

March 20, 1928.

1,663,223

H. THOMASON

ADJUSTABLE REAMER

Original Filed June 13, 1921 2 Sheets-Sheet 1

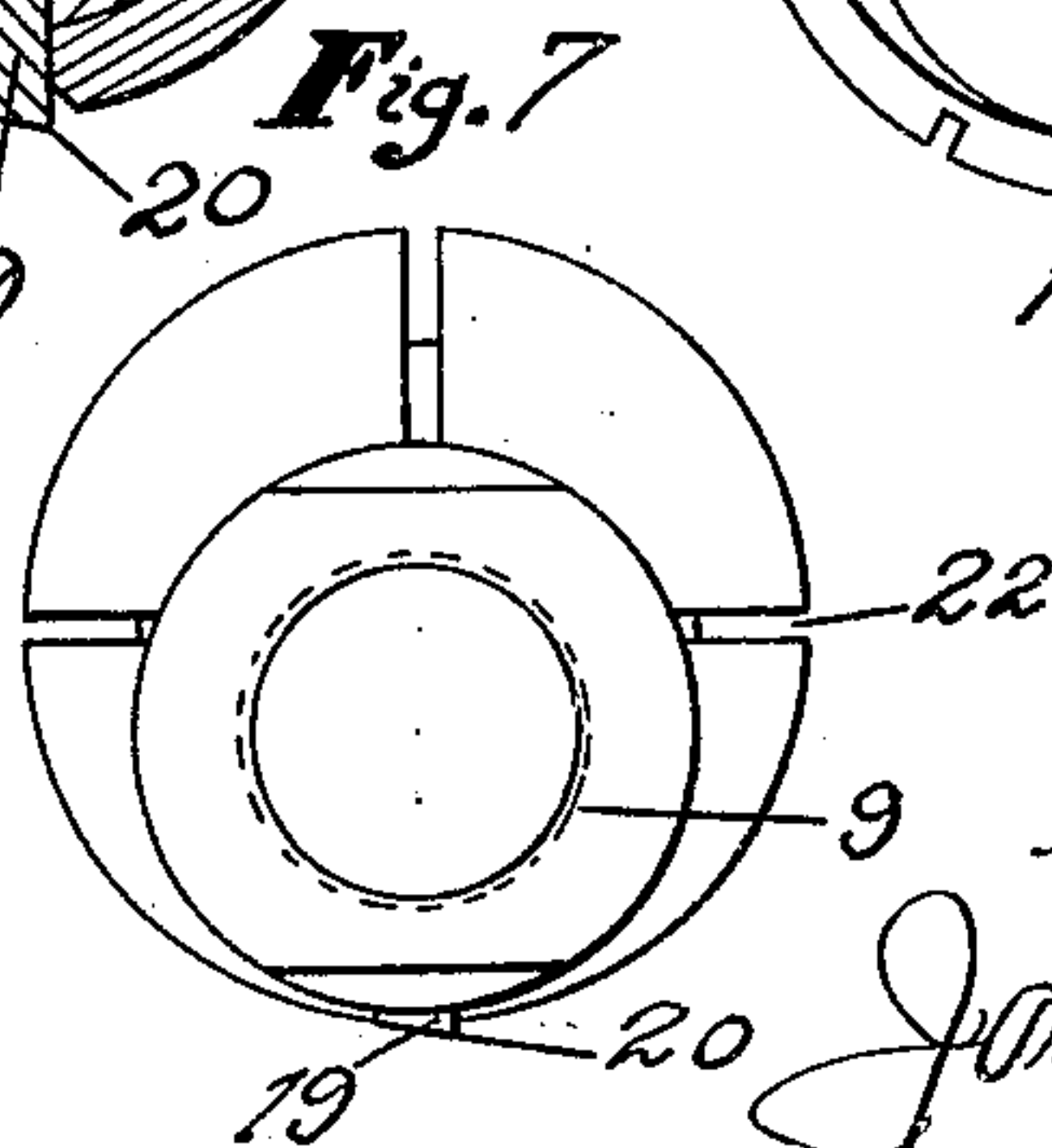
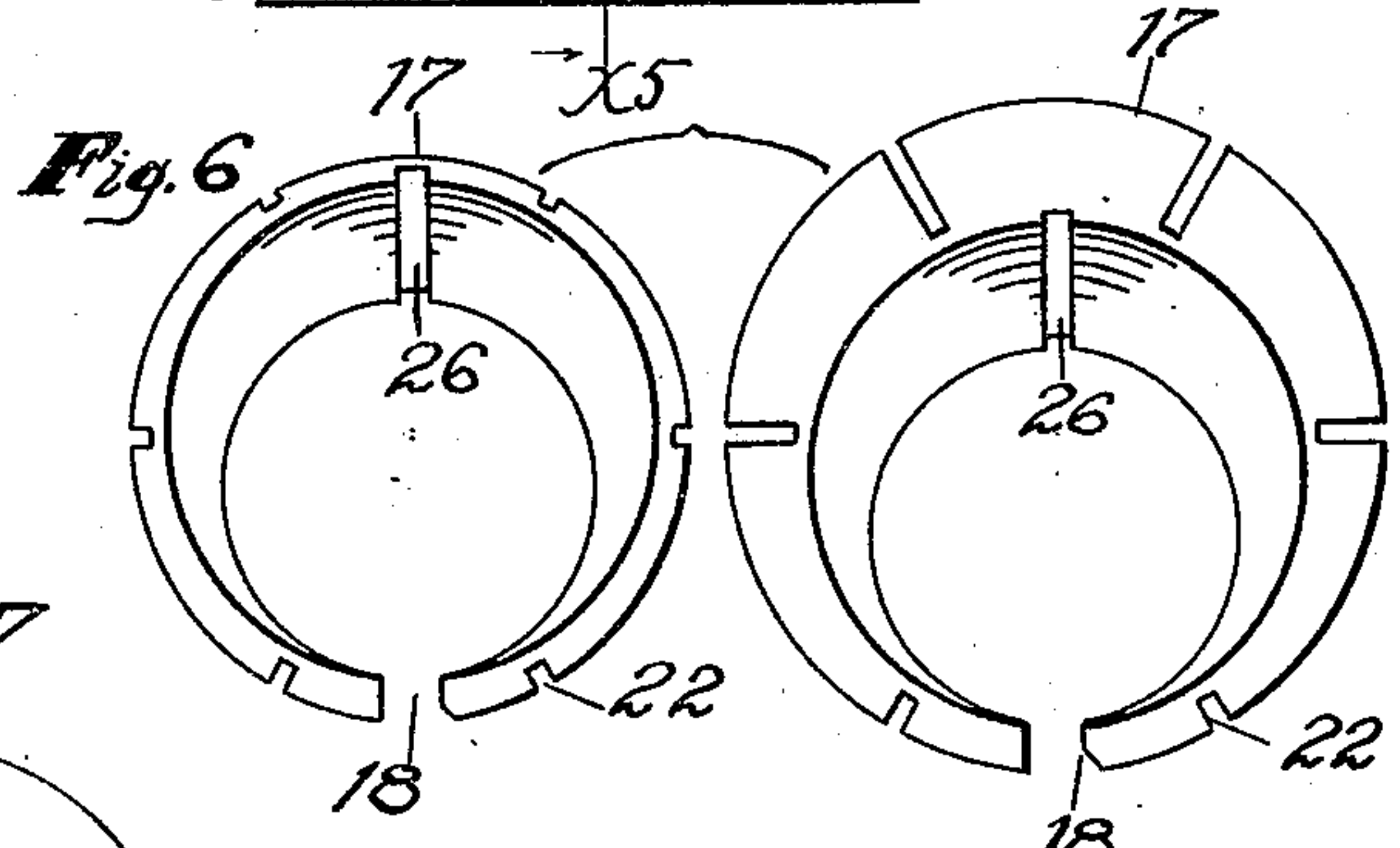
