

No. 815,620.

PATENTED MAR. 20, 1906.

W. MUESER.  
CONCRETE STEEL CONSTRUCTION.  
APPLICATION FILED JUNE 23, 1905.

Fig. 1.

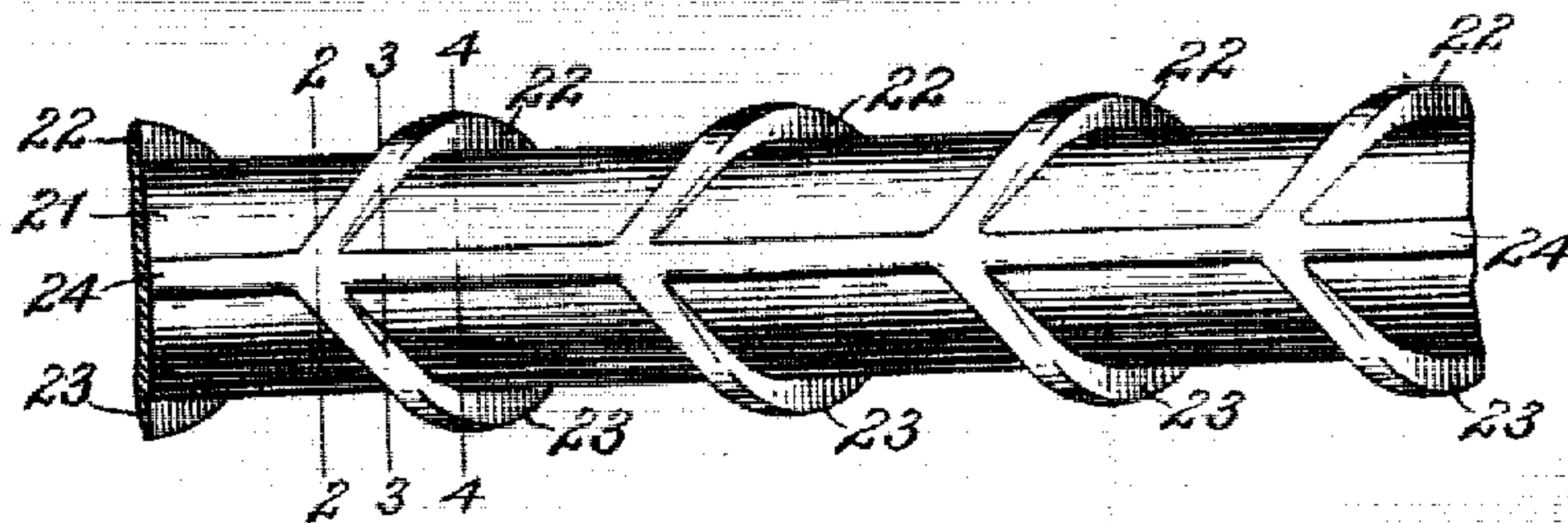


Fig. 2.

