

(No Model.)

J. THOMSON.
MILLING CUTTER.

No. 509,145.

Patented Nov. 21, 1893.

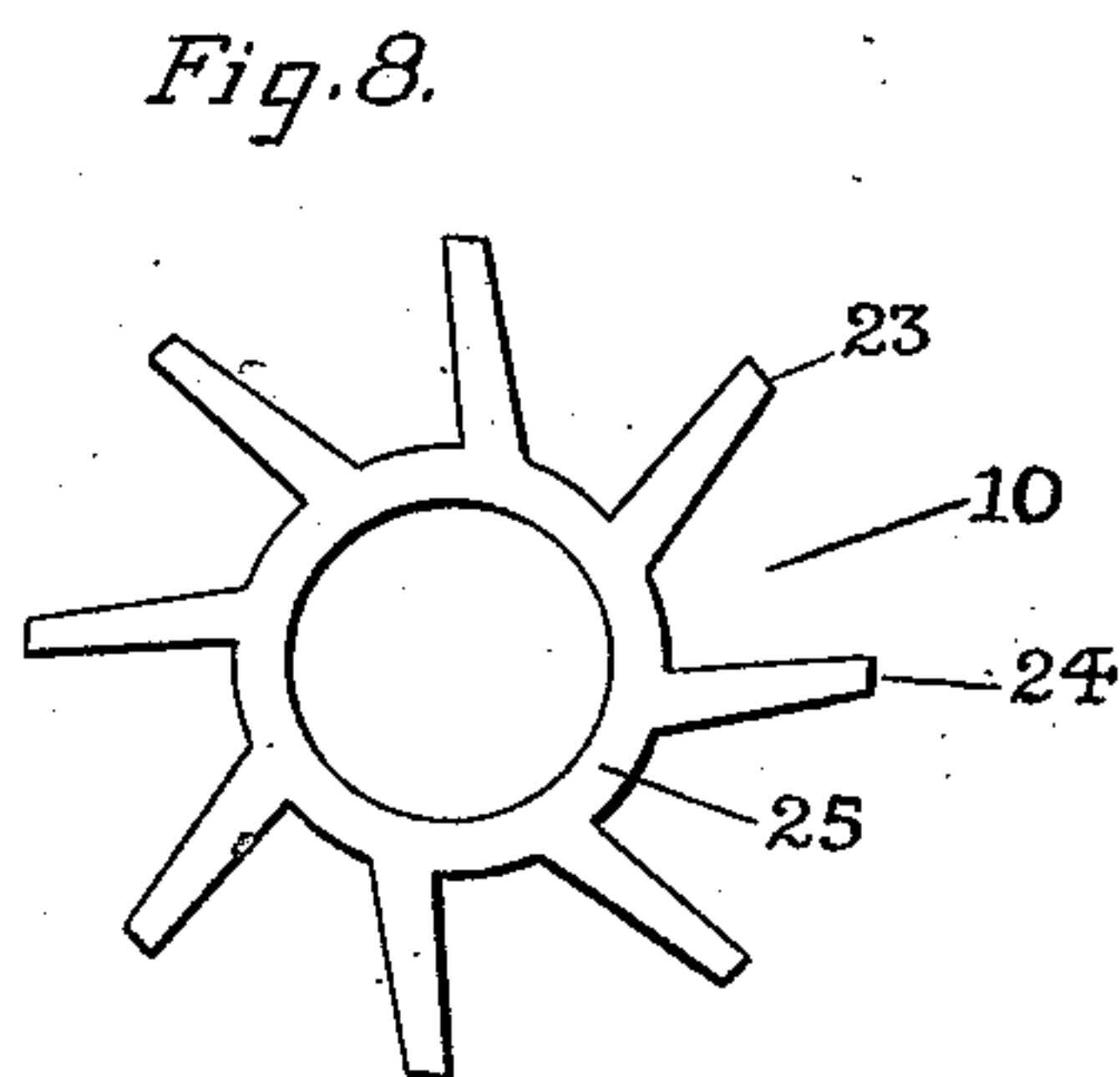