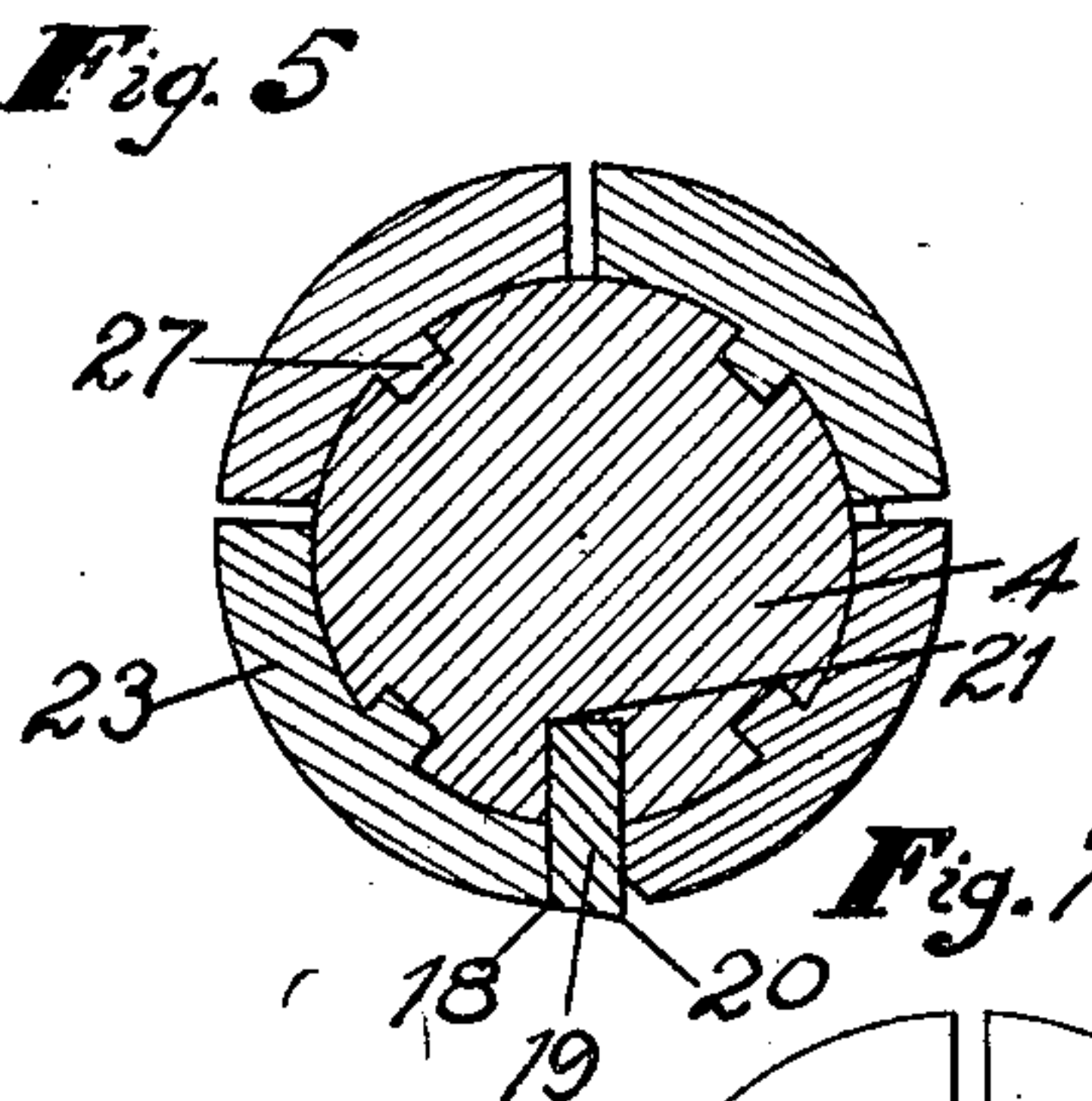
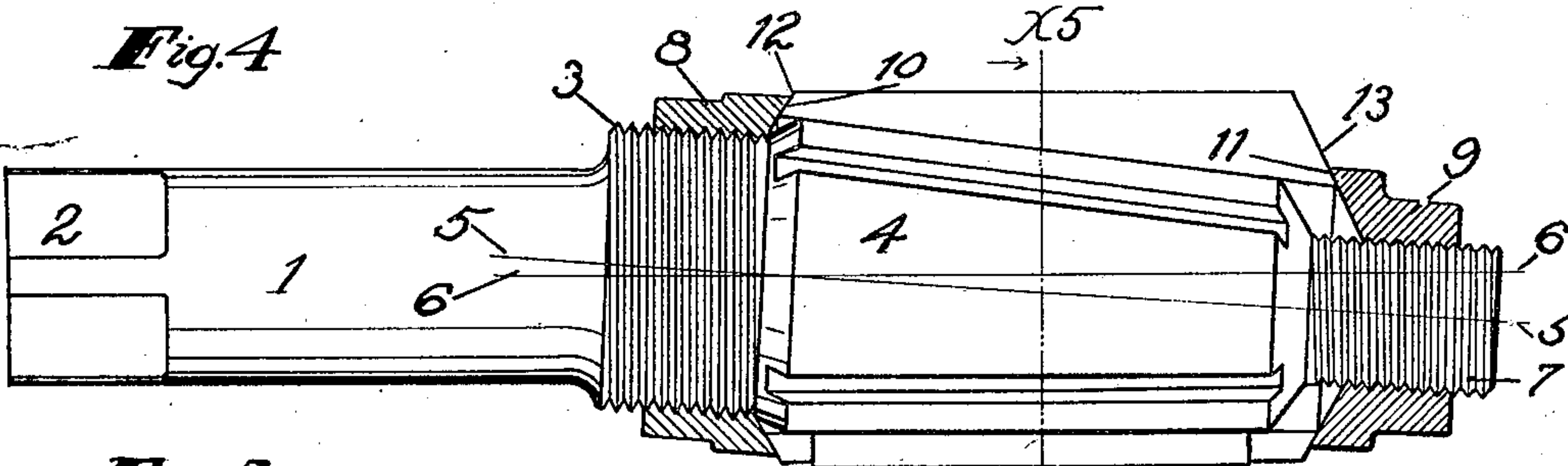
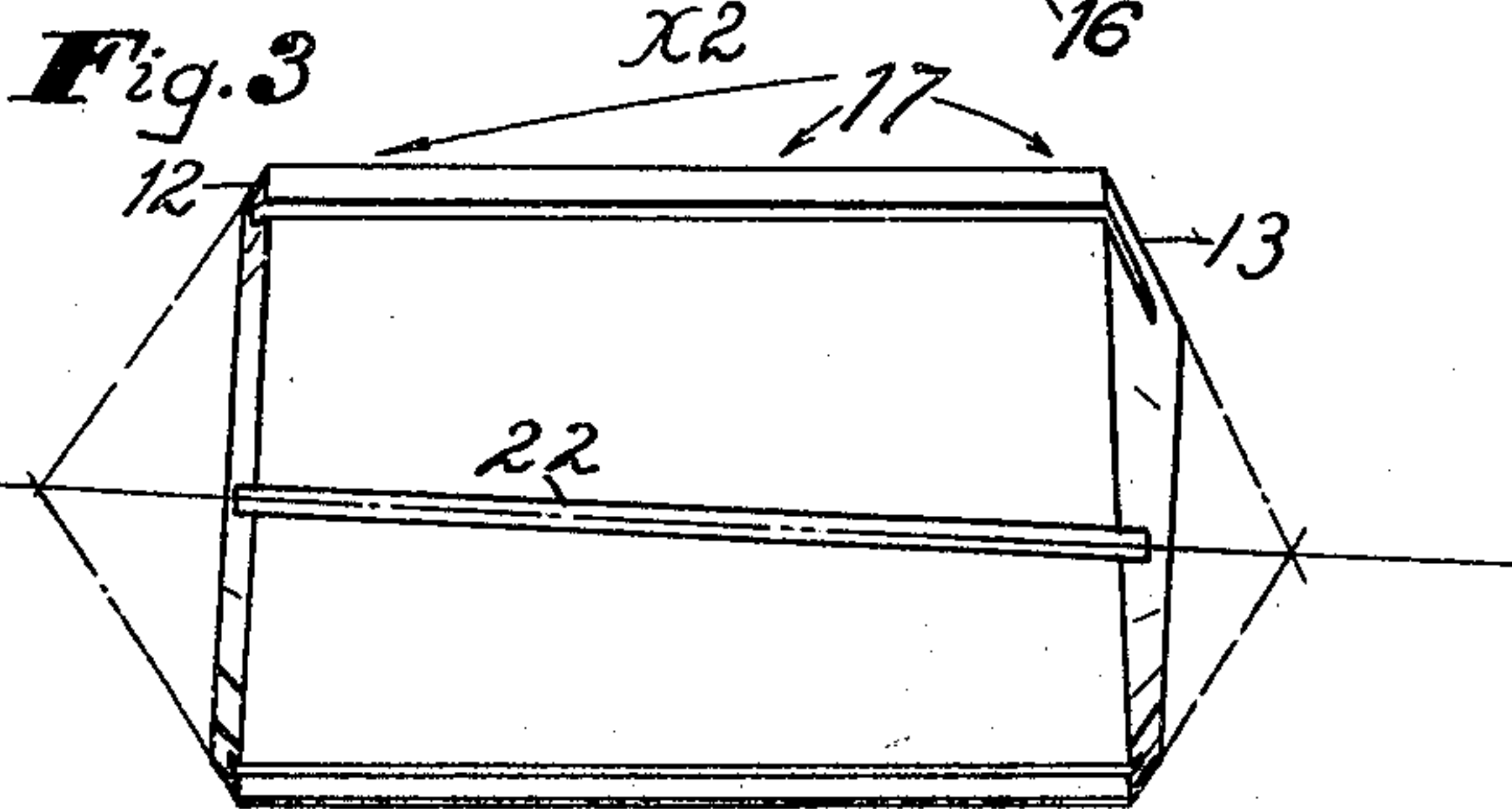
