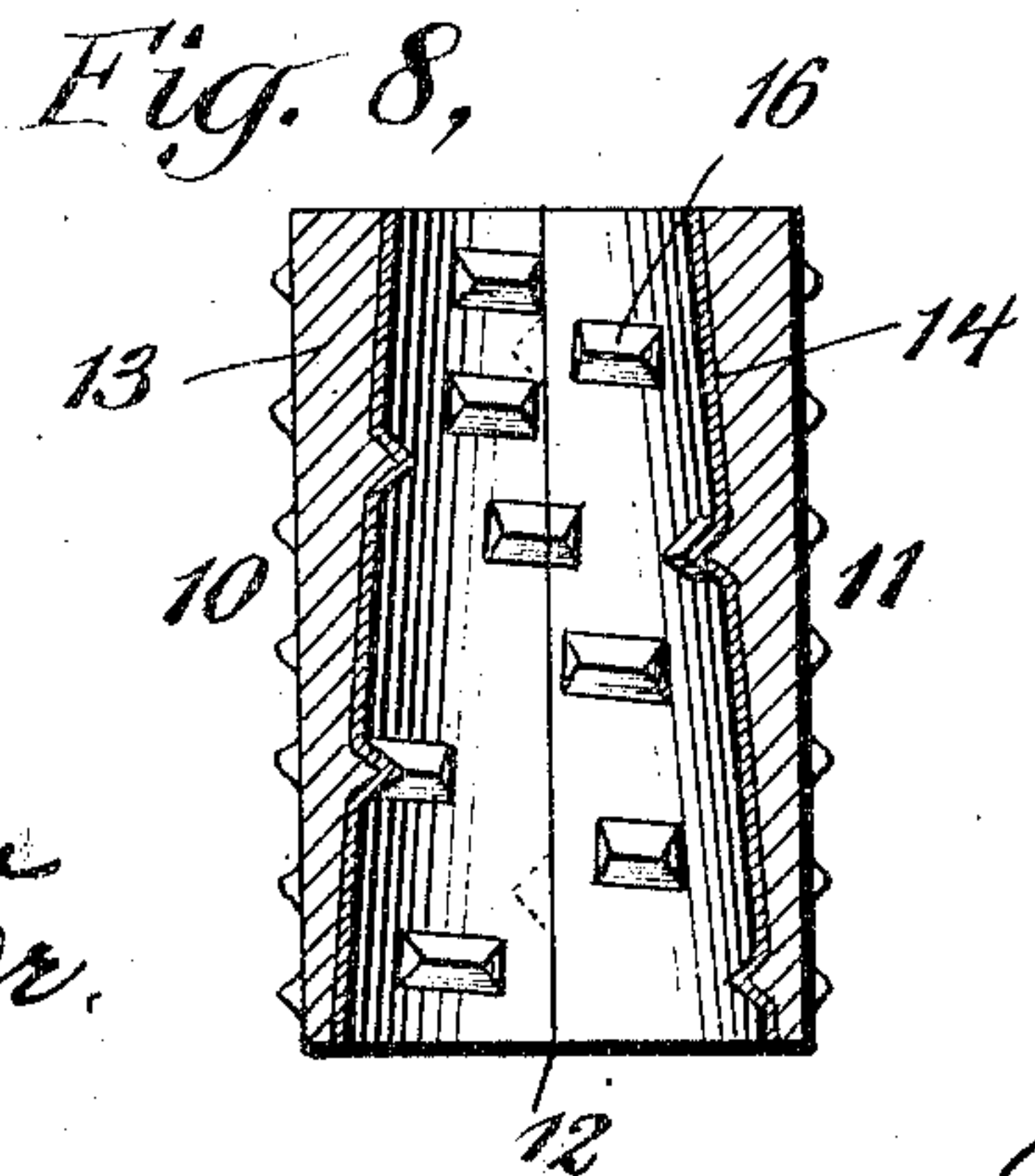
