

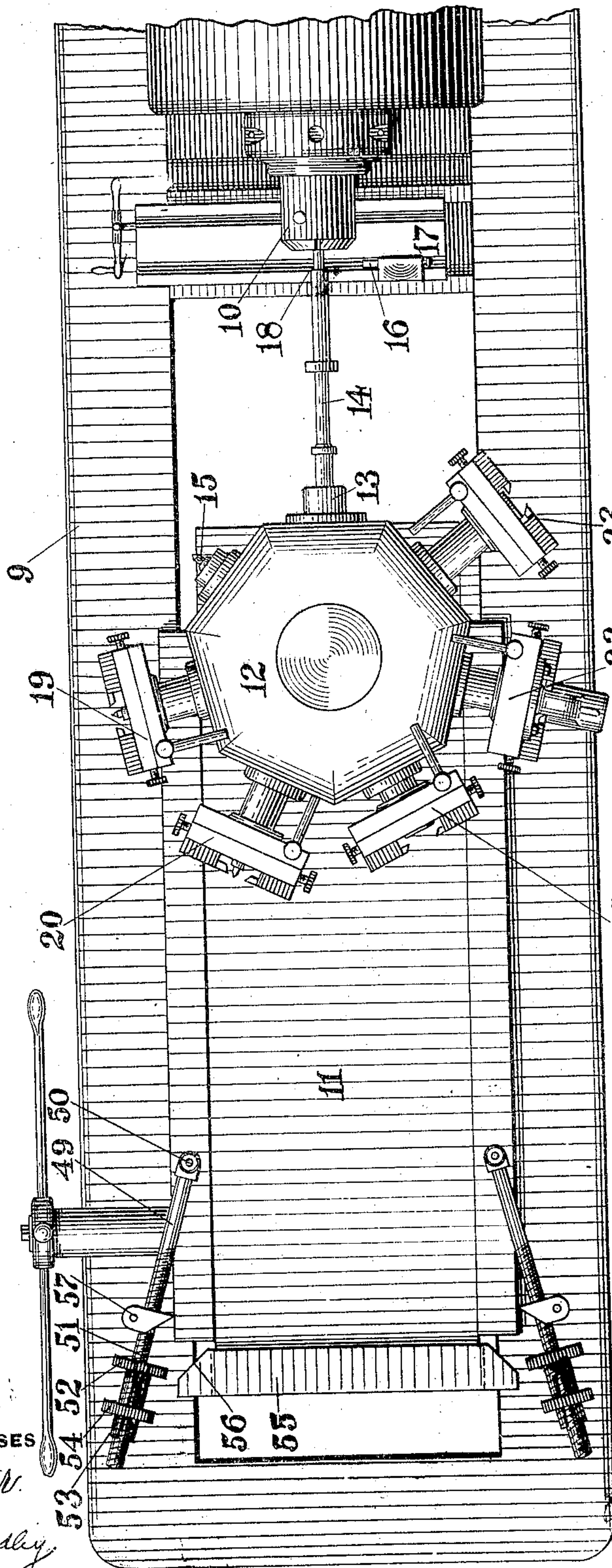
WITNESSES
F. E. Gaither.
J. C. Bradley.

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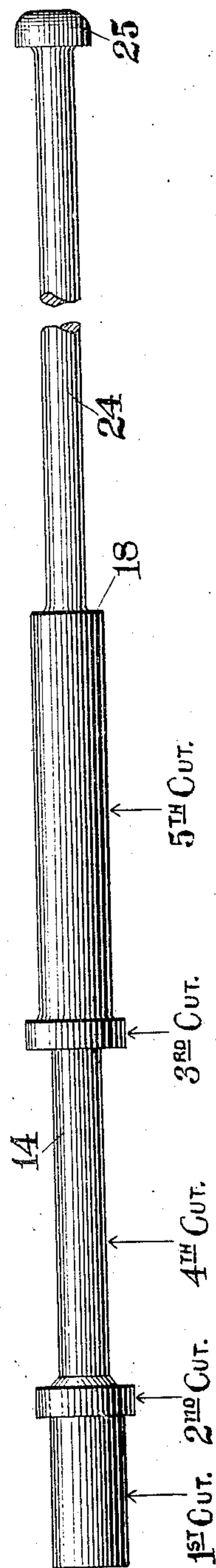
APPLICATION FILED NOV. 13, 1905.

Patented July 27, 1909.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

FIG. 3.