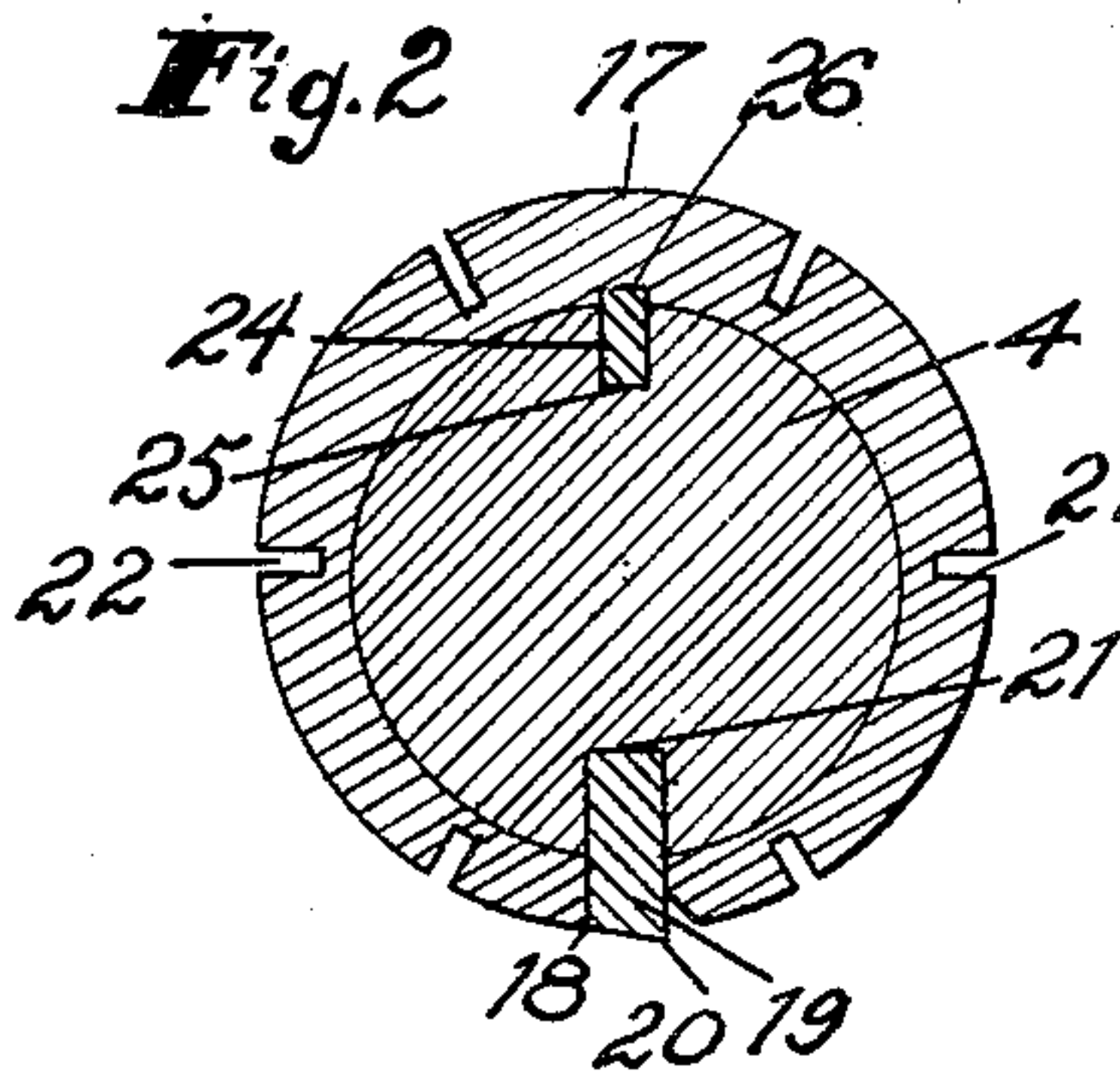
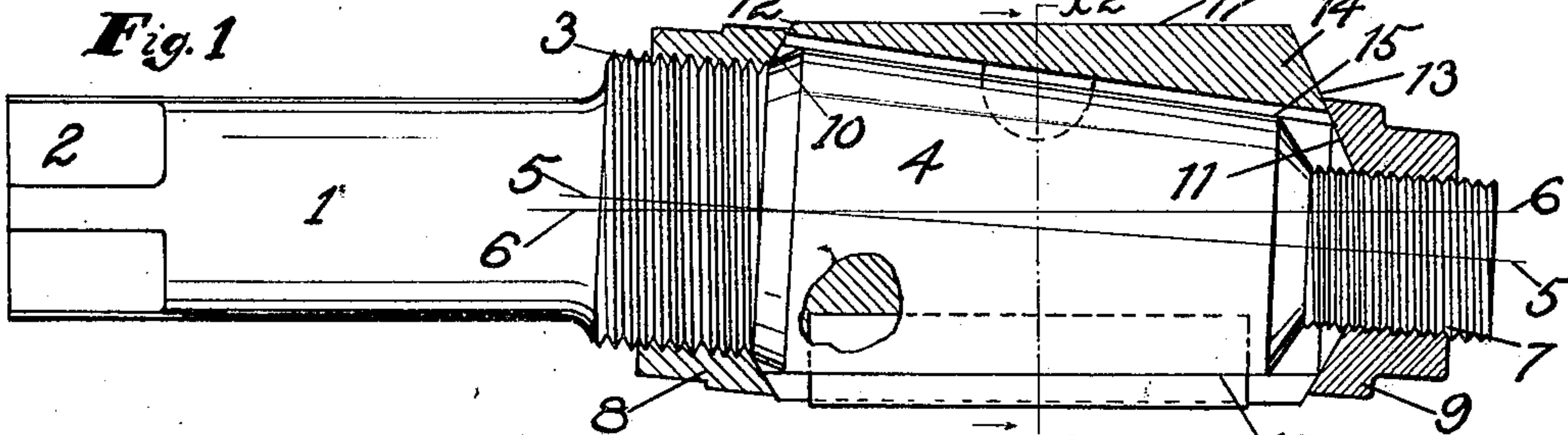


