

No. 819,543.

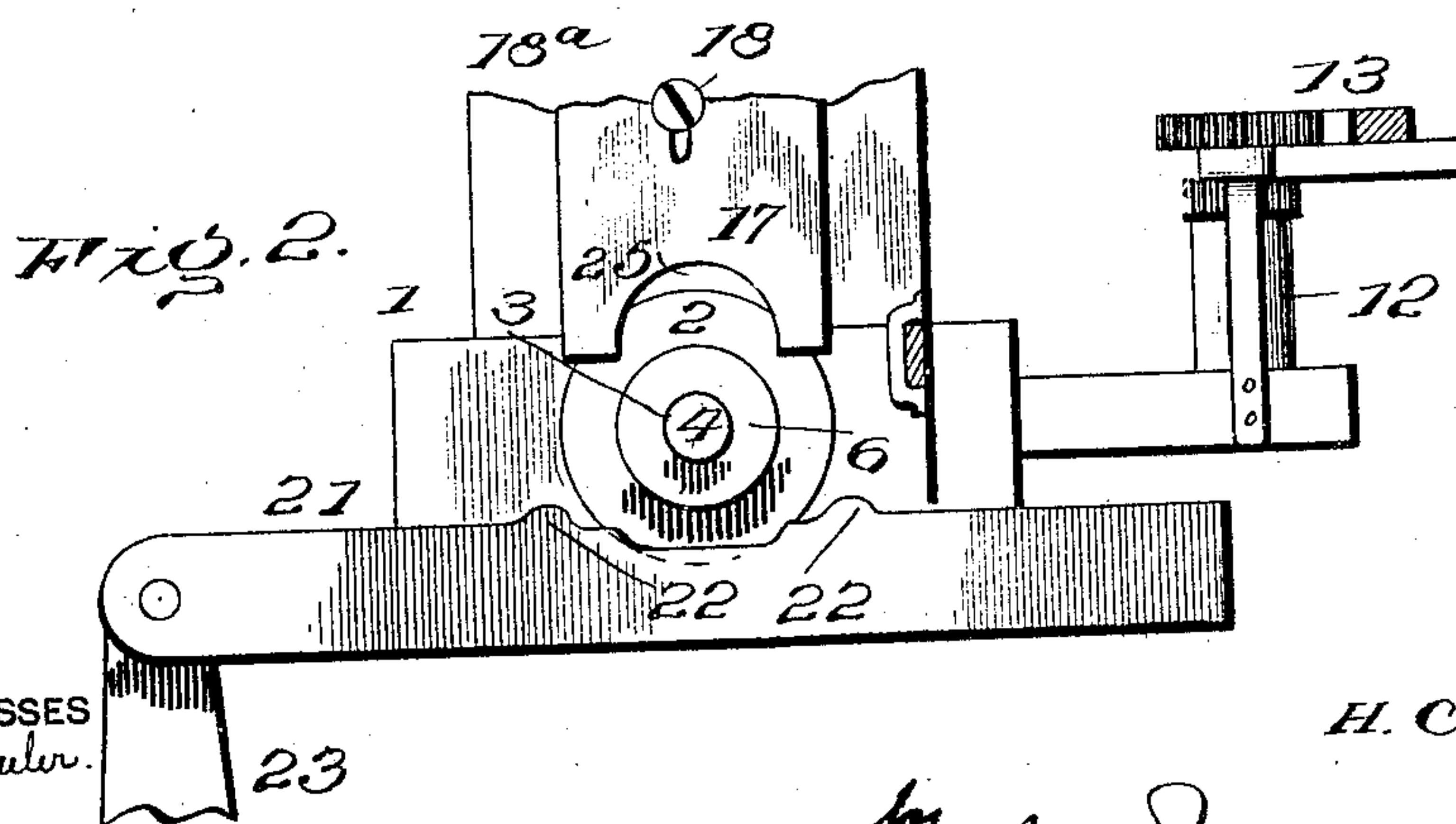
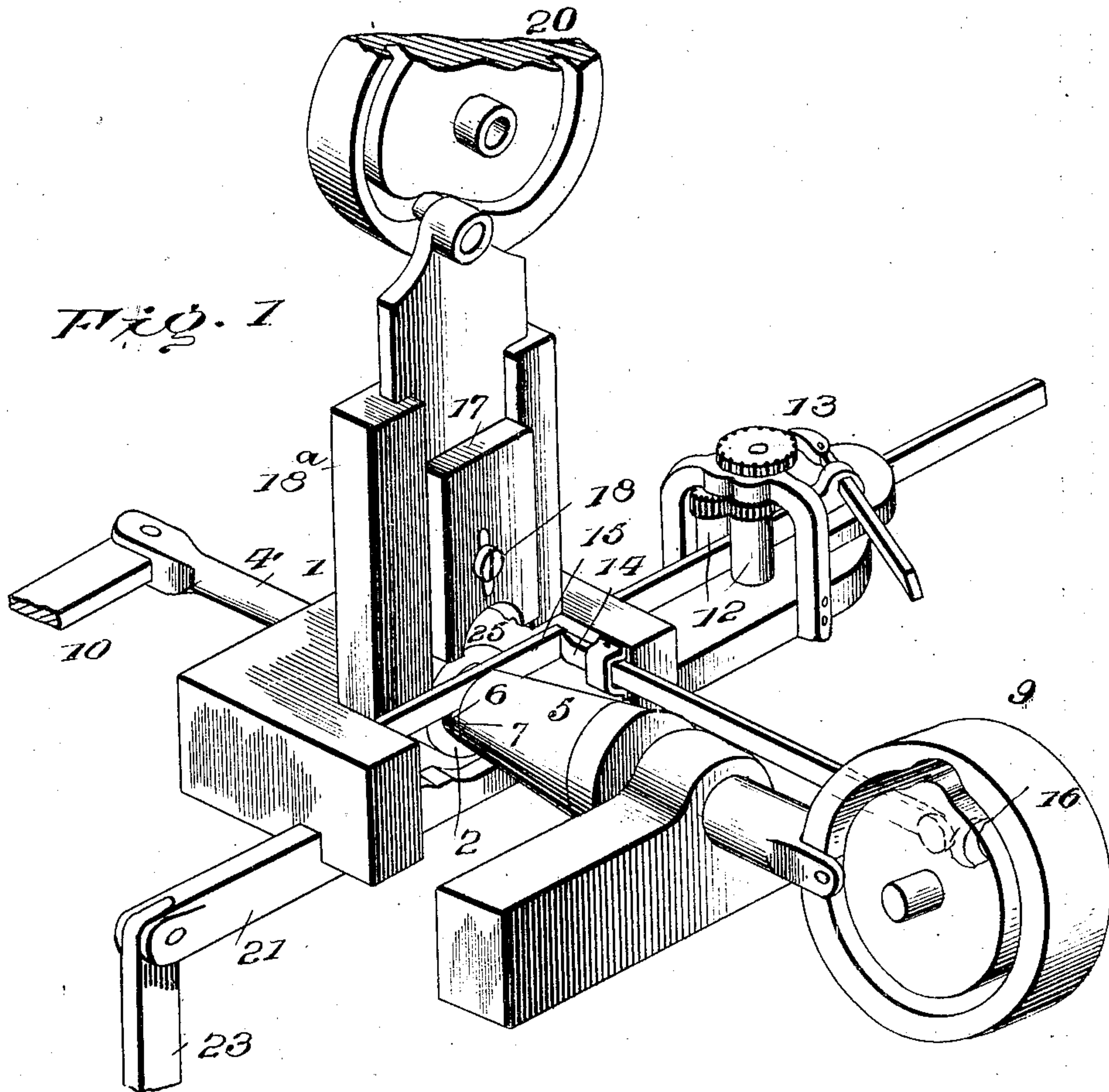
PATENTED MAY 1, 1906.

