

(No Model.)

4 Sheets—Sheet 1.

W. J. PARMELEE.

PROCESS OF AND APPARATUS FOR MAKING FAN TAIL AXLES.

No. 459,765.

Patented Sept. 22, 1891.

FIG. 1.

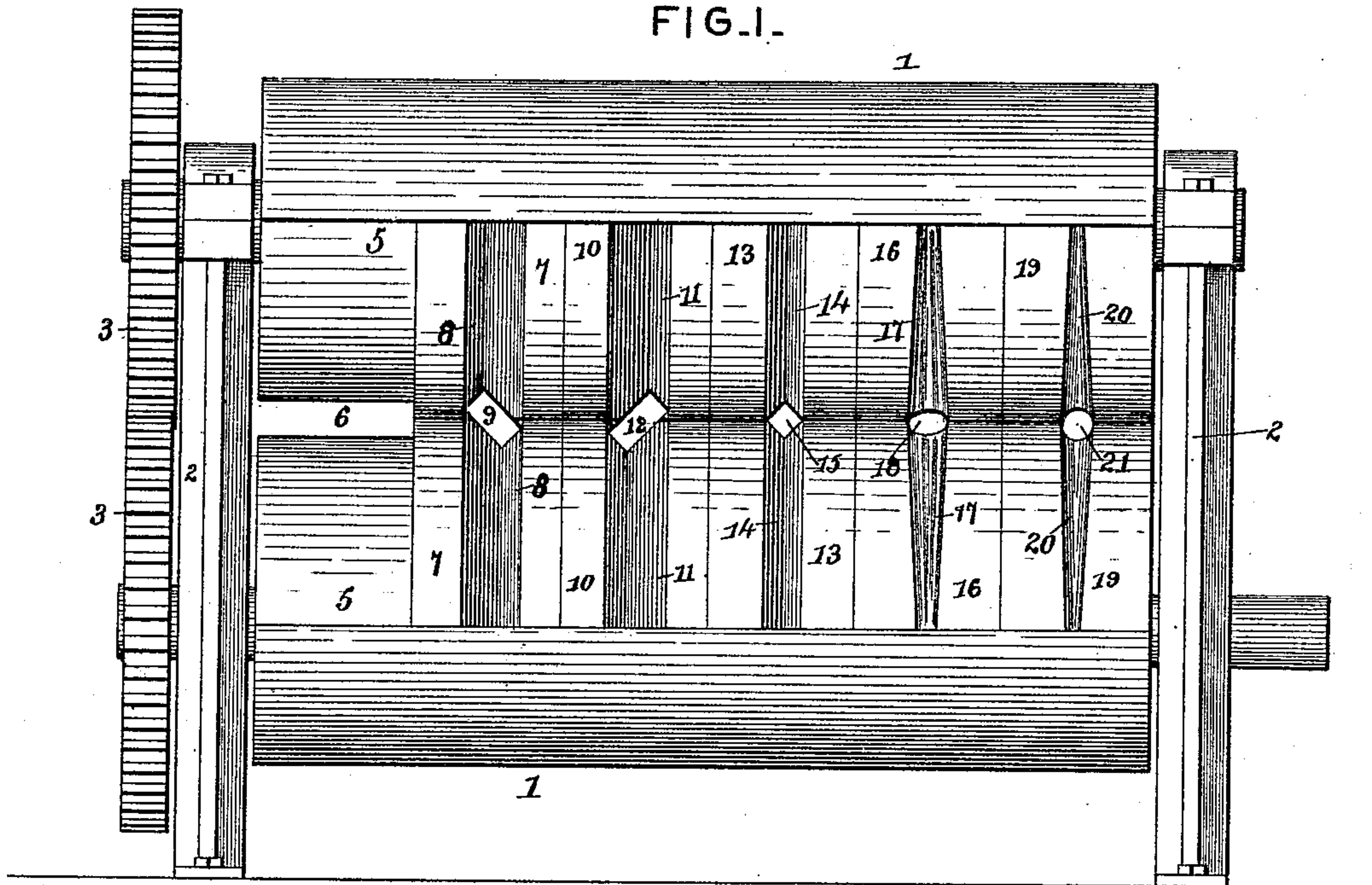
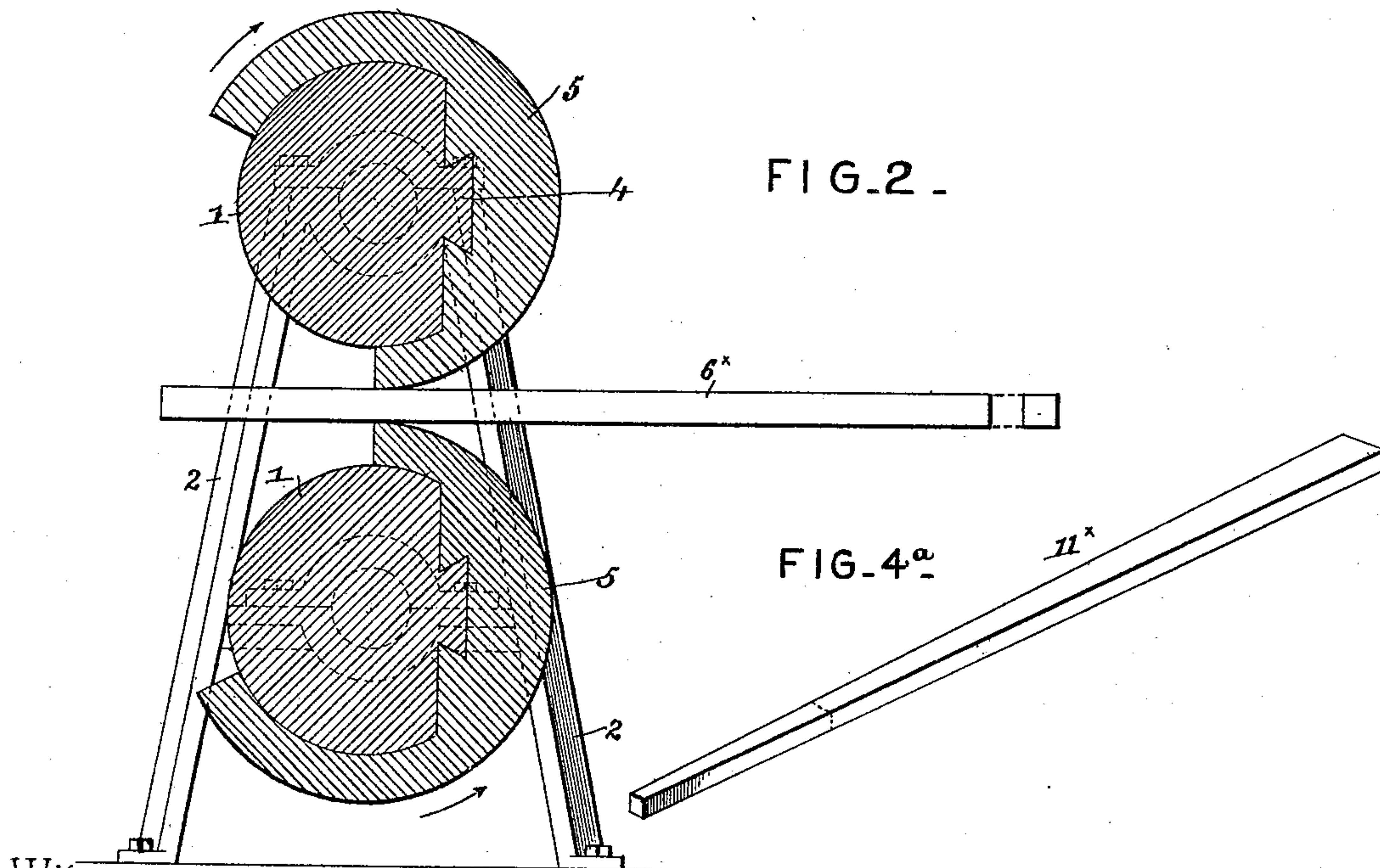
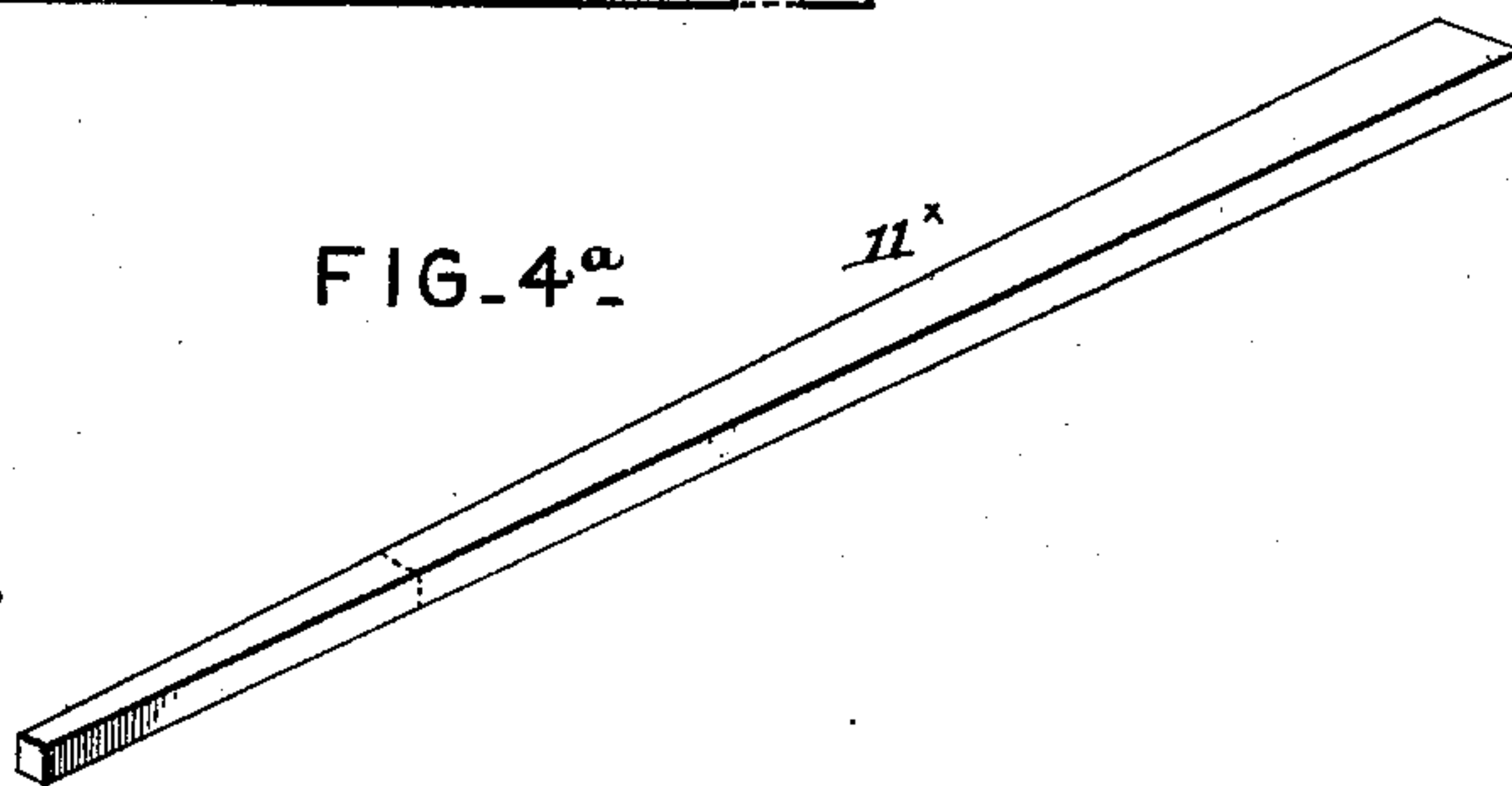