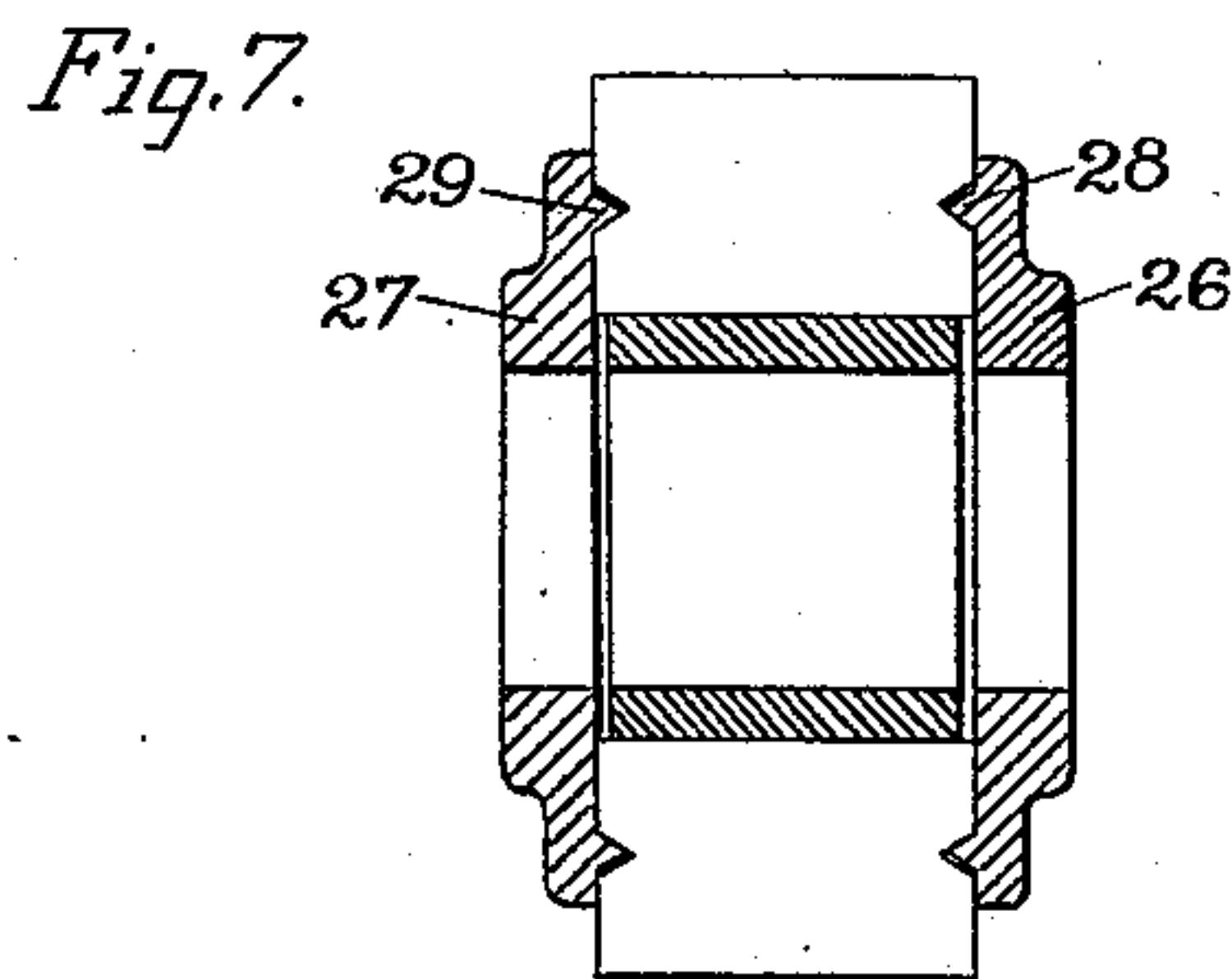