H. C. HART.

MACHINE FOR MAKING WASHERS.

APPLICATION FILED MAY 21, 1903. RENEWED NOV. 11, 1905.

2 SHEETS—SHEET 1



WITNESSES

John Wheeler.

W. A. Williams.

INVENTOR

H. C. Hart

by J. J. Irvine
Atty.

No. 819,543.

PATENTED MAY 1, 1906.

H. C. HART.

MACHINE FOR MAKING WASHERS.

APPLICATION FILED MAY 21, 1903. RENEWED NOV. 11, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

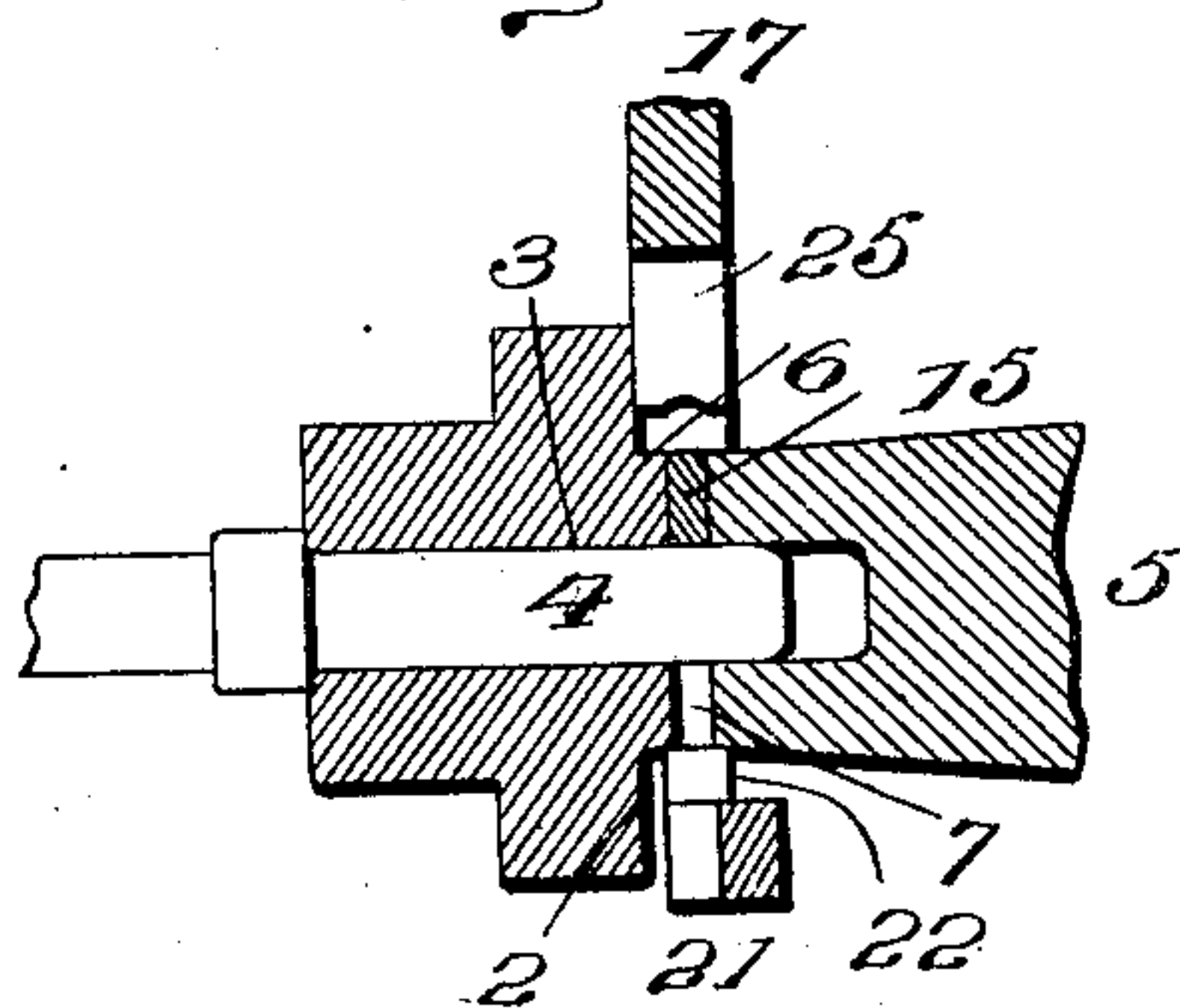


Fig. 4.