FIG. 2.

FIG. 4^a

Witnesses

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By *his* Attorneys,

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(No Model.)

4 Sheets—Sheet 2.

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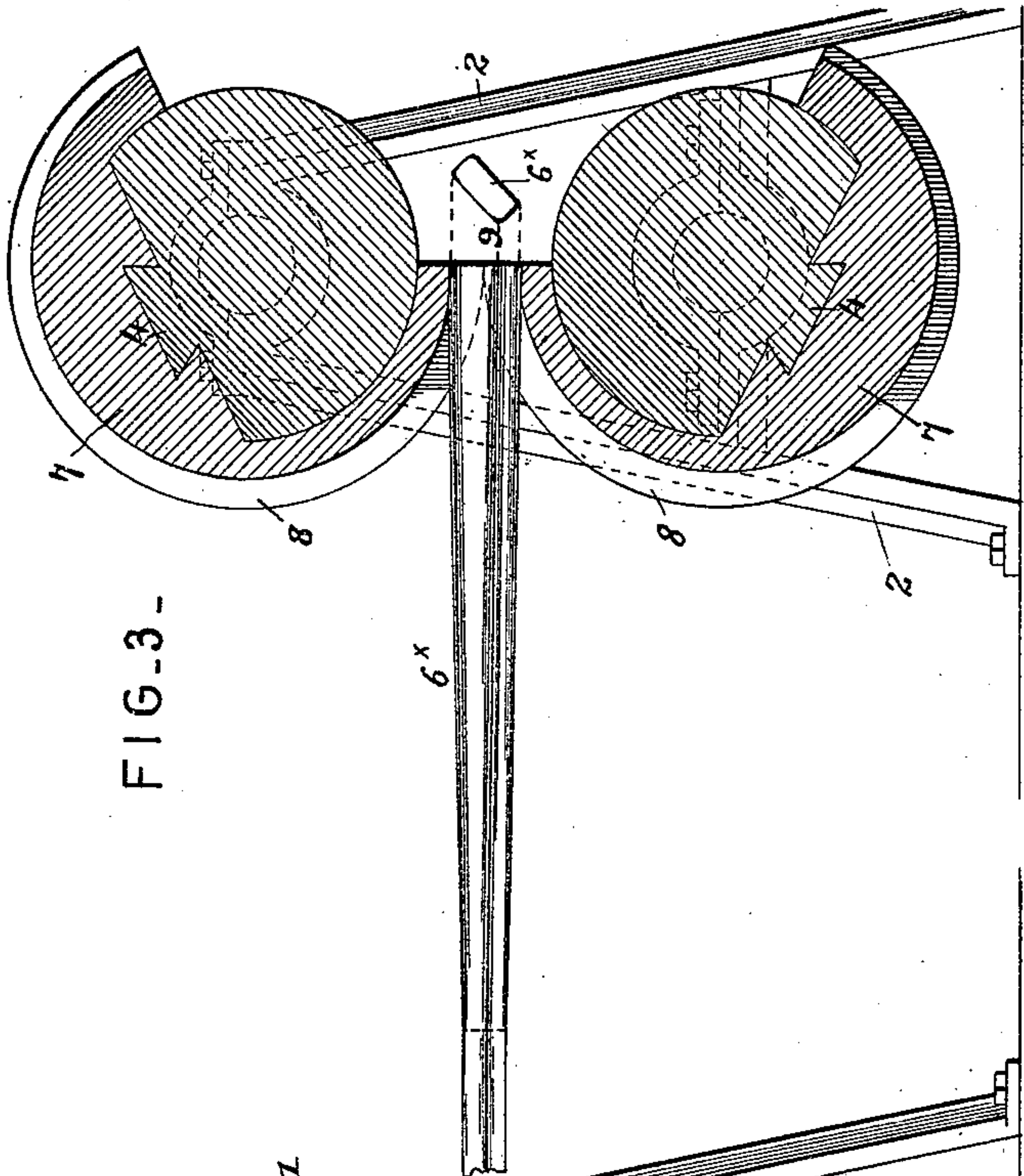