Fig. 6a
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by James R. Townsend
his atty

Witness:
L. Whipple

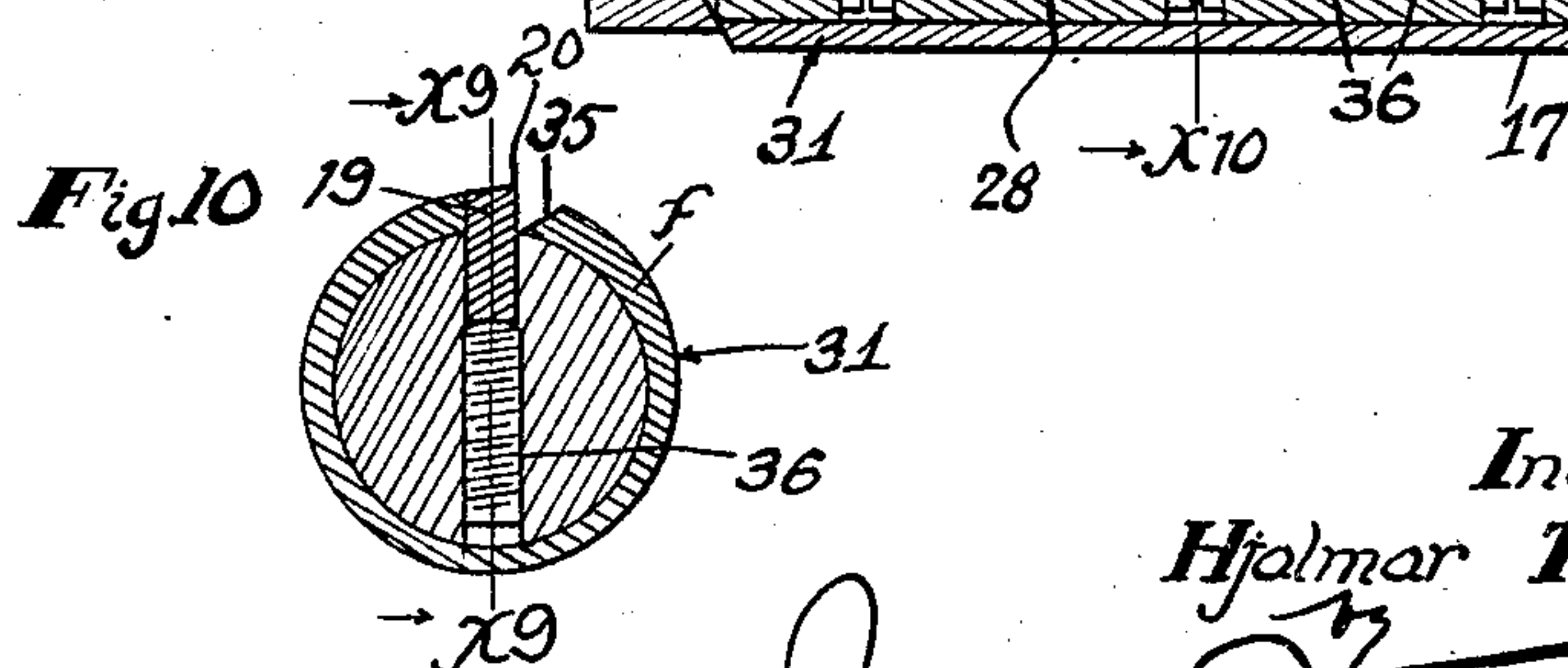
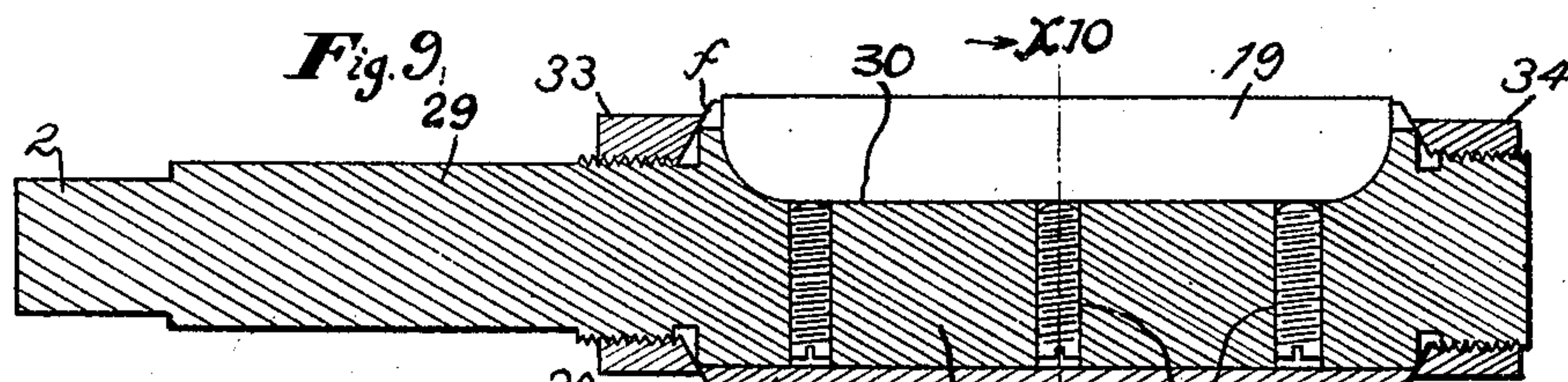
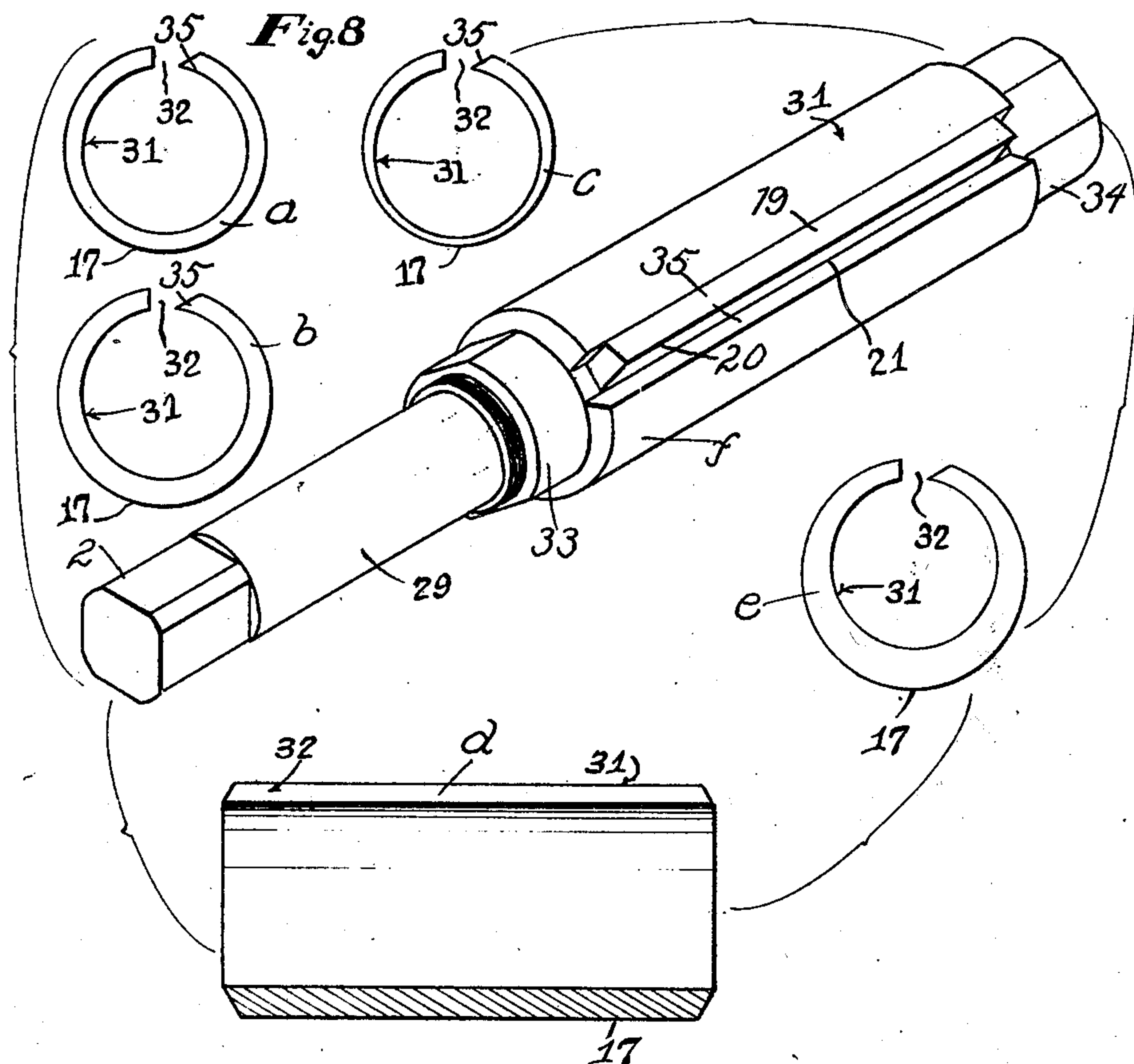
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Original Filed June 13, 1921 2 Sheets-Sheet 2