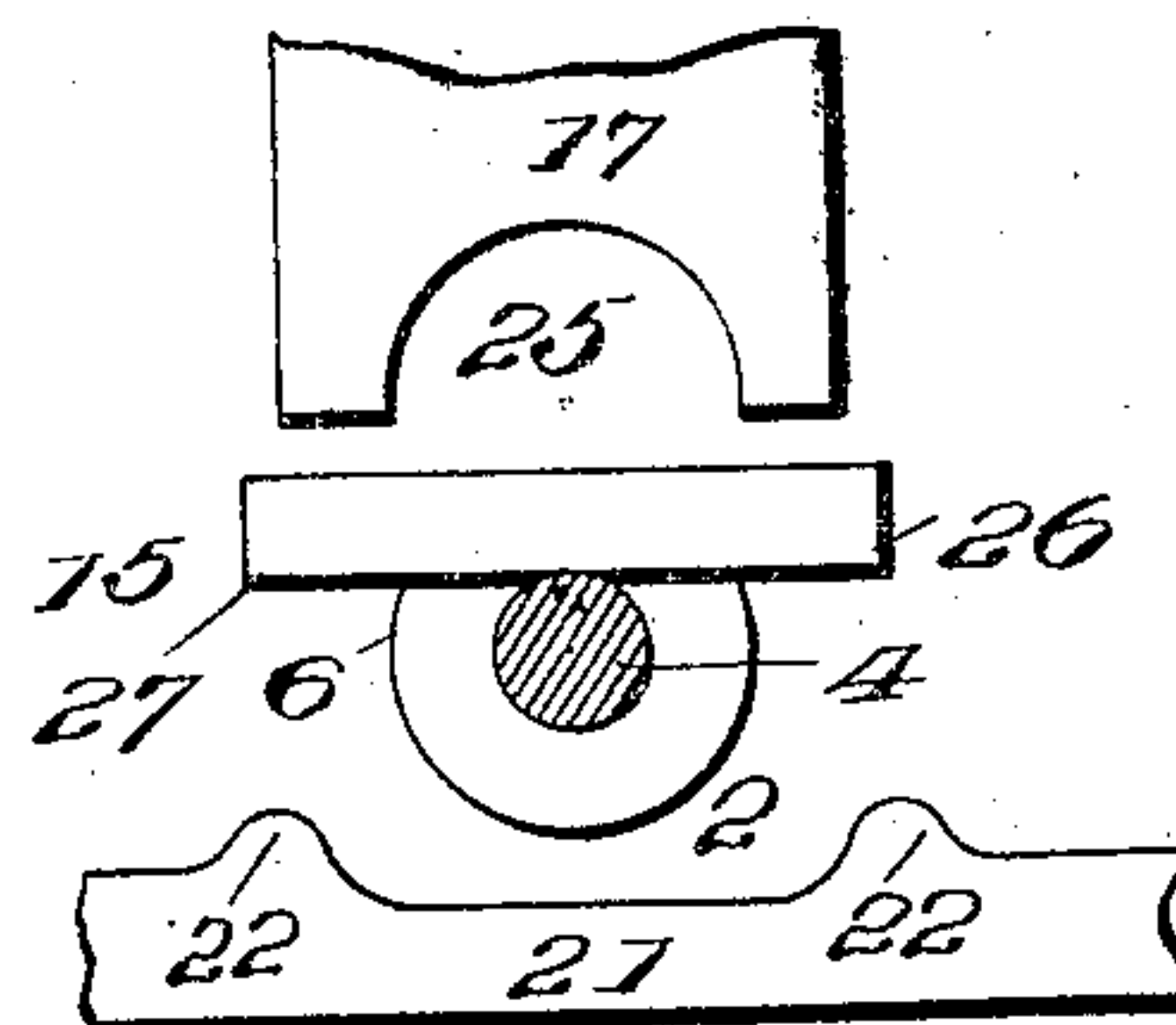


Fig. 5.

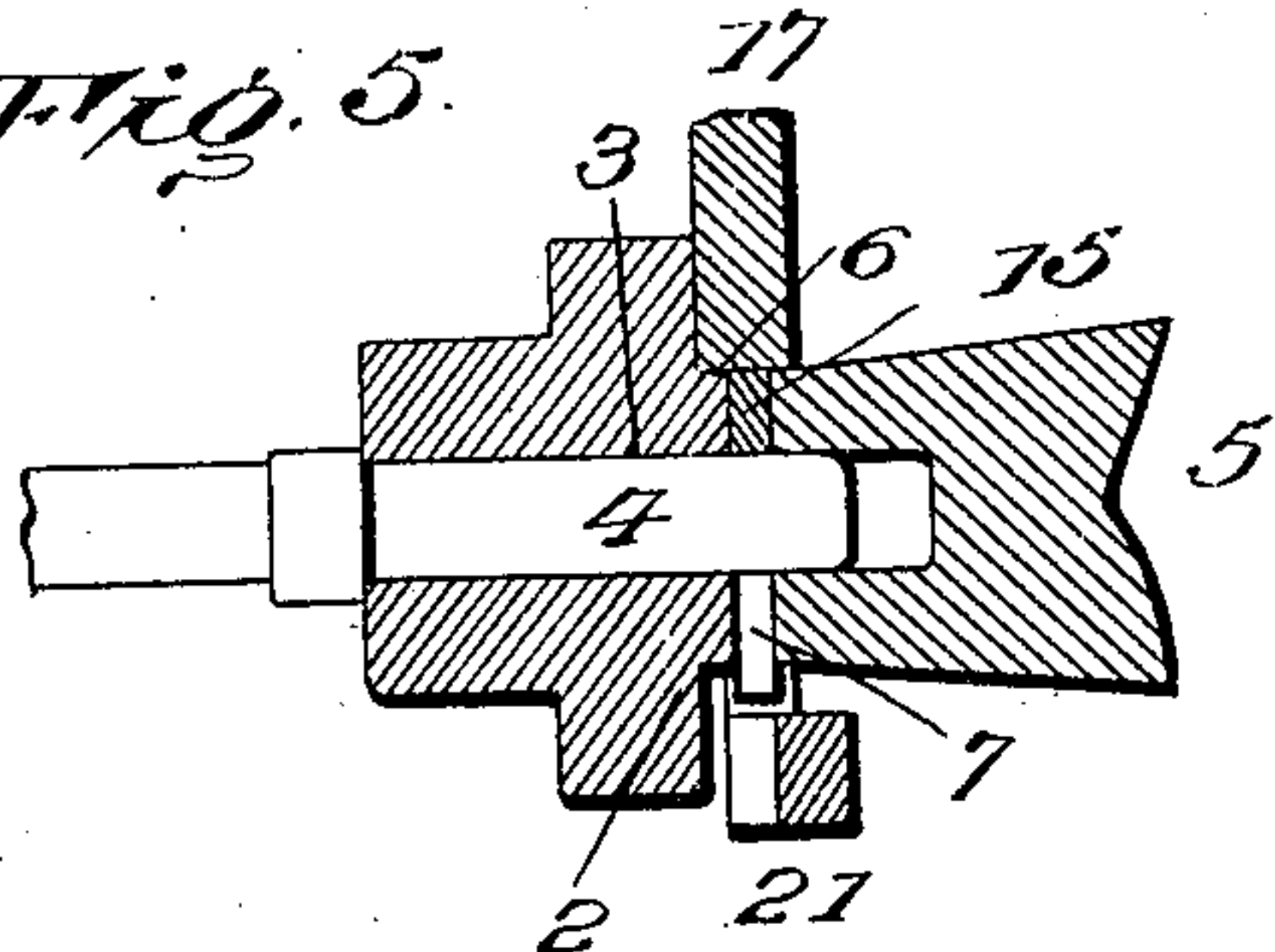


Fig. 6.