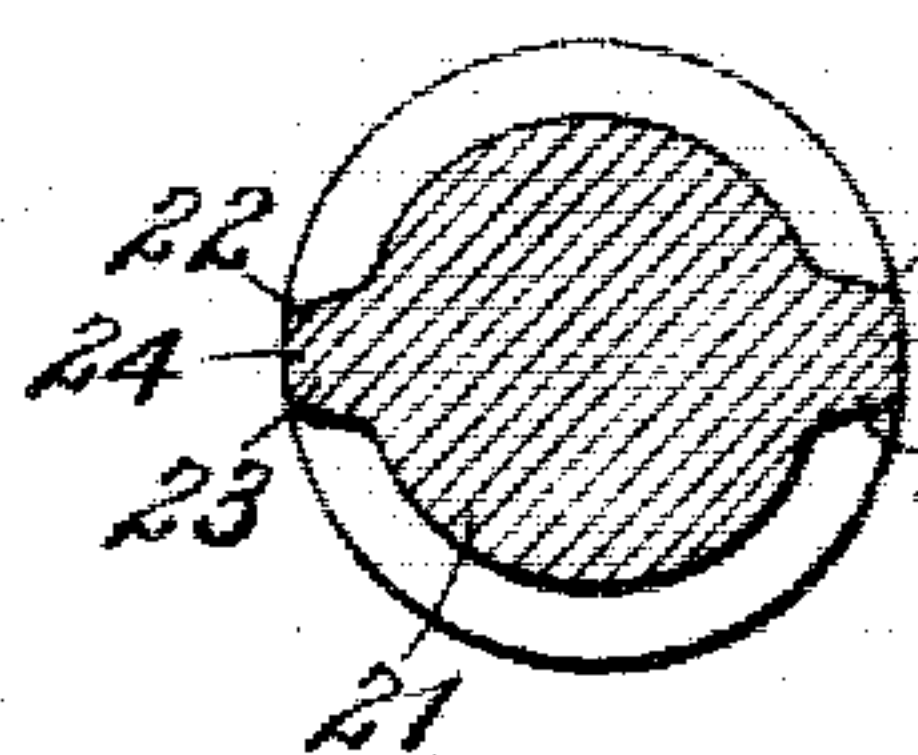


Fig. 3.

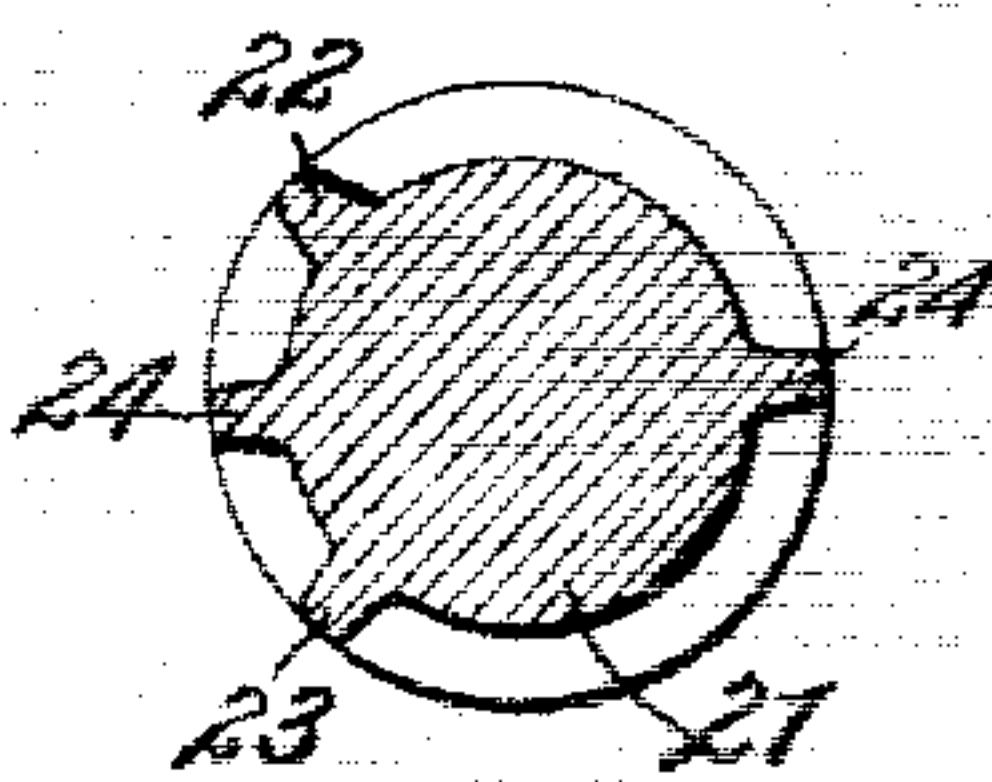


Fig. 4.