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Patented Mar. 20, 1928.

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UNITED STATES PATENT OFFICE.

HJALMAR THOMASON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO SHEPARD-THOMASON CO., OF LOS ANGELES, CALIFORNIA, COMPOSED OF A. M. SHEPARD AND HJALMAR THOMASON.

ADJUSTABLE REAMER.

Application filed June 13, 1921, Serial No. 477,104. Renewed August 22, 1927.

This invention relates to expansible reamers for reaming out circular holes or hollow surfaces such as the Babbitt bearings, bushings and the like for journal bearings of machinery.

The invention is an improvement in the art in that I provide in combination with a stock and a cutter fixed against rotation on the stock; a sleeve having an excentric bore and a side opening through which said cutter extends; and in practice I provide for such stock a plurality of such sleeves to form a single kit or outfit, the outside diameters of said sleeves respectively being different and the bore being of the same diameter and located in each instance at the same distance from the outside of the opening through which the cutter extends. By this construction and arrangement, the tool is easily adjustable to cut a hole or opening to a micrometric dimension, the cutting edge of the cutter always extending the predetermined distance from the axis of the stock, but at different distances from the actual or produced trace of the sleeve opposite to the openings through which the cutter projects.

A principle of the invention is that the portion of the periphery of the sleeve which supports the thrust of the cutter edge, determines the effective diameter of the reamer; and the distance may be changed by changing sleeves or by expanding one sleeve; and the extent of such expansion may be determined with micrometric precision by bringing the sleeve to the exact adjustment along a taper stock.

This expansion of the sleeve may be accomplished in various ways and in some instances the cutter may be seated on a taper stock that is excentric to and supported by an expansible sleeve against thrust transverse to the axis of the reamer, and may extend radially through one wall of the sleeve and be supported by an internal excentric tapered stock; means being provided whereby the expansion of the sleeve may be effected in such manner as to increase the diameter of the reamer from the cutter edge to the bearing trace opposite said cutter edge.

In a preferred form the invention may be applied by changing sleeves at each change of diameter. Such application of the invention, however requires a different sleeve for each size of hole.

The invention includes various forms of construction whereby the variation of the diameter of the reamer is effected without adjusting the cutter relative to the axis of the shank of the tool. This is done by an excentric arrangement of stock and sleeve.

In a reamer of the class which is stationary while the bearing to be reamed out is manually applied to the reamer, my invention includes a taper stock, a cutter abutting the stock, and a sleeve adapted to be expanded by the taper stock, and arranged to form a bearing for the tool opposite to the cutting edge; one longitudinal trace of the taper stock being parallel to the axis of the sleeve, and consequently to the external longitudinal trace of the sleeve which forms the thrust bearing of the cutter when the sleeve is mounted on the stock.

An object of the invention is to provide a simple adjustable reamer in which the adjusting devices are inexpensive and adapted to use with a single stock with wide range of diameters, and adapted to be adjusted with micrometric accuracy.

An object is to provide a practical reamer in which a single stock with a single cutter can be employed to ream holes of different sizes without adjusting the cutter relative to the stock.

The invention includes the taper stock in combination with a cutter and means to hold the cutter non-rotatable on, and at different positions longitudinally of, the stock; and in order to produce the same in the most direct and simple manner, and in one implement, with considerable range of adjustability, the holding means comprises an expansible cylindrical sleeve having a taper bore, which fits on the stock and the axis of which bore is oblique to the axis of the sleeve, and nuts turning on the axis of the stock, and adapted to adjust the sleeve longitudinally of the stock.

The sleeve may be unitary or may consist of a set of splints or staves held together by nuts screwed on the stock to embrace the splints or staves.

An object is to provide a reamer that is simple and that permits ready assembly and disassembly.

In the preferred form the stock is provided with a longitudinal key-way and the cutter is firmly seated in said key-way and projects from the periphery of the stock

a predetermined distance; and the sleeve is slotted to allow the cutter edge to extend the required distance beyond the periphery of the sleeve and in carrying out this invention the sleeves for any particular stock and cutter are provided with corresponding bores and are of uniform thickness at the cutter slot so that where interchangeable sleeves of different diameters are employed, each of said sleeves, with one exception, must have an excentric bore.

