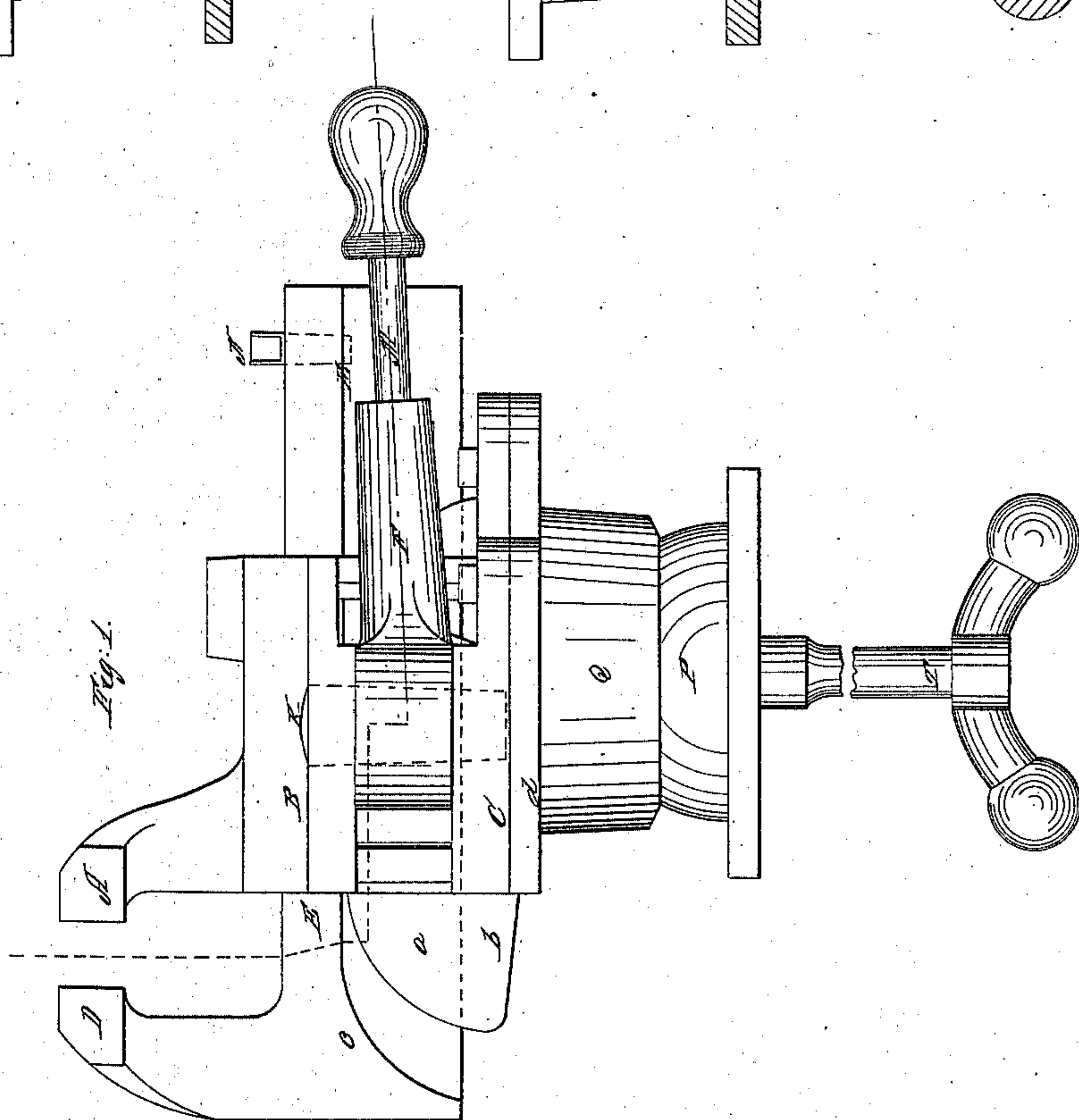