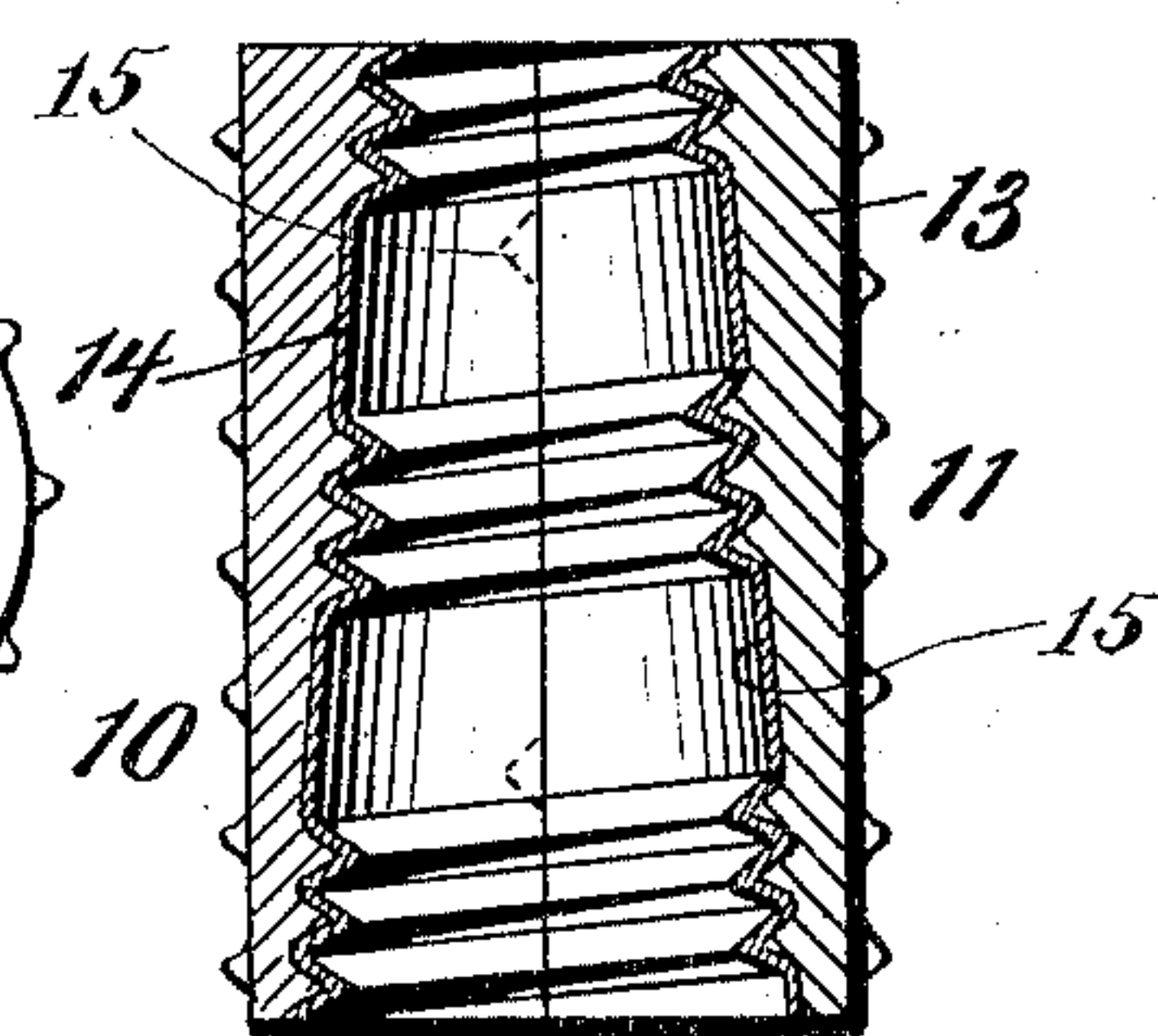
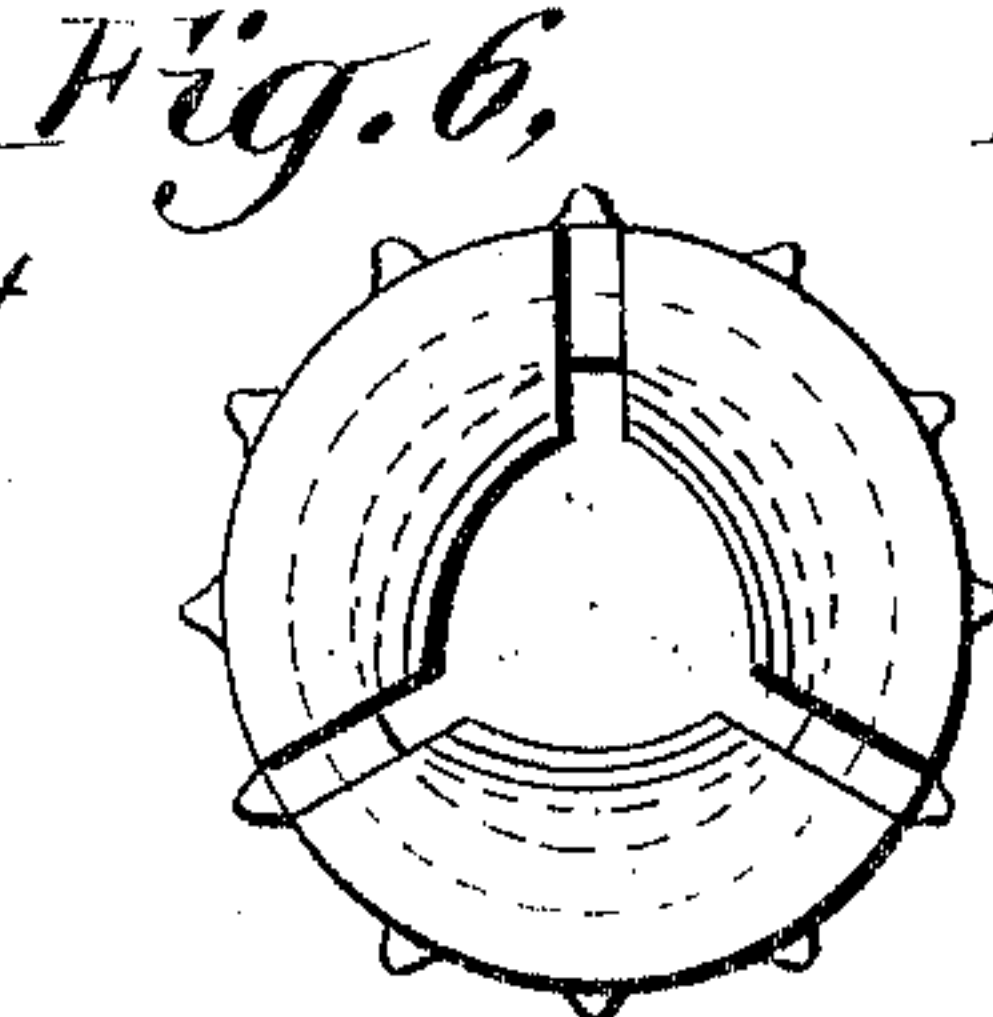