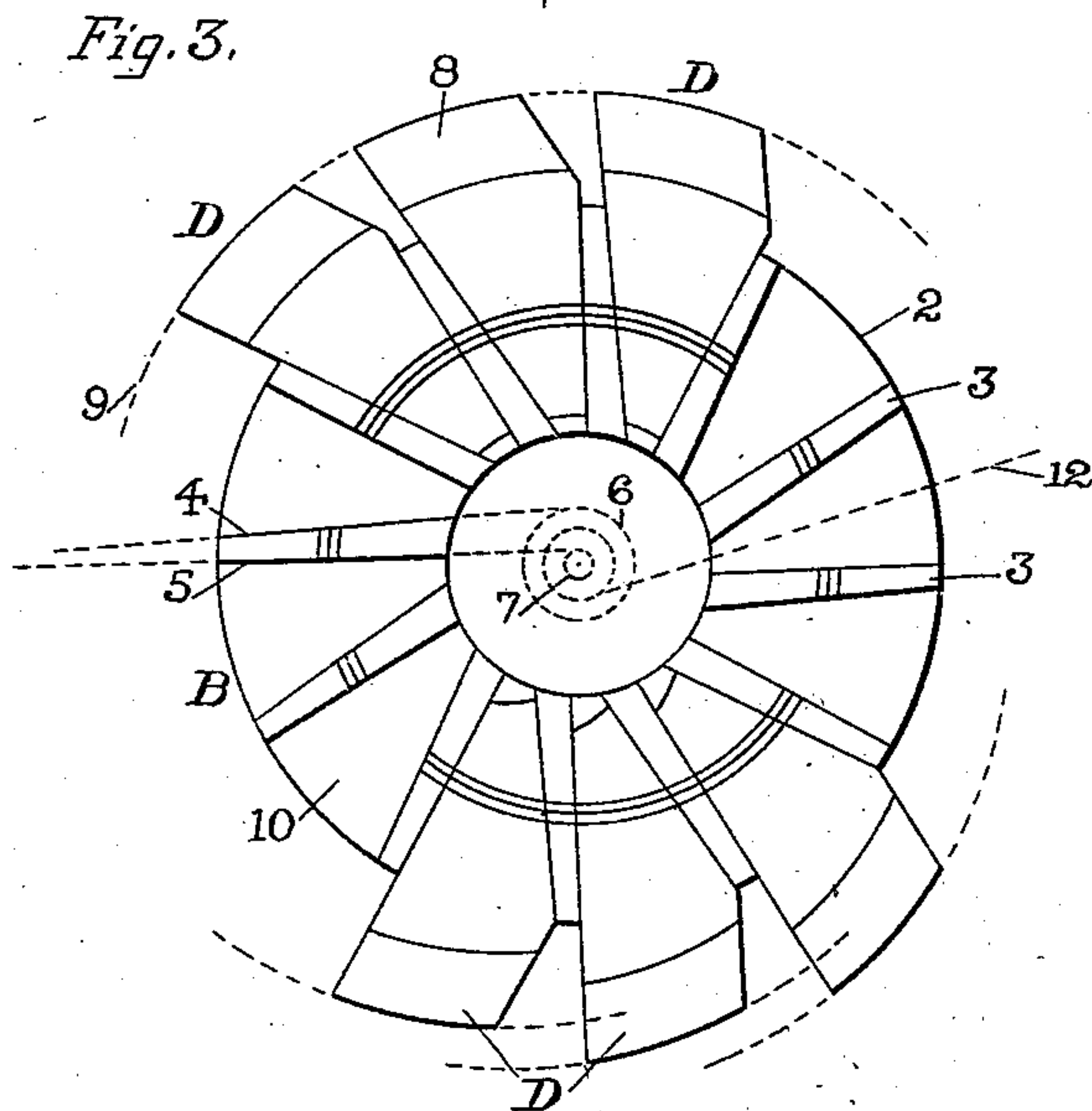
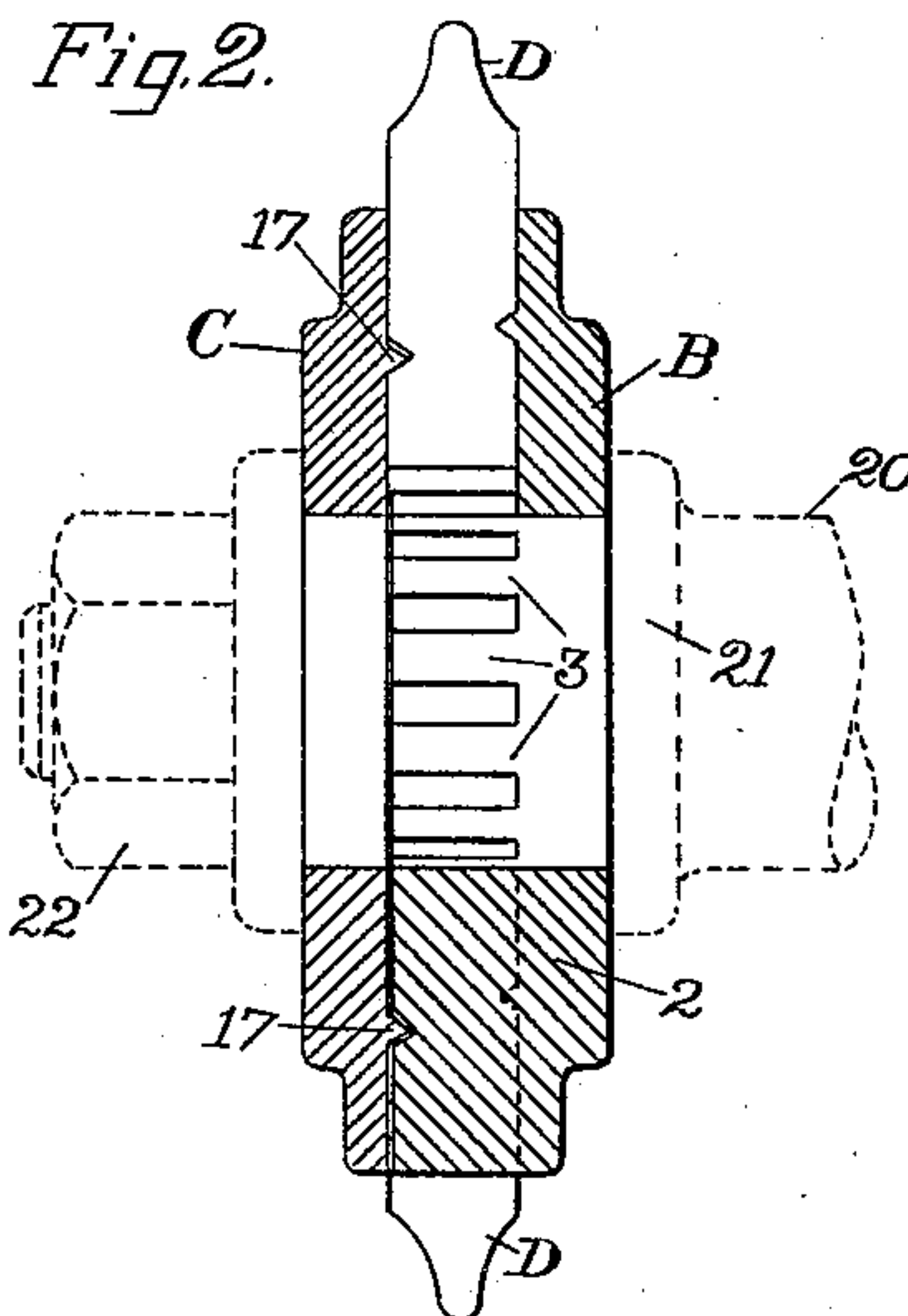