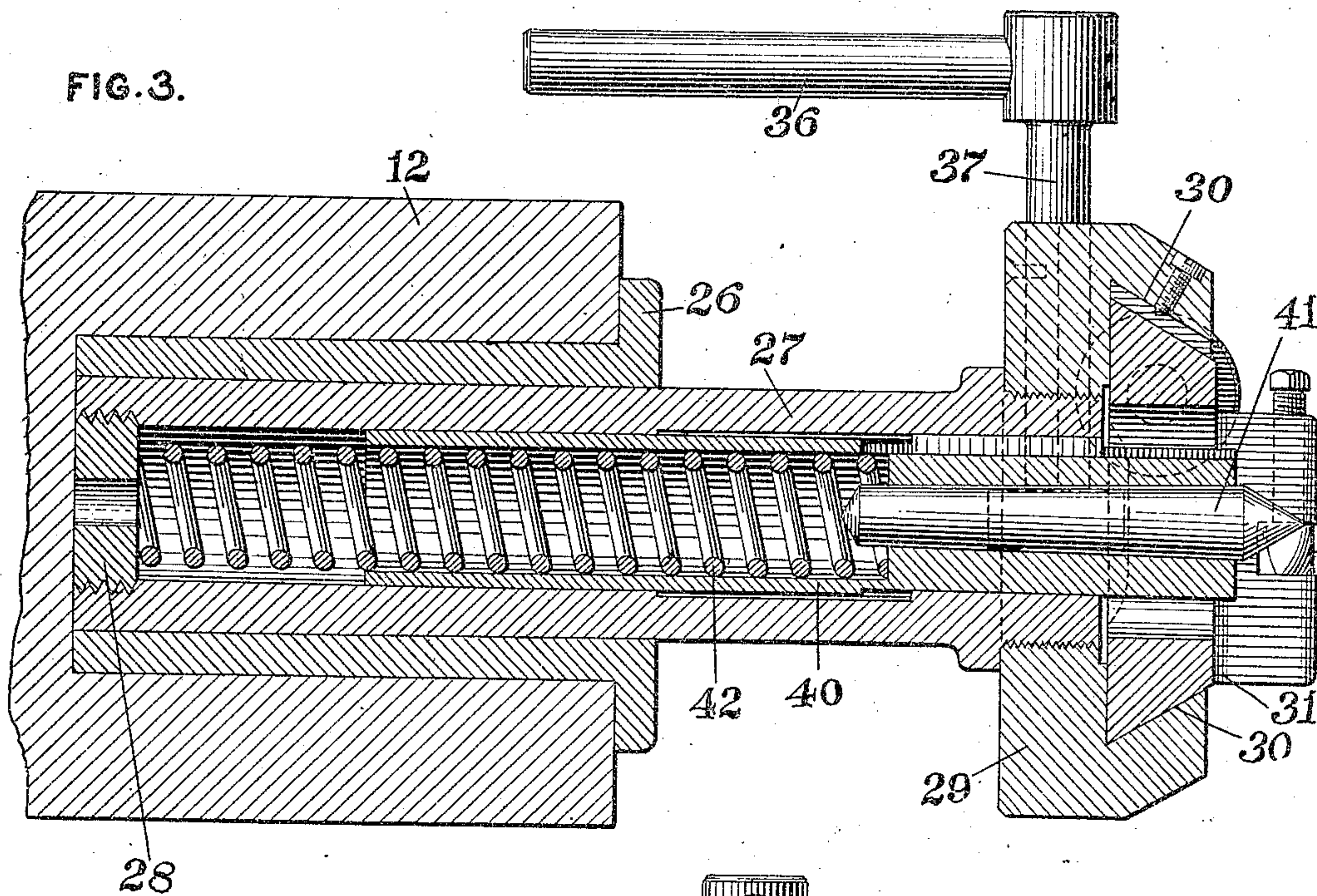


FIG. 4.

