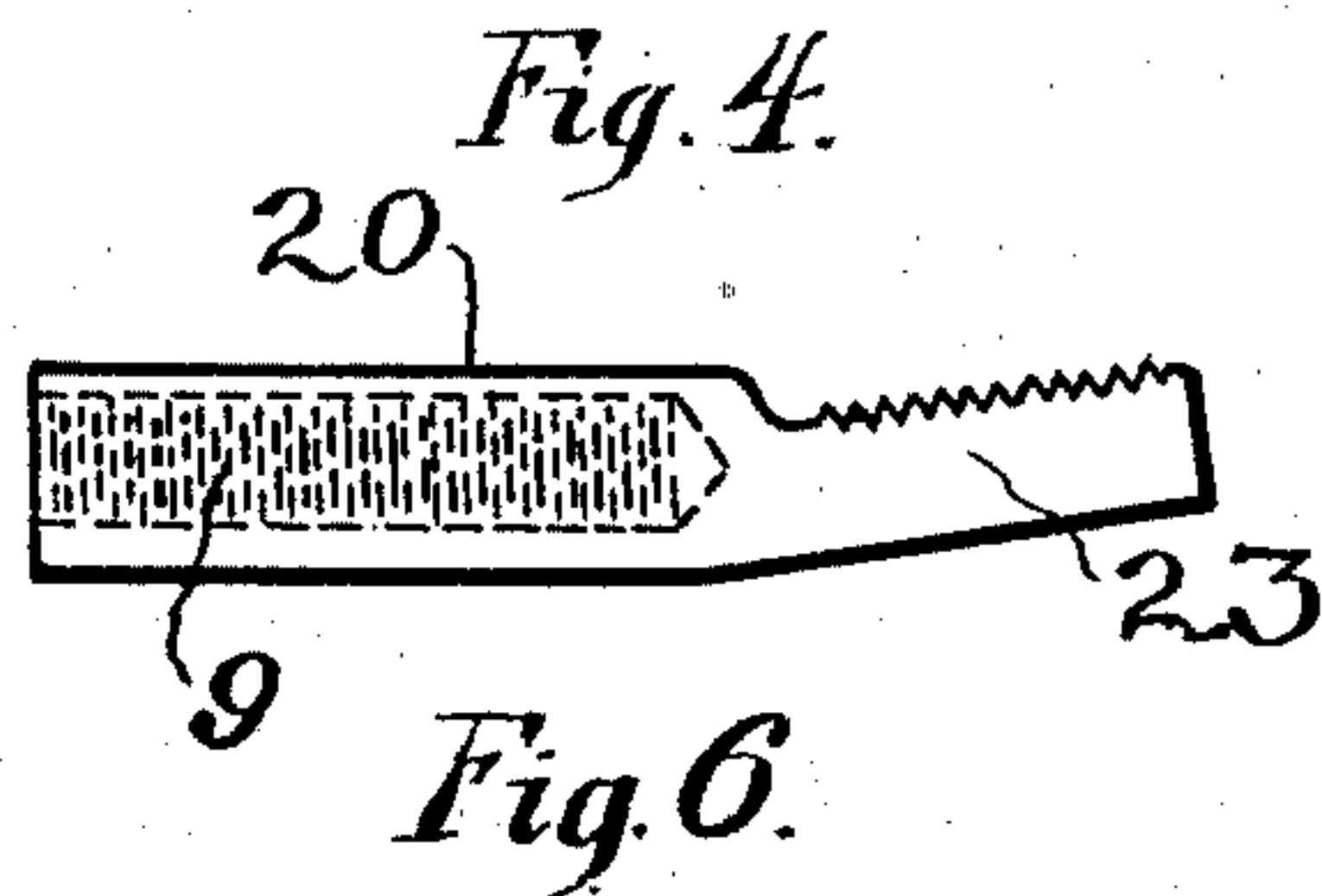