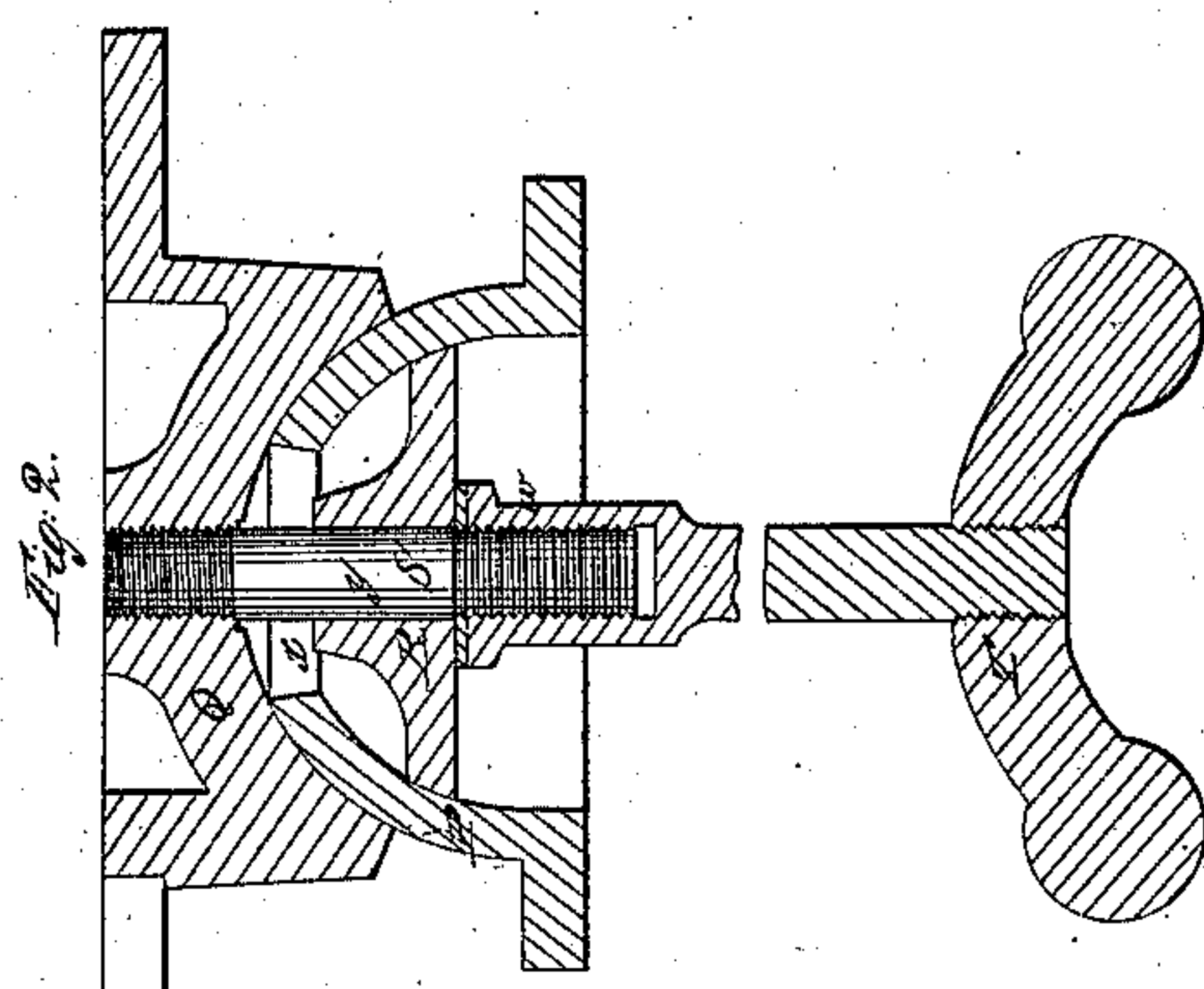
