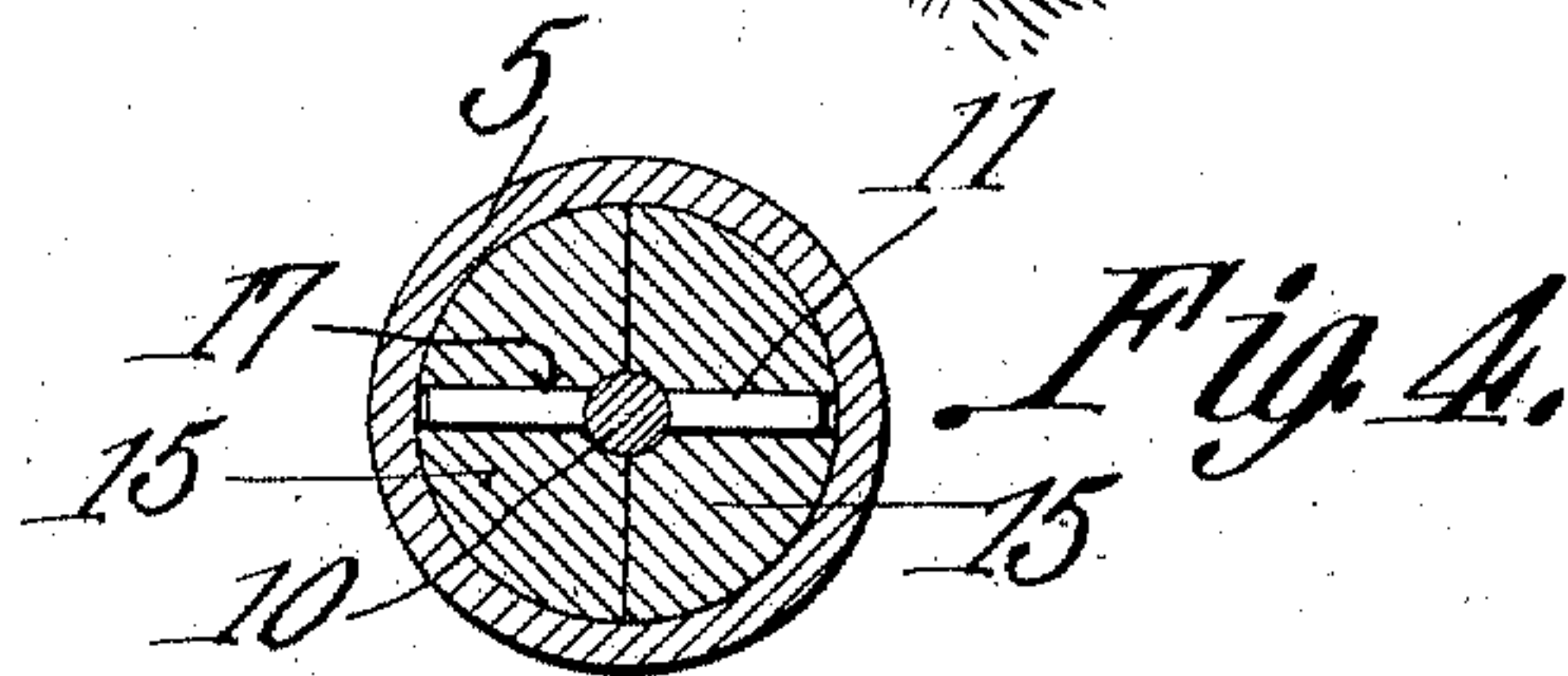