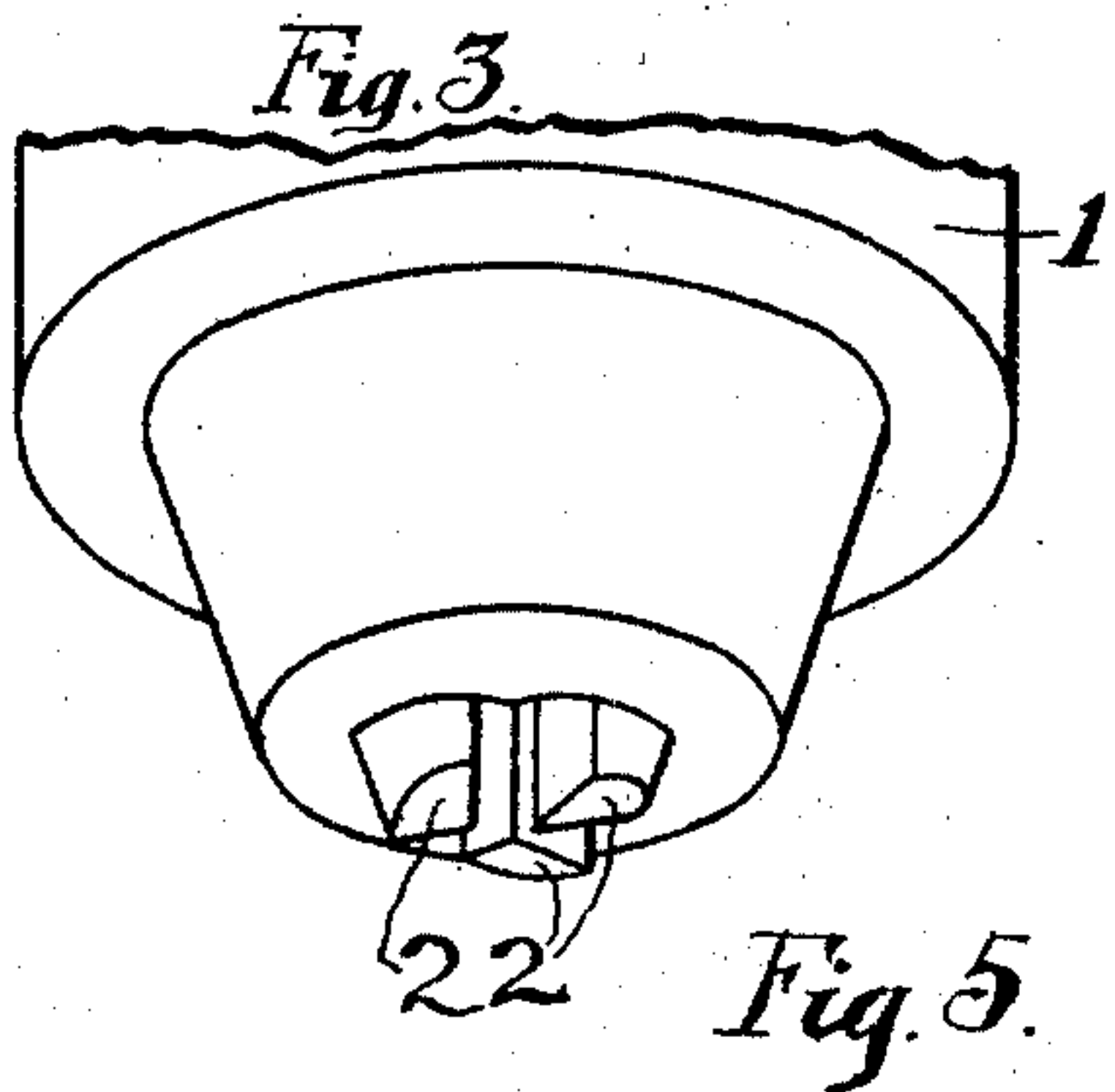