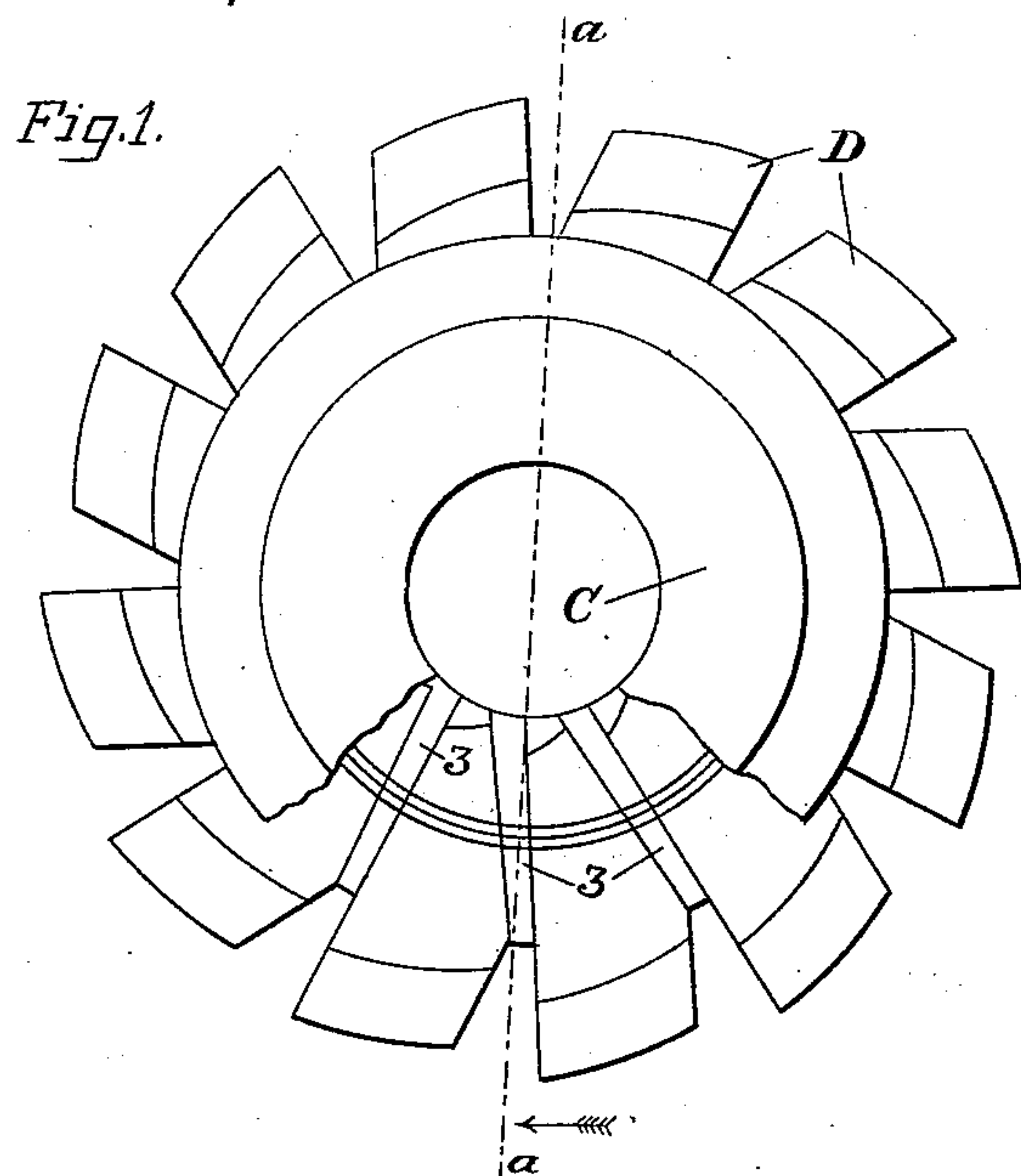