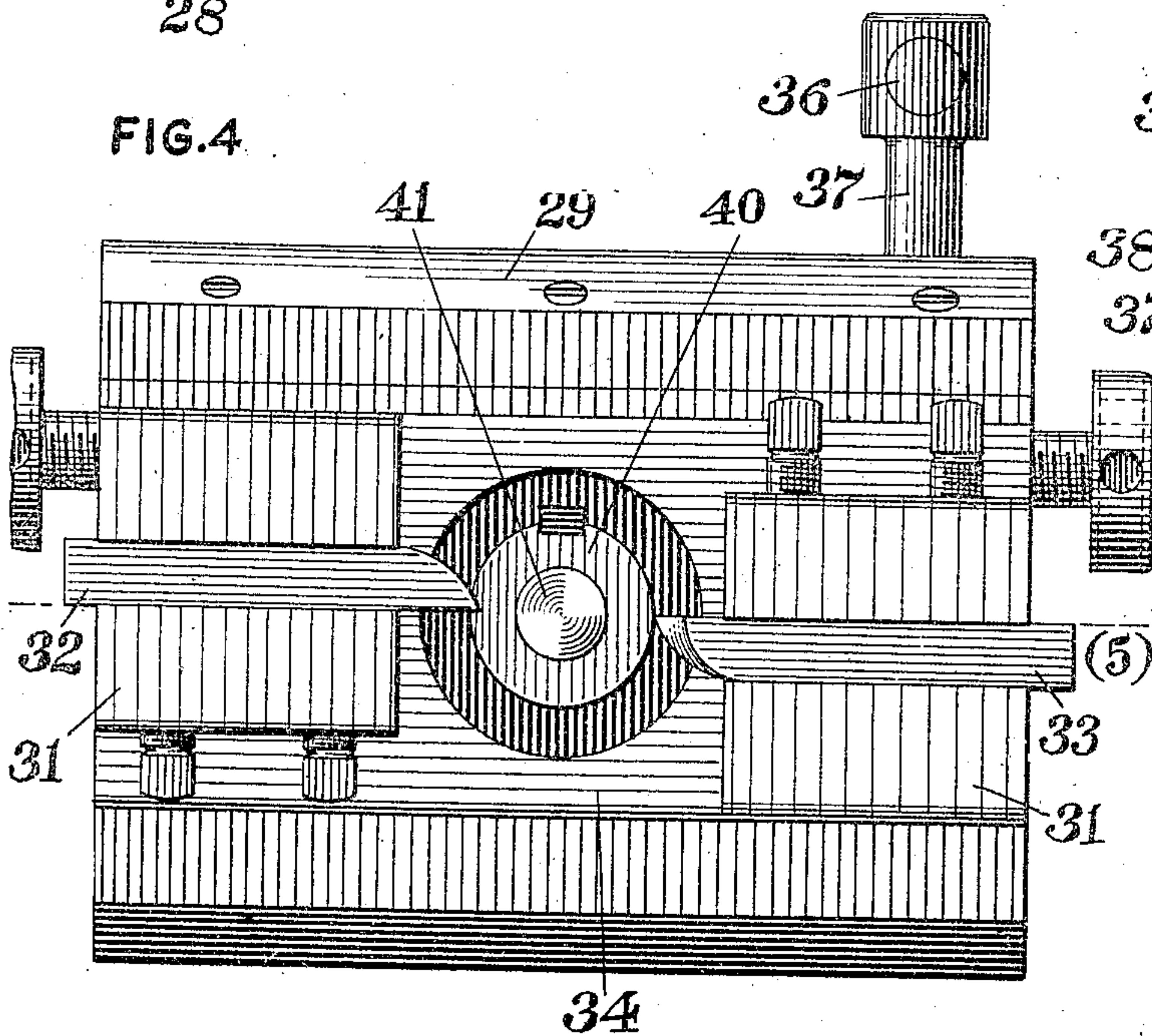