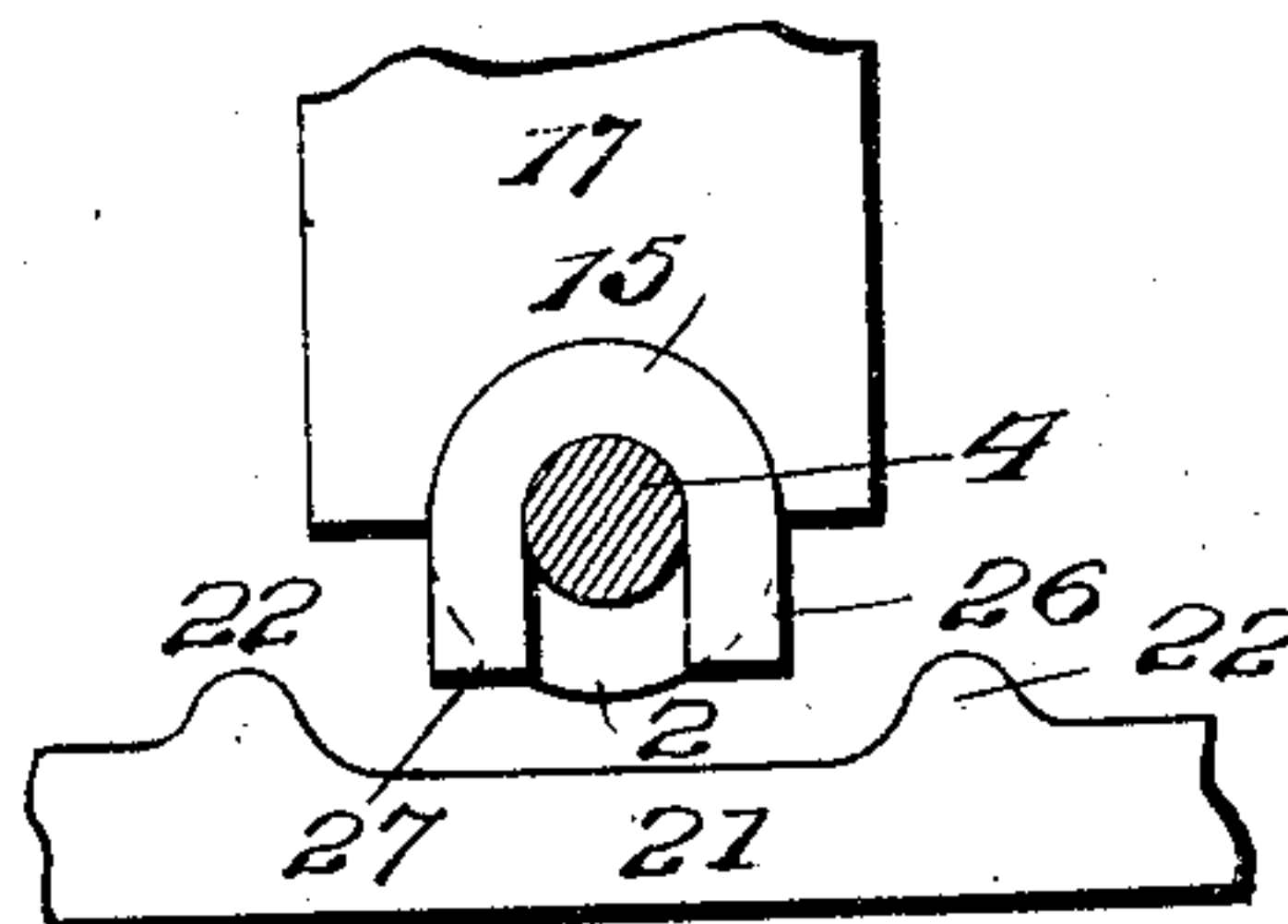


Fig. 7.

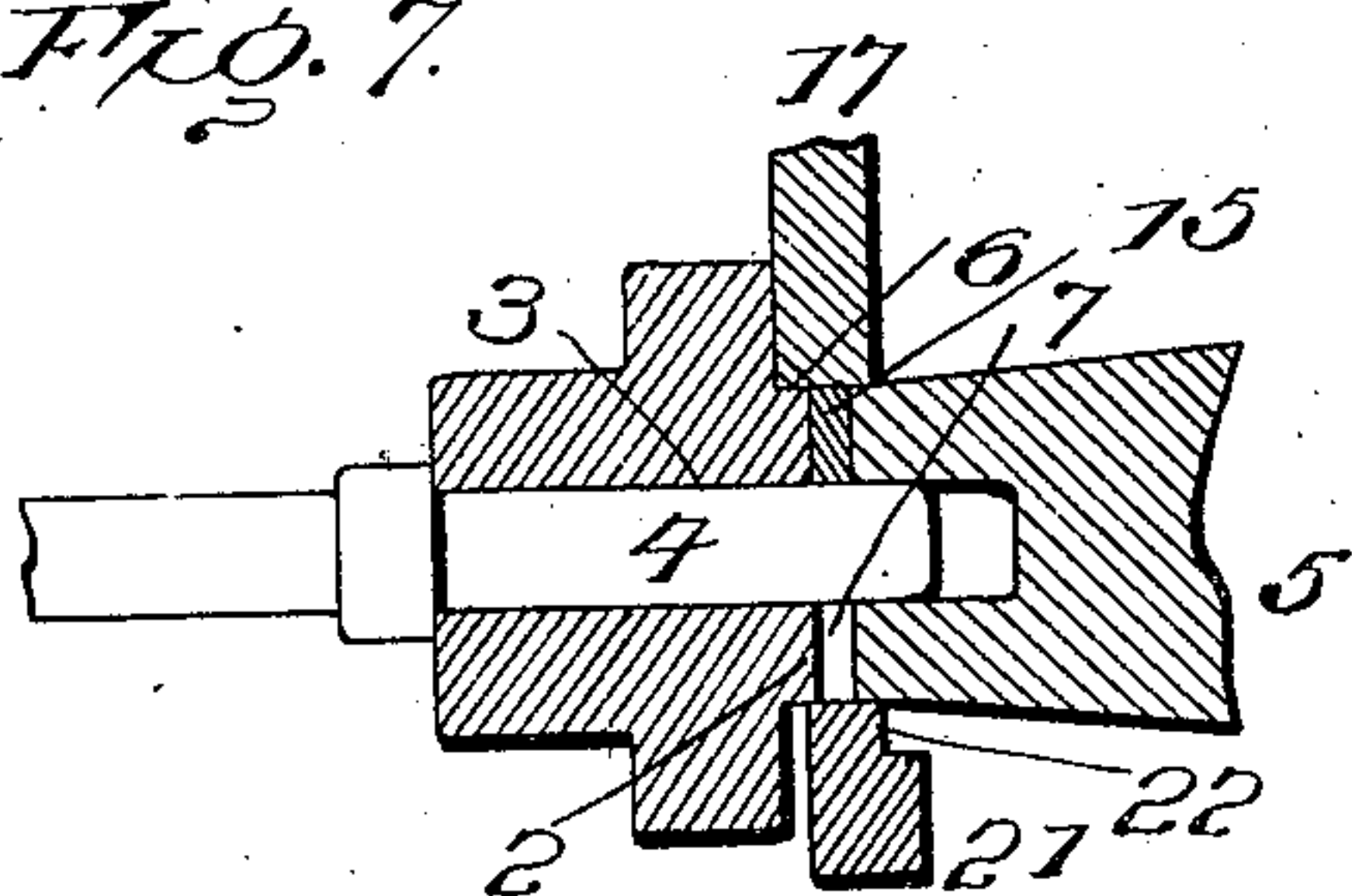


Fig. 8.