FIG. 2a -

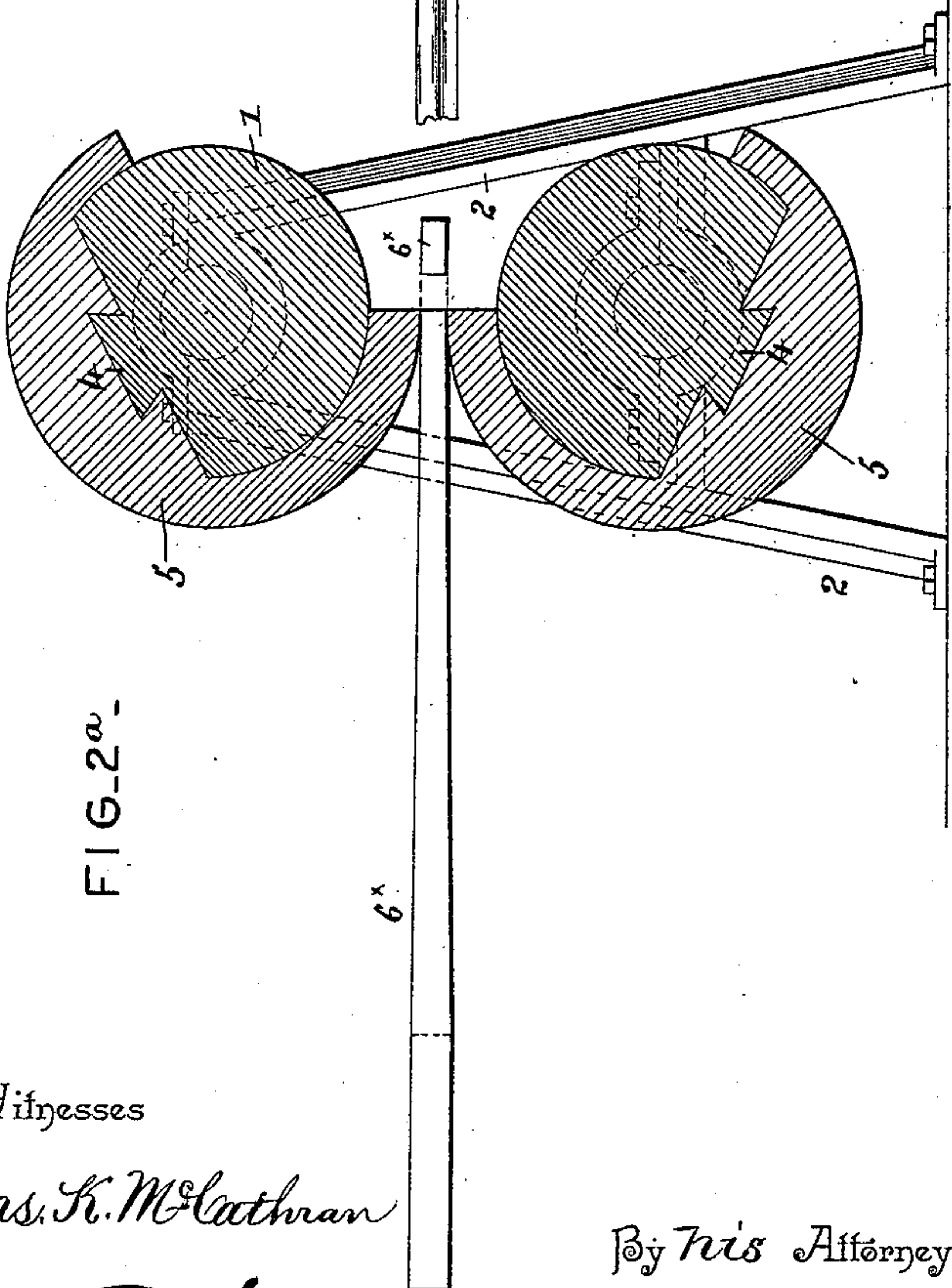


FIG. 3 -

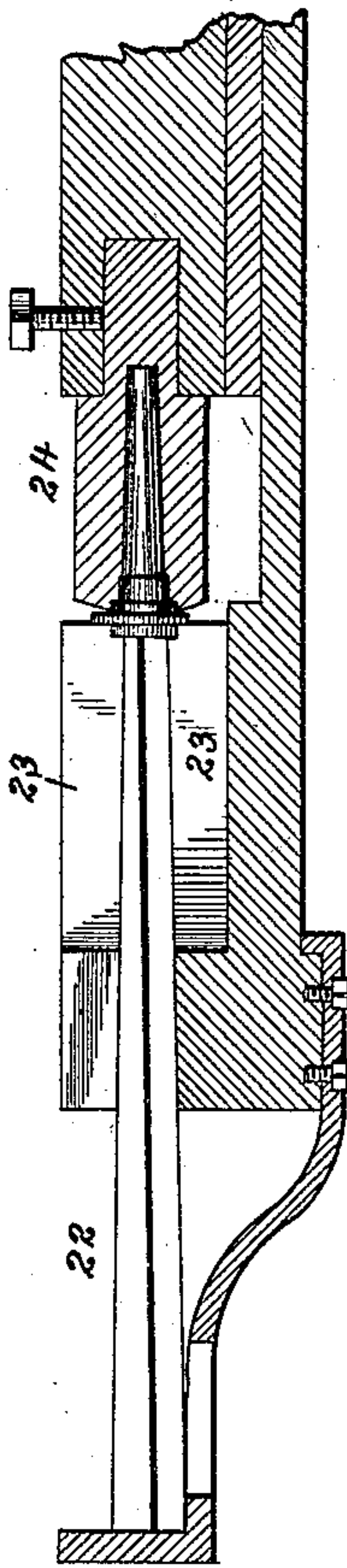


FIG. 7 -

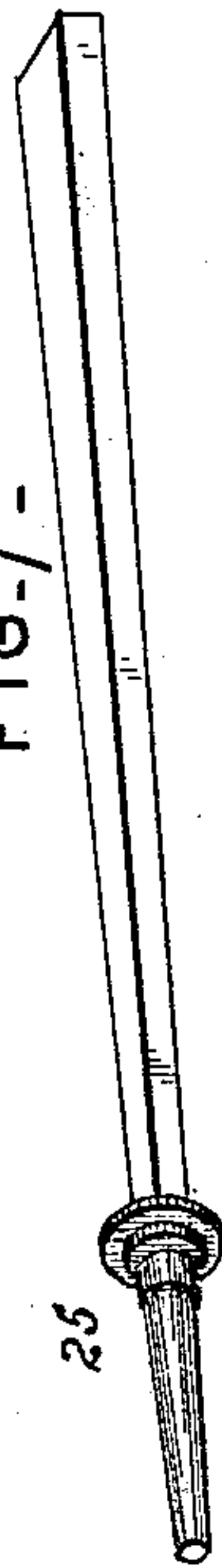


FIG. 7a -

Witnesses

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(No Model.)