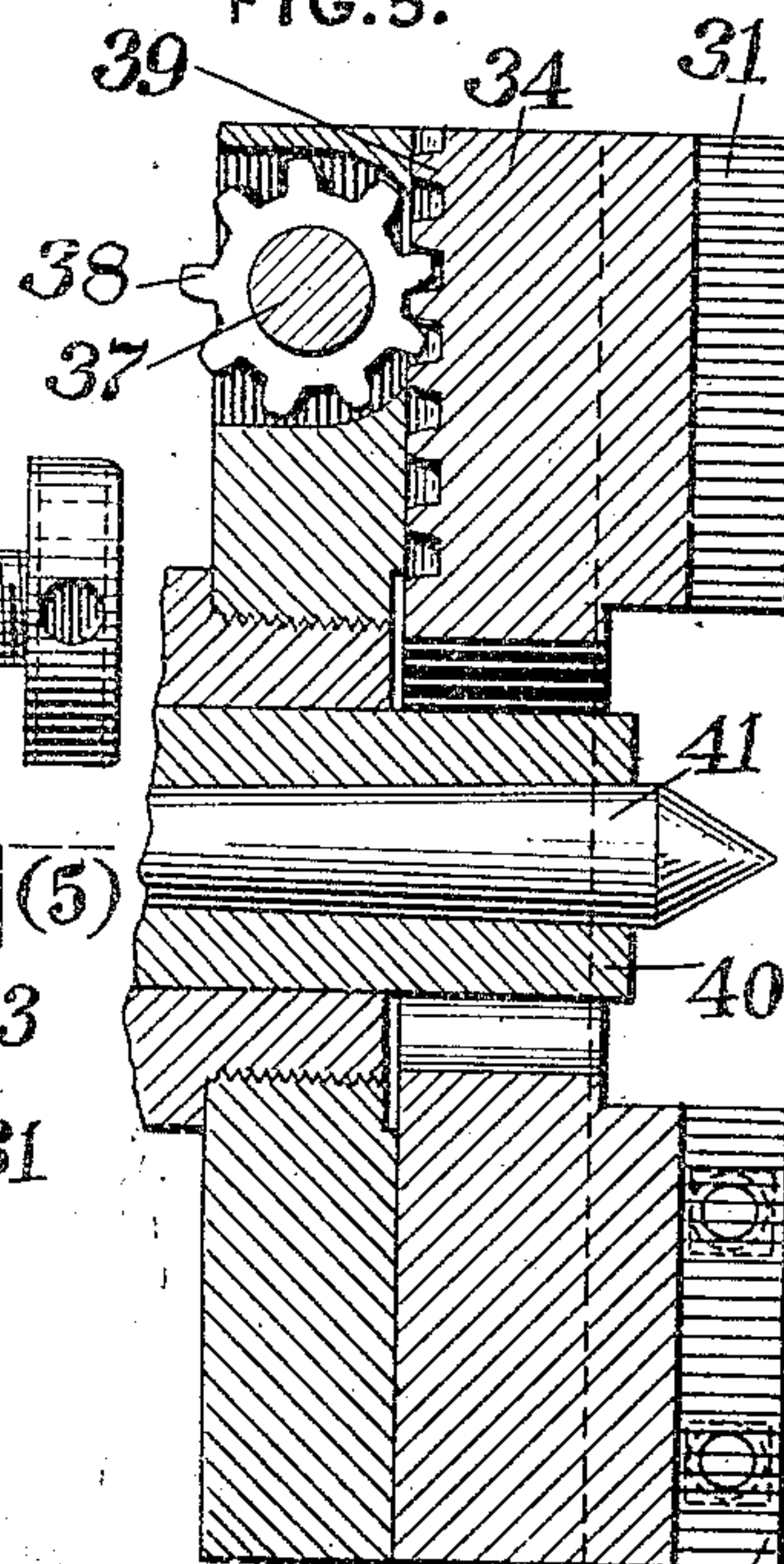