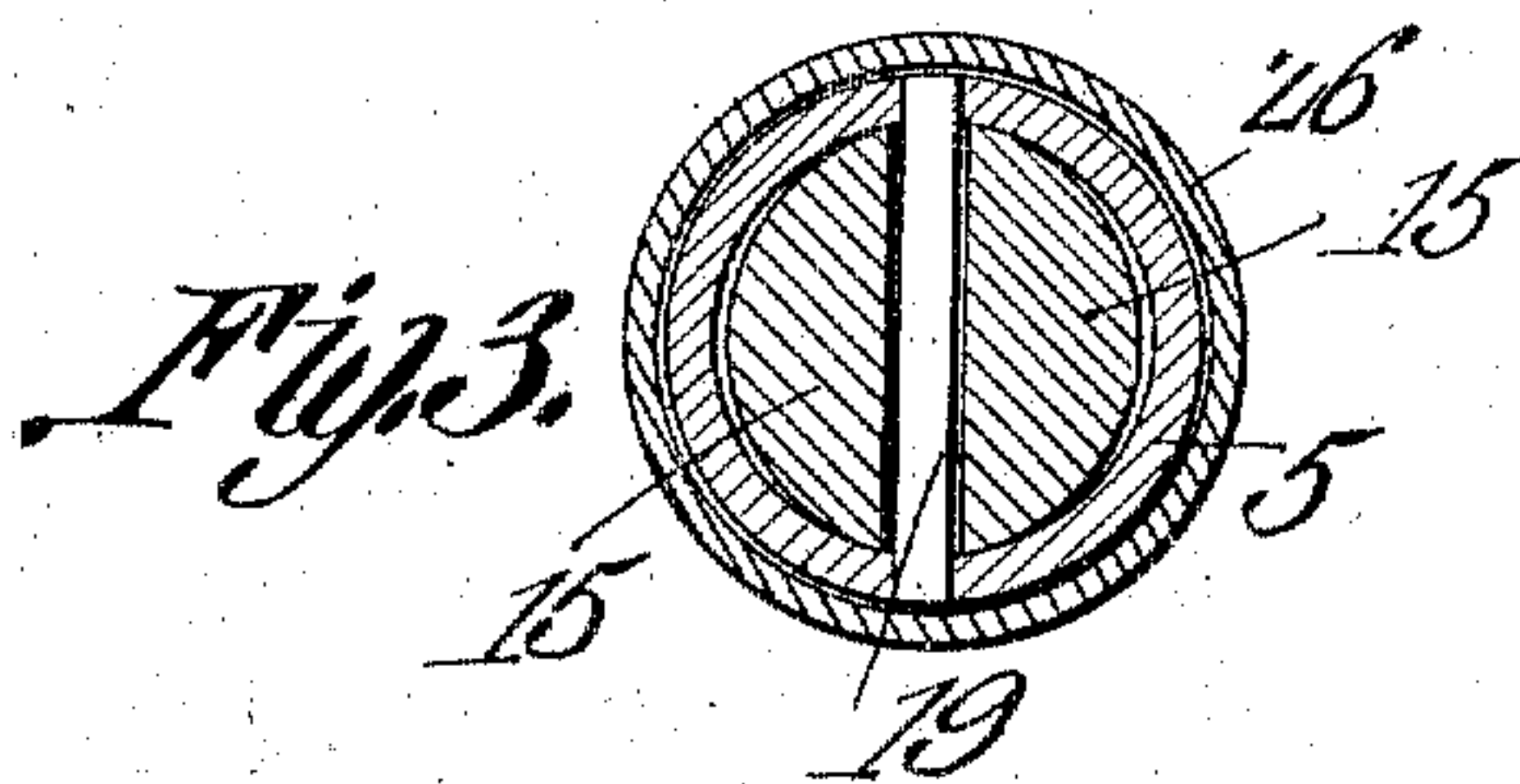
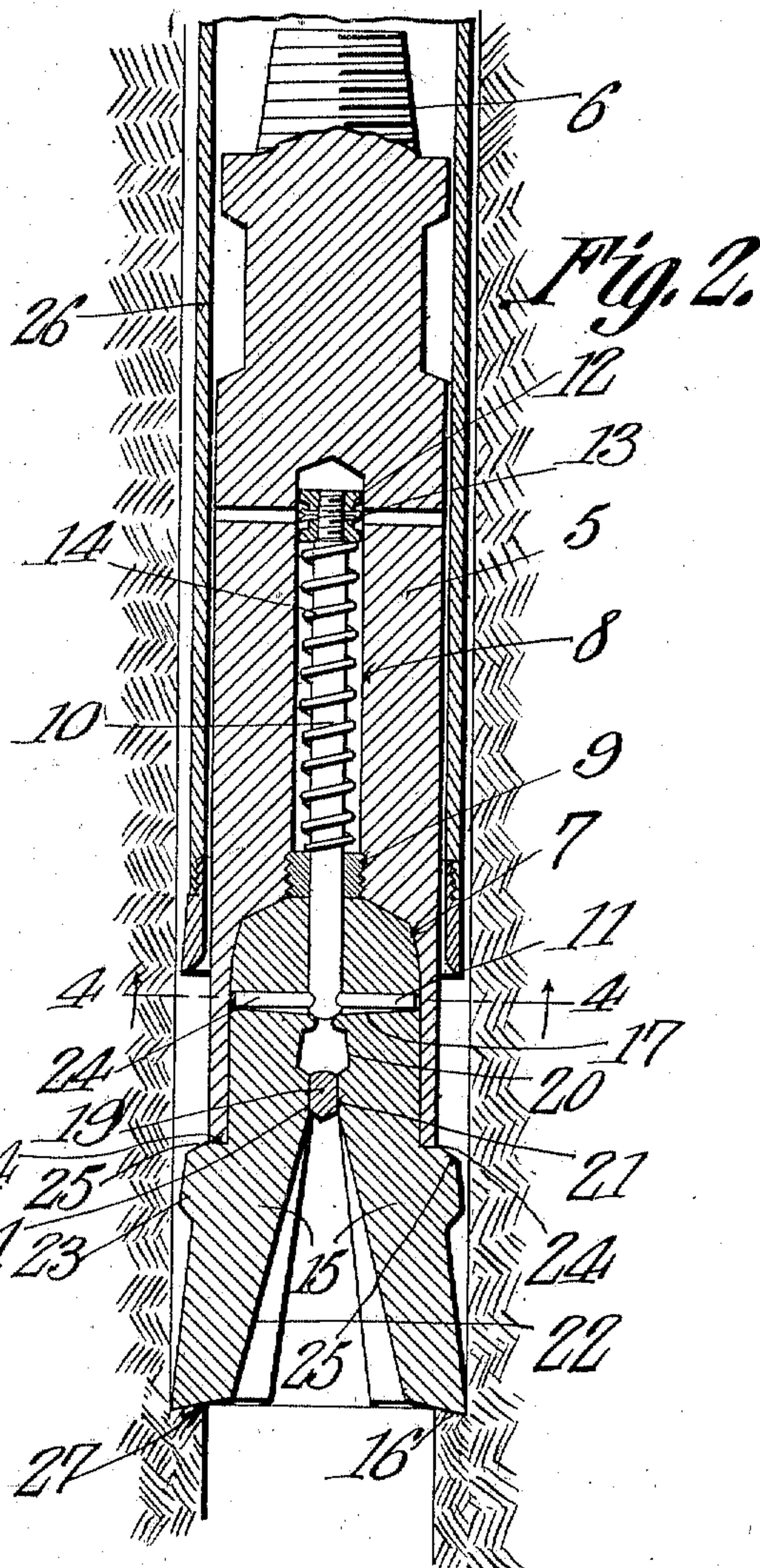