Fig. 4.

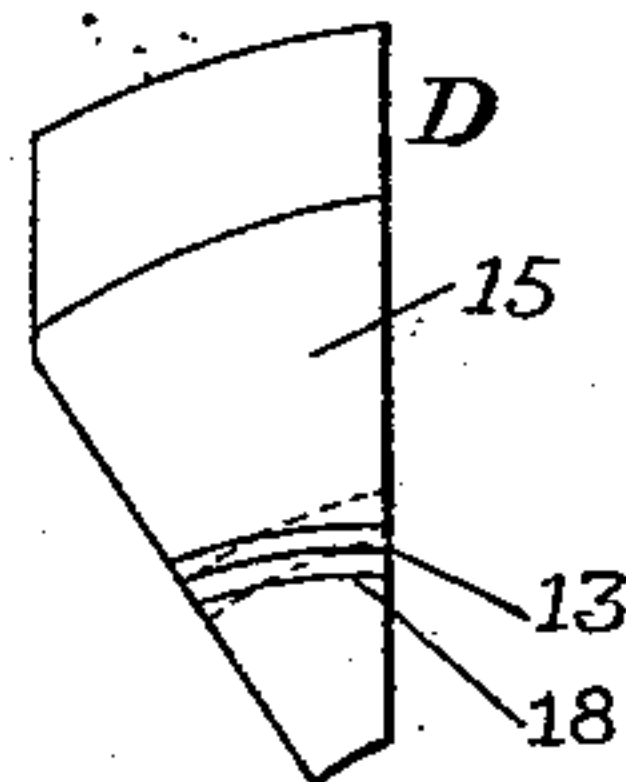


Fig. 5.

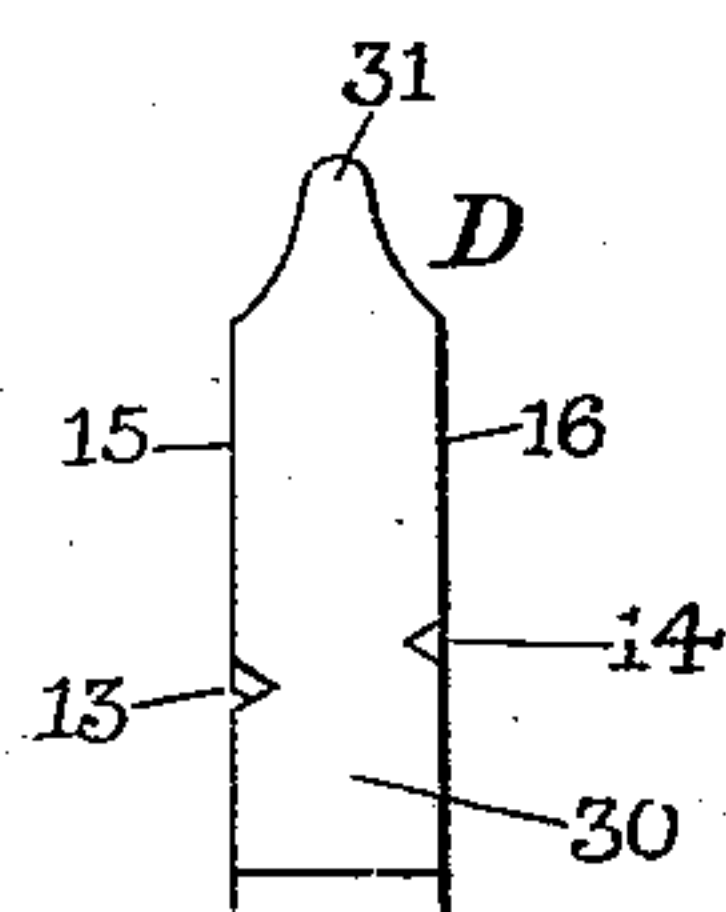
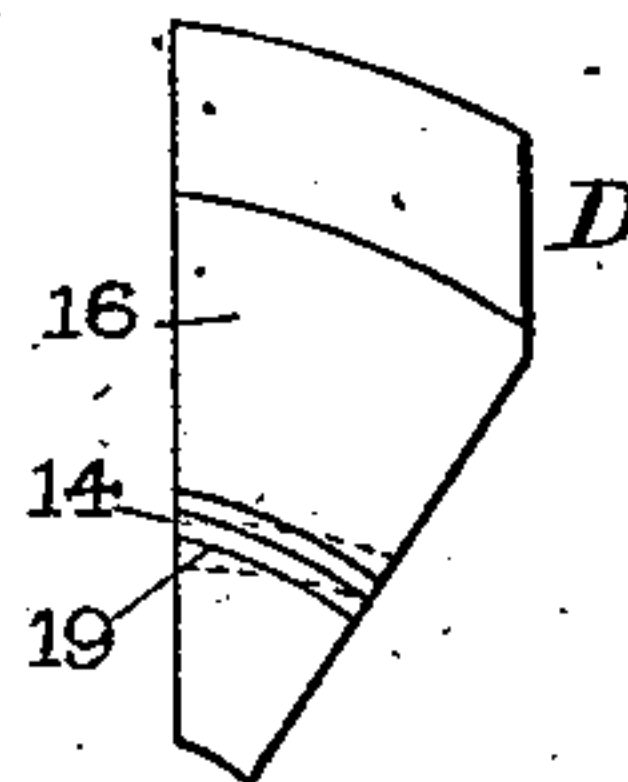