4 Sheets—Sheet 3.

W. J. PARMELEE.

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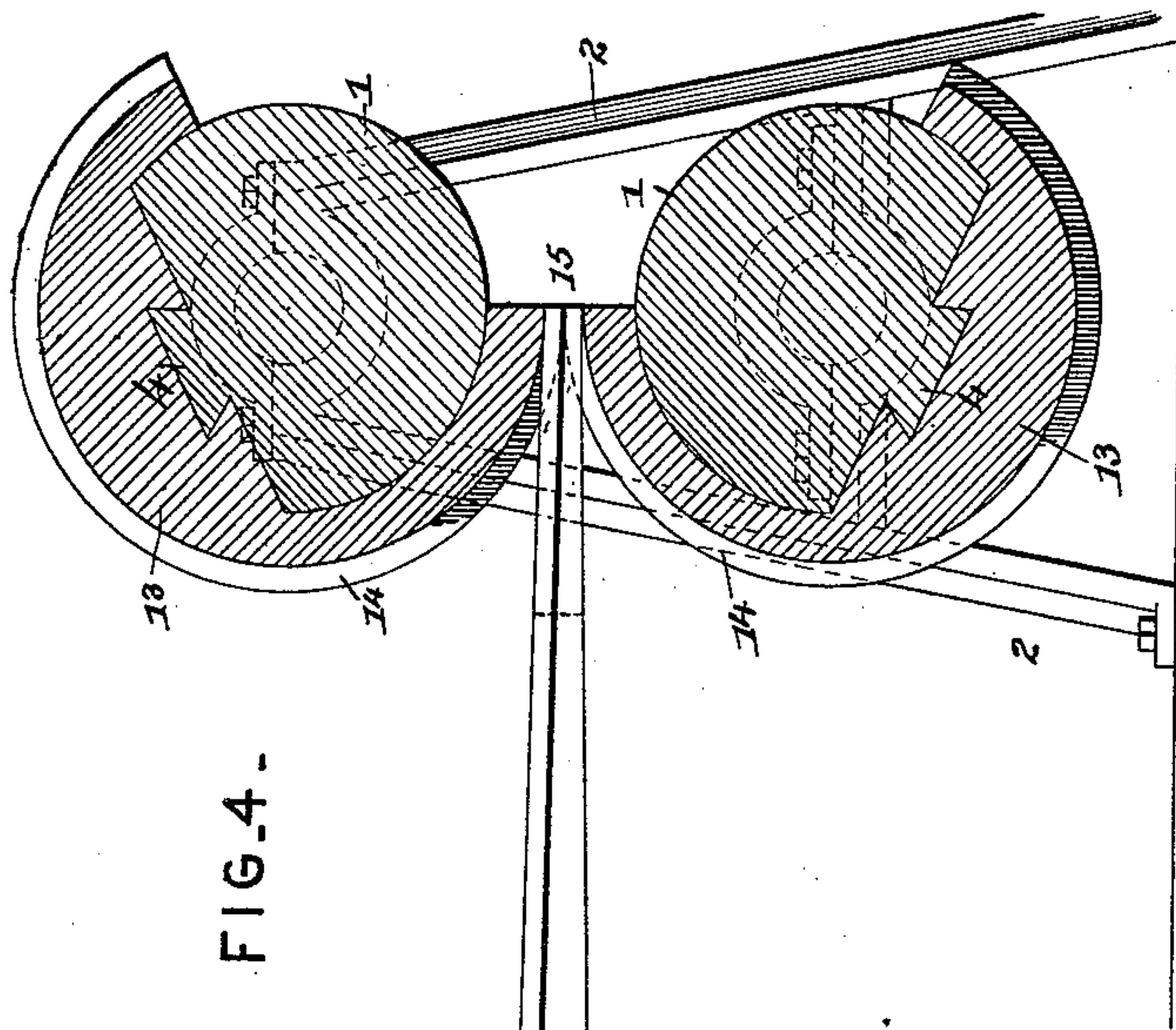