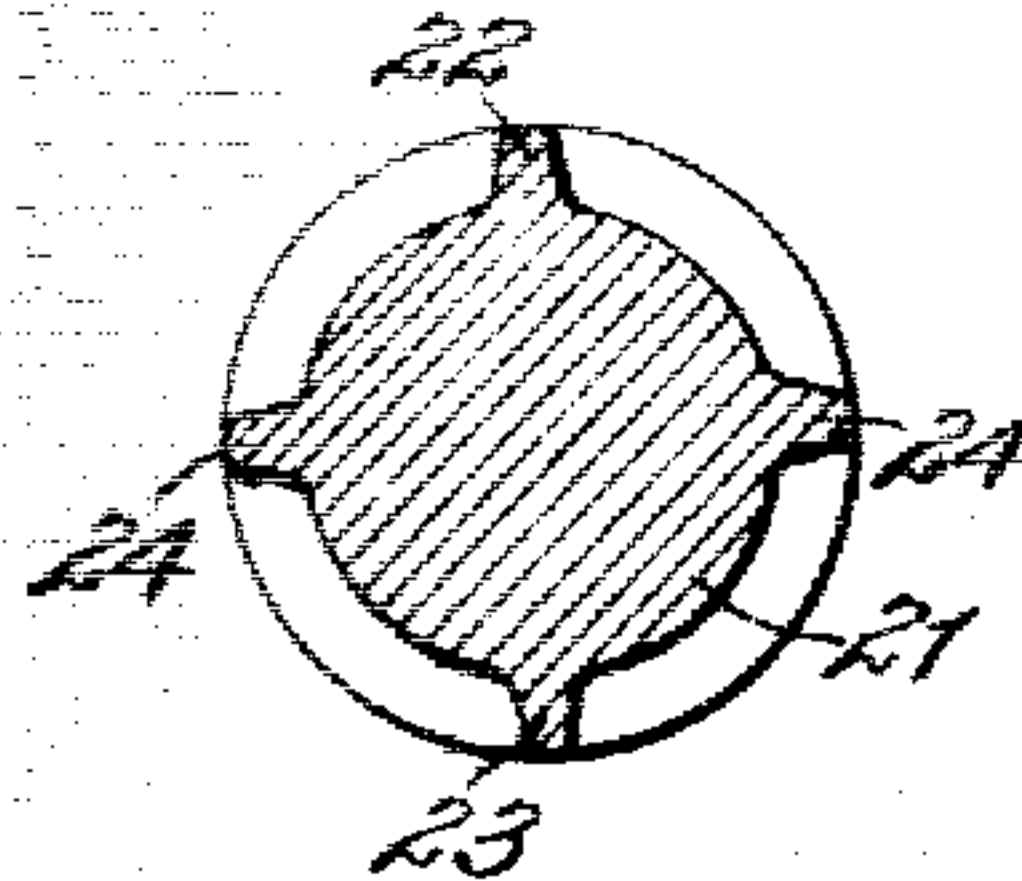


Fig. 5.