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN THOMSON, OF HARTFORD, CONNECTICUT, ASSIGNOR OF ONE-HALF TO
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MILLING-CUTTER.

SPECIFICATION forming part of Letters Patent No. 509,145, dated November 21, 1893.

Application filed January 23, 1893. Serial No. 459,394. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Milling-Cutters, of which the following is a specification.

This invention relates to that class of milling-cutters in which the teeth are removable; the object being to furnish a changeable-tooth milling-cutter in which the teeth may be reversed for the purpose of turning them to have the required peripheral relief.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation of a milling-cutter embodying my present improvements, a portion of the clamp-plate being broken away to show certain features of the construction of the cutter. Fig. 2 is a sectional view, in a line *a a*, Fig. 1. Fig. 3 is a side view of the cutter-body, showing on the lower side thereof several teeth placed therein in their working position; and on the upper side thereof several teeth placed in said body in their reversed position, as when turning-off the same. Fig. 4 is a side view of one of the cutter-teeth, and corresponds to the position of the same at the lower side of Fig. 3. Fig. 5 is a face view of the cutter-tooth, as seen from the right-hand in Fig. 4. Fig. 6 is a side view of the cutter-tooth, corresponding to the position thereof at the upper side of Fig. 3. Fig. 7 is a sectional view, similar to Fig. 2, of a modification of the invention. Fig. 8 is a side view of the central cutter-body used in the modification shown in Fig. 7.

Similar characters designate like parts in all the figures.

The improved removable-tooth milling-cutter shown in the drawings has a body, designated in a general way (in Figs. 1, 2 and 3) by B, a clamp-plate, C, and several removable teeth, D, D. The cutter-body, in the preferred form thereof shown in said Figs. 1, 2 and 3, consists of the disk, or plate, 2, and a series of partition-walls, or radially-disposed ribs, 3, which are shown formed integral with said plate 2. The division-walls 3 are shown having their opposite faces, 4

and 5, respectively, (see Fig. 2) arranged tangential to the small circles 6 and 7, respectively, so that a cutter-tooth, as 8, Fig. 3, fitted between two of said walls will, on the reversal thereof in the space or socket 10 between said walls, be shifted somewhat relatively to a line, 9, radial to the axis of the milling-cutter. By reason of said tangential construction, the sockets 10 are eccentrically disposed to the axis of the cutter; this feature is illustrated by the dotted line 12 which is central to the socket 10, and passes to one side of said cutter-axis, as shown in Fig. 3; said line 12, and also the socket in which that line is centrally located, are therefore radially inclined, being at an inclination to a true radius to the cutter-axis.

The cutter-tooth D consists of the shank-portion 30 constructed to fit in the socket-spaces 10 between the said division-walls of the cutter-body; and the projecting tooth-portion 31 which may be shaped for any work to which the cutter is to be applied; in the present instance, said shape (see Figs. 2 and 5) is that of an ordinary gear-cutter.

For the purpose of holding the cutter-teeth in place, both in their working position shown at the lower side of Fig. 3 and in their reshaping position shown at the upper side of said Fig. 3, retaining-notches, 13 and 14, are formed one in each side, 15 and 16, respectively, of the removable teeth, as illustrated in Figs. 4, 5 and 6. The retaining-notch 13 formed in the side 15 of the tooth is for use when the tooth is in its aforesaid working position, and is therefore shown formed concentric with the axis of the cutter when the tooth is in its working position shown in Figs. 1 and 2 and at the lower side of Fig. 3. The opposite retaining-notch 14 formed in the face 16 of the tooth D is for use when said tooth is in its reversed position shown at the upper side of Fig. 3, and said notch is therefore formed concentric with the cutter-axis when said tooth is in its reversed position. For holding all of the cutter-teeth in place, the clamp-plate C is formed with a retaining-ring, 17, constructed to engage firmly against the inner sides, 18 or 19 as the case may be, of said retaining-notches 13 and 14, as will be

understood by comparison of the several figures of drawings in connection with the preceding description.