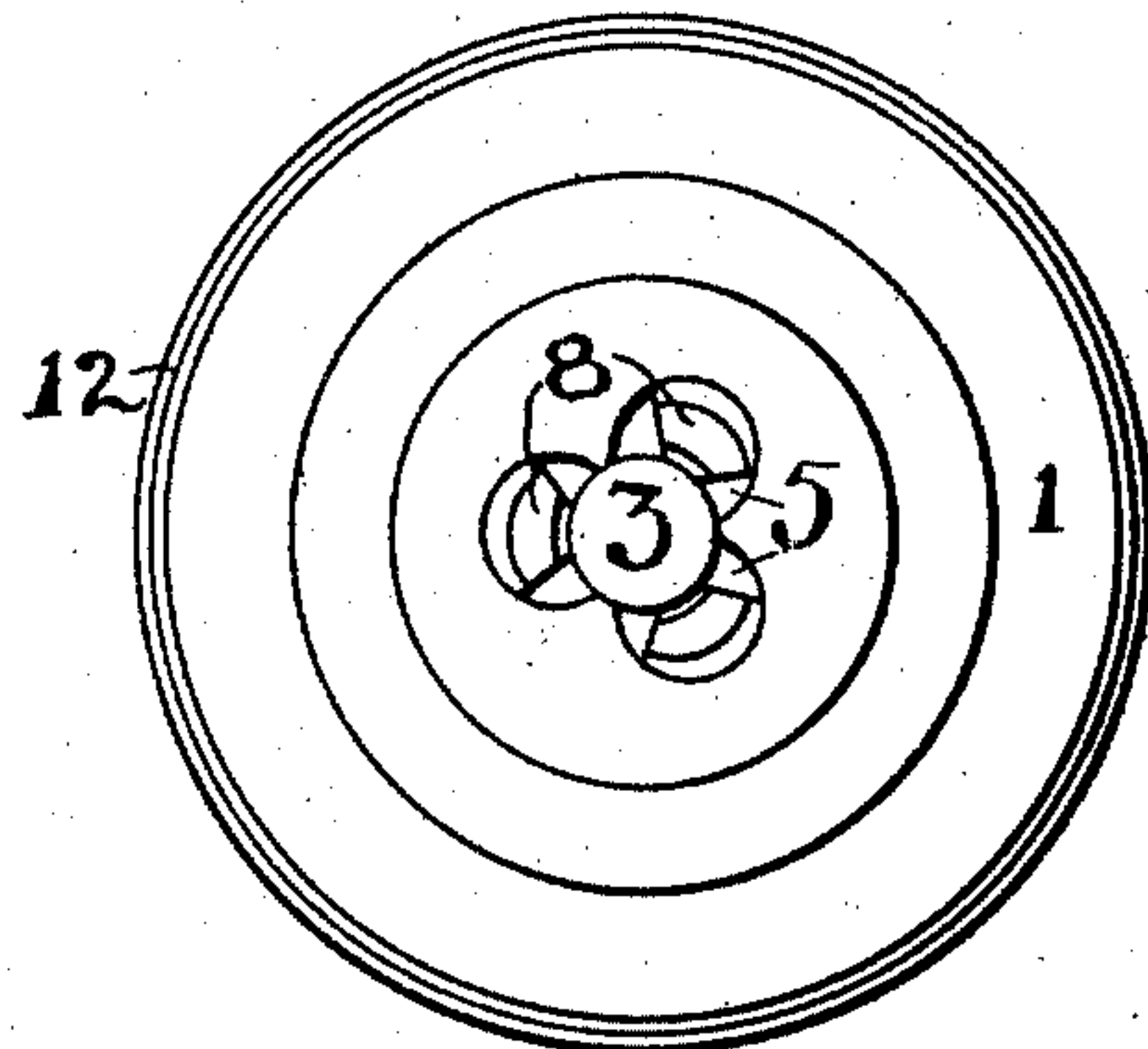