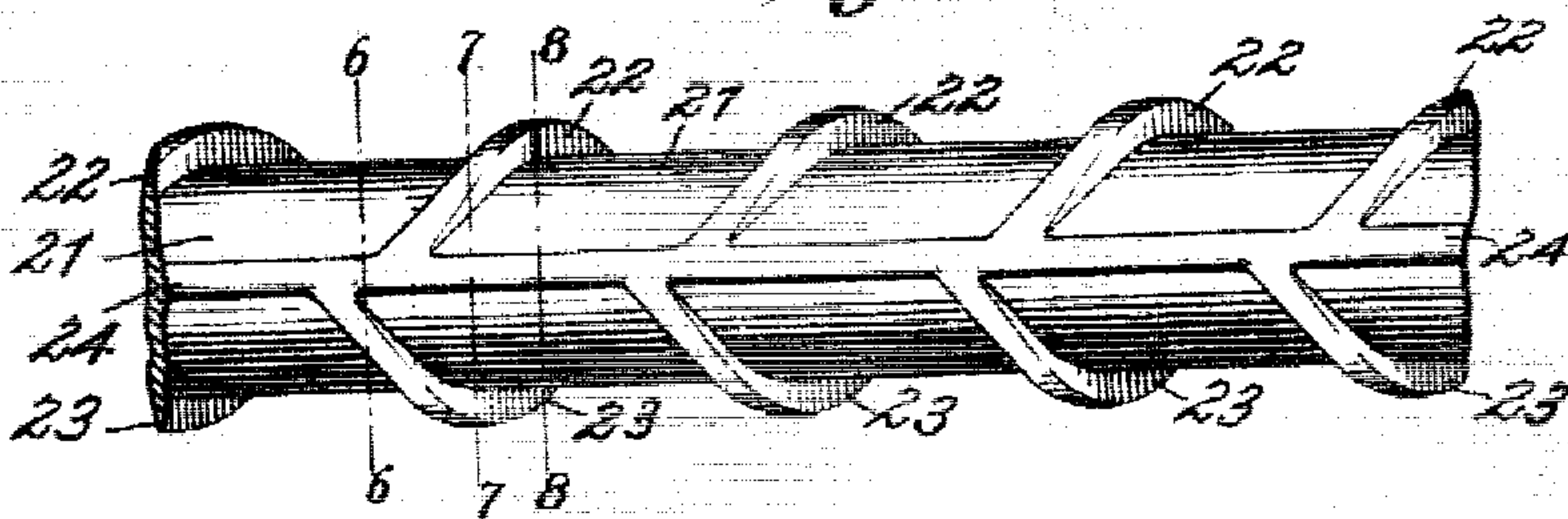


Fig. 6.

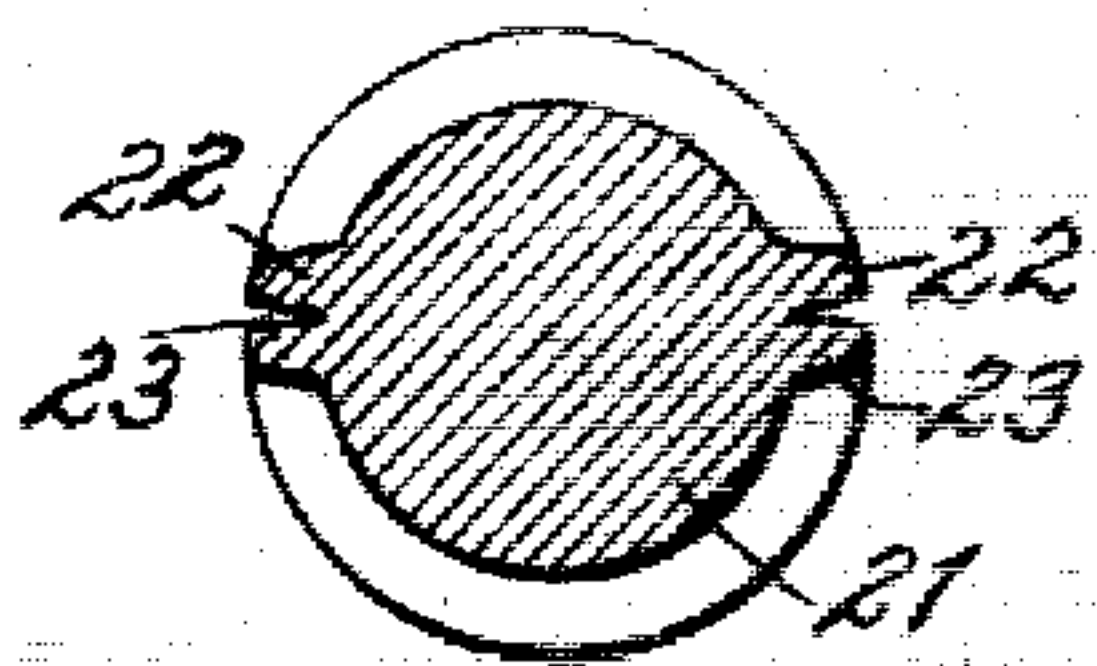


Fig. 7.

