

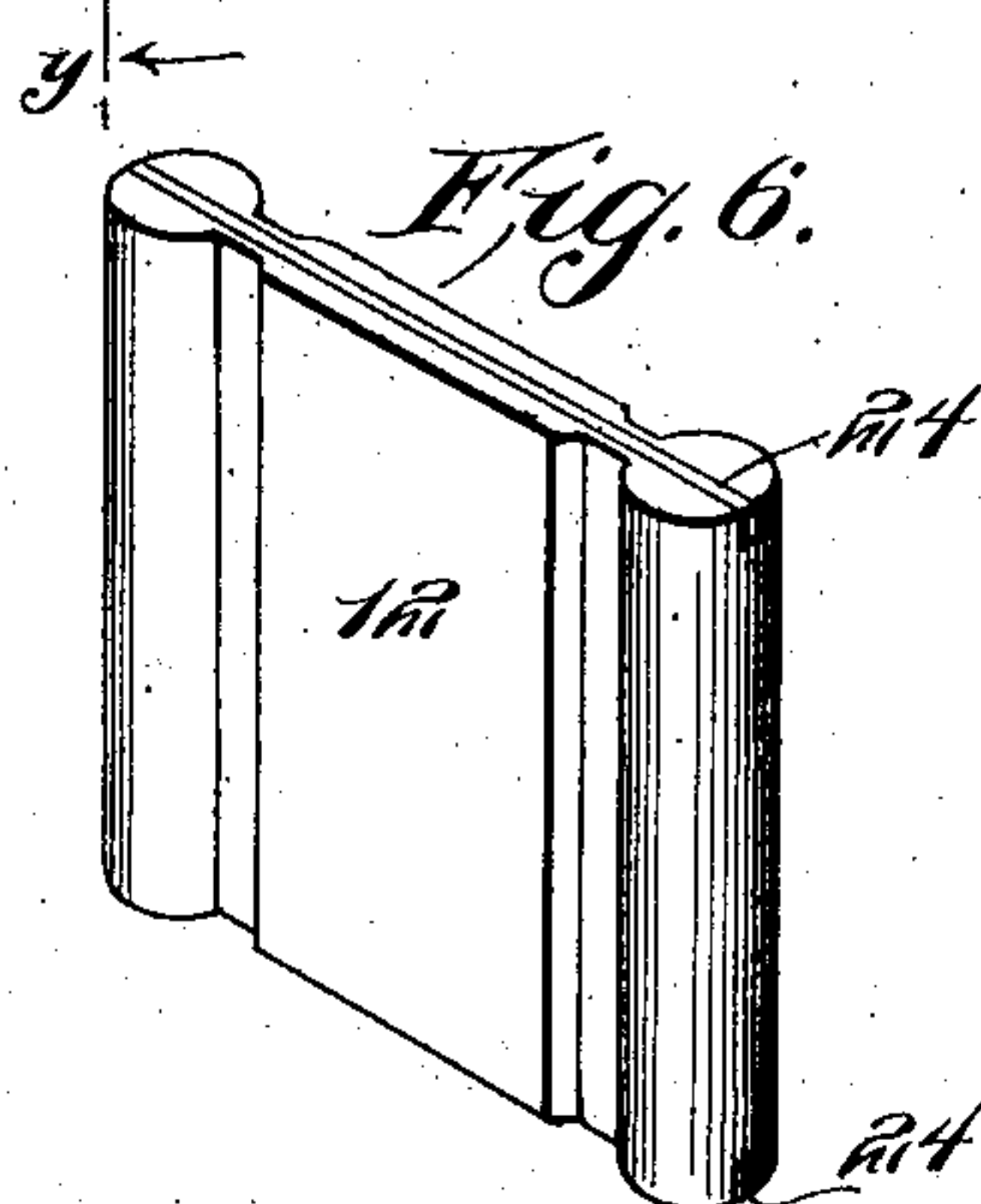
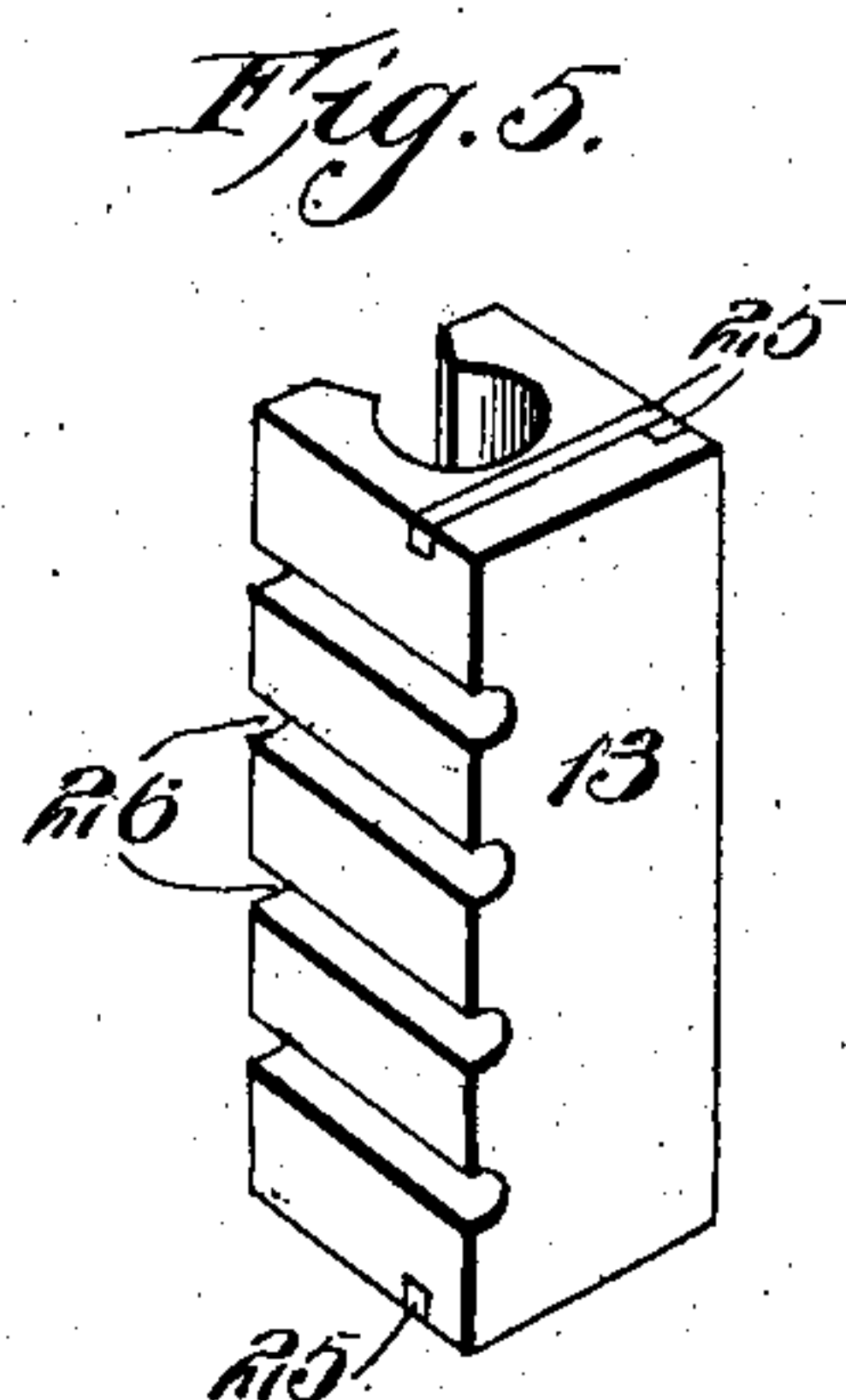