Further objects of the invention are strength and ease of manufacture.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detail description and the appended claims.

The accompanying drawings illustrate the invention.

Figure 1 is a side view of the adjustable reamer with sleeve and nuts in axial section.

Fig. 2 is a section on line x^2 , Fig. 1.

Fig. 3 is a side elevation of the sleeve shown in section in Fig. 1.

Fig. 4 is a view analogous to Fig. 1, showing a sectional sleeve formed of longitudinal splints held together by socketed nuts on the stock.

Fig. 5 is a section on line x^5 , Fig. 4.

Fig. 6 is an end view of an expansible sleeve of a diameter adapted to be applied to either of the stocks shown in Figs. 1 and 4.

Fig. 6^a is an end view of an expansible sleeve similar to Fig. 6, except as to cutting element proportions.

Fig. 7 is a view of the entering end of the tool shown in Figs. 1 and 2.

Fig. 8 is a view partly in perspective and partly in end elevation and partly in longitudinal section of an adjustable underreamer constructed in accordance with this invention embodied in a stock and a set of six sleeves of different diameters, some of said sleeves being in end elevation and some in longitudinal section.

Fig. 9 is a longitudinal section on line indicated at x^9 , Fig. 10, of the assembled tool shown in Fig. 8.

Fig. 10 is a cross section on line x^{10} , Fig. 9.

In each of the views the circular bore B is excentric to the sleeve which is generally indicated in the several views by S.

Referring first to the character of tools shown in Figs. 1-7 shank 1 may be of any desired construction and extends from the angular tip 2 to the threaded portion 3 of the stock 4, the axis 5 of which is oblique to the produced axis 6 of the shank. Said stock is provided with the threaded portions 3 and 7 adapted to seat the sleeve adjusting nuts 8, 9 that have conical seats 10, 11 accommodating the beveled ends 12 and 13 of the expansible sleeve, various forms of which may be provided.

In Figs. 1, 2 and 3, the sleeve is unitary and comprises a cylindrical body 14 having a taper bore 15, the longitudinal trace 16 of which is parallel to the produced axis 6 of the stock. The longitudinal thrust or bearing trace 17 of the sleeve is also parallel to the produced axis 6; and the nuts 8 and 9 are screwed onto the threaded portions 3 and 7 until they engage the conical ends 12 and 13 of the sleeve.

The sleeve may be constructed of any material having a degree of resiliency and is provided on the side opposite the bearing trace 17 with a slot 18 so as to allow the sleeve to expand when shoved from the entering end toward the shank end of the stock. The slot 18 is adapted to accommodate a cutter 19, the cutting edge 20 of which projects freely through said slot. The heel of the cutter is seated in a groove 21 in the stock 4 and it is evident from the foregoing that if the sleeve is shifted toward the shank, it will be expanded; and that the portion of the sleeve between the contacting or thrust bearing trace 17 and the axis of the stock, will be increased; and that increase will depend upon the amount the sleeve is shifted along the stock. The shifting for expansion may be accomplished accurately by loosening nut 8 and tightening the nut 9 to move the sleeve back. This loosening and tightening can be conducted and measurements be taken by a gage, and the diameter of the hole to be reamed can thus be exactly determined.

In order to facilitate and equalize the expansibility of the sleeve, longitudinal slots 22 are provided along the perimeter of the sleeve and these may be of greater or less depth depending upon the character of the material of which the sleeve is made, it being intended that the sleeve will be capable of expansion to a predetermined diameter from which it will return when the expanding force is withdrawn.

In lieu of the unitary sleeve with or without the slots 22 the slots may in manufacture be deepened until they entirely sever the sleeve into a number of splints as at 23 in Fig. 5, and each of these splints may be constructed in practically the same terminal contour as with the forms shown in Figs. 1, 3 and 6.

Rotation of the sleeve upon the stock 4 is prevented by some suitable means which are indicated as of two different forms, in addition to the abutting of the sleeve on the cutter.

In Fig. 2 a key 24 is mounted in the keyways 25, 26 so that revolution of the sleeve on the stock is impossible.

In the form shown in Fig. 5 each splint 23 is provided with a tongue 27 for the same purpose as key 24 of the other views.

In the form shown in Figs. 8, 9 and 10

the stock 28 is straight and is axially alined with the shank 29 and is provided with a longitudinal cutter seat 30; and the sleeve 31 is straight and fits on the stock and has a longitudinal thrust bearing trace 17 diametrically opposite the cutter seat to contact with the wall of the hole being reamed; and the cutter 19 is seated in said slot, and projects through the slot 32 of the sleeve with its cutting edge diametrically opposite the thrust trace 17.

The interchangeable tool shown in Figs. 8, 9 and 10, includes a set of sleeves of different diameters as at *a, b, c, d, e, f*; the walls of the slots therein being uniform to fit the cutter and all of the same depth; and since the bores of the several sleeves are of uniform diameter to fit the stock, each bore, with one exception, is eccentric to the periphery of its respective sleeve to increase or decrease the distance between the cutting edge 20 and the thrust bearing formed by the longitudinal trace 17, from the standard distance formed by the sleeve having a bore concentric with its periphery. Thus it may be seen that the eccentricity of the bore determines the diameter of the hole that may be reamed with said sleeve and stock. These sleeves are detachably secured by over-hang retainers, 33, 34, one of which may be integral with and the other screwed onto the stock; or both may be screwed onto the stock as in Figs. 1 and 4.

The slot wall 35 is bevelled to give clearance to the cutter and the cutter is detachably mounted on the stock through means of the seat and cutter engagement shown.

These interchangeable sleeves are practically non-expansible and vary in diameter with micrometric precision so that adjustment of the tool to exact diameter of bore is quickly made by simply fastening onto the stock the specific sleeve therefor.

The stock is shown provided with holes 36 through which a punch may be driven to displace the cutter when desired.

I claim—

1. A reamer comprising a stock; a cutter fixed against rotation on the stock; and a sleeve having a bore eccentric to the outside diameter of the sleeve and adapted to fit said stock, said sleeve also having a side opening to allow the cutter to project beyond the side of the sleeve when said sleeve is on the stock, the diameter of said sleeve determining the diameter of the hole that may be reamed with said stock and sleeve.