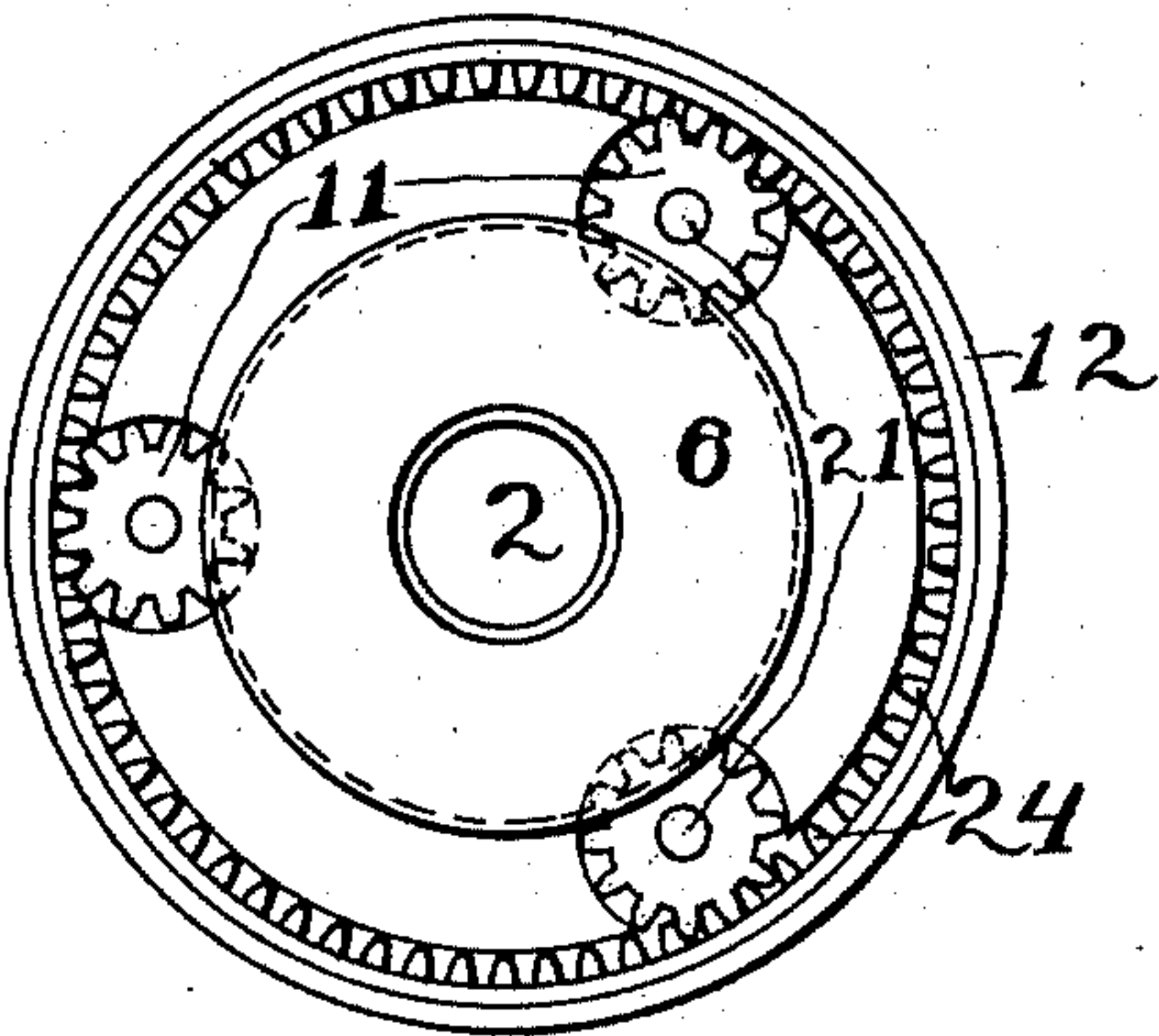