FIG. 5.



WITNESSES

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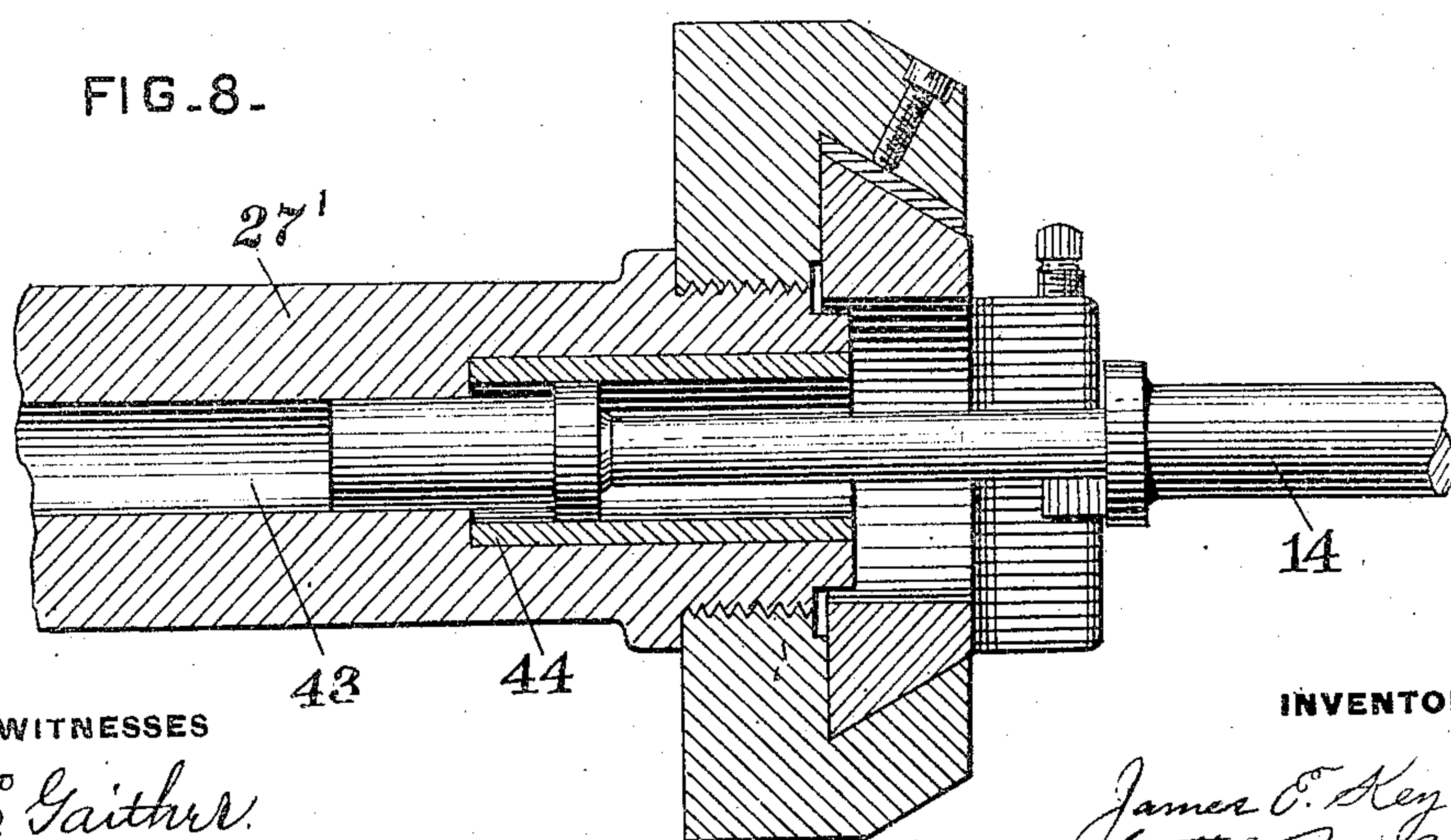
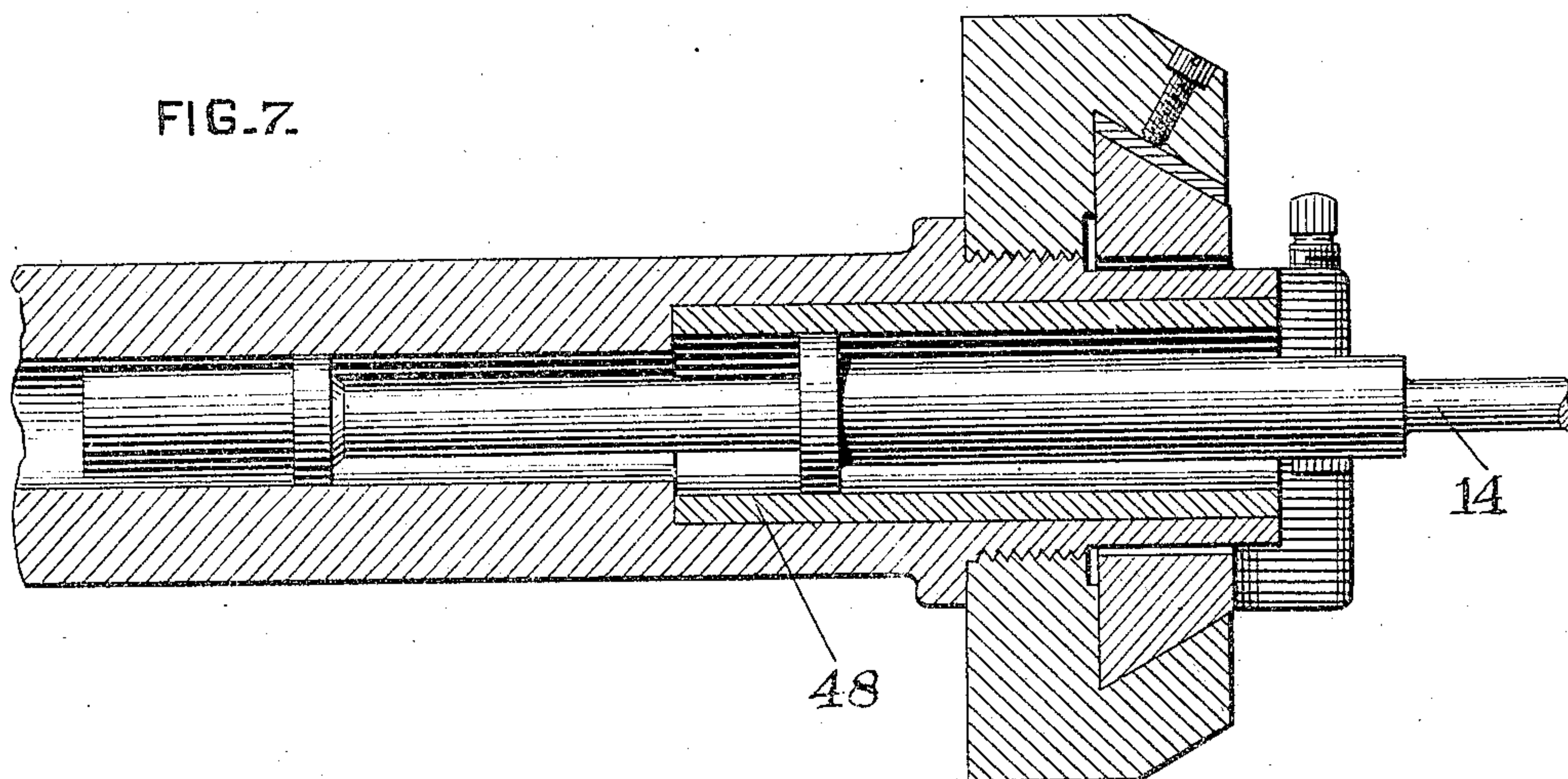