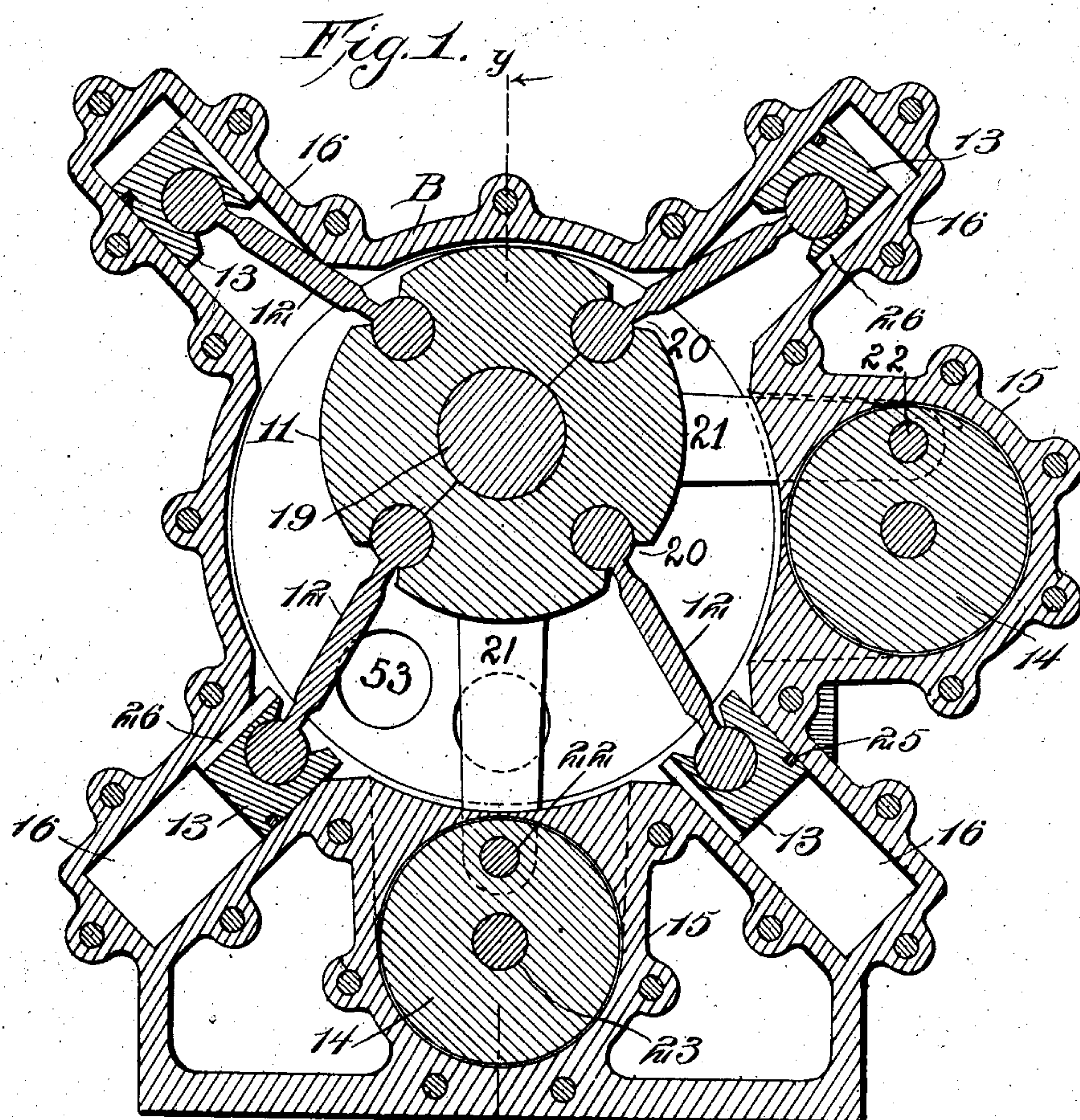
No. 834,033.

PATENTED OCT. 23, 1906.

H. TUTTLE.  
ROTARY ENGINE.