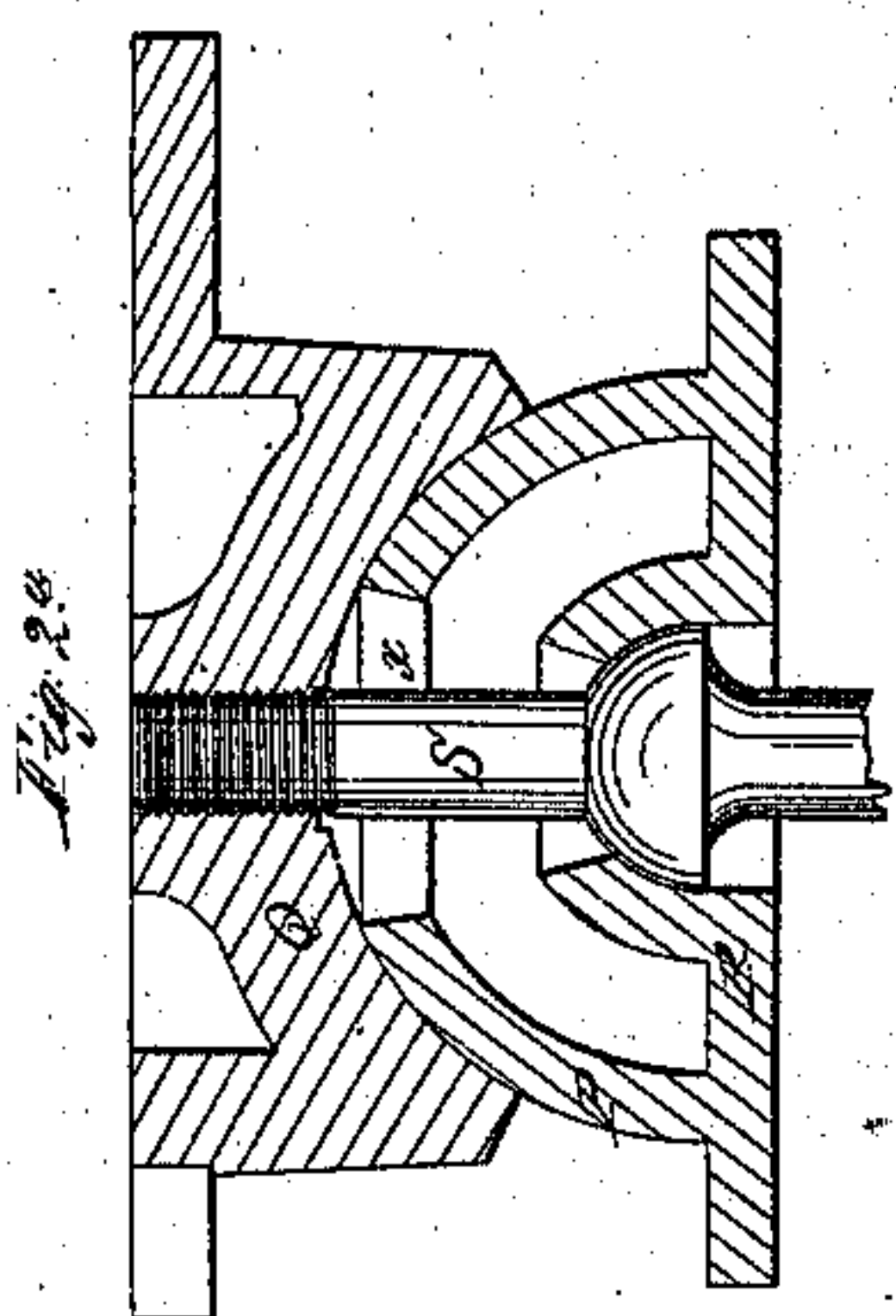