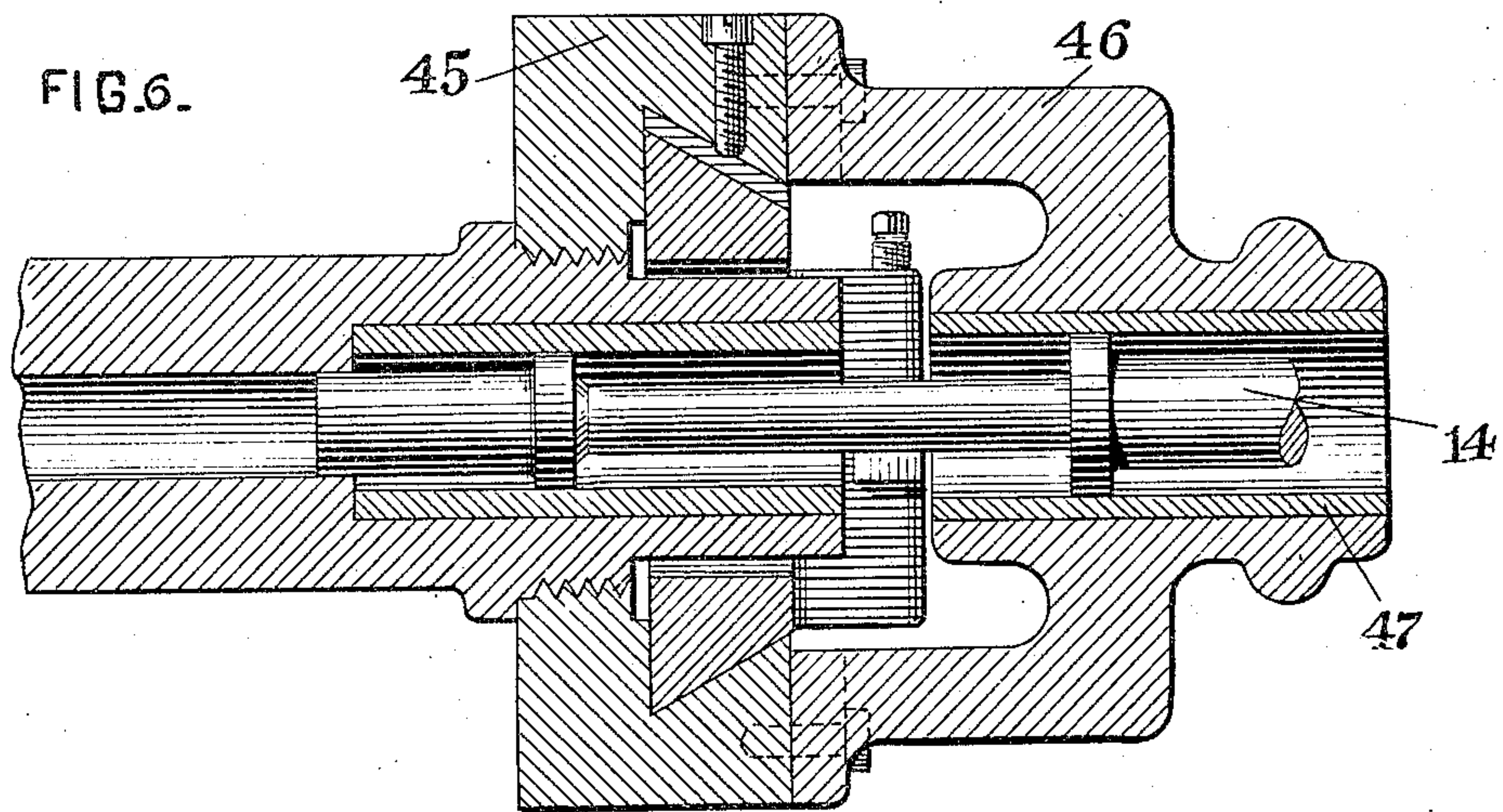
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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LATHE.