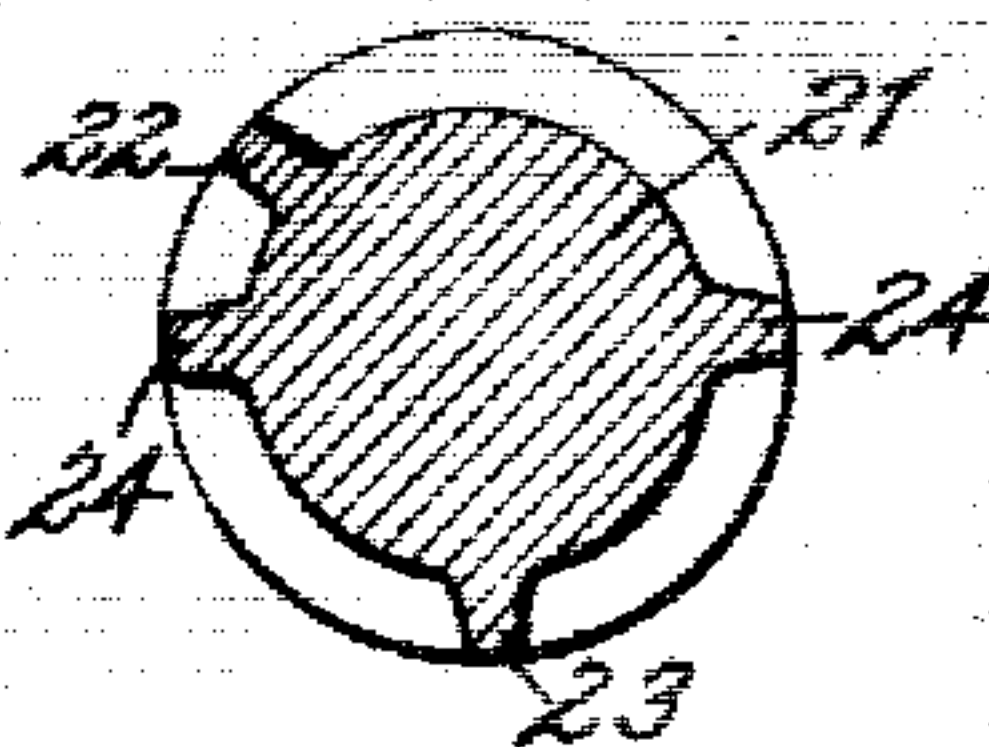
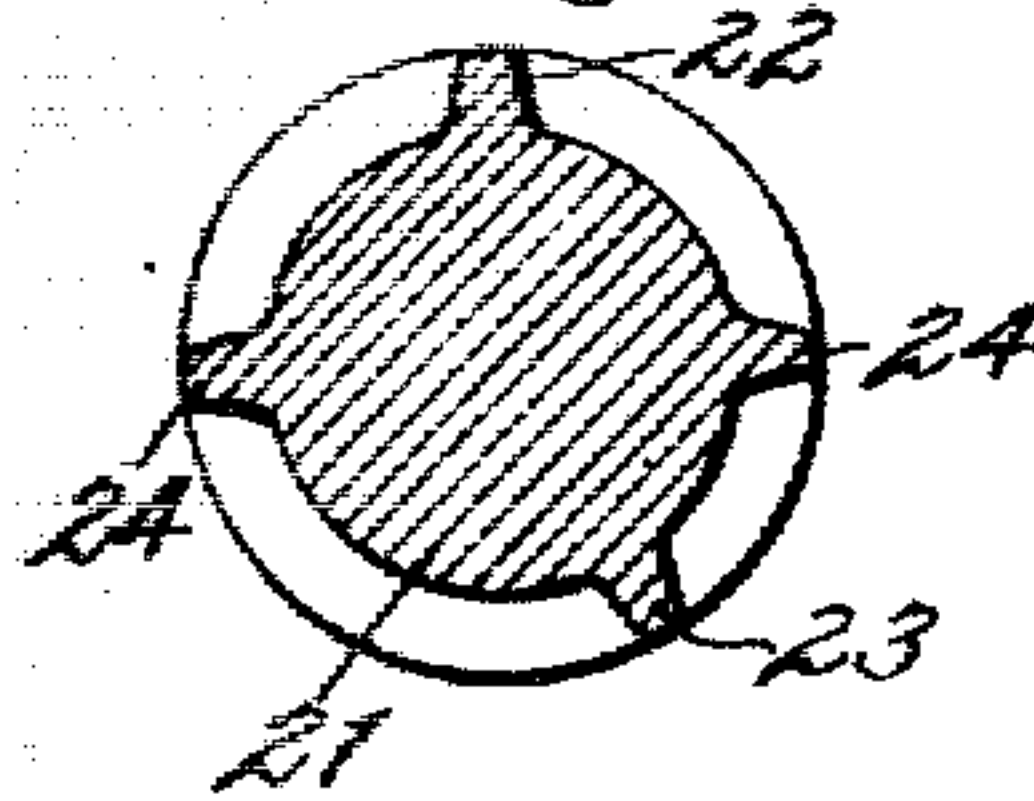