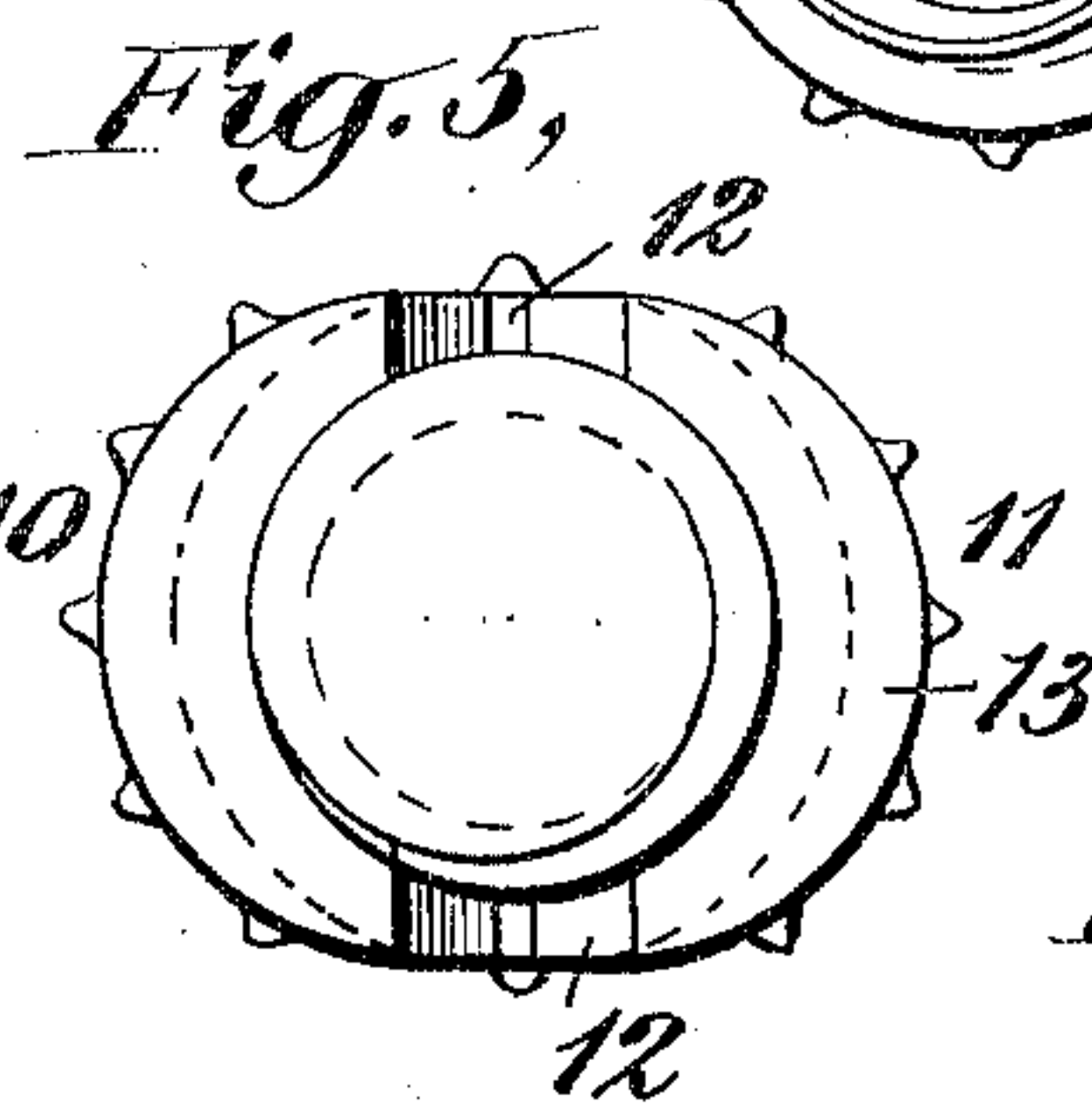