No. 929,226.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES E. KEY, a citizen of the United States, residing at Wilmerding, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Lathes, of which the following is a specification.

The invention relates to an apparatus for turning down valve rods and other similar articles in which a plurality of operations are performed on the same rod for reducing various portions and lengths thereof to predetermined dimensions.

The objects of the invention are: to provide a turret lathe adapted to perform a plurality of cutting operations upon a rod, and in which the rod is securely supported adjacent the cutters during each operation; to provide a tool carriage in which the turret positions the work and afterward serves as a support for the revolving work during a plurality of successive operations; and finally to provide a lathe which is easily operated and which is capable of performing very accurate work. One form of the invention is described in the following specification and illustrated in the accompanying drawings in which—

Figure 1 is a plan view of the machine;

Figure 2 is a detail showing the article produced;

Figure 3 is a longitudinal section through the support of the first and second sets of turning tools;

Figure 4 is a front view showing the end of the device of Figure 3;

Figure 5 is a section on the line (5) of Figure 4;

Figure 6 is a longitudinal section through the support of the fourth set of turning tools;

Figure 7 is a longitudinal section through the support of the fifth or last set of turning tools, and

Figure 8 is a longitudinal section through the support of the third set of turning tools.

The article which the machine is primarily intended to turn out is a reversing valve rod for an air pump, which article is shown in Figure 2 of the drawings. It is obvious, however, that the machine may be used in the production of similar articles, and that the various constructions of tool supports shown and described hereafter are applicable to other machines than turret

lathes. The essential parts of the machine comprise a stationary revolving work chuck in which the work is positioned and held, and a tool turret mounted for longitudinal motion in front of the chuck and adapted to revolve so as to bring a plurality of sets of cutting tools successively in position to turn down the sections of the rod. It will be understood that the rod used is roughly forged, and the purpose of the machine is to finish the rod to precise dimensions. In rods of this type it is necessary that the size and length of the various sections of the rod be exact, and for this reason the machine is provided with positioning or gaging means whereby the carriage may be started at an exact position, and further is provided with the usual automatic stopping attachment for stopping the carriage when it has reached the end of a predetermined cut. The turret is adapted to revolve to bring the various tools in proper position, and is also adapted to reciprocate so that after the tools are in alinement with the work they may be carried along the rod to turn down the required length thereof. The turret is provided with the usual means (not shown) to automatically turn and position the turret at proper places in its rotary movement. Each set of turning down tools is provided with a roughing and finishing cutter which may be alternately brought into action so that each section of the rod is gone over twice. Since the turret feeds over the work, provision is made for a yielding lathe center on the turret for supporting the work during the first operation, and for the other operations means are provided whereby the finished part of the work is supported inside the turret and is thereby centered and held rigid. The particular tool supports with their centering means in the turret constitute an important feature of the invention, and are fully described in the following description.

As shown in Figure 1, 9 is the bed of the machine which bed carries the chuck 10 for grasping and rotating the rod, the reducing gearing for such chuck being broken away, and being of ordinary construction. Mounted upon the bed for longitudinal movement, is the carriage 11, adapted to reciprocate in front of the work chuck and bring the tools of the turret 12 in position to operate upon the valve rod. The turret

as shown is provided with seven faces, which number is of course variable and depends on the number of operations to be performed, and is rotatably mounted upon the carriage 11. No means are shown for reciprocating the carriage 11 or for rotating the turret 12, and it will be understood that any of the common forms of mechanism for accomplishing this result may be used, the only requisite being that such mechanism be provided with stops for stopping the feed of the carriage automatically in its longitudinal movement after the proper length of cut and with means for rotating the turret a step at a time and positively holding the cutting tool in alinement with the chuck. The turret is provided with a stop 13 which may be made to abut against the rod 14 and so fix the distance which such rod projects outside of the chuck. 15 is an ordinary lathe center which is adapted to engage the rod after the turret has turned one step. This lathe center serves to test the trueness of the rod in its rough state and also to true it up on after the turning is completed. The shoulder 18 on the rod 14 is cut by the tool 16 which is mounted on a transversely slidable carriage 17 in the usual way. The succeeding sets of cutting tools are numbered in the order in which they operate; 19, 20, 21, 22 and 23.

The first set of cutting tools, 19, cut that portion of the rods marked "1st cut" in Figure 2, and the sets of tools 20, 21, 22 and 23 cut respectively those portions of the rod in Figure 2 marked respectively "2nd cut", "3rd cut", "4th cut" and "5th cut". As previously stated, the shoulder 18 is cut by an ordinary tool 16, and that part of the rod marked 24, with its knob 25, is turned down in another machine. The sets of tools 19 and 20, with their lathe centers, are shown clearly in the sectional views in Figures 3 and 5, and in the front view, Figure 4. These two sets of tools, 19 and 20, are precisely the same, and their use is identical, the only difference being that 19 makes the "1st cut", and 20 makes the "2nd cut". As shown in Figures 3, 4 and 5, 12 is the turret carrying removably the sleeve 26 which holds the casing 27 provided with the end plug 28. Screwed upon the end of this casing is the block 29 which carries in guide-ways 30 the tool blocks 31, which tool blocks carry respectively a roughing tool 32 and a finishing tool 33 which are adapted alternately to engage the work. The blocks 31 are integral with a back piece 34, and this back piece is reciprocated by means of the handle 36 carried on the shaft 37. This shaft is provided with a pinion 38, which pinion engages a rack 39 on the back of the part 34, as shown in Figure 5. It will be seen that by turning the handle 36, one tool may be withdrawn from the work, and the

other engaged with such work, or, the handle may be turned only partially so that the work lies midway between the tools, which is the position of the tools when the turret is moved longitudinally to commence a cut or to be brought back to position for starting a new cut. Means for centering the work comprise a casing 40 partially closed at its outer end and carrying the center 41. Between this casing and the plug 28 a spiral spring 42 is interposed, which spring provides for the gradual retreat of the center as the turret is fed along the work to make the cuts.