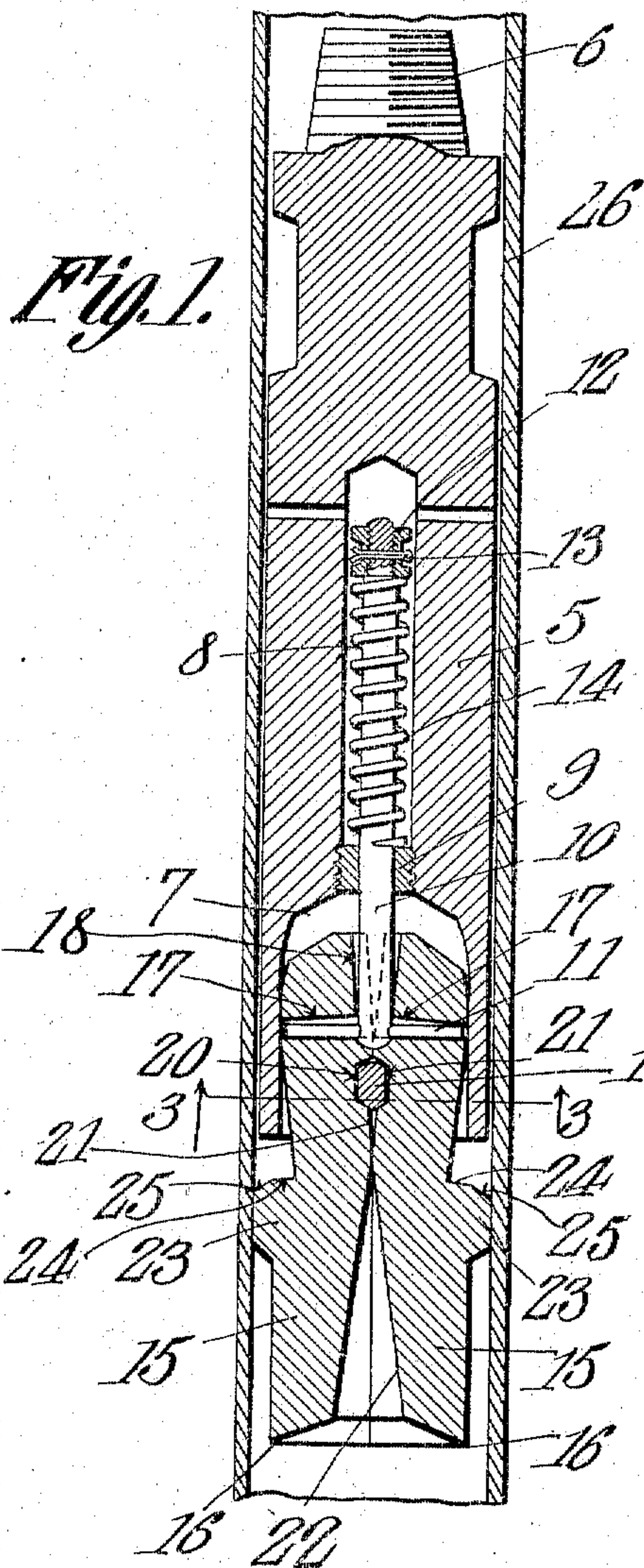