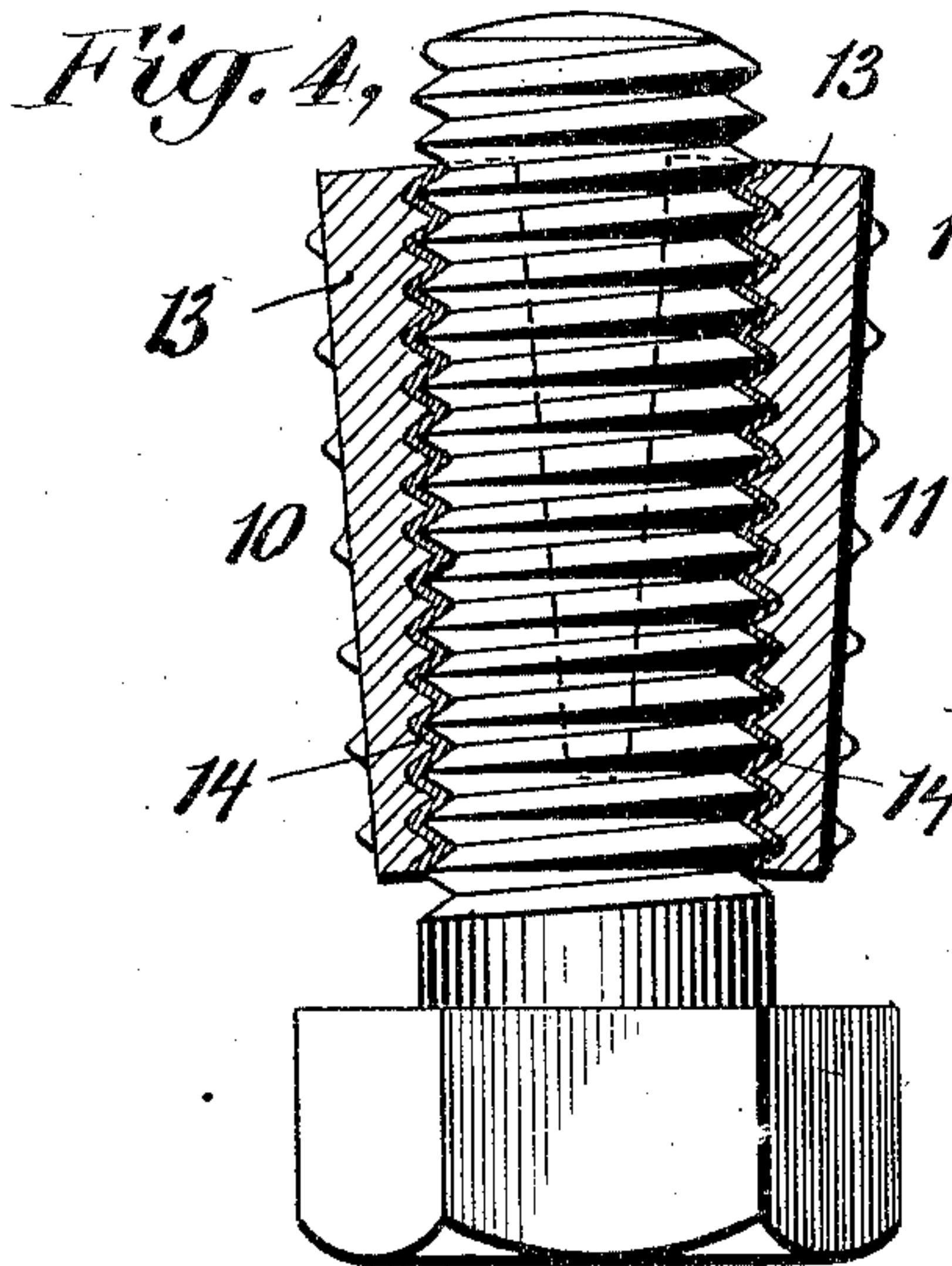