Fig. 8.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## CONCRETE-STEEL CONSTRUCTION.

No. 815,620.

Specification of Letters Patent.

Patented March 20, 1906.

Original application filed April 20, 1905, Serial No. 256,579. Divided and this application filed June 23, 1905. Serial No. 266,625.

*To all whom it may concern:*

Be it known that I, WILLIAM MUESER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Concrete-Steel Construction, of which the following is a specification.

My invention relates to concrete-steel construction, and its novelty consists in the construction and adaptation of the parts, as will be more fully hereinafter pointed out.

In an application for Letters Patent of the United States filed by me October 13, 1904, Serial No. 228,342, I have shown and described a form of bar adapted to be embedded in concrete and to form a unitary structure with its concrete envelop, which bar comprises a longitudinal body provided with external spirally-arranged ribs, whereby a resistance is afforded to the movement of the bar within the concrete envelop, and yet at the same time the cross-sectional area of the bar in a plane at right angles to its longitudinal axis is substantially constant and of uniform character, and therefore the tensile strength of the bar, and, what is more important, its elongation under stress is substantially uniform at all points along its length.

In another application filed by me April 20, 1905, Serial No. 256,579, of which the present application is a division, I have shown sundry modifications of the bar of the application before referred to. The subject-matter of this present application also comprises sundry modifications of this form of bar, and has for its object the production of a bar which while varying somewhat in form and proportions from those described in the applications referred to yet possesses the advantages of such bars, while at the same time it has other advantages peculiar to itself and may perhaps be more readily manufactured.

In the drawings, Figure 1 is a longitudinal elevation of a bar embodying my invention, showing the concrete envelop in section in two planes, the outline of the bar being shown dotted where it is concealed. Figs. 2, 3, and 4 are transverse sections at right angles to the longitudinal axis of the bar on the planes of the lines 2 2, 3 3, and 4 4 in Fig. 1. Fig. 5 is a longitudinal elevation of the same bar, showing the modification or distortion which occurs in its shape when the two rolls through which it is formed do not exactly register while this operation is taking place; and Figs. 6, 7,

and 8 are transverse sections at right angles to the longitudinal axis of the bar on the planes of the lines 6 6, 7 7, and 8 8 in Fig. 5.