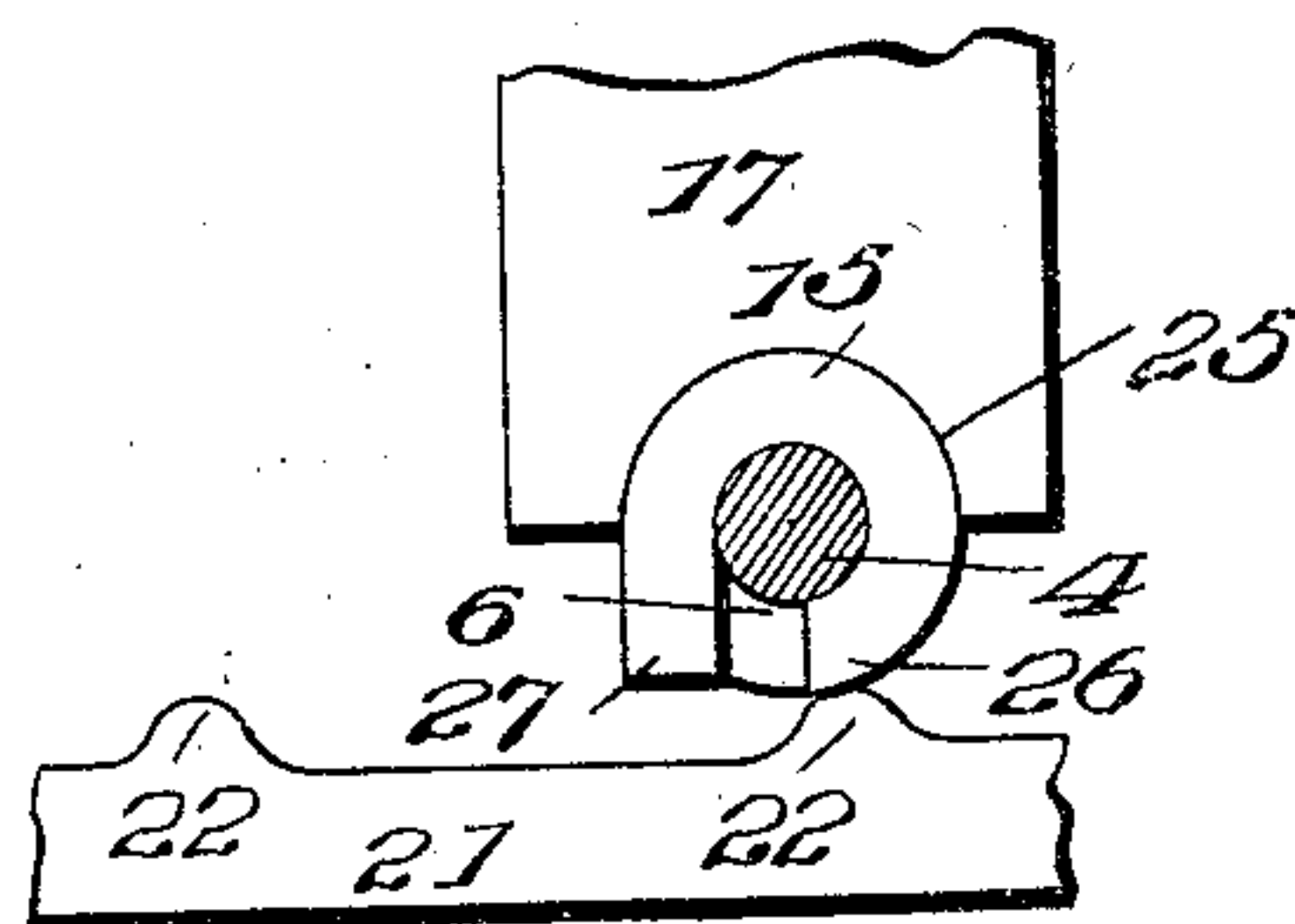


Fig. 9.

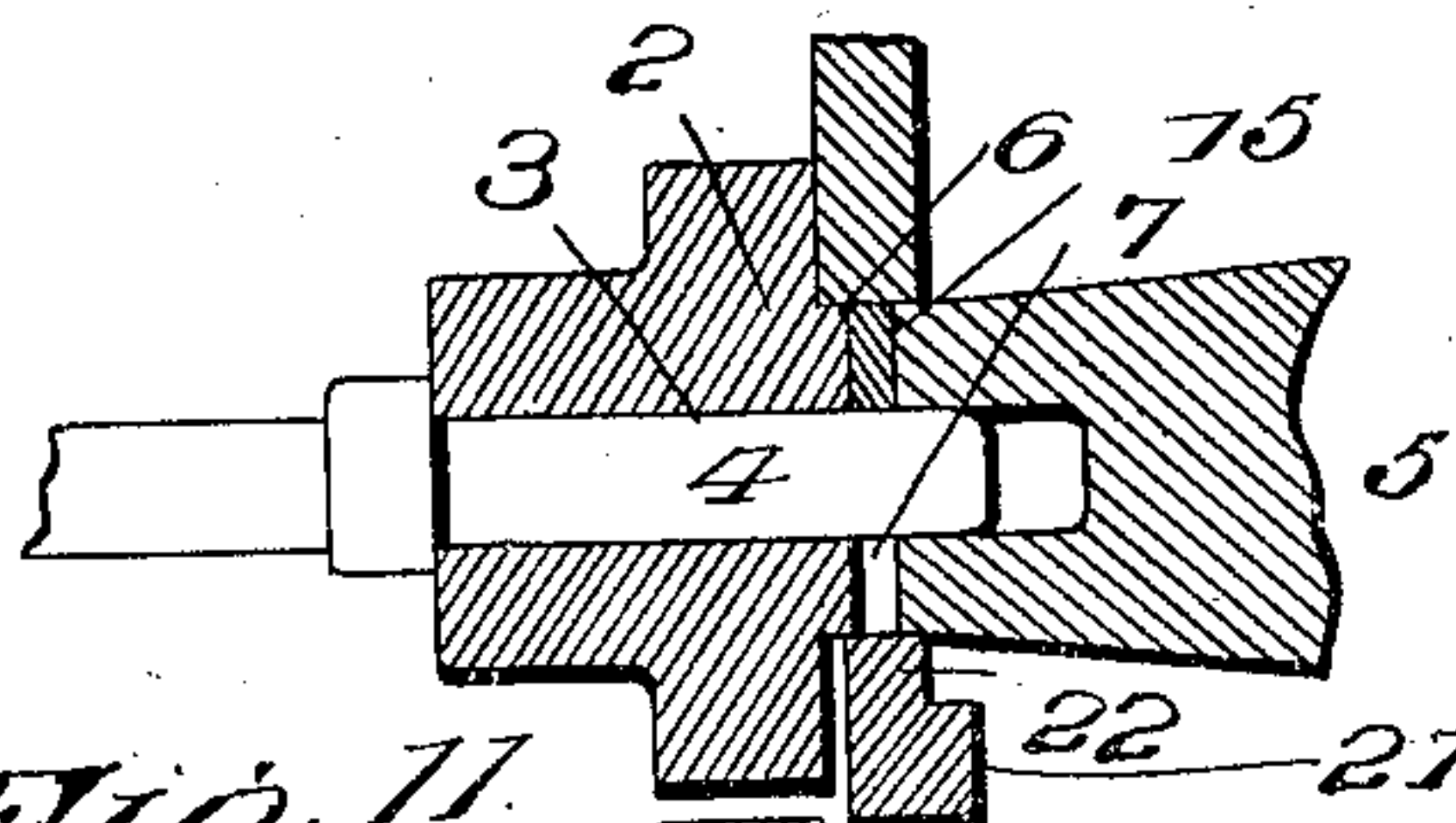


Fig. 10.