APPLICATION FILED APR. 3, 1905.

5 SHEETS—SHEET 1.



Witnesses  
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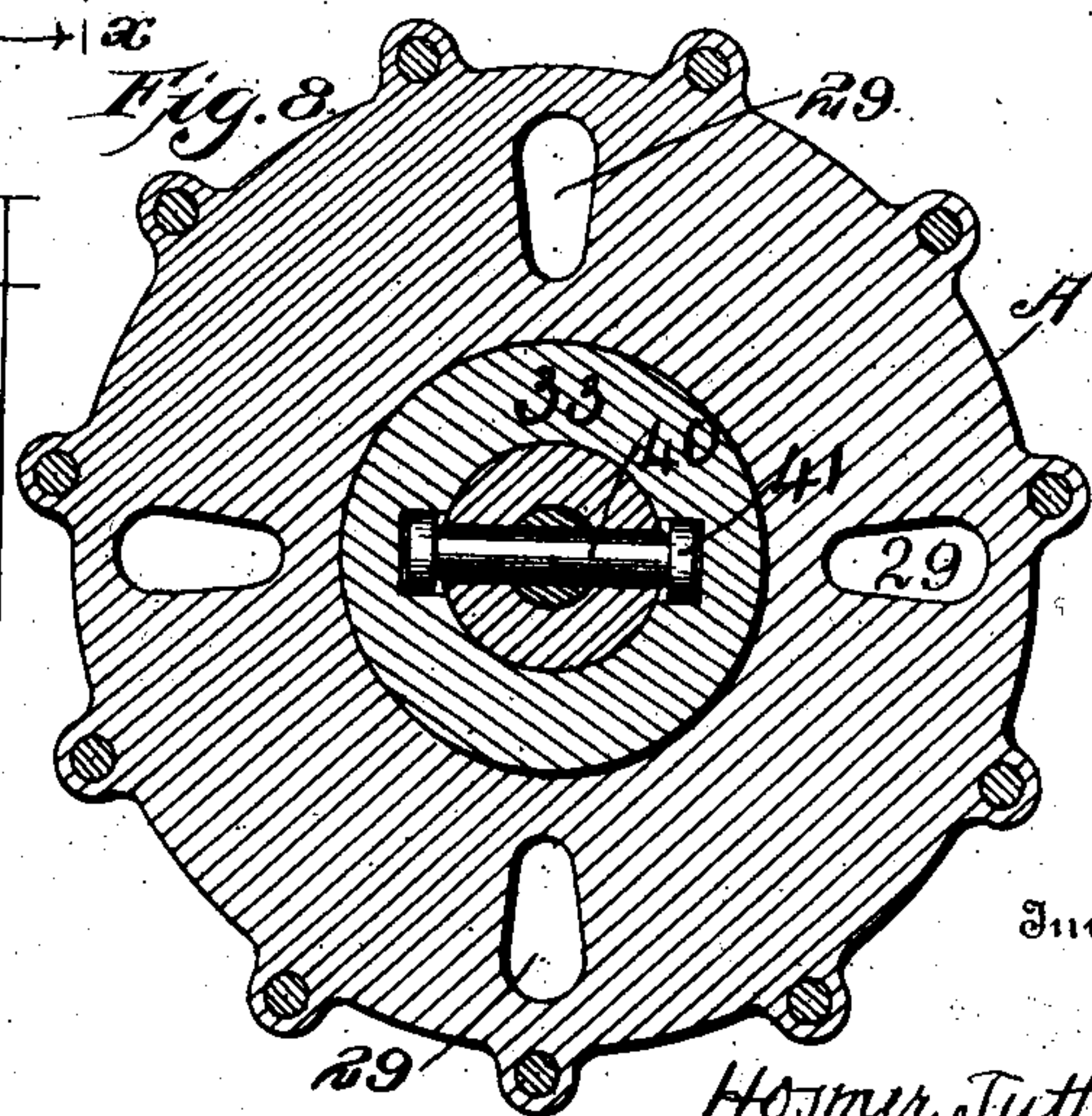
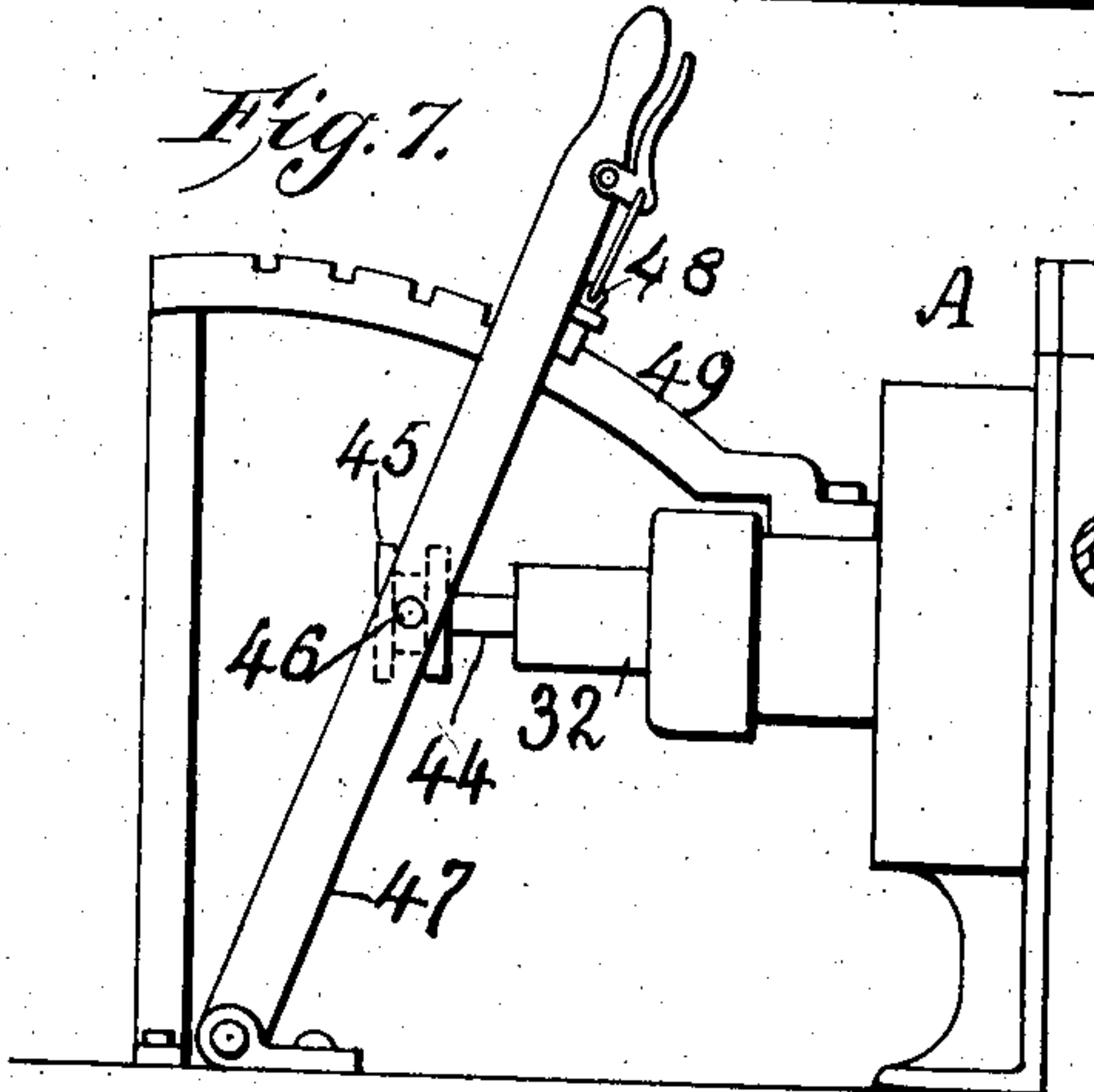