A. P. Stephens,

Vise

N^o 105,507.

Patented July 19, 1870.



Witnesses:

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Inventor:
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Vise,

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Fig. 3.

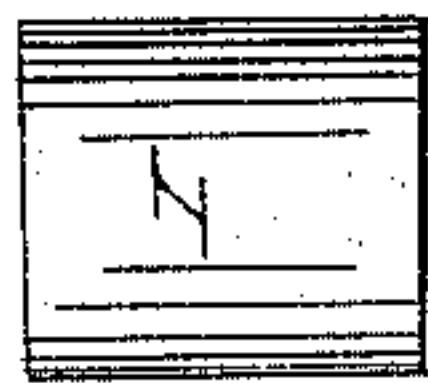


Fig. 5.



Fig. 7.



Fig. 3.

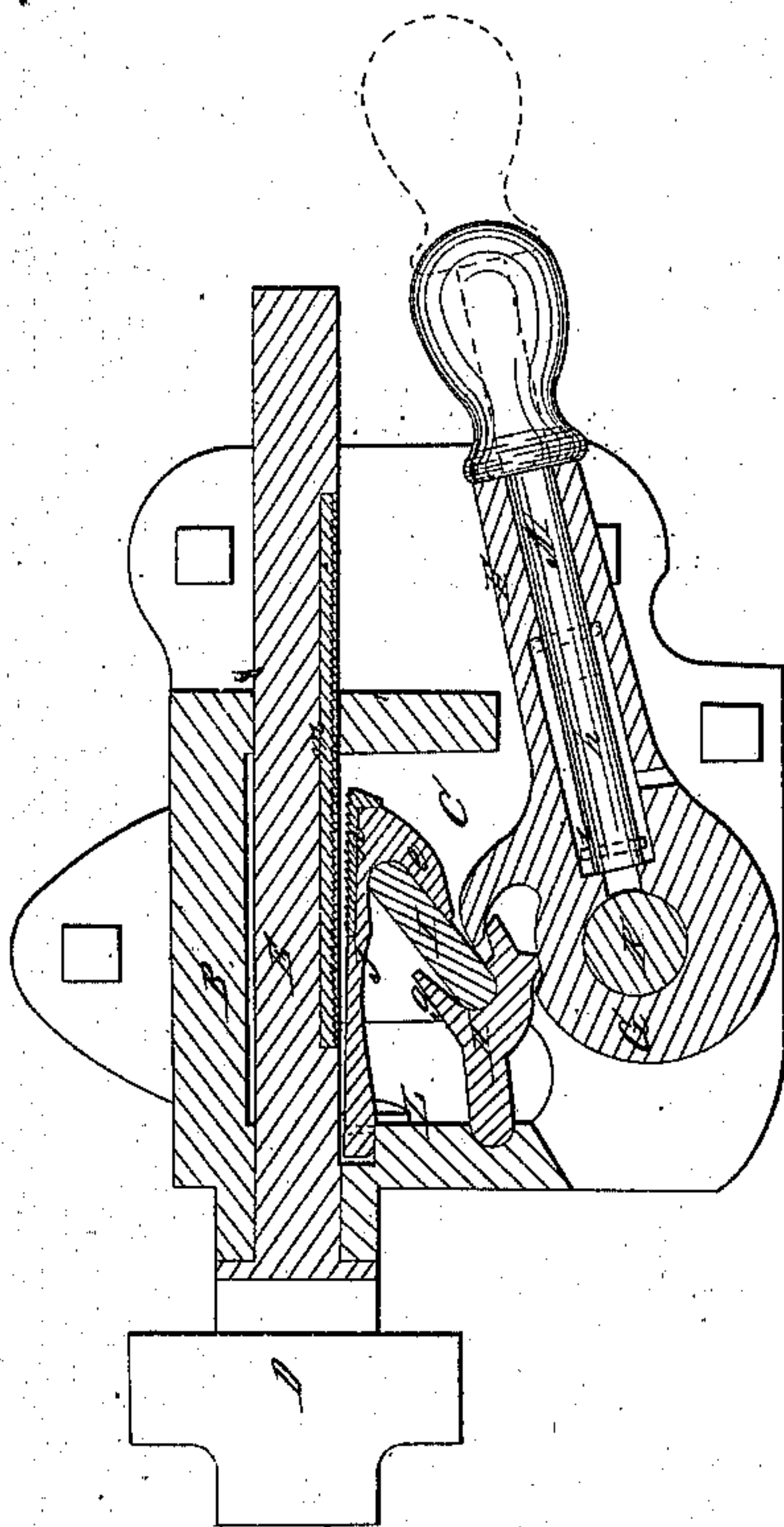
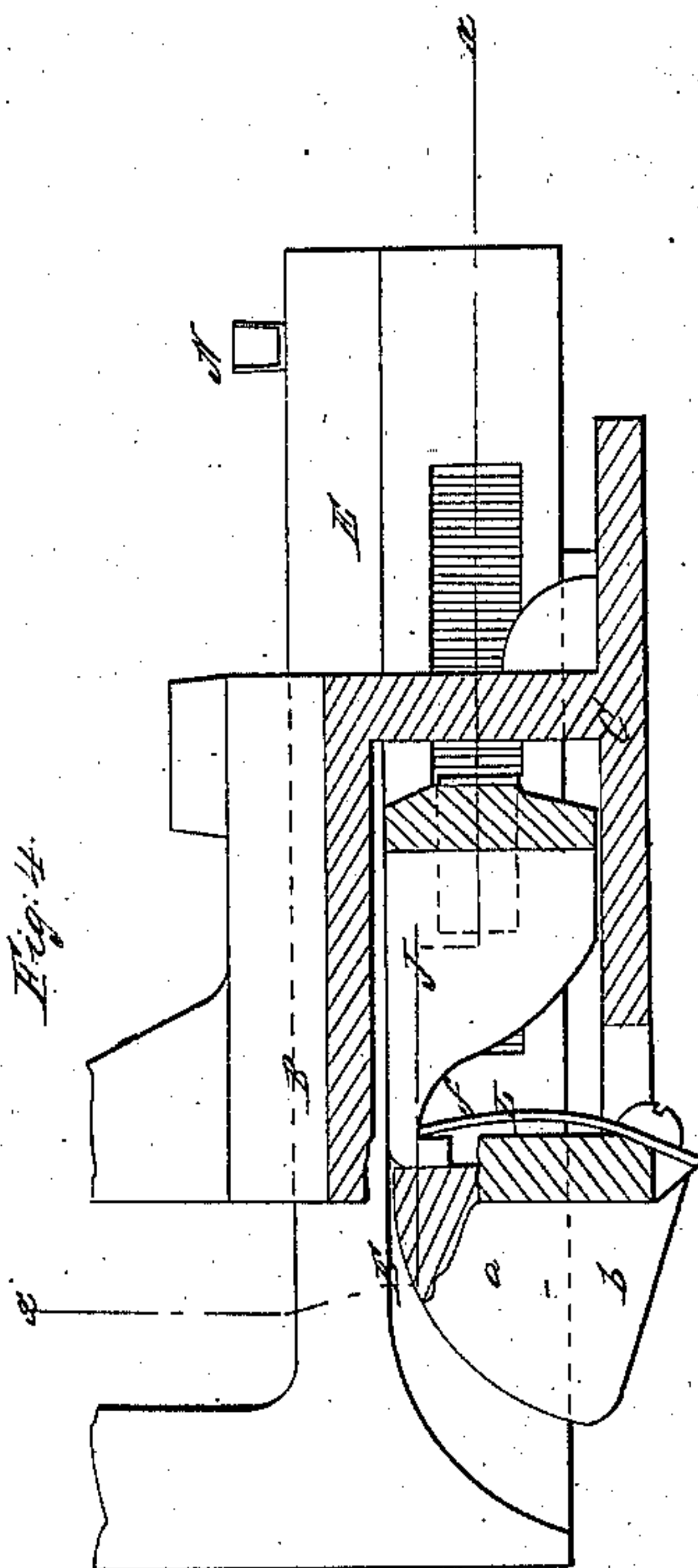