The drawings represent a bar of metal, preferably iron or steel, which has been rolled or otherwise fashioned into the forms shown. It comprises a longitudinal body 21, of symmetrical form and provided with external ribs 22, 23, and 24, variously disposed around and projecting from the body 21. The body 21 is shown in the illustrations as a long cylinder; but it may well have any polygonal shape in cross-section, so long as its transverse sectional area is uniform at all points. The external ribs 22, 23, and 24 are preferably made integral with the body of the bar. Their size contrasted with the body of the bar may be varied to suit different circumstances of use, but about the proportions shown in the drawings are usual and convenient. In cross-section each one of these ribs above the body of the bar resembles somewhat the shape of an ordinary tooth of toothed gearing. The ribs are each arranged symmetrically with reference to the longitudinal axis of the bar.

Referring specifically to Figs. 1 to 4, the body of the bar is provided with pairs of half-spiral ribs 22 23, arranged to encircle the bar half-way round and terminate in the longitudinal ribs at such points as they would intersect if prolonged. Coincident with one-half of these points of junction are the longitudinal ribs 24 24, substantially parallel with the longitudinal axis of the bar. It will be seen that by this arrangement spaces roughly diamond-shaped are left between the ribs. These spaces are adapted to receive the concrete and assist in holding the bar and its envelop together after they are once in place. It will of course be understood that the number of half-spiral ribs may be varied on a given size of bar.

The bar made as described has substantially the same cross-sectional area in all planes at right angles to its longitudinal axis. Theoretically, at the angles formed by the junction of the longitudinal ribs with the spiral ribs this cross-sectional area would be slightly less than elsewhere, and in order to compensate for such decrease in area the angle of junction is rounded out slightly and a little more metal is left at that point, so as to make the sectional area of the bar at that point uniform with that at the other points along its length. Another matter to be noted is that all oblique sections of the bar are greater in



area than the transverse right-angled section, and consequently this area of uniform section represents the minimum strength of the bar. It cannot twist nor cannot pull out of the concrete, and the longitudinal ribs prevent it from rotating. How the cross-sectional area remains uniform is seen from an examination of Figs. 2, 3, and 4. In Fig. 2 it is seen that the ribs 22 and 24 are close together on one side and the ribs 23 and 24 likewise close together on the opposite side of the bar. In Fig. 3 the ribs 22 and 23 are somewhat separated. In Fig. 4 the ribs 22, 23, and 24 are at the farthest possible distances apart, being separated by substantially ninety degrees. In all of these sections, the combined area of the ribs is substantially identical.

In Figs. 5, 6, 7, and 8 there is shown a modified form of the bar illustrated in the preceding figures. It happens in rolling the bar that sometimes the two rolls employed are not registered with sufficient care and the upper half of the bar is not in precise symmetrical relation with the lower half of the bar. In Fig. 5 this is shown in slightly exaggerated form in order to make the situation clear. This non-registration of the rolls is apt to occur, and it has occurred frequently in every rolling-mill, and is a difficulty which iron-masters have long sought to overcome, but have not overcome except at an expense entirely disproportionate to the result sought to be obtained. When a bar of my improved form, however, is employed, it makes no difference whether the rolls register or not, because the cross-sectional area of the bar at all points will be found to be the same, even although such registration does not take place. How this occurs is fully illustrated in Figs. 6, 7, and 8, showing cross-sections of the bar illustrated in Fig. 5. By these sections it will be seen that while the ribs 22, 23, and 24 are not at any place symmetrically arranged around the periphery of the intersecting circular plane, yet nevertheless their combined area is outside of the body of the bar, and consequently the cross-sectional area at all of these points is at all times the same.

Having in view the principles governing the construction of this form of concrete bar—namely, that the body of the bar shall be of symmetrical form and that the external ribs shall be symmetrically placed about such form—it will be relatively easy for those skilled in the art to which the invention relates to make other modifications in the form of the bar while still practicing the principles of the invention.