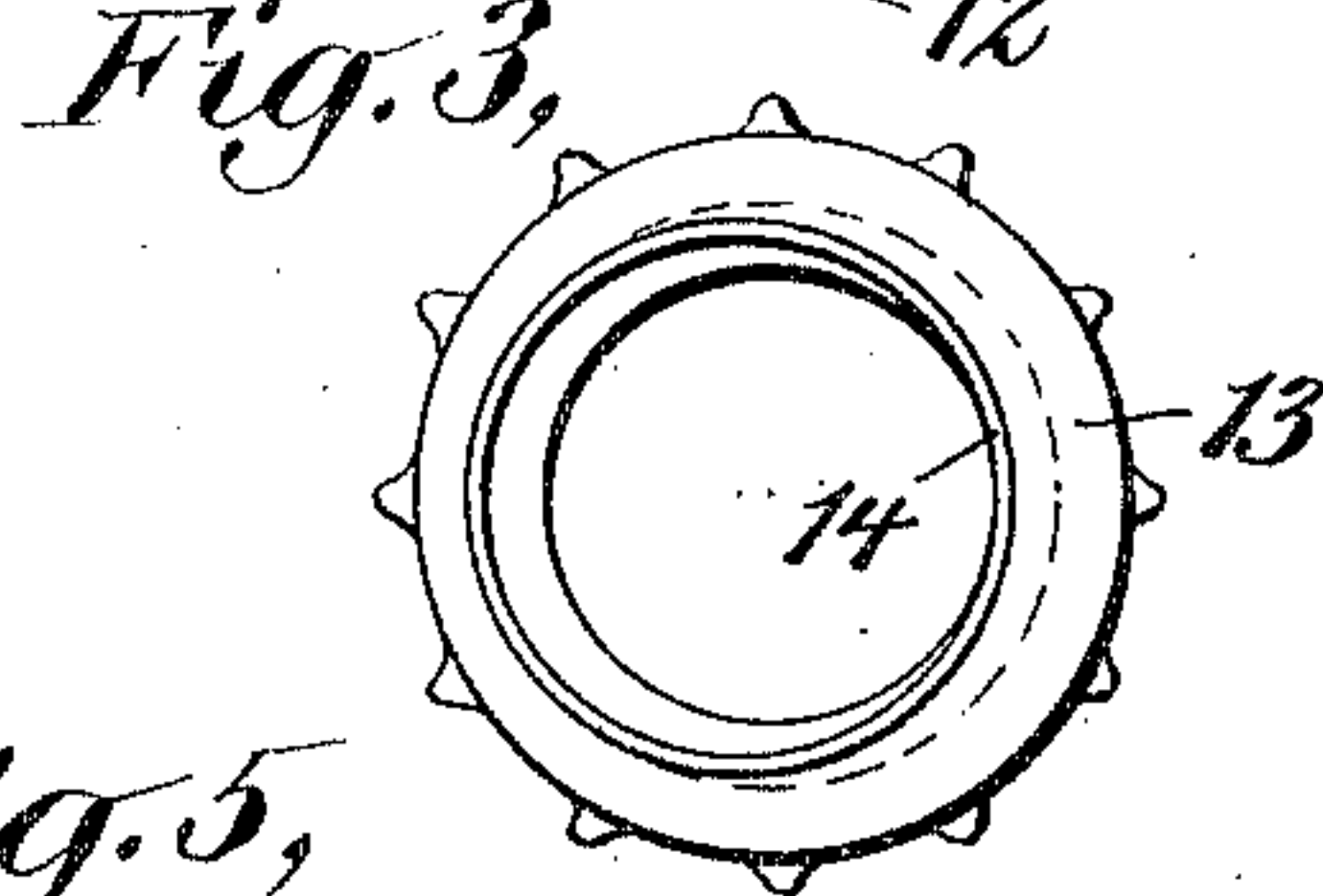
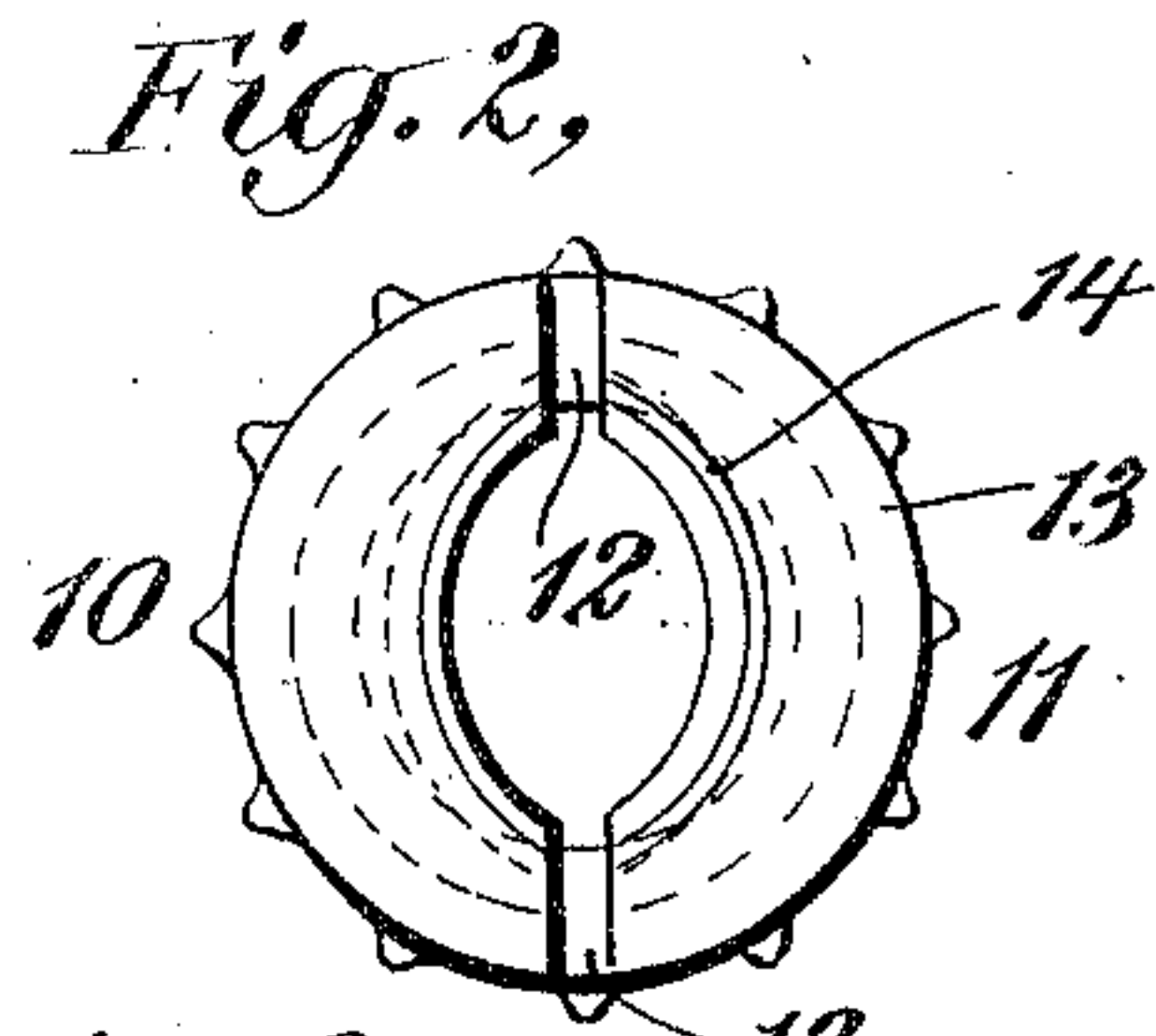