980,331.

Patented Jan. 3, 1911.



Witnesses  
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# UNITED STATES PATENT OFFICE.

BERT L. PETERSON, OF ROBINSON, ILLINOIS.

UNDERREAMER.

980,331.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed March 28, 1910. Serial No. 551,992.

*To all whom it may concern:*

Be it known that I, BERT L. PETERSON, a citizen of the United States, residing at Robinson, in the county of Crawford and State of Illinois, have invented a new and useful Underreamer, of which the following is a specification.

In drilling oil and other wells it is frequently desirable, for various reasons, to continue the casing to a greater depth, and this is usually done by enlarging the hole below the casing sufficiently so that the casing may be lowered, the hole being thus continued to the desired depth. This operation is known as underreaming, and the invention relates to a tool for performing this operation, the tool being of that type in which the slips or cutters expand when they clear the lower end of the casing.

It is the object of the invention to provide an underreamer of the kind stated which is strong and durable, and also simple in construction, the number of parts being reduced to a minimum, so as to eliminate as much as possible, screw and other joints, which are objectionable by reason of their liability to become separated when the tool is in use.

The invention also has for its object to provide improved means for supporting and reinforcing the slips or cutters, so that they may successfully withstand the strain which is placed on them when at work.

With these objects in view, the invention consists in a novel construction and arrangement of parts to be hereinafter described and claimed, reference being had to the accompanying drawing, in which,

Figure 1 is a longitudinal section of the tool showing the position of the parts as the tool is being passed through the well casing. Fig. 2 is a longitudinal section of the tool in operative position. Fig. 3 is a horizontal section on the line 3—3 of Fig. 1. Fig. 4 is a horizontal section on the line 4—4 of Fig. 2.

In the drawing, 5 denotes the body or stock of the tool, which is formed at its upper end with an exteriorly threaded portion 6 for uniting with the other tools of the string in a manner well known in the art. The stock is preferably cylindrical in form, and has at its lower end a cylindrical socket 7 to receive the upper ends of the slips to be presently described. The stock also has a central longitudinal bore 8 which is closed

at one of its ends, and opens at its other end into the socket 7. Into the last mentioned end of the bore is screwed a bushing 9. Through this bushing extends a rod 10, one end of which passes into the bore 8, and the other end of the rod extends into the socket 7. The last mentioned portion of the rod carries a transverse key 11 which projects from opposite sides thereof. The function of this key will be presently described. The end of that portion of the rod which is located in the bore is reduced and screw threaded to receive a nut 12 which screws down on the shoulder formed by said reduced portion. The nut is locked by a cotter 13. In the bore is located a coiled spring 14, said spring being coiled around the rod between the bushing 9 and the nut 12.

At 15 are indicated the slips or cutters of the tool. The bottom of each slip is inclined to form a cutting edge 16. The slips extend at their upper ends into the socket 7, and are connected to the rod 10 by means of the key 11, said key passing through openings 17 made in the slips. The openings 17 are made sufficiently large to permit the slips to be expanded or contracted as will be presently described. The opposite faces of the upper portions of the slips are grooved as indicated at 18 to permit the rod to come therebetween.