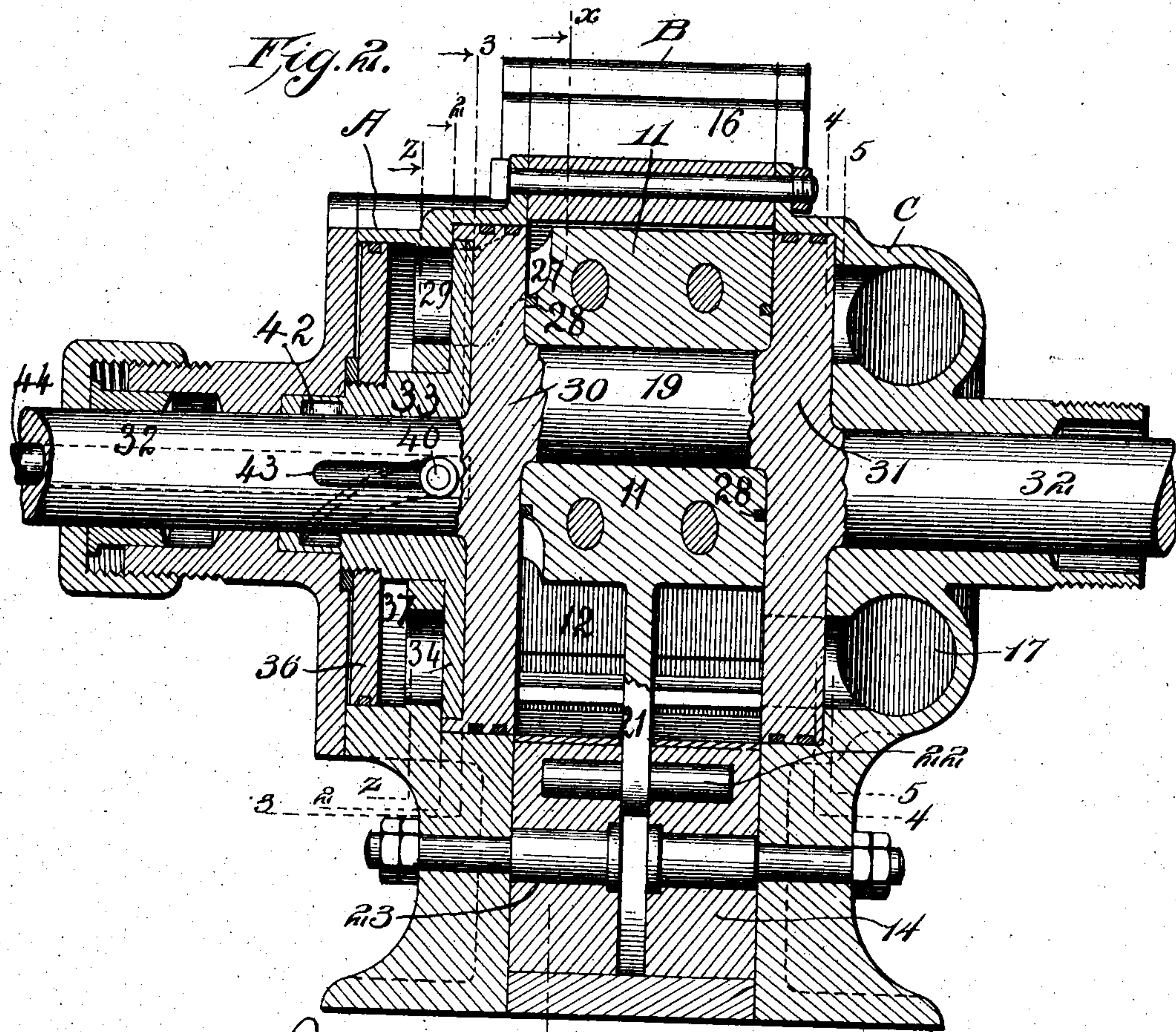


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5 SHEETS—SHEET 2.