FIG. 4 -

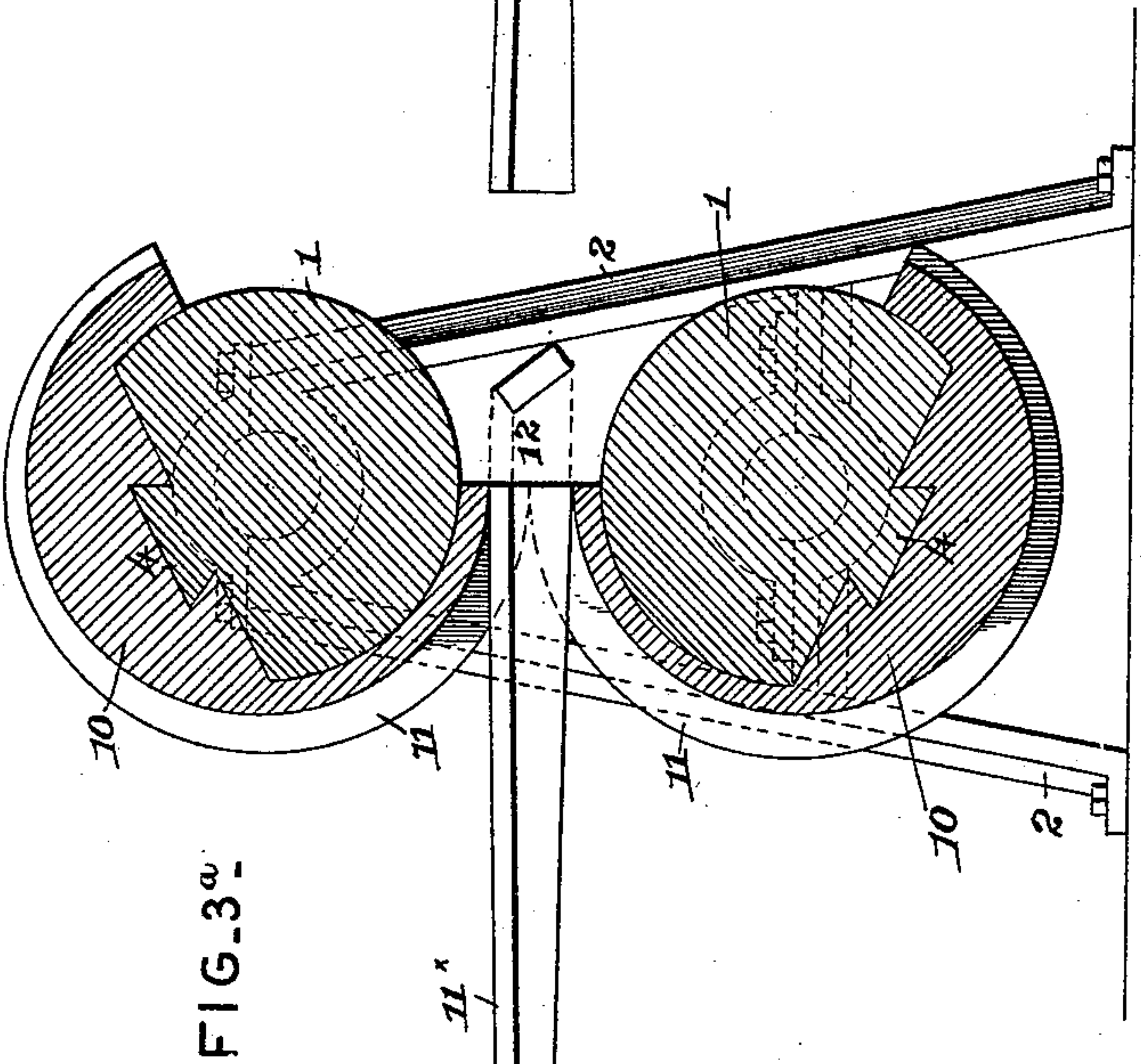


FIG. 3 -

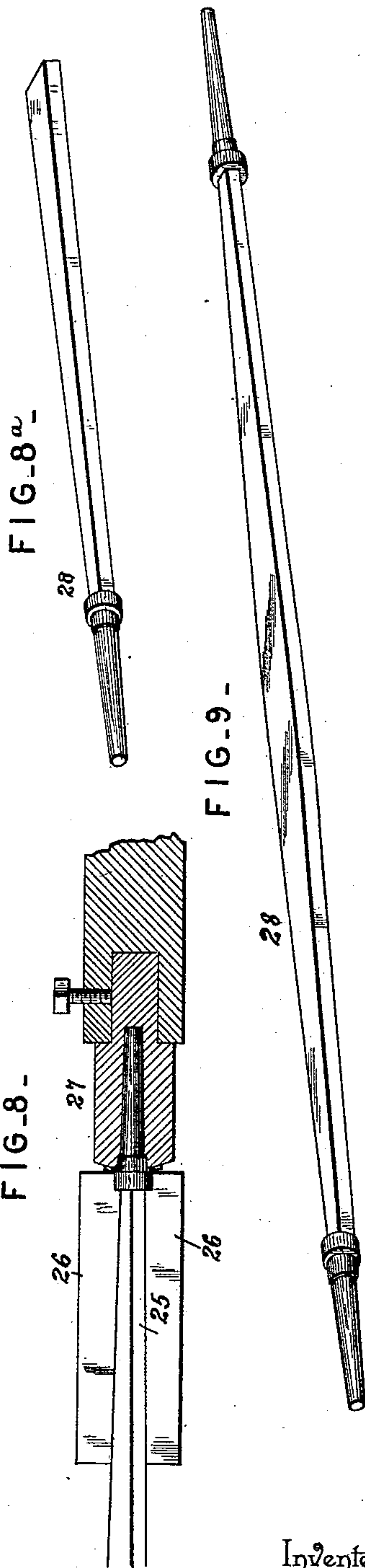


FIG. 8 -

FIG. 9 -

Witnesses

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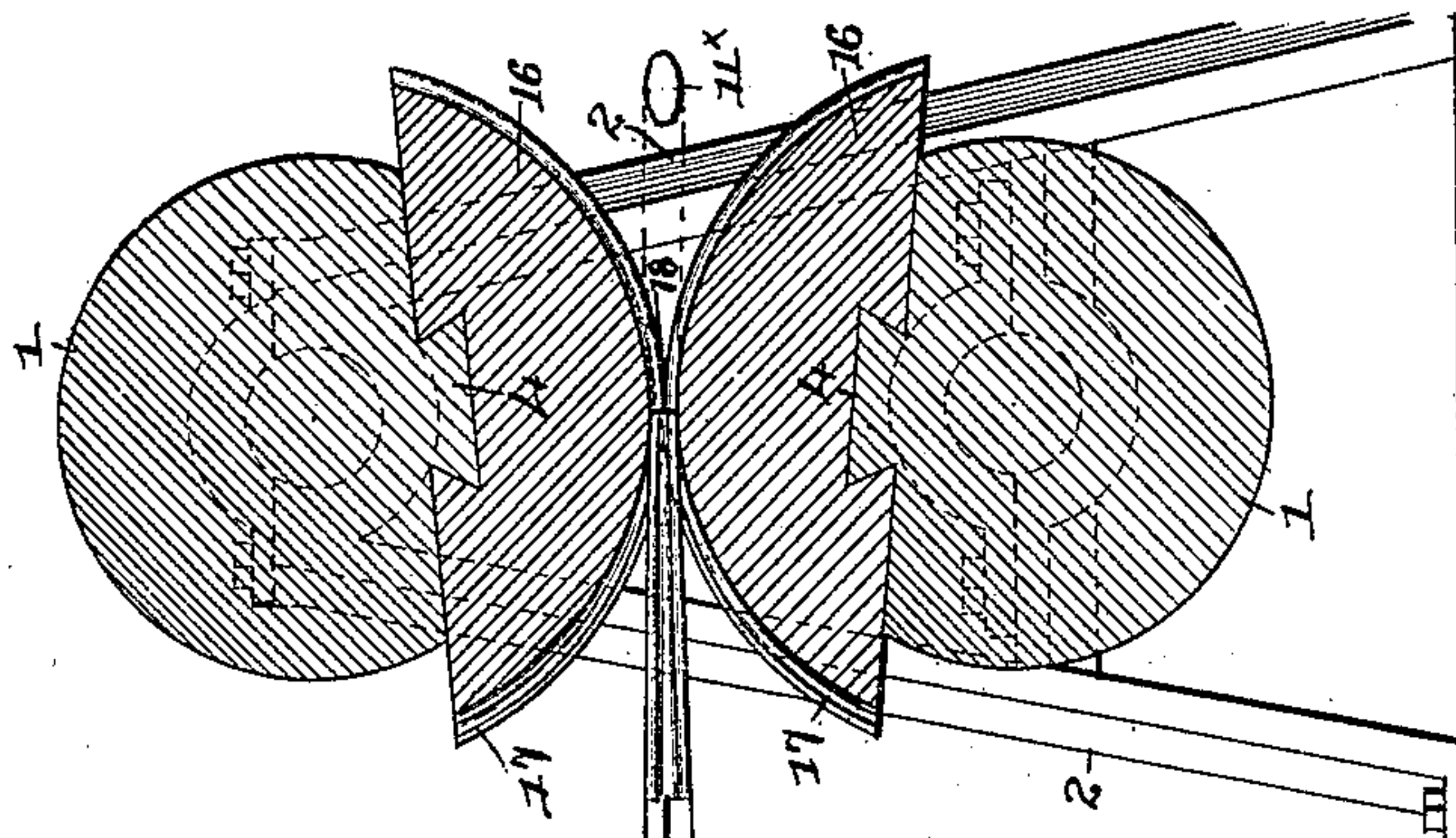


FIG. 5.