It will be noticed by reference to the drawings, Fig. 3, that the teeth-holding-sockets 10 extend from the extreme outer edge or periphery of the cutter-body to the hub-opening, and that the ribs or dividing-walls are comparatively thin. The construction just 10 described is of material importance, and has two objects in view;—one, to permit the sockets to be formed in the cutter body in the easiest and cheapest possible manner, and the other, which is of material importance, to secure elasticity to the dividing-walls, they being free to yield the greater portion of their area, so that the cutter-teeth when secured in place will be tightly impinged thereby.

When the cutter is to be used, the clamp-plate C is clamped firmly against the set of teeth D, usually by means of the ordinary cutter-arbor a portion of which is indicated in Fig. 2 by dotted lines, 20 being a portion of said arbor, 21 the usual shoulder on the arbor against which the cutter is held, and 22 25 the nut whereby the cutter is held against said shoulder. If preferred, however, the clamp-plate may, either in connection with the aforesaid nut 22 or independently thereof, be held in place on the cutter-body after the well-known manner of holding two disks together by means of ordinary binding-screws.

In practice, it is intended to provide several sets of removable teeth adapted for use 35 in the same cutter-body. The removable reversible teeth, either complete or with the cutting portion thereof in blank form, constitute a separate article of manufacture, and are intended to be sold to the trade interchangeably fitted to the cutter-bodies, so that 40 the user, by placing the unhardened tooth-blanks in the position shown at the upper side of Fig. 3, may by the ordinary operation of turning bring the teeth to any required 45 shape.

In some cases, and especially when the cutter-teeth are of considerable width (longitudinally of the cutter-axis), I construct the milling-cutter as shown in Figs. 7 and 8. In this 50 form of cutter, the ribs or division-walls 23 and 29 are shown formed upon the central sleeve or hub 25, and not upon either of the

side disks or clamp-plates. In the present instance, also, each of the clamp-plates 26 and 27, Fig. 7, is provided with a retaining-ring, 55 28 and 29, respectively, which engage in the opposite sides of the cutter-teeth, as will be understood from the said figure. In this form of cutter, of course, the retaining-notches should be so constructed as to engage with 60 the retaining-rings of the clamp-plates when the cutter-teeth are in their working position and also when the same are reversed; but the bearing of the retaining-rings in the retaining-notches of said teeth need not, ordinarily, 65 be as full or perfect when the teeth are reversed as when these are in position for use.

Having thus described my invention, I claim—

1. As an improved article of manufacture, 70 a milling-cutter having cutter-teeth receiving-sockets, eccentrically disposed with relation to the axis of the cutter, and extending from the extreme outer edge or periphery of the cutter-body to the hub-opening, reversible 75 cutters fitting said sockets having retaining notches formed in both sides thereof, which notches are of like radius but located in different planes relative to each other as shown, and a clamping-plate having a retaining-ring 80 adapted for engagement with one or the other of the notches in the cutter-teeth, substantially as described.

2. As an article of manufacture, the improved milling-cutter herein described, comprising, in combination, the cutter-body having 85 cutter-teeth receiving-sockets eccentrically disposed with relation to the axis of the said cutter-body and extending from the periphery thereof to the hub-opening therein, 90 and having the thin radially-inclined dividing partitions left free to yield as described, to impinge the cutter-teeth, the reversible cutter-teeth within said sockets having notches of equal radius at opposite sides thereof located at an inclination one to the other, and 95 a clamping-plate having a retaining-ring adapted for engagement with one or the other of the notches in the cutter-teeth, interchangeably, substantially as described.

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