Extending across the socket 7, adjacent to its lower end, is a cross bar 19, said cross bar being wedge shaped in cross section at its lower end. The cross bar is located between the slips below the point of attachment of said slips to the rod 10. The inner faces of the slips are formed with notches 20, these notches, being opposite each other, and when the slips come together, forming a recess to receive the cross bar 19. Below this recess the inner faces of the slips are straight for a short distance as indicated at 21, and beyond the same, said faces are inclined in opposite directions, as indicated at 22, to form a space between the slips which is tapered in the direction of the cross bar. The recess formed by the notches 20 tapers in the direction of the portions 21.

The outer surface of each slip is formed with a shoulder 23, having an upper portion 24 which is adapted to come squarely against the lower end of the stock when the slips are in working position as shown in Fig. 2, and beyond this portion of the shoulder, the same is beveled as indicated at 25.



Fig. 1 shows the position of the parts as the tool is being run down the well casing 26. The slips have been retracted so that they may pass through the casing. This is done by pulling said slips downwardly until the cross bar 19 comes into the recess formed by the notches 20. The outer surfaces of the shoulders 23 are in contact with the inner surface of the casing, whereby the points 16 are held spaced from said surface of the casing, and the slips are also prevented from spreading out any further. Upon pulling the slips downwardly as stated, the spring 14 is compressed between the bushing 19 and the nut 12. The spring cannot pull the slips upwardly by reason of the engagement of the shoulders 23 with the casing 26. Any upward movement of the slips would tend to spread them still further, and thus increase the frictional contact between the shoulders 23 and the casing wall. This tendency of the slips to spread is produced by the cross bar 19. When the shoulders 23 clear the lower end of the casing 26, the slips are released, and they spread as shown in Fig. 2, and thus come into operative position. It will, of course, be understood, that before placing the tool in operative position, the casing 26 is raised a short distance in order that the reaming may start at the shoulder 27 which originally supported the casing. When the slips spread out as stated, their points 16 extend outwardly sufficiently to make a hole having the same diameter as the original hole. The moment the shoulders 23 clear the lower end of the casing 26 the spring 24 is permitted to expand, and it pulls the slips upwardly until the portion 24 of the shoulders engages the lower end of the stock 5. When the slips move upwardly, the cross bar 19 enters between the portions 21 of the slips, and thus causes said slips to spread out as stated. The entry of the cross bar between this portion of the slips is facilitated by its wedge shape, as well as by the tapered portion of the recess formed by the notches 20. It will be noted that the space between the portions 21 of the slips is slightly tapered in the direction of the recess when the slips are in retracted position, and the point of the wedge shaped portion of the cross bar extends into this flared portion of the space. When the slips are in working position, as shown in Fig. 2, their upper ends are in contact with the upper end of the socket 7, and with the bushing 9. That portion of the slips which extends into the sockets, is shaped to fit snugly therein. The entire upper ends of the slips are therefore backed, which, with the engagement of the shoulders with the lower

end of the stock 5 sustains the thrust and strain on the slips when in operation. The slips are thus firmly supported, and they will successfully withstand the heavy strain to which they are subjected when in operation. The shoulders 23 extend substantially around the full circumference of the slips. Rotation of the slips in the stock is prevented by the cross bar 19.

To withdraw the tool, the stock 5 is pulled upwardly until the shoulders 23 engage the lower end of the casing 26. A continued pull on the stock, elevates the stock with respect to the slips, and the cross bar 19 enters the recess formed by the notches 20. As the cross bar enters this recess, the slips come together so that they may enter the casing 26, the parts now again assuming the position shown in Fig. 1. The bevels 25 engage the lower edge of the casing, and force the slips inwardly as the cross bar enters the recess.

By the structure herein described, an underreaming tool is had which is strong and durable, and also simple in construction, it being entirely devoid of complicated parts. The number of parts is also reduced to a minimum, and said parts are so connected that there is no danger of the same becoming separated. The key 11 passes through the rod 10 and the slips only, and as it is located within the socket 7, it is held in position, and cannot slip out while the tool is in use. The bushing 9 permits the spring 14 to be placed in position from the lower end of the stock, thus avoiding screw joints at its upper end.

What is claimed is:

An underreamer comprising a stock having an end socket, slips mounted in the socket, and having their cutting portions projecting therefrom, a support for the slips carried by the stock, said support being connected to the portions of the slips which are located within the socket, and said support permitting a sliding and spreading movement of the slips, and a cross bar carried by the stock, said cross bar being located in the end socket between the portions of the slips extending thereinto, the opposite faces of said portions being recessed to receive the cross bar, and said cross bar being wedge shaped in cross section to spread the slips when it passes out of the recesses.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

BERT L. PETERSON.

Witnesses:

GEORGE D. McCARTY,  
JOHN KOPP.