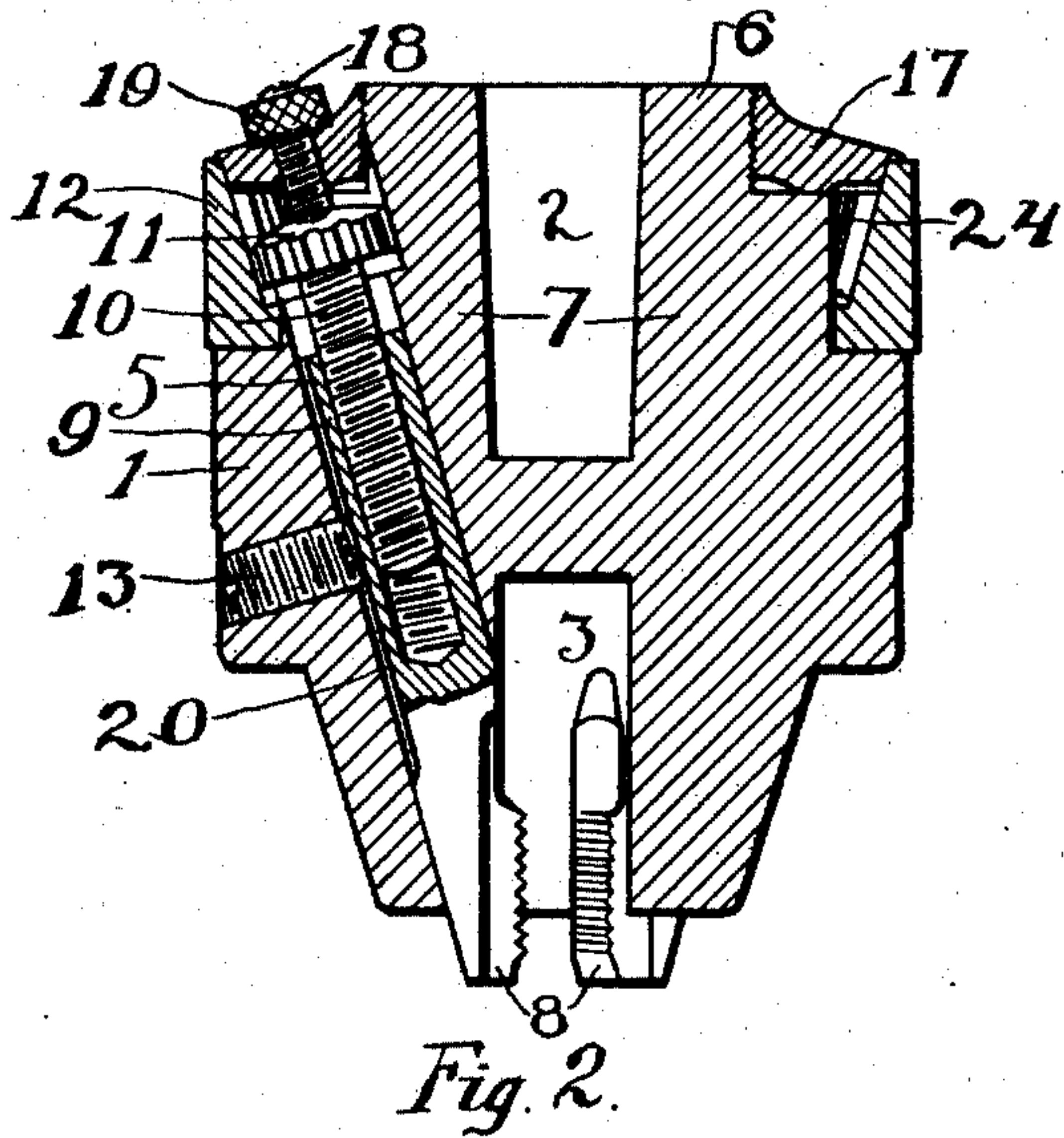