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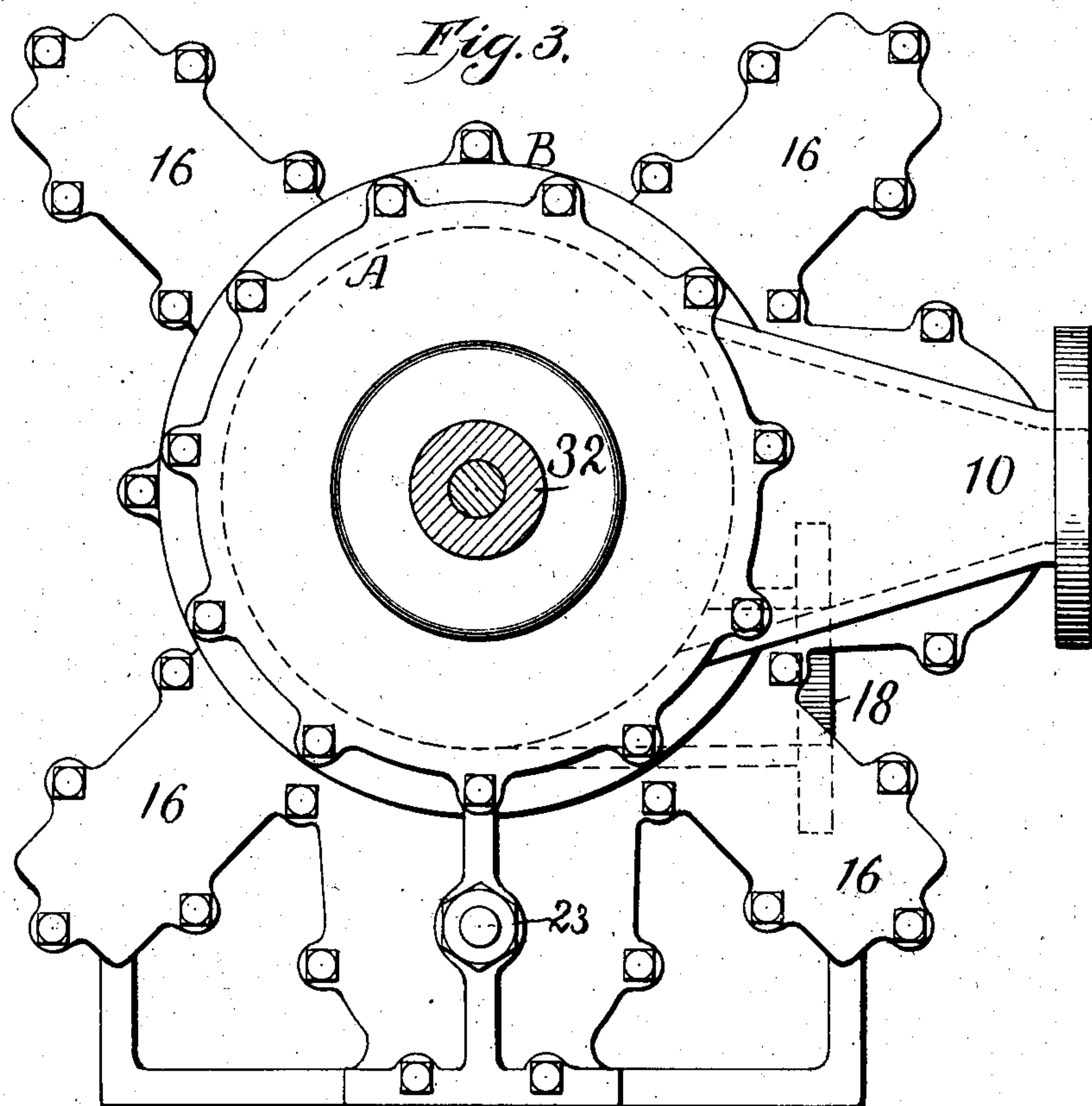


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