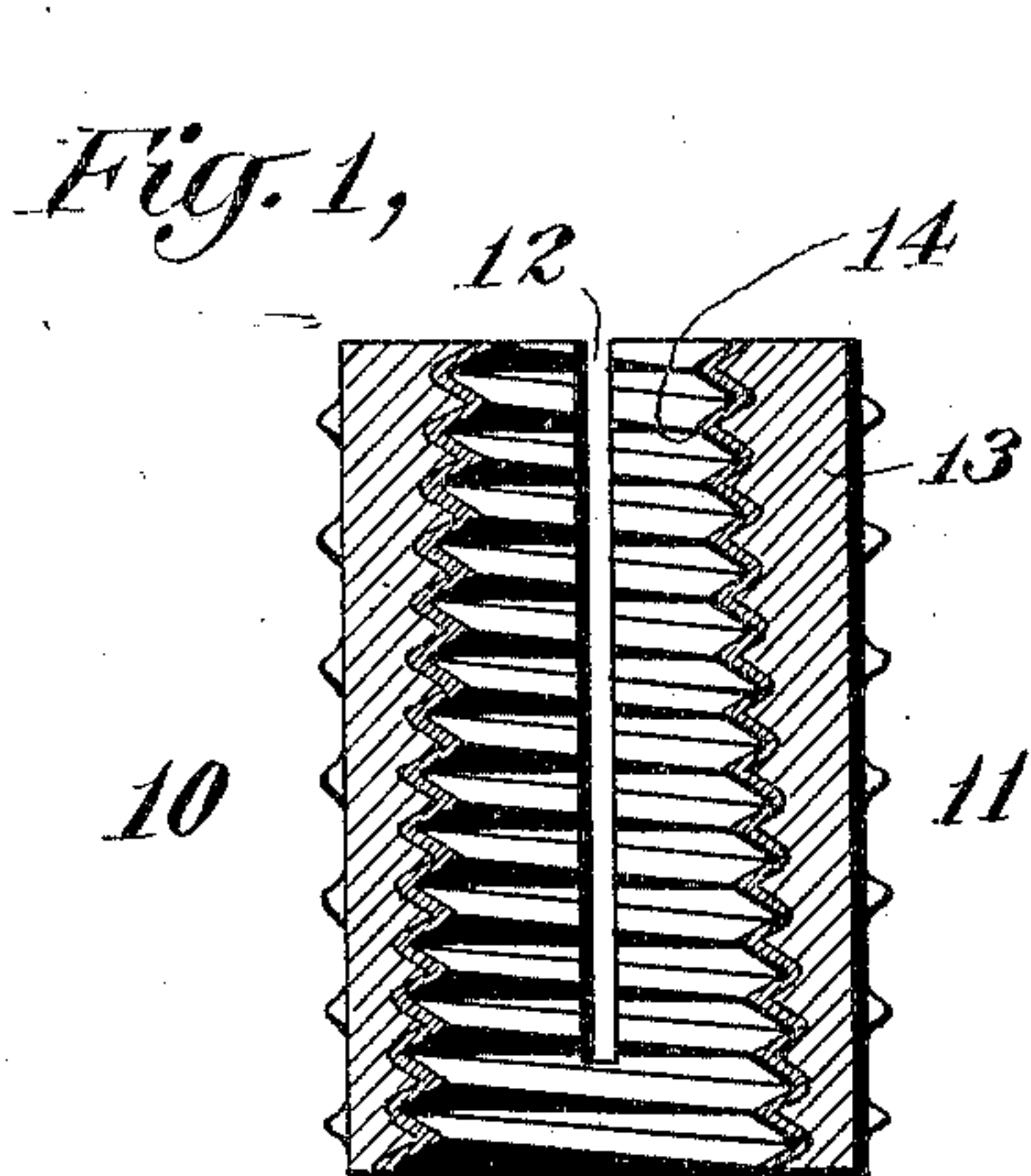