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

ANSON P. STEPHENS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN VISES.

Specification forming part of Letters Patent No. 105,507, dated July 19, 1870.

To all whom it may concern:

Be it known that I, ANSON P. STEPHENS, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Vises; and that the following is a full, clear, and exact description and specification of my said invention.

The object of my invention is more particularly to improve the construction and operation of the vise for which Letters Patent of the United States were issued to me the 5th day of April, 1864, but some of my improvements are applicable with advantage to other purposes.

In order that my invention may be fully understood, I will proceed to describe a vise which embodies all my improvements, and which I have represented in the accompanying drawing.

Figure 1 represents a side view of the vise. Fig. 2 represents a vertical section of the ball-and-socket attachment of the vise. Fig. 3 represents a horizontal view of the vise, with certain parts in section, following the dotted line *xx* of Fig. 1. Fig. 4 represents a similar vertical view of the vise; and Figs. 5 to 7 represent views of detached parts of the vise, designated by the same letters as the same parts in the previous figures.

The vise thus represented has a stationary jaw, A, which is secured to the slide-box B of the stock C, that is connected with the work-bench. It has also a movable jaw, D, which is secured to a slide-bar, E, that is constructed to slide longitudinally in the slide-box B.

The movable jaw, with its slide, is constructed to be moved freely (by the sliding of the slide-bar in the slide-box) up to the point at which the article is to be gripped, and then the movable jaw is caused to gripe the article between it and the fixed jaw with great force by the action of a cam operated by a lever, F, a toggle-jointed mechanism, G H I J K, and a toothed rack, *m*, secured to the slide-bar, upon which the toggle-jointed mechanism operates, through the intervention of a rack, *n*, connected with the toggle-jointed mechanism.

I construct the slide-bar E of a T-section with the flange at the upper side. The effect of this construction is to greatly increase its strength both vertically and laterally, and also to pro-

tect the mechanism of the vise from the action of filings and dirt, the flange overlapping the rack-bar of the toggle-jointed mechanism and shielding it from injury.

The portion of the slide-bar which extends in front of the slide-box is supported by a projection, *b*, extending from the stock C outward from the slide-box; and, in order to increase the strength of this part of the implement without extending the metal below the base *d* of the slide-box, I connect the said projection *b* with the sides of the slide-box by means of two ears, *a*, (one at each end of the slide-bar.) I also round off the upper outer corners of the said ears, so as to afford space for the thickening of the slide-bar at the place of connection *c* of the movable jaw with the slide-bar, where the strain is greatest.

In my patented vise aforesaid the rack-teeth of the slide-bar were constructed of cast-iron. In order to increase the durability of the rack-teeth I construct a rack of wrought-iron or of steel, *m*, and insert it in a cavity formed in the side of the slide-bar E. By inserting it in a cavity the necessity of securing it by screws or by rivets is avoided, all that is necessary being to fit it so that it may be driven tightly into its cavity; but if screws or pins are used to secure it in its place they are relieved of any shearing strain, because the end of the rack bears solidly against the end of the cavity and transmits the strain directly to the slide-bar.

The lever F, by which the toggle-jointed mechanism is operated, is pivoted to the stock C of the vise by means of a pin, K, which is made tapering, so that it may be driven solidly into the stock C of the vise.

The hole in the lever is bored slightly larger than the barrel of the pin, so that the lever may turn freely upon it. A similar tapering pin, N, is used as a stop to prevent the slide-bar from being drawn out of the slide-box, and the sides of the head of this pin are flattened, so that it may be gripped by a wrench or by a hand-vise when it is to be withdrawn to permit the vise to be taken apart.

The toggle-jointed mechanism consists of the cam formed by the eccentric hub G of the lever F, of the first joint, H, of the toggle, of the second joint, I, of the toggle, of the rack-

bar J, and of the spring L, by which the rack-bar is moved backward when the lever-handle F is turned outward from the slide-box to unclamp the article which has been gripped. These parts correspond in their functions with similar parts of my patented vise before referred to, but I have greatly improved their construction.

I construct the rack-bar J by inserting a rack, *n*, of steel, (see dotted lines in Figs. 4 and 5,) into the mold in which this piece is cast, and by then casting the cast-iron upon the steel. In this way I secure the advantages of a steel rack, having teeth of great strength, and the cheapness of construction due to the formation of an article of such irregular form by the casting process. I also form the rack-bar with a recess, *f*, at its lower left-hand side, so as to afford space for an upright spring, L. By this improvement I am enabled to use a plain spring, L, of much less costly construction than the V-formed spring of my patented vise. I am also able to dispense with the necessity of cutting away the first joint of the toggle to make room for such a V-formed spring, thereby substituting the removal of material from a place where there is a superabundance of it, in proportion to the strength required, for the removal of material from a place where great strength is required, and where, consequently, the removal of material is detrimental.

I further construct the rack-bar J with a projecting lip, *e*, extending across its breadth, and of uniform section throughout, such lip acting as the stop to prevent excessive movement by the second joint, I, of the toggle when the vise is to be opened or unclamped. The lip thus produced takes the place of the flanged stop upon the rack-bar of my patented vise. The position of that flanged stop across the end of the socket of the second joint rendered it extremely difficult to dress up the socket, but the construction of the improved rack-bar with the lip *e* of uniform section permits the socket for the second joint, I, to be readily dressed up by a milling-machine, and thus materially reduces the cost of construction of the vise.