2. A reamer outfit comprising a stock; a cutter fixed against rotation on the stock; and a plurality of sleeves of different outside diameters each having a bore eccentric to the outside diameter of the sleeve and adapted to fit said stock, each sleeve having a side opening to allow the cutter to project beyond the side of the sleeve when the sleeve

is on the stock, the various sleeves at said opening being of uniform thickness and being of varying thicknesses at the side opposite said side opening to enable the operator to ream various sized bores by simply changing the sleeve, the diameter of said sleeve determining the diameter of the holes that may be reamed with said stock and sleeves; and means for detachably fastening the sleeves interchangeably upon the stock.

3. A sleeve adapted for use in a reamer outfit, said sleeve having an opening in one side and having a bore open to said opening and eccentric to the outside diameter of said sleeve.

4. An adjustable reamer comprising a cylindrical sleeve having a taper bore, the longitudinal trace of one side of which bore is parallel to the longitudinal trace of the adjacent produced periphery of the sleeve; said sleeve being slotted for the purpose of allowing it to expand; a taper stock adapted to the bore of said sleeve and provided with a cutter seat; a cutter supported by said cutter seat and extending through the wall of the sleeve and having a cutting edge that is parallel to the axis of the sleeve; and adjustable means for fixing the sleeve at different positions along the stock.

5. An adjustable reamer comprising a taper stock and a shank therefor, said stock being provided with a longitudinal groove forming a seat for a cutter, the axis of said stock being oblique to the produced axis of the shank; a cutter seated in said seat and having a cutting edge parallel to the produced axis of the shank; an expansible cylindrical sleeve having a taper bore slidably and non-rotatably mounted upon the stock, and also having a slot through which the cutter seated in the seat in the stock may project; said sleeve being non-rotatable on the stock; and means for adjusting the sleeve along the stock.

6. An adjustable reamer comprising a taper stock and a shank therefor, said stock being provided with a longitudinal groove forming a seat for a cutter; the axis of said stock being oblique to the produced axis of the shank, and the cutter seat being on that side of the stock farthest removed from said produced axis of the shank; a cutter seated in said cutter seat and having a cutting edge parallel to the produced axis of the shank; an expansible cylindrical sleeve having a taper bore and slidably and non-rotatably mounted upon the stock, and also having a slot through the side nearest the axis of said bore through which slot the cutter seated in the seat in the stock may project; and means cooperating with the stock for holding the sleeve in fixed relation thereto at different adjustments on the stock.

7. A reamer comprising a stock; a cutter fixed against rotation on the stock, and a

sleeve through which said cutter extends, said sleeve being provided with a thrust bearing trace diametrically opposite to the edge of the cutter, said sleeve forming the bearing at one side of the hole being reamed, while the cutter operates diametrically opposite this bearing, said sleeve being adapted to fill the finished portion of the hole and being detachable from the stock for the purpose of interchange with another sleeve of different diameter.

8. A reamer comprising a stock; a cutter fixed against rotation on the stock, and a sleeve having an eccentric bore fitting the stock and also having a slot through which the cutter extends and having a thrust bearing trace diametrically opposite the cutting edge of said cutter, said sleeve forming the bearing at one side of the hole being reamed, while the cutter operates diametrically opposite this bearing, and said sleeve being adapted to fill the finished portion of the hole.

9. A reamer comprising a cylindrical stock; a cutter fixed against rotation on the stock, and a cylindrical sleeve having an eccentric cylindrical bore fitting the stock and also having a slot through which the cutter extends and having a thrust bearing trace diametrically opposite the cutting edge of said cutter, said sleeve forming the bearing at one side of the hole being reamed, while the cutter operates diametrically opposite this bearing, and said sleeve being adapted to fill the finished portion of the hole.

10. In a reamer, the combination of a stock; a cutter seated in said stock and in non-rotatable relation thereto; a sleeve having an eccentric bore fitting the stock and provided with a slot through which said cutter projects, the diameter of said sleeve determining the diameter of the hole that may be reamed with said stock and sleeve; and nuts screwed onto the stock and overhanging the ends of the sleeve.

11. An adjustable reamer comprising a stock, a cutter carried by the stock and a sleeve adapted to be mounted on said stock and having a slot to allow the edge of the cutter to project beyond the side of the sleeve when it is on the stock; the bore of said sleeve being equidistant throughout from the periphery of the sleeve on the

slotted side thereof and being of a greater or less diameter from the periphery of the sleeve on the side opposite the slot.

12. An adjustable reamer comprising a cutter; a stock therefor and a sleeve adapted to be mounted on the stock and to provide a support along the side opposite the cutting edge of the cutter, the axis of the stock being oblique to the axis of the sleeve.

13. In an adjustable reamer, a taper stock, and a cutter on said stock provided with a cutting edge; a sleeve having a bore adapted to fit said stock, said bore being eccentric to the outside diameter of said sleeve, said sleeve also having an opening for the cutting edge of said cutter; and means for moving said sleeve longitudinally on said stock to increase and decrease the distance between said cutting edge and the outside of the sleeve opposite said opening.

14. A reamer comprising a stock; a cutter fixed against rotation on the stock; and a sleeve having a bore eccentric to the outside diameter of the sleeve and adapted to fit said stock, and said sleeve having a side opening to allow the cutter to project beyond the side of the sleeve when the said sleeve is on the stock.

15. A reamer outfit comprising a stock; a cutter fixed against rotation on the stock; and a plurality of sleeves of different outside diameter, each having a bore eccentric to the outside diameter of the sleeve and adapted to fit said stock, each sleeve having a side opening to allow the cutter to project around the side of the sleeve when the sleeve is on the stock, and the various sleeves at said opening being of uniform thickness and of varying thickness at the side opposite to said side opening to enable the operator to ream various size bores by simply changing the sleeve.

16. In a reamer, the combination of a stock; a cutter seated in said stock and in non-rotatable relation thereto; a sleeve having an eccentric bore fitting the stock and provided with a slot through which said cutter projects, and nuts screwed upon the stock and overhanging ends of the sleeve.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 26th day of May, 1921.

HJALMAR THOMASON.