FIG. 6.

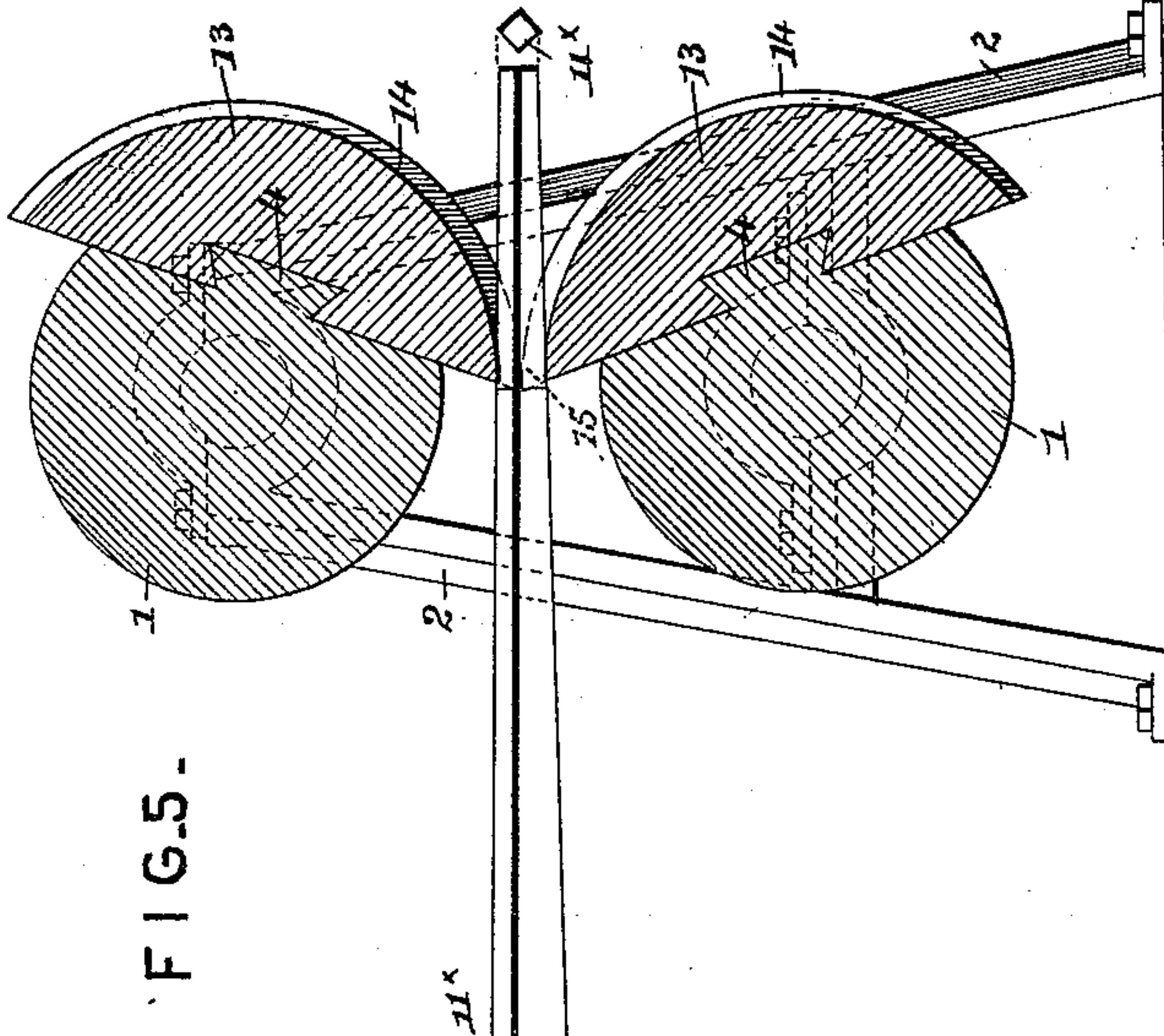
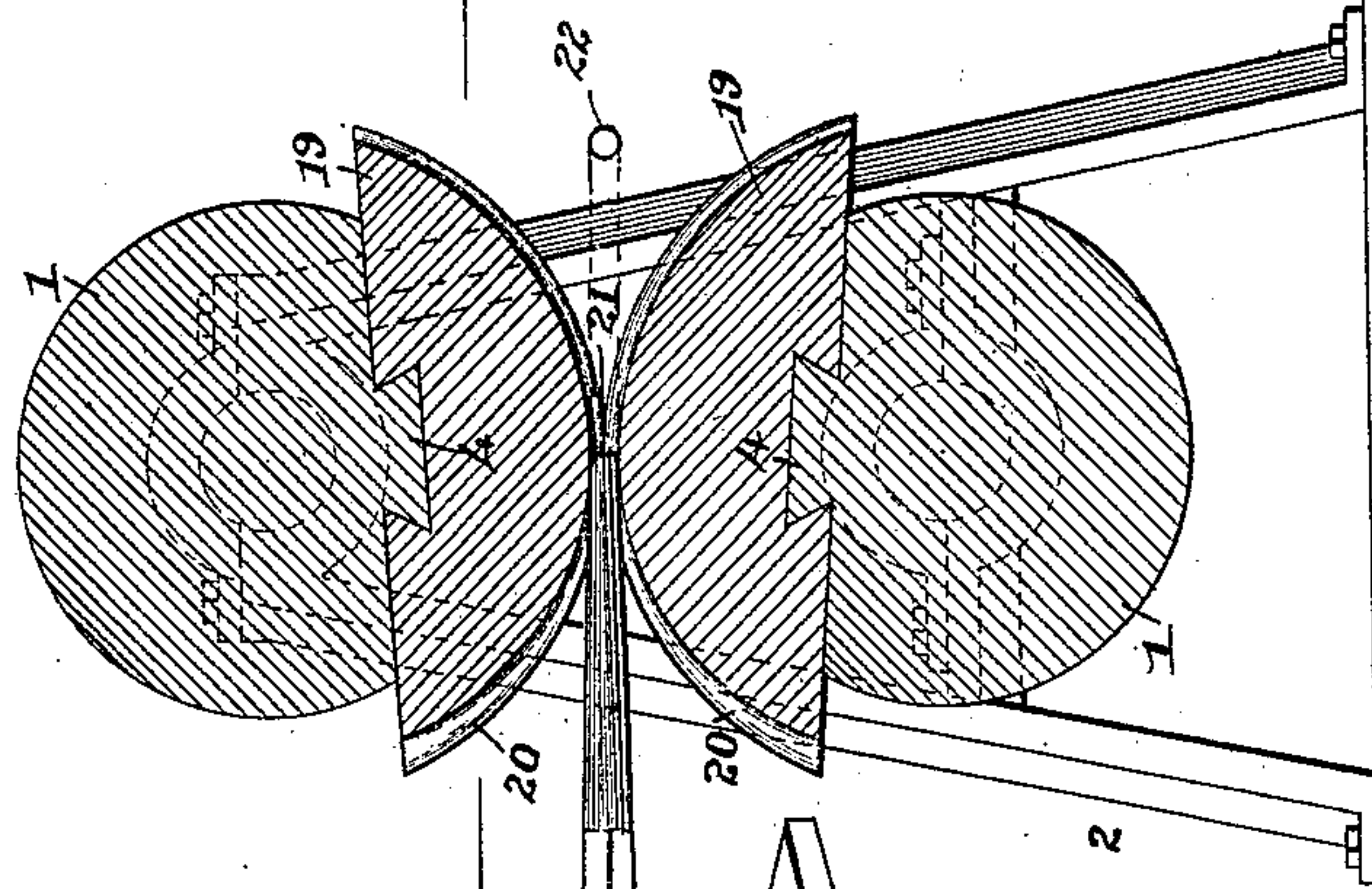


FIG. 5.