What I claim is—

1. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs of uniform cross-section, one of said ribs being sub-

stantially parallel to the longitudinal axis of the body, and extending a substantial part of the length of the body, and another rib beginning in said longitudinal rib and extending diagonally therefrom at least half-way around the body, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

2. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body, and provided with external projecting ribs of uniform cross-section, one of said ribs being substantially parallel to the longitudinal axis of the body, and extending a substantial part of the length of the body, and a plurality of others beginning in said longitudinal rib, and extending diagonally therefrom at least half-way around the body, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

3. A bar adapted to be used as a core to be embedded in a concrete envelop, comprising a regularly-formed central body, and provided with external projecting ribs of uniform cross-section, a plurality of said ribs being substantially parallel to the longitudinal axis of the body, and extending a substantial part of the length of the body, and another rib diagonal thereto and beginning in one and terminating in another of said longitudinal ribs, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

4. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs of uniform cross-section, a plurality of said ribs being substantially parallel to the longitudinal axis of the body and extending a substantial part of the length of the bar, and a plurality of others diagonal thereto and beginning in one and terminating in another of said longitudinal ribs, the whole structure being of uniform cross-sectional area throughout the length of the rib.

5. A bar adapted to be used as a core to be embedded in a concrete envelop, comprising a regularly-formed central body, and provided with external projecting ribs of uniform cross-section extending a substantial part of the length of the body, one of said ribs being substantially parallel to the longitudinal axis of the body, and a plurality of others beginning at and extending diagonally in different directions from opposite sides of said longitudinal rib, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

6. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body, provided with external projecting ribs of uniform cross-section, a plurality of said ribs being



substantially parallel to the longitudinal axis of the body and extending a substantial part of the length of the bar, and a plurality of others, beginning at, and extending diagonally in different directions from opposite sides of one of said longitudinal ribs and terminating in another of said longitudinal ribs, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

7. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs of uniform cross-section extending a substantial part of the length of the body, one of said ribs being substantially parallel to the longitudinal axis of the body, another rib beginning at and extending diagonally from said longitudinal rib on one side, and a third rib beginning at and extending diagonally in a different direction from said longitudinal rib on the opposite side thereof, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

8. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs of uniform cross-section extending a substantial part of the length of the body, one of said ribs being substantially parallel to the longitudinal axis of the body, a plurality of said ribs extending diagonally from one side of said longitudinal rib, and another plurality of said ribs extending diagonally from the opposite side of said longitudinal rib, the two pluralities of ribs beginning in the longitudinal rib and extending in different directions, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

9. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs of uniform cross-section extending a substantial part of the length of the body, one of which is arranged substantially parallel to the longitudinal axis of the body, and a plurality of others partially encircling the body diagonally in different directions and beginning in

said longitudinal rib, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

10. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body, and provided with external projecting ribs of uniform cross-section extending a substantial part of the length of the body, a plurality of which are arranged substantially parallel to the longitudinal axis of the body and a plurality of others, encircling the body diagonally in different directions, and beginning in one of, and terminating in another of said longitudinal ribs, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

11. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs of uniform cross-section extending a substantial part of the length of the body, one of which is arranged substantially parallel to the longitudinal axis of the body, and a plurality of others, each encircling the body diagonally in different directions half-way round and beginning in said longitudinal rib, the whole structure being of uniform cross-sectional area throughout the length of the body.

12. A bar adapted to be used as a core to be embedded in a concrete envelop comprising a regularly-formed central body and provided with external projecting ribs, of uniform cross-section, two of which are arranged on opposite sides of and substantially parallel to the longitudinal axis of the body, and extend a substantial part of the length of the bar, and a plurality of others extending diagonally at least half-way round the body in different directions, and beginning in one and terminating in the other of said longitudinal ribs, the whole structure being of uniform cross-sectional area throughout the length of the ribs.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM MUESER.

Witnesses:

HERMAN MEYER,  
ALAN C. McDONNELL.