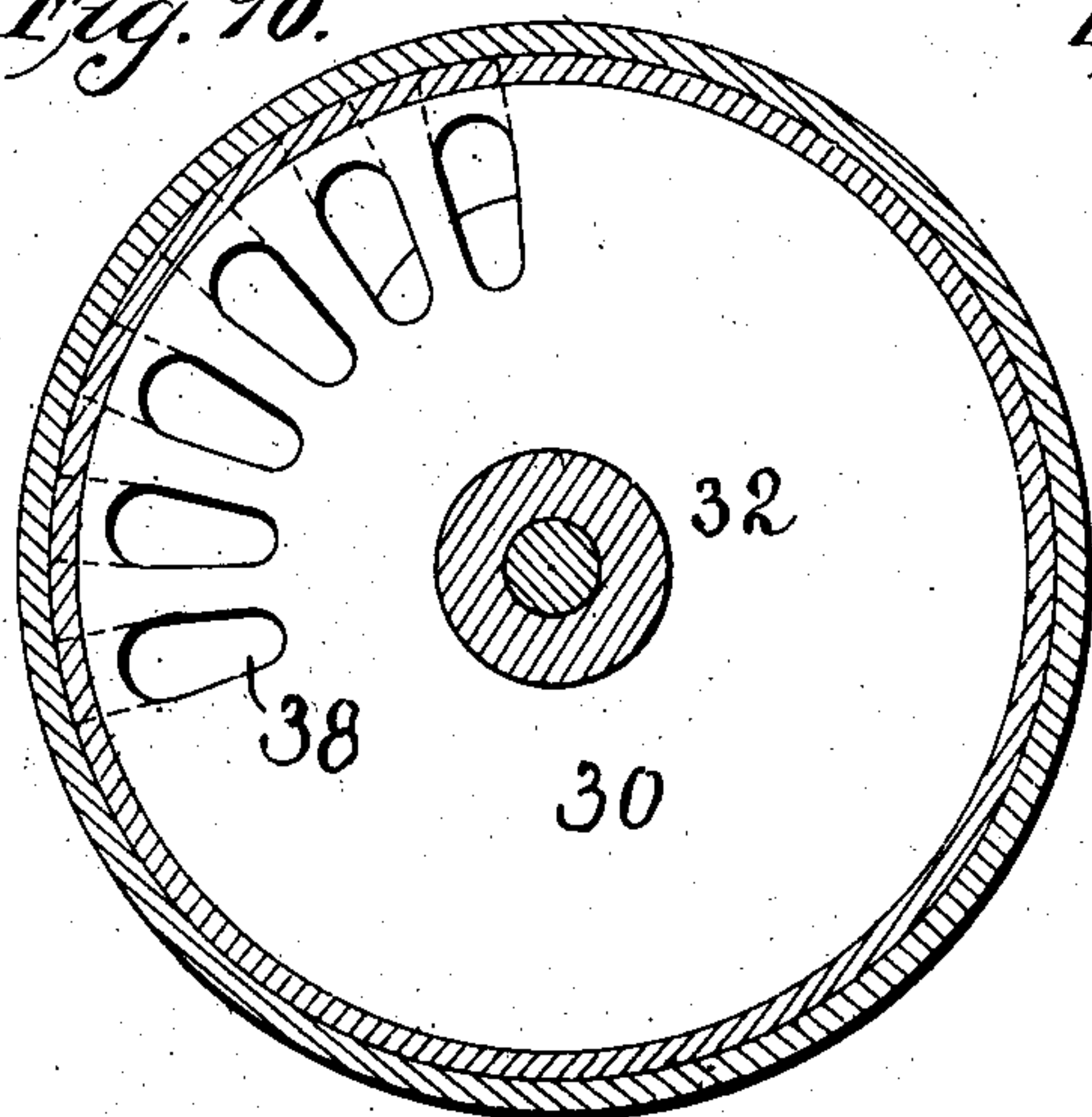
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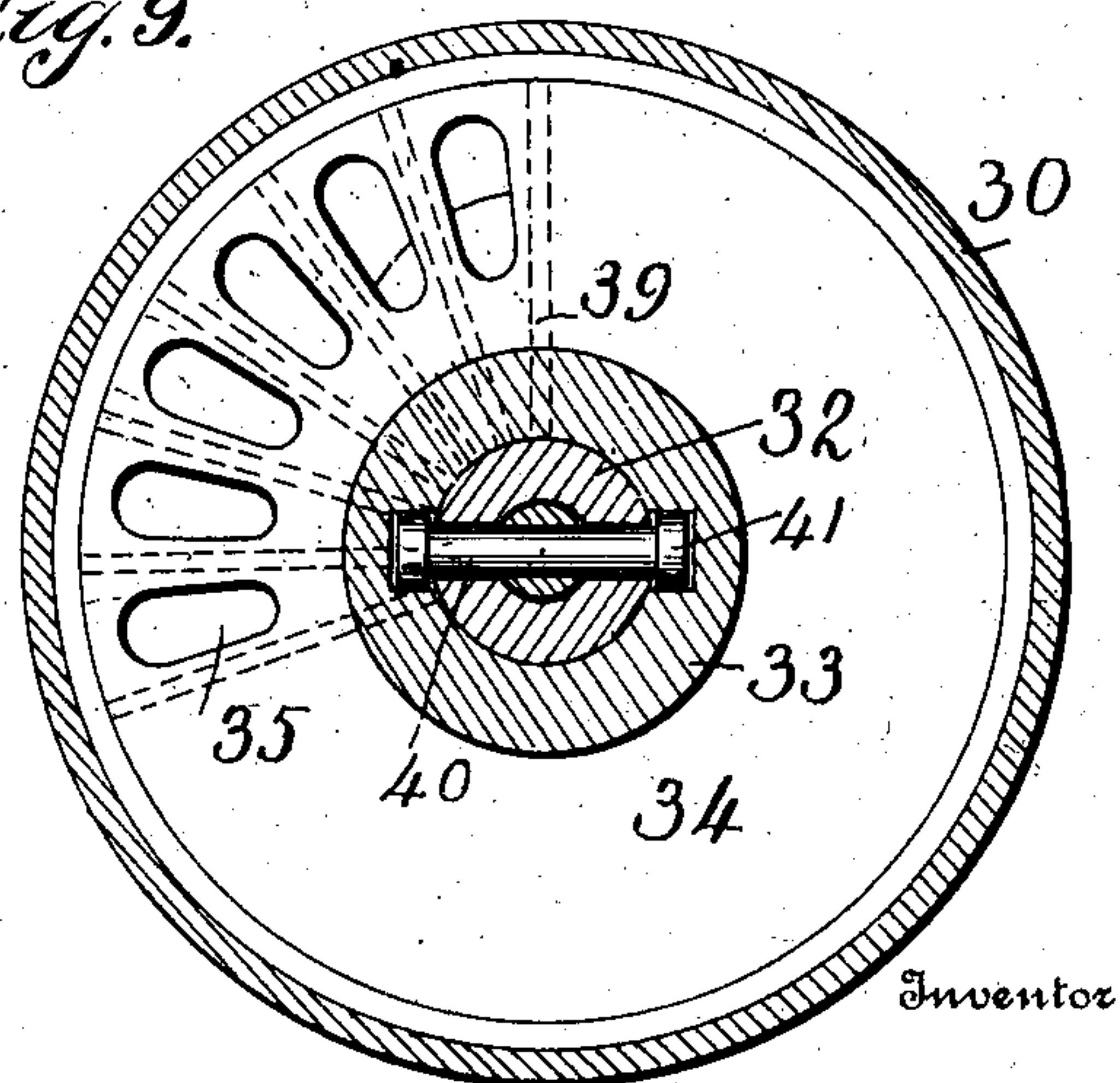