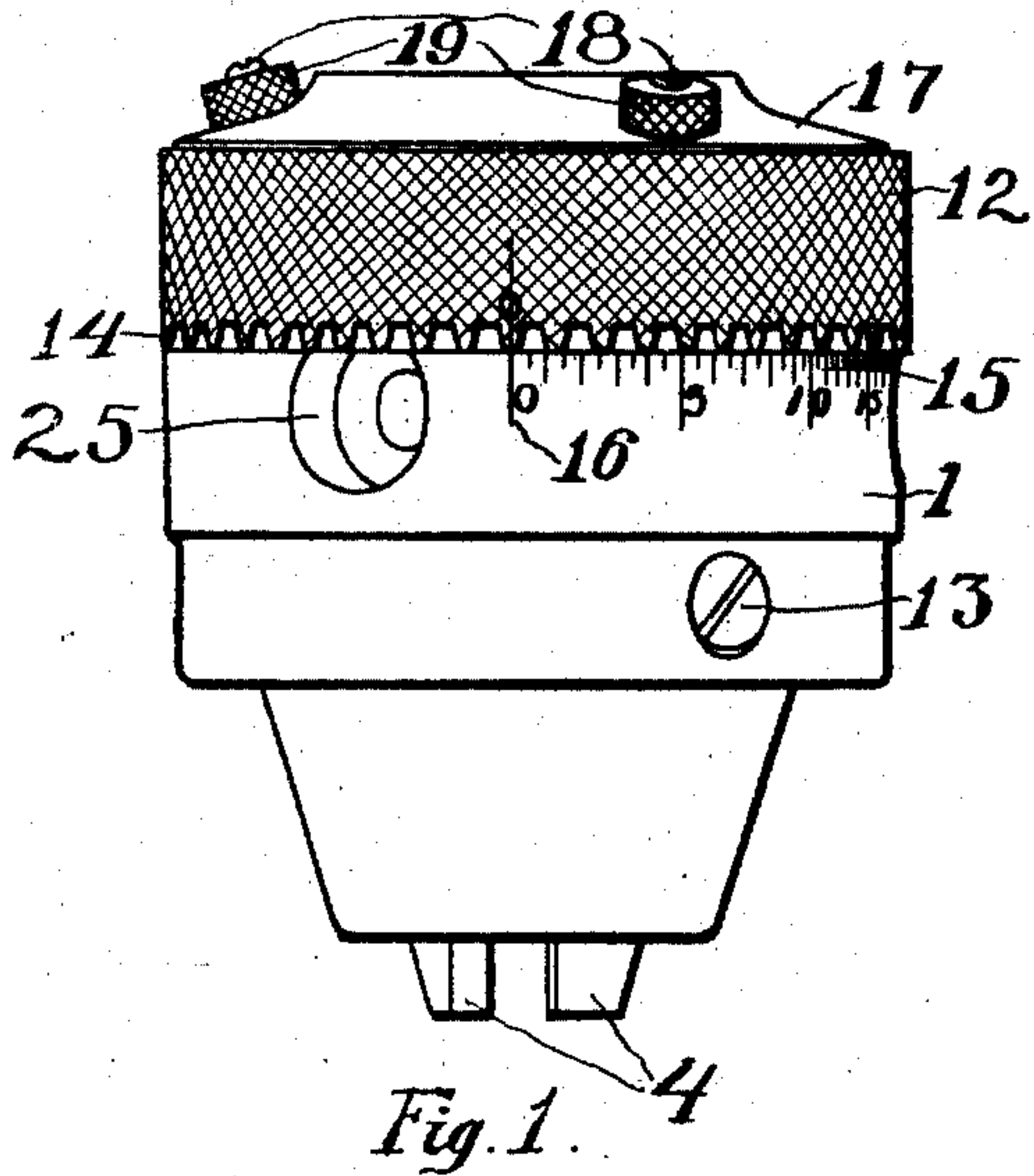