FIG. 6.

22

Witnesses

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UNITED STATES PATENT OFFICE.

WOLCOTT J. PARMELEE, OF WILKES-BARRÉ, PENNSYLVANIA.

PROCESS OF AND APPARATUS FOR MAKING FAN-TAIL AXLES.

SPECIFICATION forming part of Letters Patent No. 459,765, dated September 22, 1891.

Application filed June 22, 1891. Serial No. 397,096. (No model.)

To all whom it may concern:

Be it known that I, WOLCOTT J. PARMELEE, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Process of and Apparatus for Making Fan-Tail Axles, of which the following is a specification.

My invention relates to a new process of and apparatus for the manufacture of "fan-tail" axles; and it has for its object to roll the stock or square blank of metal used into a fan-tail shape before the spindle and collar is formed thereon, thus avoiding the objectionable features incident to the formation of such axles by former methods. Heretofore axle-beds have been made fan-tail in shape by rolling, but only subsequent to the formation of the collar thereon. The main objection to this is that the form is imperfect, and that by forming the collar first the bed cannot be rolled close thereto without danger of spoiling the shape of the collar.

To avoid these objections is the object of my invention, the same being attained by first forging the bed with peculiarly constructed and arranged rolls and subsequently upsetting with dies and apparatus, which leave the bed the desired length without involving the old process of shearing, the half-axle, in which form I preferably make my fan-tail axles, being subsequently welded together by the electric process.

With these objects in view the invention consists in a series of specially constructed and arranged rolls and upsetting-dies and in the process of making axles, all of which will be hereinafter more fully explained, illustrated in the accompanying drawings, and specifically pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a front elevation of a set of axle-forming rolls constructed and arranged in accordance with my invention. Fig. 2 is a vertical sectional view of the first set of rolls with the bar or stock inserted up to the point from which it is tapered and at the beginning of its passage through the rolls. Fig. 2^a is a similar view of the same rolls with the tapered axle at the point of leaving the same. Fig. 3 is a

vertical sectional view of the first set of squaring-rolls with the axle about leaving the same. Fig. 3^a is a similar view of the second set of squaring-rolls, the axle in the same position as in the last view. Fig. 4 is a vertical section of the reducing-rolls with the axle at the end of its passage therethrough. Fig. 4^a is a detail view in perspective of a fan-tail axle after leaving the squaring and reducing rolls. Fig. 5 is a vertical cross-section of the first set of spindle-forming rolls, the axle end inserted therein. Fig. 5^a is a similar view, the axle leaving the rolls. Fig. 6 is a similar view of the second set of spindle-rolls, the axle leaving the same. Fig. 6^a is a detail in perspective of a fan-tail axle after leaving the spindle-rolls. Fig. 7 is a longitudinal sectional view of my patented flash-collar-forming apparatus with the axle of Fig. 6^a inserted therein and the collar formed thereon. Fig. 7^a is a detail in perspective of the axle after leaving the collar-forming apparatus. Fig. 8 is a longitudinal sectional view of my patented flash-cutting apparatus with a fan-tail axle having the spindle and collar thereon inserted therein. Fig. 8^a is a detail in perspective of the axle after the trimming of the flash. Fig. 9 is a detail in perspective of the completed axle.

Referring to the accompanying drawings, 1 1 designate longitudinal rolls mounted within the frame 2 and suitably geared together by the gear-wheels 3, both rolls being provided with longitudinal and beveled tongues 4, that are adapted to engage dove-tailed grooves in the series of dies that are mounted thereon and carried around by the revolution of the rolls. The first set of rolls or dies 5 5 are segmental in shape and have flat faces, and when attached to the rolls, as just described, their peripheries being eccentric with the axis of the rolls, their meeting faces form together, as they describe the arc of their movement, a flat tapering space 6, which tapers from one extremity of the arc to the opposite end of the arc. The bar of metal or stock, after being heated to a sufficient degree, is inserted between the dies 5 5 up to a point which leaves a sufficient length from the end of the stock, upon which the spindle and collar can be formed. The stock is inserted, of course, when the dies are not touch-

ing each other, as there is a space left for such insertion between the ends of the segmental dies, which, revolving in opposite directions, bite the stock when their faces meet at their widest point and roll the same out to the operator on the same side from which the stock was inserted and flatten the axle out into a fan-tail shape as the same is subjected to the flattening pressure caused by the tapering space formed by the meeting faces of said dies. After leaving this first set of shaping-dies the corners and edges of the axle-blank 6^x or half-axle, as illustrated in the drawings, are somewhat rounded and irregular on account of the flattening pressure received in the first set of rolls. To correct this and square the edges of the axle, the same is subjected to the pressure of the squaring-dies 7 7, mounted also upon the carrying-rolls 1 1 and alongside of the shaping-dies just referred to. These dies are also segmental in shape, but are provided upon their faces with the angular grooves 8, which, when the faces of the dies are together, form an oblong, but diagonally-arranged, groove 9, which necessarily tapers in the reverse direction to the tapering space between the dies 5 5. The axle, after leaving the shaping-dies, is inserted up to the same point as it was inserted between the first dies and at the same point of revolution of the rolls and dies, the dies taking hold of the fan-tail bar or stock at the point from which the spindle is to be formed and carries the same directly back to the operator, as did the first dies. The direct pressure exerted by these squaring-dies comes upon two edges of the stock and evenly squares and finishes the same, while the two opposite edges remain unevenly finished and rough. To obtain all four edges evenly squared and finished, the stock is next inserted between the second set of squaring-dies 10 10, which are similar in construction to the rolls 7 7 and are mounted upon the main rolls 1 1 along the side of said dies. The grooves 11 are oppositely arranged with those of the first set of shaping-dies, and form an oblong and diagonally-arranged space 12 between the meeting faces of the dies 10, that is set at the opposite angle to that between the dies referred to, the space or groove tapering in the same direction as that between the first set of shaping-dies. When the axle-blank 11^x has left the second set of tapering rolls or dies, all four edges are evenly squared and finished by the reverse pressure exerted upon the same between the two sets of squaring-dies. It is now in condition for the spindle to be formed on the end which has not been affected by the forging which the bed of the axle has undergone; but in case a heavier bed is wanted to the axle, with a correspondingly lighter spindle or arm, the same is now subjected to the pressure of the dies 13, mounted upon the main rolls and next to the last set of squaring-dies. These dies are provided with an-