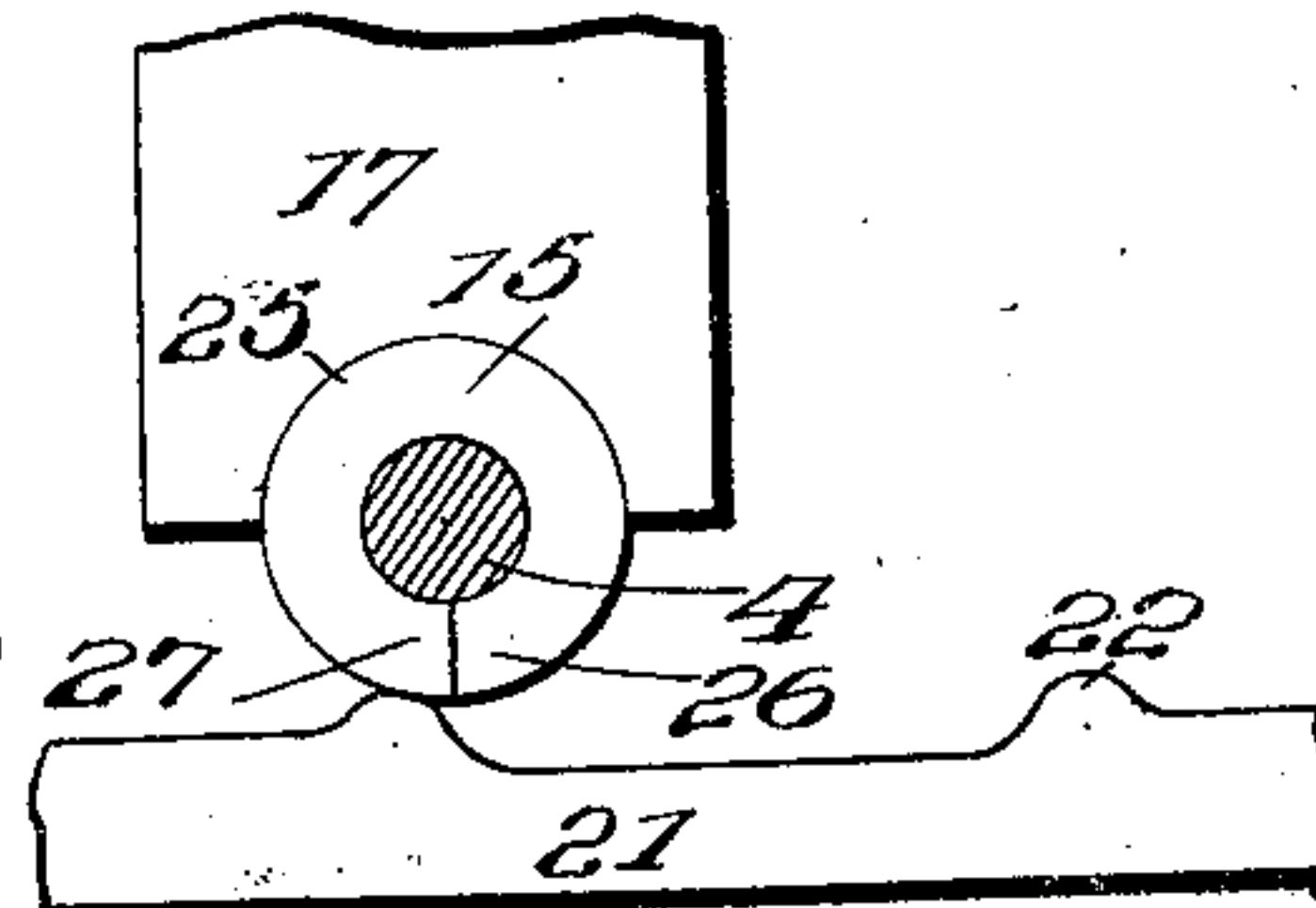


Fig. 11.