A. E. CHURCH.
 ROTARY TOOL HEAD.
 APPLICATION FILED FEB. 5, 1909.

928,180.

Patented July 13, 1909.



Witnesses

Ray G. Kutz
 O. B. Barnell.

Inventor

Albert E. Church,

By

Willard Eddy,

Attorney

UNITED STATES PATENT OFFICE.

ALBERT E. CHURCH, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE UNION MANUFACTURING COMPANY, OF NEW BRITAIN, CONNECTICUT, A CORPORATION.

ROTARY TOOL-HEAD.

No. 928,180.

Specification of Letters Patent.

Patented July 13, 1909.

Continuation of applications Serial No. 367,226, filed April 9, 1907, and Serial No. 389,613, filed August 22, 1907.

This application filed February 5, 1909. Serial No. 476,265.

To all whom it may concern:

Be it known that I, ALBERT E. CHURCH, of the city of New Britain, the county of Hartford, and the State of Connecticut, have invented certain new and useful Improvements in Rotary Tool-Heads, which improvements are described in the following specification and are illustrated by the accompanying drawings.

My invention relates generally to that class of rotary metal-working tool-heads, such as drill chucks, hollow mills, end mills, screw-cutting die-heads, collapsible taps, adjustable reamers, and the like, in which adjustable members, variously called jaws, cutters, dies, chasers, etc., symmetrically disposed in forwardly convergent chambers about the axis of the tool-head, revolve orbitally around, within, into, against or toward the work. For convenience of expression, all such revolving members, whether acting as cutters or holders, will hereinafter be uniformly termed jaws, and that term will be used in the subjoined claims to designate all such revolving members indiscriminately.

My invention relates particularly to means of moving such jaws relatively to each other and to the rotary tool-head body in which they are held.

It is the object of the invention to obtain, in tool-heads of the specified kind, a superior adjustability of the jaws to work of different kinds and sizes; to render the jaws interchangeable, and separately adjustable with reference to each other; and to attain those incidental advantages of structure and operation which will appear from the following description. To accomplish this object, I use, in connection with such revoluble tool-head body and convergent jaws, a number of pinions with screw connections for driving those jaws in unison, and means for adjusting said jaws independently with reference to each other.

In said drawings, Figure 1 is a side elevation of a drill chuck, which is constructed in accordance with the principles of my invention. Fig. 2 is an axial section of a similarly constructed screw-cutting die-head. Fig. 3 is a rear elevation of the same chuck; and is also a rear elevation of the same die-head. Fig. 4 is a front elevation of said die-head. Fig. 5 is a perspective view of the nose of a

hollow mill, or end mill, which is constructed in accordance with the same principles. Fig. 6 is a side elevation of one of the jaws of a similarly constructed tap.

In these views, the numeral 1 denotes the body of the tool-head. This body has the general external form of a solid of revolution, a posterior axial bore 2 for the reception of the mandrel of a turning-machine, and an anterior axial bore 3, which may accommodate the work. Several inclined chambers 5, bored through body 1, converge forwardly toward the axis of that body, diverge symmetrically backward, and severally intercommunicate with said anterior bore 3, in the familiar manner which is illustrated in drill chucks of the Almond type, so-called. Of body 1 the rear cylindrical portion 6 is provided with peripheral screw threads, while the adjacent cylindrical portion, of a larger diameter, constitutes the hub 7. In each of the inclined chambers 5, just described, is inserted one of a predetermined number or set of jaws. In Fig. 1 these jaws are denoted by the numeral 4, and are sharpened to parallel straight edges, suitable for gripping the shank of a drill in the usual manner; while in Figs. 2 and 4 the corresponding jaws, denoted by the numeral 8, have screw-cutting die-threads on their inward faces. In Fig. 5 the jaws, denoted by the numeral 22 have V-shaped cutting edges, suitable for plain cylindrical work. In Fig. 6, the jaw 23 has on its outer face a screw-cutting thread suitable for inside work. Each jaw has a hollow, internally threaded shank 9, containing a screw 10, which is the stem of a pinion 11, meshing with a gear ring 12. The latter encircles hub 7, and is held rotatably thereon by a nut, or screw cap, 17, and is provided internally with beveled gear-teeth 24, meshing with pinions 11. Along its anterior edge, this gear ring may be armed with a circular rack 14, as shown in Fig. 1, for engagement with a key pinion, which is not shown in the drawings, but which may be inserted in key-hole 25. For convenience in making or repeating required adjustments the gear ring 12 and body 1 may be provided with a graduated scale 15 and zero mark 16, as shown in Fig. 1. An adjusting screw 18, which is seated in cap 17, and is provided with a set nut 19, abuts in a shallow depression 21, in pinion

