or edges of which are curved.

In the drawings,

Figure 1 is an elevation of co-operating rolls suitable for the production of a bar in accordance with my invention.

Figure 2 is a cross section on an enlarged scale through the bar on the line 2—2 of Figure 4.

Figure 3 is a cross section through the bar on the plane of one rib and as indicated by the dotted line 3—3 of Figure 4.

Figure 4 is a side elevation of the bar provided with deformations of a particular character.

Referring to Figure 1, A B are the co-operating rolls provided with registering grooves *a*, *b*, which constitute the roll pass. In cross section, each groove is a curve less than a semi-circle, the curve of each groove crossing or intersecting the other groove in the plane of the meeting surfaces of the rolls, which plane corresponds to the major axis of the pass.

C is the bar produced by the action of the rolls upon the metal confined within the roll pass. In cross section, the surfaces of the bar are bounded by curves *c*, *d*, each less than a semi-circle, said curved surface *c* being reversed to the curved surface *d*, and said reversed curves crossing and intersecting one with the other in the plane of the major axis, indicated by the line *e* in Figure 2.

In the operation of producing a bar by the action of rolls having a pass of the formation depicted in Figure 1, the surfaces of the metal confined within the pass and subjected to the rolling pressure of said rolls is in contact with the surfaces of the pass *a*, *b*, so that the contact between metal and

rolls in the areas adjacent the meeting surfaces of said rolls will be of such character that there is no undue friction which results in binding. A tangent to the curve indicated at *f*, Figure 2, is inclined at an angle to the major axis *e* of the bar, see Figure 2. The peculiar cross sectional form of the bar produced by the action of the rolls having the pass *a*, *b*, enables the bar to be rolled without undue frictional contact in the areas adjacent the meeting surfaces of the rolls, and, accordingly, my invention enables bars curved in cross section to be produced rapidly, economically and without experiencing that tendency of the metal to bind in the roll pass usually met with in rolling bars of circular or elliptical cross section wherein the metal adjacent the meeting surfaces of the rolls has contact with the surfaces of the roll pass on lines perpendicular to the horizontal axis of the pass or the transverse diameter of the resulting circular or elliptical bar.

The bar is provided with ribs D D′ in staggered or alternate order and projecting from opposite sides of the bar, each rib having side faces *g* inclined as shown in Figure 4, and converging toward the curved surfaces *c*, *d*. The outer surfaces *h* of the ribs are curves of a radius less than a semi-circle, the curves *h* of the ribs being eccentric to the curves *c*, *d*, see Figure 3, and the curved surface *h* of one rib D being in a plane which at the ends crosses or intersects with the curves *h* of the ribs D′, as also shown in Figure 3, so that the ribs D D′ are adapted to be rolled with the bar in a manner to obviate binding contact of the metal with the surfaces of the roll pass in the regions adjacent the meeting surfaces of the co-operating rolls.

The bar shown and described is adapted for use in concrete construction work, wherein the ribs D D′ are bonded with the concrete in a manner to interlock therewith and anchor the bar against movement under the stresses applied to the concrete material. When laying the bar in a horizontal position, and dumping the wet concrete upon it, as is usually practiced in the installation of the bars, the more or less plastic material is free to flow by gravity below the curved surfaces of the bar so as to become bonded effectively therewith.

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

1. A reinforcing bar provided at definite intervals with deformations protruding from the surfaces of the bar, said bar in the intervals intermediate the deformations being of curved cross section and the surfaces of which are bounded by two reversed curves which meet in the plane of the major axis of the bar.

2. A cross sectionally curved bar the surfaces of which are bounded by two reversed curves which cross each other in the plane of the major axis of said bar, and ribs integral with the bar the outer surfaces of said ribs being curved to occupy an eccentric relation to the curved bar surfaces and which outer curved rib surfaces meet the curved surfaces of the bar in planes corresponding to the major axis of the bar.

In testimony whereof I have hereto signed my name this 29th day of April, 1921.

KARL R. SCHUSTER.