WITNESSES
John Wheeler
W. Williams

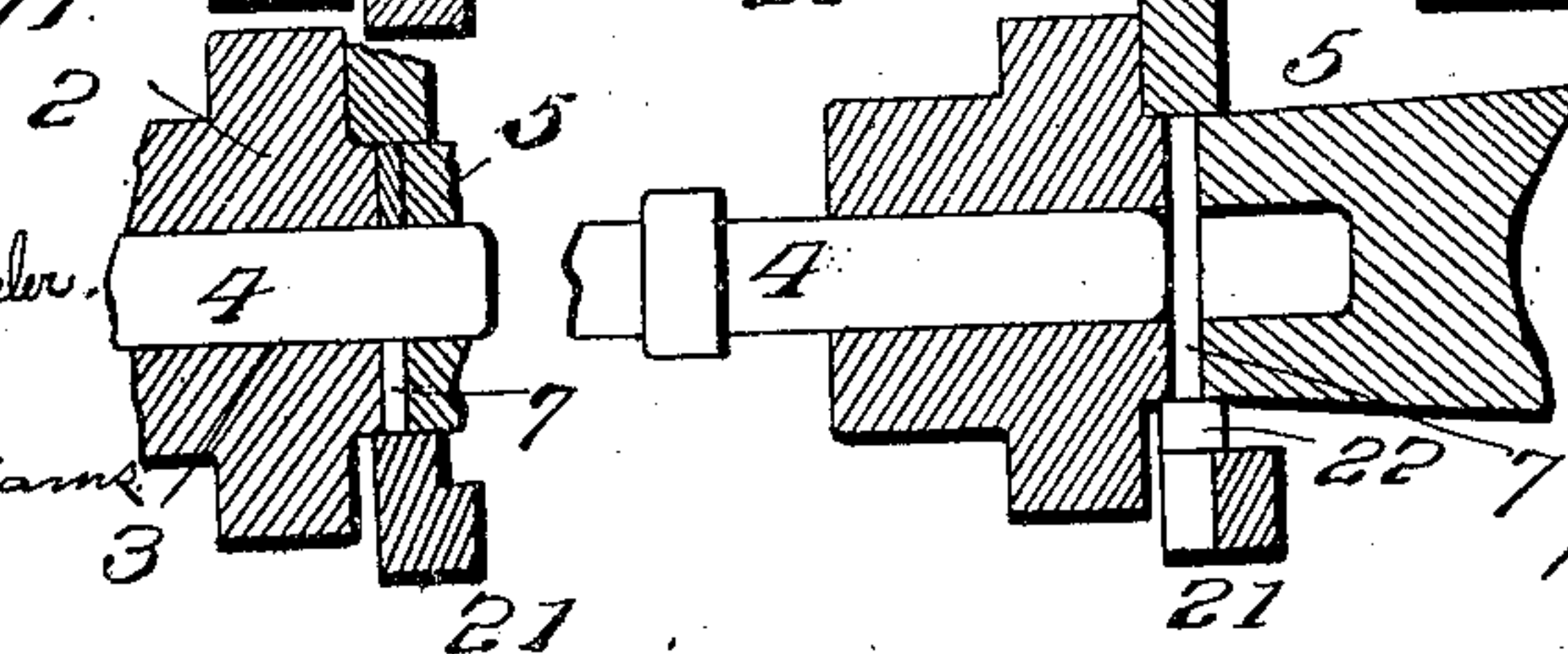
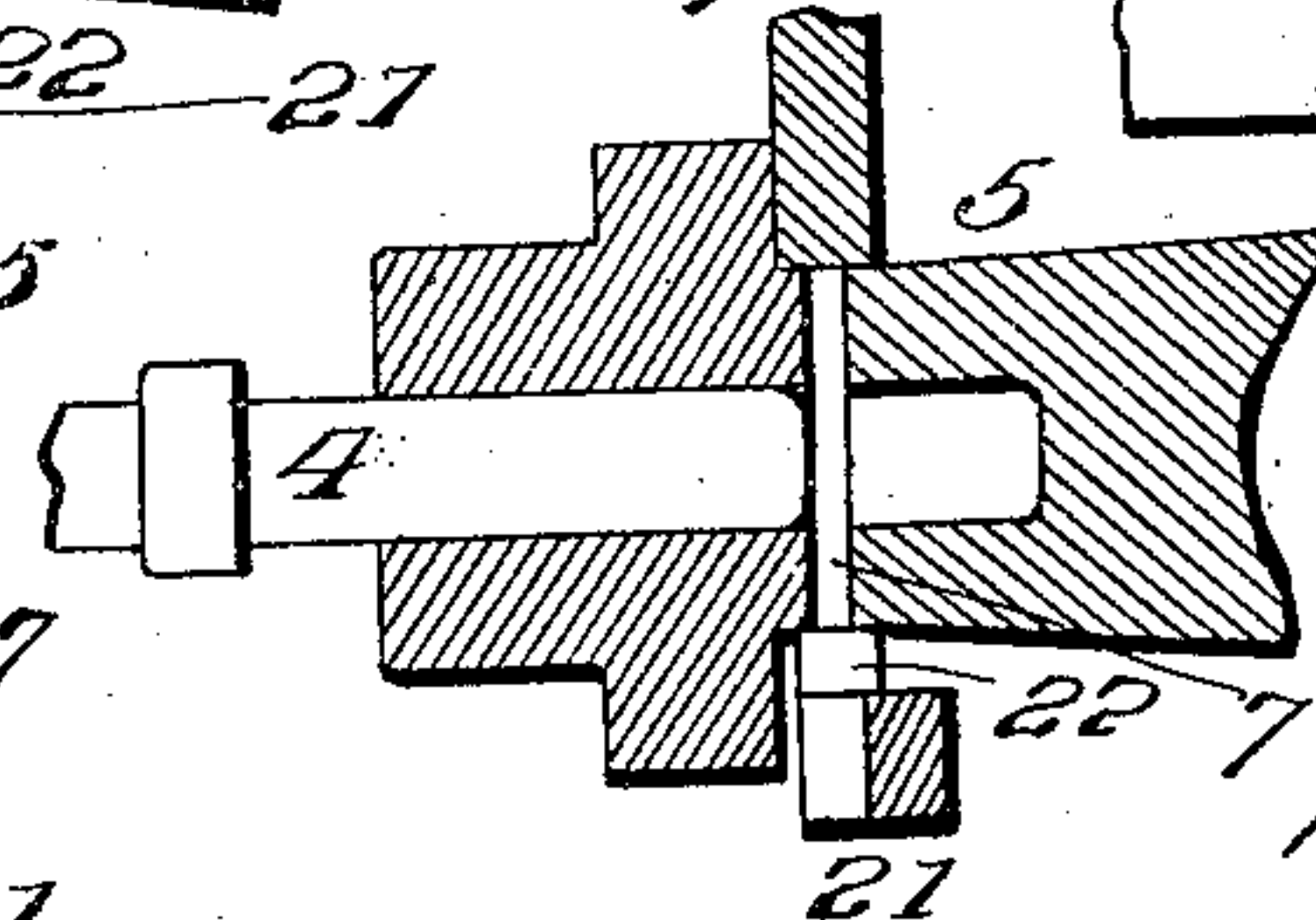


Fig. 12.



INVENTOR

H. C. Hart

Att'y

UNITED STATES PATENT OFFICE.

HUBERT C. HART, OF UNIONVILLE, CONNECTICUT.

MACHINE FOR MAKING WASHERS.

No. 819,543.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed May 21, 1903. Renewed November 11, 1905. Serial No. 286,912.

To all whom it may concern:

Be it known that I, HUBERT C. HART, a citizen of the United States, residing at Unionville, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Machines for Making Washers, of which the following is a specification.

This invention relates to improvements in machines for making split-ring washers, and is an improvement of my Patent No. 682,070, bearing date of September 3, 1901. In this patent the construction is such that it precludes the use of flat strips of metal; but I find that a good grade of washers can be produced from short flat metal strips by arranging the mechanism to form a groove or seat to confine it while it is being bent into a ring and then flatten it with a predetermined pressure to remove the unevenness due to the bending of the metal on its edge. However, I do not, as in the former patent, apply pressure sufficient to compress the whole body of metal, but simply flatten it to give it a finish.

To this end it is the object of this invention to provide a mechanism comprising essentially an anvil and mandrel, a plunger, mechanism for bending a strip of metal on its edge to form a ring around a mandrel and between an anvil and plunger, mechanism for feeding a metal strip, and mechanism for severing the strips, all of which operate in sequence to produce a split-ring washer from flat metal strips.

It is highly important that the strip of metal be bent into a ring in a groove; and it is one of the principal objects of this invention to arrange a plunger relative to an anvil and mandrel so that the ring will be prevented from excessive buckling in bending and yet not be held tight enough to prevent its proper bending around the mandrel. Furthermore, it is my purpose to make the diameter of the ring and the plunger about the same and then apply pressure to the plunger, which will flatten the slight wrinkles or buckles in the ring and give the washer a finished appearance.

I desire to emphasize the fact that I do not contemplate compressing the metal as described in my former patent, for which reason no provision has to be made to confine the periphery of the strip.

The details for accomplishing the objects, as well as the mode of operating my machine, will now be fully set forth, and particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view of a conventional machine for carrying out my invention. Fig. 2 is a vertical sectional view. Fig. 3 is a transverse section taken through the mandrel, the strip of metal having just been introduced into its groove to be bent into a ring. Fig. 4 is a diagrammatic face view of the same. Fig. 5 is a view similar to Fig. 3, but illustrating the strip as receiving its first or initial bend. Fig. 6 is a conventional face view of the same. Fig. 7 is a view similar to Fig. 5, the second bending of the strip having taken place. Fig. 8 is a conventional face view of the same. Fig. 9 is a view similar to Fig. 3, the third and last bend of the ring having been made and the plunger moved to flatten the ring. Fig. 10 is a conventional face view of the same. Fig. 11 is a view similar to Fig. 9, but showing the washer in the act of being flattened. Fig. 12 is a transverse section taken through the mandrel, the latter being withdrawn.

The same numerals refer to like parts in all the figures; but I desire it to be understood that the various mechanisms I have shown and shall describe are merely conventional.

Inasmuch as numerous mechanical expedients may be employed to accomplish the necessary movements and as these features do not specifically form part of my invention, I have for convenience of clearness shown the machine in the simplest conventional form.

The numeral 1 represents a frame; 2, an anvil having an opening 3; 4, a mandrel, and 5 a plunger.