D. H. HAYWOOD.  
BOLT ANCHOR.  
APPLICATION FILED JAN. 5, 1910.

987,229.

Patented Mar. 21, 1911.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

DANIEL HOWARD HAYWOOD, OF NEW YORK, N. Y.

BOLT-ANCHOR.

987,229.

Specification of Letters Patent.

Patented Mar. 21, 1911.

Application filed January 5, 1910. Serial No. 536,454.

*To all whom it may concern:*

Be it known that I, DANIEL HOWARD HAYWOOD, a citizen of the United States of America, and a resident of New York, county and State of New York, have invented certain new and useful Improvements in Bolt-Anchors, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to bolt anchors of the class employed for securing bolts in holes in walls of brick, stone, and the like, and consists: first, in composing the expansible shell of a bolt anchor in part of a relatively soft material and in part of a relatively hard material, the object thereof being to reinforce and strengthen the shell and render it more durable and less easily damaged, and particularly where the hard metal portion constitutes the lining of the shell to strengthen the bore thereof; and second, in a novel form and configuration of the interior bore of segmental bolt anchor shells, the same comprising substantially cylindrical segments of uniform radius throughout, but which converge from one end of the shell toward the other to form a tapered bore, the object of this portion of my invention being to provide that the shell bore shall properly fit the cylindrical bolt with which the shell is to be employed, when the bolt is inserted all the way and the shell is expanded.

In order that my invention may be thoroughly understood, I will now proceed to describe an embodiment thereof, having reference to the accompanying drawings illustrating the same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in central longitudinal section through a bolt anchor constructed in accordance with my invention. Fig. 2 is an end view of the same looking toward the inner end thereof. Fig. 3 is an end view of the same looking toward the outer end thereof. Fig. 4 is a sectional view similar to Fig. 1, except that a bolt is shown as having been inserted therein and the anchor segments have been expanded thereby. Fig. 5 is an inner end view of the bolt and anchor as shown in Fig. 4. Fig. 6 is an inner end view of a bolt anchor composed of three segments instead of two as in the other figures. Figs. 7 and

8 are views in longitudinal section of modified forms of the bolt anchor.

Referring first to the form of my invention illustrated in Figs. 1 to 5 inclusive, the device comprises a substantially cylindrical shell composed of two segments 10, 11 divided upon a medial plane as at 12. The shell is of composite form, being composed of an outer relatively soft metal portion 13 and an inner lining 14 of relatively hard metal. The harder metal lining is interiorly provided with screw threads to receive a bolt and is united in any suitable manner to the softer metal backing 13. As a convenient method of manufacture, the linings may first be constructed in any suitable manner, and thereafter placed in molds wherein the backings are cast.

The interior bore of the shell is tapered (see Fig. 1) so that when a bolt of substantially cylindrical form is inserted therein, the segments will be expanded as is shown in Fig. 4. In thus being expanded, the softer metal backing of the shell will be forced against the walls of the hole in which it is inserted, and compelled to assume the configuration thereof, the soft metal being caused substantially to flow whereby such intimate engagement will be effected between it and the walls of the hole as to anchor the shell securely in place. Soft metal anchors expanded by the bolt to be held in place are in common use at the present day, but so far as I am aware, they are in no case reinforced by harder metal portions, and particularly in no case are they provided with a hard metal lining having threads for engagement with the threads of the bolt to be held in place. The consequence is that either threads have to be formed in the soft metal bore by the screw as it is being forced into the anchor, in which case but imperfect threads are formed, and the bolt is not securely held in place, or if the shell be initially threaded, these threads are apt to be stripped by the bolt as it is being inserted, especially when the hole in which the anchor is inserted is slightly smaller than it should be, and in any event, a distortion of every portion of the shell is likely to result. By the use of the hard metal lining of my present invention, I retain the advantages following from the use of the soft metal wherein it is caused to assume the shape of the hole, while avoid-



ing the disadvantages above enumerated. It will be understood that in the broad aspect of my invention, I do not wish to be limited to employing the relatively hard metal reinforcement as a lining as obviously it may be otherwise disposed, and many benefits thereby obtained. Different metals may be employed in the construction of the anchor, to suit different conditions and they may also be varied with respect to the relative degree of hardness thereof; for instance, in some cases a quite soft metal such as lead or lead composition may be employed in combination with a much harder metal such as iron, while in other cases both of the metals may be somewhat soft though one softer than the other,—one, say, antimony and the other, lead, while in other cases they may be both somewhat hard though one harder than the other,—one metal being, say, copper, and the other, iron or steel.