The third set of cutting tools, 21, is shown in cross section in Figure 8. That part of the rod marked "3rd cut" is operated upon by this set of tools. As in the case of the tools 19 and 20, there is a roughing and a finishing tool, which tools operate in the same way as that described for tools 18 and 19. The centering means in this tool differs however in that the casing 27' is provided with a recess 43, a part of which is provided with a casing 44. This recess is adapted to receive the end of the rod 14 and act as a centerer through which the rod may be fed for making the third cut.

The set of tools for making the fourth cut is shown in section in Figure 6. In this construction the mounting of the cutting tools and their operation is the same as in the tools 19, 20 and 21. 45 is the block which carries the tools, and bolted to the front of this block is a guide block 46. The guide block 46 is provided with a recess having a lining 47 which is adapted to support the collar previously turned on the rod. The tools operate in the recess between the blocks 45 and 46, so that the section of the rod being cut is supported on both sides of the tools. This provides a very rigid support for the work and reduces the springing thereof to a minimum whereby accuracy of turning is secured. The set of cutting tools 23 for giving the last or fifth cut on the rod, is shown in section in Figure 7. This construction is substantially the same as that shown in Figure 8, with the exception that the sleeve 48 is elongated to provide for the reception of the second collar, and a larger opening is provided in the turret for the reception of the end of the rod.

In order that the point at which the cutting tools commence to operate upon the rod may be accurately determined, the machine is provided with stop mechanism for limiting the movement of the carriage to the left, (Figure 1) or in the backward direction. As shown, there are two sets of these stops, one of which is used for fixing one point of cut, and the second for fixing another point of cut. These devices consist of swinging rods 49 pivoted at 50 to the frame bed and having screw threads 51. On this

rod is threaded a nut or stop 52 which has a split shank 53, and is provided with a lock nut 54 for clamping the split shank at any desired position on the rod 51. The part 52 is adapted to engage the back side of a cross piece on the carriage 55, and so limit the backward movement of such carriage. This cross piece is also provided with cam surfaces 56 which are adapted to engage cams 57 on the rods 49. On the forward movement of the carriage the cam surfaces 56 engaging with the cams 57 move the rods to the position shown in Figure 1, in which position they will be out of the way when the carriage returns to its backward position.

The operation of the device is as follows: A rough formed rod 14 is inserted in the clamp 10, the turret 12 is then advanced until it is stopped automatically by some stop mechanism at a predetermined point. This point determines the length of the rod 14 by virtue of the engagement of the stop 13 with such rod. The chuck is then clamped and the turret is withdrawn and the lathe center 15 brought into position. The rod is revolved on this point to see if it is properly centered. The turret is again withdrawn and revolved a step and advances so that the roughing tool of the set 19 cuts down that part of the work marked "1st cut" and is automatically stopped when the end of the cut is reached. The turret is now withdrawn to the beginning of the cut and the finishing tool sent over the work to smooth it up. During this cutting operation the center 41 is kept in constant engagement with the end of the work by means of the spring 42. The turret is now successively revolved and similarly reduced on the successive tools 20, 21, 22 and 23, as previously described. If any final smoothing or finishing of the rod is necessary the rod may be engaged again by the center 13 and a file or other hand smoothing means applied. The shoulder 18 may now be cut by means of the cutter 16, and the rod is finished as far as this machine is concerned.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following:

1. In combination, a bed, a carriage mounted thereon, and a swinging arm on one of

the parts provided with an adjustable stop and a cam surface, and engaging means and a cam surface on the other part, all so arranged that the stop will engage the engaging means at the backward limit of movement of the carriage and on a forward movement the arm will be cammed open by the engagement of the cam surface of the arm with the cam surface of the other part.

2. In combination, a bed, a carriage mounted thereon, and a movable member on one of the parts provided with a stop and a cam surface, and engaging means and a cam surface on the other part, all so arranged that the stop will engage the engaging means at the backward limit of the movement of the carriage and on a forward movement the member will be cammed open by the engagement of the cam surface of the member with the cam surface of the other part.

3. In combination, a relatively movable rotatable work chuck and tool carrier adapted to be moved transversely of the work-chuck, a cutting tool on the tool carrier set to reduce the end of the stock to a predetermined size, a retractile cone point on the tool carrier for supporting the end of the stock during the first cutting operation, a cylindrical opening in the tool carrier of a size to snugly fit the end of the reduced stock, and a second tool on the tool carrier adapted to reduce the stock after its engagement with the cylindrical opening.

4. In combination, a relatively movable rotatable work chuck and tool carrier adapted to move transversely of the work-chuck, a cutting tool on the tool carrier to reduce the end of the stock to a predetermined size, a spring held cone point on the tool carrier for supporting the end of the stock during the first cutting operation, a cylindrical opening in the tool carrier of a size to snugly fit the end of the reduced stock, and a second tool on the tool carrier adapted to reduce the stock after its engagement with the cylindrical opening.

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

JAMES E. KEY.

Witnesses:

R. F. EMERY,
J. B. MACDONALD.