The anvil has a slight flange 6 on its front face, against which a washer bears while it is being formed, and the mandrel is designed to be projected beyond the face of this flange into a recess formed in the plunger 5. The diameter of the plunger about equals the diameter of the proposed washer, the latter being bent on the mandrel in the groove or seat 8, formed by the flange 6 and the inner end of the plunger, said groove being approximately the width of the thickness of the strip from which the washer is to be made, the plunger being reciprocated at the appropriate time by a cam 9. A lever 10, connected by any convenient means, is employed to reciprocate the mandrel to permit removal of the finished washers.

12 indicates a pair of feed-rolls between which the flat metal is fed to the mandrel. These rolls are geared together and are pe-

riodically revolved by a pawl-and-ratchet mechanism 13, connected to and timed to be operated with the rest of the machine. After the metal has been fed forward the required distance it is cut into strips 15 of appropriate length by a cutter, (indicated at 14,) and which is operated by a cam 16.

When the strip 15 has been positioned on the mandrel and just subsequent to the cut, a plunger 17, adjustable by a set-screw 18, is forced into engagement with and gives the strip its initial bend. This plunger is reciprocated in ways 18^a and is operated by a cam 20. About the time the plunger 17 completes its movement a horizontally-reciprocated slide 21, bearing projections 22, is operated by a lever 23. The first movement of the slide causes one of the projections 22 to complete the bending of one terminal of the strip, and upon the reverse movement of said slide the other projection 22 bends the other terminal around the mandrel, which completes the ring.

The operation of my invention is substantially as follows: Assuming the parts to be in the position shown in Figs. 1, 3, and 4—that is, the metal strip has been fed into the groove 7 and onto the mandrel and is ready to be severed and bent—at this point it may be well to call attention to the fact that the bending devices all act on the narrow edge of the strip, and it is the incident buckling due to this operation which requires a groove. Cams 20 and 16 are now operated, and by the time the cutter completes its mission the plunger 17 engages the strip, and as said plunger has a crotch 25 to straddle the washer upon its being depressed it bends the strip into a U shape, the upper part of the crotch resting on and holding the bent strip tight to the mandrel, this operation being clearly shown in Fig. 6. Slide 21 now moves toward the mandrel; and one of the projections 22 contacts with one of the terminals 26 of the strip and bends it around the mandrel, which is the second step in the bending operation and is shown in Fig. 8. Slide 21 is reciprocated in the opposite direction, (see Fig. 10,) and the companion projection 22 contacts with the other terminal 27 of the strip and completes its bending, and thus a ring is formed. However, the ring is somewhat rough, due to the bending, as hereinbefore described, and to remove this and to give the washer a finish immediately after the bending is completed the cam 9 acts on the plunger 5 and flattens the washer between said plunger and the anvil, after which the plunger is withdrawn, and the lever 10 withdraws the mandrel, and the finished washer drops out.

My invention is extremely simple in construction and durable in character, and from the description herein given it is believed the merits and operation will be fully compre-

hended by those skilled in the art to which it appertains.

It is to be understood that notwithstanding the description and showing of the means for completing the bending of the metal stock in two successive operations in this application no claim to such is made herein, it being reserved for and fully claimed in a copending application filed by me June 20, 1903, Serial No. 162,443.

What I claim as new is—

1. In a machine of the class described, a mandrel, an anvil surrounding the mandrel, a horizontally-movable plunger, means for normally holding the plunger a distance from the face of the anvil slightly greater than the washer-stock to provide a groove for the washer, means for bending a strip about the mandrel and in the groove, and means for forcing the plunger against the washer.

2. In a machine of the class described, an anvil, a movable plunger, means for normally holding the plunger a distance from the face of the anvil slightly greater than the washer-stock to form a washer-securing groove, means for forming a ring in said groove, and means to force the plunger against the washer.

3. A machine of the class described, comprising a mandrel, an anvil, a plunger positioned to form a groove a distance from the anvil slightly greater than the width of the washer-stock to receive a flat strip of metal, mechanism for bending the strip of metal edgewise around the mandrel and in the groove to form a split ring, and mechanism to move the plunger for flattening the rough surfaces on the ring when the latter is in the groove, substantially as described.

4. A machine of the class described, comprising a mandrel, an anvil, a plunger normally positioned a distance from the anvil slightly wider than the washer-stock to form a groove of predetermined width around the mandrel, mechanism for introducing a strip of flat metal edgewise in the groove, mechanism for bending the metal strip edgewise into a ring, and mechanism for moving the plunger for decreasing the width of the groove to remove irregular surfaces on the ring to form a finished washer, substantially as described.

5. A machine of the class described, comprising a reciprocating mandrel, an anvil through which said mandrel operates, a movable plunger, having a seat for the mandrel, a plunger, means for holding the plunger a distance from the anvil slightly greater than the width of the washer-stock to form a groove, mechanism for introducing a flat metal strip edgewise in the groove, mechanism for bending the flat strip edgewise in the groove to form a split ring, and means for forcing the plunger toward the anvil to flatten and finish the ring to a washer, substantially as described.

6. A machine of the class described, com-

prising an anvil, a movable plunger, means for holding the plunger spaced from the anvil a distance equal to the width of the stock to form a groove, mechanism for introducing
 5 flat strips of metal edgewise in the groove, mechanism for giving an initial edgewise bend to the strip, a reciprocating slide bearing contacts to successively act on the terminal of the initially-bent strip to form a split
 10 ring, means for operating the slide and means for operating the plunger to decrease the width of the groove to flatten and finish the ring to a washer, substantially as described.

7. A machine of the class described, comprising an anvil, a movable plunger, means for holding the plunger normally spaced a predetermined distance from the anvil to form a washer-holding groove, mechanism for introducing flat strips of metal edgewise
 15 in the groove, mechanism for giving an initial edgewise bend to the strip, movable projections to successively act on the terminals of the initially-bent strip to form a split ring, means for moving said projections, and means
 20 for operating the plunger to decrease the width of the groove to flatten and finish the ring to a washer, substantially as described.

8. In a machine of the class described, an anvil, a movable plunger, means for holding
 30 the plunger normally spaced a predetermined distance from the anvil to form a groove, mechanism for introducing flat strips of metal edgewise in the groove, mechanism for giving

an initial edgewise bend to the strip, reciprocating slide-bearing projections, each of said
 35 respective projections contacting with a respective terminal of the initially-bent strip at each reciprocation of the slide to form a split ring, and means for operating the plunger to decrease the width of the groove to flatten
 40 and finish the ring in a washer, substantially as described.

9. A machine of the class described, comprising an anvil, a mandrel reciprocating in the anvil, a movable plunger, means for normally holding the plunger spaced a predetermined distance from the anvil to form a
 45 groove, mechanism for introducing a flat strip of metal edgewise in the groove, a vertically-moving plunger adapted to initially bend the strip edgewise in the groove and remain in contact with the said strip, and a reciprocating slide bearing two projections which respectively and successively contact
 50 with the respective terminals of the initially-bent strip to form the latter into a ring, and means for operating the plunger to flatten the ring to form a finished washer, substantially as described.

In testimony whereof I have signed my
 60 name to this specification in the presence of two subscribing witnesses.

HUBERT C. HART.

Witnesses:

DENIZA MATTHEWS,
 JNO. IMIRIE.