I preferably form the interior threaded bore of the shell of such shape (disregarding the threads) as to represent portions of a cylinder or cylinders of uniform diameter throughout, so that when the anchor is expanded, the walls will fit the bolt as is shown in Fig. 5. When the segments are in their contracted condition, prior to use, the inner end of the shell appears somewhat as is shown in Fig. 2, the bore being bounded at such end by two arcs, whose radii are equal, and equal to half the diameter of the bore at the opposite end, but the centers of which are apart, each having approached the arc of the other center. Similarly, the bore in a cross section at any point throughout the device would be represented by arcs of circles whose radii are still equal to one-half the diameter of the bore at its greatest portion, but whose centers progressively move away from each other from a position of coincidence at one end to the position referred to in connection with the end view of Fig. 2 at the other end. The advantage of this form of bore is that as the bolt is forced into the shell there is no tendency to distortion at right angles to the expanding movement of the segments, *i. e.* the movement from the position shown in Fig. 1 to the position shown in Fig. 4; and the threads, viewed transversely of the shell, will substantially fit the threads of the bolt at all points, as appears in Fig. 4.

It is, of course, true that more than two segments may be employed and in Fig. 6 I have shown an anchor comprising three segments but it will be noted that in this case, as in the construction shown in the other figures, each segment in cross section is bounded upon the inside by arcs of circles whose diameter equals the diameter at the opposite end of the shell.

It will also be readily understood that

it is immaterial whether or not the segments are united at their outer ends as is shown in Fig. 1, or are divided throughout their entire length as is shown in Fig. 7, both constructions being well known in this art, and both constituting expansible shells. In Fig. 7 the interior bore is threaded at intervals, the portions 15 between the threaded portions being unthreaded. This construction is sometimes advantageous in that it renders the device adapted for use with threads which do not accurately fit the threads of the shell. For instance, a bolt having a greater or less number of threads to the inch than the threaded portion of the shell will co-act with sufficient turns of the thread before the want of registry is sufficient to be objectionable. Thereafter by leaving a blank space, a fresh set of threads will again coincide with other threads of the bolt and so on. A bolt anchor having this form of intermittent thread is one which is in use upon the market at the present day, and the features of my invention may be readily applied thereto, if desired. Similarly, in Fig. 8, I have shown the shell as provided interiorly with a plurality of projections 16 which being properly disposed in a helical line will constitute a mutilated screw thread, and which may be employed in place of the continuous screw threads illustrated in the other figures.

What I claim is:

1. A bolt anchor comprising an expansible shell composed in part of a relatively soft material and in part of a relatively hard material, the hard and soft elements being arranged one within the other.
2. A bolt anchor comprising an expansible shell longitudinally divided to form segments and composed in part of a relatively soft material and in part of a relatively hard material, the hard and soft elements being arranged one within the other.
3. A bolt anchor comprising an expansible relatively soft metal shell and a relatively hard metal expansible tubular reinforcement therefor.
4. A bolt anchor comprising an expansible shell composed of a relatively soft metal shell and an interior relatively hard metal lining united thereto.
5. A bolt anchor comprising a relatively soft metal shell and an interior relatively hard metal screw-threaded lining united thereto.
6. A bolt anchor comprising a relatively soft metal shell, and a relatively hard metal lining therefor, the said shell and lining being longitudinally divided to form segments.
7. A bolt anchor comprising a relatively soft metal shell and a relatively hard metal screw-threaded lining therefor, the said shell and lining being longitudinally divided to form segments.



8. A bolt anchor comprising a relatively hard metal tubular element which tapers from one end toward the other, and a relatively soft metal backing therefor whose thickness increases toward the smaller end of the first said element.

9. A bolt anchor comprising a relatively hard metal tubular shell whose walls are of substantially uniform thickness throughout, and a relatively soft metal backing whose walls are of progressively increasing thickness from one end to the other.

10. A bolt anchor comprising a tubular relatively hard metal element whose walls are of substantially uniform thickness

throughout, and which tapers from one end toward the other, and a relatively soft metal backing therefor whose walls progressively increase in thickness toward the smaller end of the first said element.

11. A bolt anchor comprising an expandable relatively soft metal shell, provided with longitudinally disposed relatively hard metal reinforcing elements.

In witness whereof, I have hereunto set my hand this 30 day of December, 1909.

D. HOWARD HAYWOOD.

Witnesses:

F. B. GRAVES,

LYMAN S. ANDREWS, Jr.