11, and constitutes a bearing, which is adapted to sustain the backward thrust of the pinion screw stem 10. To prevent the jaws from rotating in their respective chambers 5, while being moved longitudinally therein, and also to hold them fast in any desired position to which they may have been adjusted, the shank 9 is flattened along its back 20, and is there engaged by a screw 13, which is seated in the external wall of body 1, and is adapted, in one position of advancement, to engage the jaw as a key or spline, and, in a more advanced position, to engage the same as a set screw.

15 The shape and direction of the cutting or gripping edges or faces of the jaws, may be various, according to the kind of work for which the tool-head is to be used. As already shown in Fig. 1, if plain gripping jaws 4 are inserted in the jaw chambers 5, the tool-head is a drill chuck; while, if jaws 8, which have screw-cutting threads upon their inward faces, as shown in Figs. 2 and 4, are inserted in the same tool-holder body, the device is a screw-cutting die-head. If plain jaws 22, having inside or anterior cutting edges, be substituted in the same jaw-holding body 1, the structure becomes a hollow mill, or end mill, as shown in Fig. 5. In like manner, if 30 jaws of the pattern which is shown in Fig. 6, be similarly substituted, the device becomes a tap, or cutter-head for cutting inside screw-threads in blanks of various sizes. In like manner, if plain jaws, having outside cutting 35 edges, be similarly substituted, the structure becomes an adjustable reamer. In like manner, if jaws which are provided with screw-cutting threads upon their outer faces, as in Fig. 6, and also with screw-cutting threads 40 upon their inner faces, as in Fig. 2, be similarly substituted, the instrument becomes a cutter-head, which may be used alternatively for cutting male and female screws, as convenience may require. In like manner 45 jaws of other patterns may be similarly substituted.

Before the tool-head is used, a preliminary adjustment of the jaws, relatively to each other, may be effected by either one or more 50 of three methods, as happens to be most convenient. The first of these methods, which is applied without disturbing nut 17, consists in merely turning one or more of the adjusting screws 18; the second method, which

also is applied without opening the tool head, 55 consists in rotating one, and, if need be, another, of the jaws by hand through one or more complete revolutions on screw 10, while such jaw is disengaged from screw 13; the third method, which involves the temporary removal of nut 17, consists in disengaging one, and, if need be, another, pinion 11 from gear ring 12, in rotating such pinion with reference to its connected jaw, so far as due adjustment may require, and in 65 then bringing that pinion back into a new engagement with said ring.

Being independently adjustable as described, the jaws of a single set may, by construction, be exact duplicates of each other, 70 and interchangeable; and any jaw, being released from screw 13, and turned off screw 10, may conveniently be withdrawn forwardly from the body of the tool-head, and replaced by a new or different jaw, without opening 75 the tool-head or removing nut 17.

In the operation of the invention, any desired opening, closing or collapsing of the jaws in unison, for engaging or disengaging tools or work, is effected by turning gear 80 ring 12.

I claim—

1. A tool-head body, having convergent jaw chambers, a number of adjustable and forwardly inclined jaws, provided with internally screw-threaded hollow shanks, working in said chambers, a number of pinions, having screw stems, working in said shanks respectively, and a gear ring, encircling said body and engaging said pinions, in combination with a screw cap, holding said gear ring 90 rotatively in position, and a number of adjusting screws, working through said screw-cap, and engaging said pinions respectively.

2. In a rotary tool-head, a number of independently adjustable and forwardly inclined convergent jaws, and an equal number of adjustable pinions, having screw connections with said jaws, in combination with screws for adjusting said pinions independently, and 100 means for driving said pinions in unison.

In testimony whereof I have hereunto set my name in the presence of two witnesses.

ALBERT E. CHURCH.

Witnesses:

C. F. WOODFORD,
MARY A. TAYLOR.