I construct the second joint, I, of my improved vise of uniform section from end to end, and without the stop projections at the ends, which were necessary when the parts were formed as represented in my previous patent aforesaid. This improved construction enables me to make this instrument at a small cost, because a long bar may be dressed up to the required section and then cut transversely into short pieces, each of which forms the joint of a toggle.

I construct the first toggle-joint, H, of my improved vise with a lip, *g*, of uniform section throughout the breadth of the joint, to operate as the stop in place of the flange-stop of the corresponding joint of my patented vise. This construction enables me to dress up the

socket in this joint for the second joint, I, by means of a milling-machine, in the same manner as the corresponding socket of the improved rack-bar J. The lips *e g* of these two instruments operate as stops by coming in contact with the adjacent faces of the second joint, I.

I construct the lever-handle F of the toggle mechanism with a sliding extension, M. This construction enables greater leverage to be obtained without affecting the compactness of the implement.

The sliding shank *h* of the extension is prevented from being drawn out of its socket by means of a pin, *i*, inserted transversely into its inner end through a hole drilled in the handle F for that purpose.

The vise is combined with a peculiar swiveling or ball-and-socket attachment, by which it is connected with the work-bench, and which permits the vise to be set in many desirable positions for holding articles.

This attachment consists substantially of the hollow ball P, which is secured to the work-bench, of the ball-socket Q, which is secured to the vise-stock or slide-box, of the clamp R, and of the clamp-screw S, which connects the clamp R and the ball-socket Q through the opening *x* in the ball.

The cavity within the hollow ball P is concentric, or thereabout, with the exterior surface of the ball; hence a slight turning of the clamp-screw S, or of its nut *w*, frees the vise and permits it to be turned horizontally and transversely to any desired position for holding the article to be operated upon, and a slight turning of the screw or its nut in the opposite direction secures the vise firmly in its new position.

In the vise represented in the drawing I have constructed the parts with the screw S firmly screwed into the ball-socket Q and with the movable nut *w* connected with the handle T, the stem *y* of the screw being fitted loosely in the clamp R. The screw may, however, be constructed in one piece with the handle, a shoulder being formed at the under side of the clamp, and the hollow thread in the ball-socket Q being used as the nut in which the screw is turned for the purpose of clamping or unclamping the attachment, or the clamp may be arranged at the horizontal diameter of the ball P. In this case the shoulder of the screw should be of ball form, fitting into a corresponding ball-socket formed in the clamp, the center of the ball-shoulder being at the center of the hollow ball P, and the opening for the passage of the stem of the screw being enlarged to permit it to be inclined to the desired extent required by the movement of the ball-socket Q upon the hollow ball P. In this case the clamp may be cast in one piece with the ball, as represented in section at Fig. 2, and the cavity need only be large enough to permit the requisite inclination of the screw.

Having thus described a vise embodying all

my improvements, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the slide-bar, the stock, the slide-box, and its connecting-ears, all constructed for joint operation, as set forth.

2. The combination of the slide-box, the movable jaw, the slide-bar, the rack in the slide-bar, and the toggle-rack, all constructed to operate as set forth.

3. The combination of the lever of the toggle-jointed mechanism with the stock of the vise-box by means of a tapering pin fitted tightly into the stock and loosely in the hub of the lever, as described.

4. The arrangement of the upright spring within the recess of the rack-bar of the toggle-jointed mechanism, as set forth.

5. The relative arrangement, as set forth, of the projecting lip of the rack-bar and the second joint of the toggle-jointed mechanism, whereby said lip operates as a stop for said rack.

6. The second joint of the toggle mechanism, constructed, as described, of uniform section throughout, without projections at its side.

7. The relative arrangement, as set forth, of the lip of the first joint of the toggle-jointed mechanism, and the second joint thereof, whereby said lip operates as the stop for said first joint.

8. The swiveling mechanism consisting of the combination of the hollow ball, the ball-socket, the clamp arranged within the cavity of the hollow ball, and the clamp-screw, the whole arranged as represented and described, with the handle of the clamp-screw at one side of the ball and the hollow ball at the opposite side thereof.

In testimony whereof I have hereto set my hand this 14th day of December, A. D. 1868.

ANSON P. STEPHENS.

Witnesses:

E. S. RENWICK,
W. L. BENNEM.