gular recesses or grooves 14, which, when the meeting faces of the dies abut, form a space or groove 15 of the taper and size to conform to the configuration and thickness of the bed and spindle desired. The axle-spindle is inserted in its full length in these dies, which returns the same to the operator, as before described. Having reduced the diameter of the axle-spindle as desired, the spindle must now be shaped to the required form, and in case the length of stock has been increased more than is necessary the old process and objectionable features thereof of cutting the extra length off is avoided by the use of my improved collar and spindle forming apparatus, which leaves the stock or axle the exact length desired. The stock 11^x is now in its completed fan-tail shape and in condition for the spindle to be formed on the end which has been unaffected by the preceding dies. These spindle-forming dies have been patented by me under No. 444,253, dated January 6, 1891. Upon the main rolls and next to the reducing-dies 13 are the spindle-shaping dies 16, which are provided with the semi-elliptical grooves 17, which are tapering to correspond to the taper of the ordinary axle or spindle, and when the faces of the dies are together form an elliptical groove or space 18. The axle 11^x, upon which the spindle is to be formed, is inserted between these dies up to the point from which the spindle tapers in the manner before described, and the same taking hold of the stock presses the same out into an elliptical shape, conforming to the elliptical groove 18 between the dies, and throws the same back to the operator, as before described. The blank bar is then reversed to the extent of one-quarter revolution and again fed between the same dies. The effect of this second manipulation will be that the spindle is upset and its elliptical shape changed to one which more nearly approximates the circular. Having undergone reverse pressures between the shaping-dies, the spindle end of the stock or blank is passed between the finishing-dies 19, which are provided with a semicircular groove or recess 20, which form, when the meeting faces of the dies are together, a cylindrical groove or space 21, tapering in accordance with the taper of the spindle to be formed, and from which the spindle end of the stock or blank receives the correct taper and true circular cross-section. The blank 22 has now the completed fan-tail shape with the spindle end subsequently formed thereon, and is now ready for the ordinary collar to be formed on the same. At this stage the axle-blank, after leaving the finishing-spindle dies, which are the last of the series of roller-dies that are arranged side by side and upon the same rolls, is placed between the collar-forming dies 23 of the collar-forming apparatus 24, for which I obtained Letters Patent, bearing No 430,541. Leaving the collar-forming apparatus, the stock or blank 25 is completed, with the ex-

ception of the removal of the flash upon the forged collar, which remains upon the same after leaving the collar-forming dies. To complete the axle the blank or stock 25 is next placed within the dies 26 of the flash-trimming apparatus 27, for which I obtained Letters Patent bearing No. 434,068.

Although I preferably form my fan-tail axle by submitting half-axles to the pressure of the shaping and finishing dies and subsequently welding the same together by electric welding, nevertheless the axles may be formed out of a single blank of metal, and in either event after leaving the flash-trimming apparatus presents the appearance as shown by 28 in the last figure of the drawings.

The operation of forming my improved fan-tail axle is now thought to be apparent without further description. The rectangularly-shaped stock or blank of metal is first forged into a fan-tail shape, and is subsequently squared and finished in this condition. If desired, the same may be reduced to the requisite weight or thickness by subjecting the same to the action of reducing rolls or dies. At this point or stage of the process the spindle is formed on the end of the blank bar or stock and subsequently the collar as previously described, while the process is completed by removing the fins or flash from the axle-collar.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described process for manufacturing fan-tail axles, which consists in subjecting the axle-blank while heated to a forging heat to pressure between dies that flatten the same out into a fan-tail shape, squaring the edges of the same, and finally forming the spindle and collar thereon, substantially as set forth.

2. The herein-described process for manufacturing fan-tail axles, consisting in subjecting the axle-blank while heated to a forging heat to pressure between dies that flatten the same out into a fan-tail shape, squaring the edges of the blank in opposite diagonally-arranged squaring-dies, then subjecting one end of the blank to pressure between spindle-forming rolls, and finally forming a collar thereon, substantially as set forth.

3. The herein-described process for manufacturing fan-tail axles, consisting in subjecting the axle-blank while heated to a forging heat to pressure between dies that flatten the same out into a fan-tail shape, then squaring the edges of the blank in opposite diagonally-arranged squaring-dies, subjecting the same to pressure between the spindle shaping and finishing dies, forming a collar thereon with an intermediate flash, and finally trimming the flash from the collar, substantially as set forth.

4. The herein-described process for manufacturing fan-tail axles, consisting in subjecting the axle-blank while heated to a forging

heat to pressure between dies that flatten the same out in a fan-tail shape, then squaring the edges in opposite diagonally-arranged squaring-dies, subjecting the spindle end of the blank to the action of the reducing-dies, subjecting the spindle of the blank or stock to pressure between the spindle shaping and finishing dies, forming a collar thereon and intermediate flash, and finally trimming said flash from the collar, substantially as set forth.

5. The herein-described process for manufacturing fan-tail axles, consisting in subjecting the axle-blank while heated to a forging heat inward from the point where the spindle is to be formed to pressure between dies that flatten the same out in a fan-tail shape, then squaring the edges from the same point in opposite and diagonally-arranged squaring-dies, then subjecting the untouched ends of the fan-tail stock to reverse pressure within an elliptical spindle-die, finishing the spindle by pressure within a circular spindle-die, forming a collar thereon with an intermediate flash, and finally removing said flash from the collar, substantially as set forth.

6. In an apparatus for the manufacture of fan-tail axles, the combination, with the rolls, of the fan-tail-shaping dies detachably mounted thereon and provided with a tapering space between the same, and squaring-dies and spindle-forming dies mounted upon the same rolls, substantially as set forth.

7. In an apparatus for the manufacture of fan-tail axles, the fan-tail-shaping dies provided with a tapering space between them and the squaring-dies provided with the diagonal and oppositely-arranged squaring grooves or recesses, substantially as set forth.

8. In an apparatus for the manufacture of fan-tail axles, the fan-tail-shaping dies provided with a tapering space between the same, squaring-dies provided with the diagonal and oppositely-arranged and rectangular and tapered grooves or recesses, and reducing-dies provided with a shaping-groove conforming to the configuration of the squared fan-tail blank, substantially as set forth.

9. In an apparatus for the manufacture of fan-tail axles, the fan-tail-shaping dies provided with receding faces forming a tapering space between the same, squaring-dies provided with angular recesses forming diagonal rectangular grooves or spaces between the die-rolls, the said grooves in each set of squaring-dies being arranged diagonally opposite to each other, and reducing-dies provided with a shaping-groove conforming to the configuration of the squared fan-tail blank, substantially as set forth.

10. The fan-tail-shaping dies provided with receding faces forming a tapering space between the same, substantially as set forth.

11. The fan-tail-blank-squaring dies provided with angular recesses forming rectangular and tapering grooves or spaces diagonally arranged across the same, the grooves in each set of squaring-dies being arranged diago-

nally opposite to each other, substantially as set forth.

12. In an apparatus for the manufacture of fan-tail axles, the fan-tail-shaping dies provided with receding faces forming a tapering space between the same, squaring-dies provided with angular recesses forming diagonal rectangular grooves or spaces between the die-rolls, the said grooves in each set of squar-

ing-dies being arranged diagonally opposite to each other, substantially as set forth.

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

WOLCOTT J. PARMELEE.

Witnesses:

E. G. SIGGERS,

J. H. SIGGERS.