6 SHEETS—SHEET 3.



*Fig. 10.*



*Fig. 9.*



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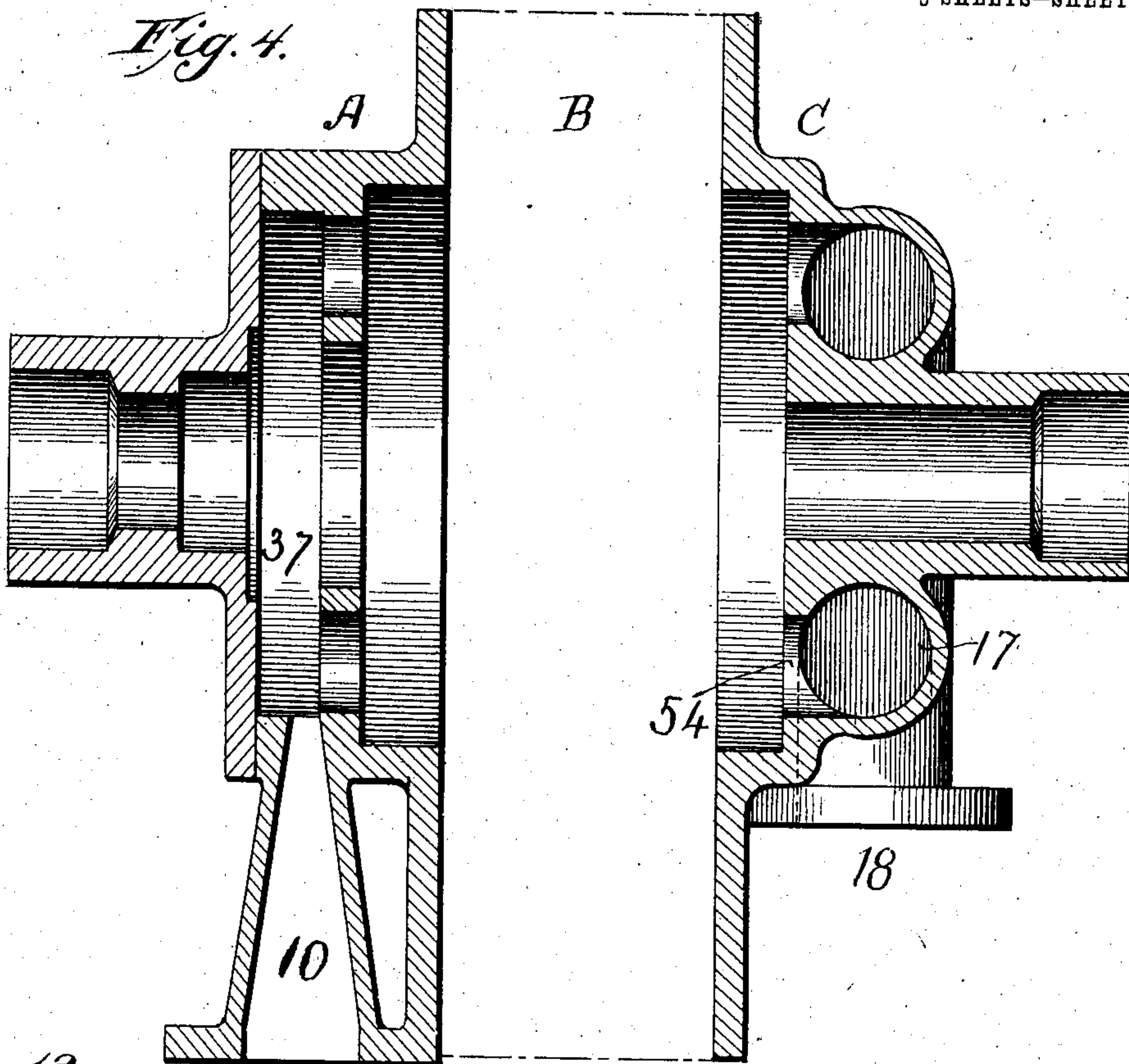
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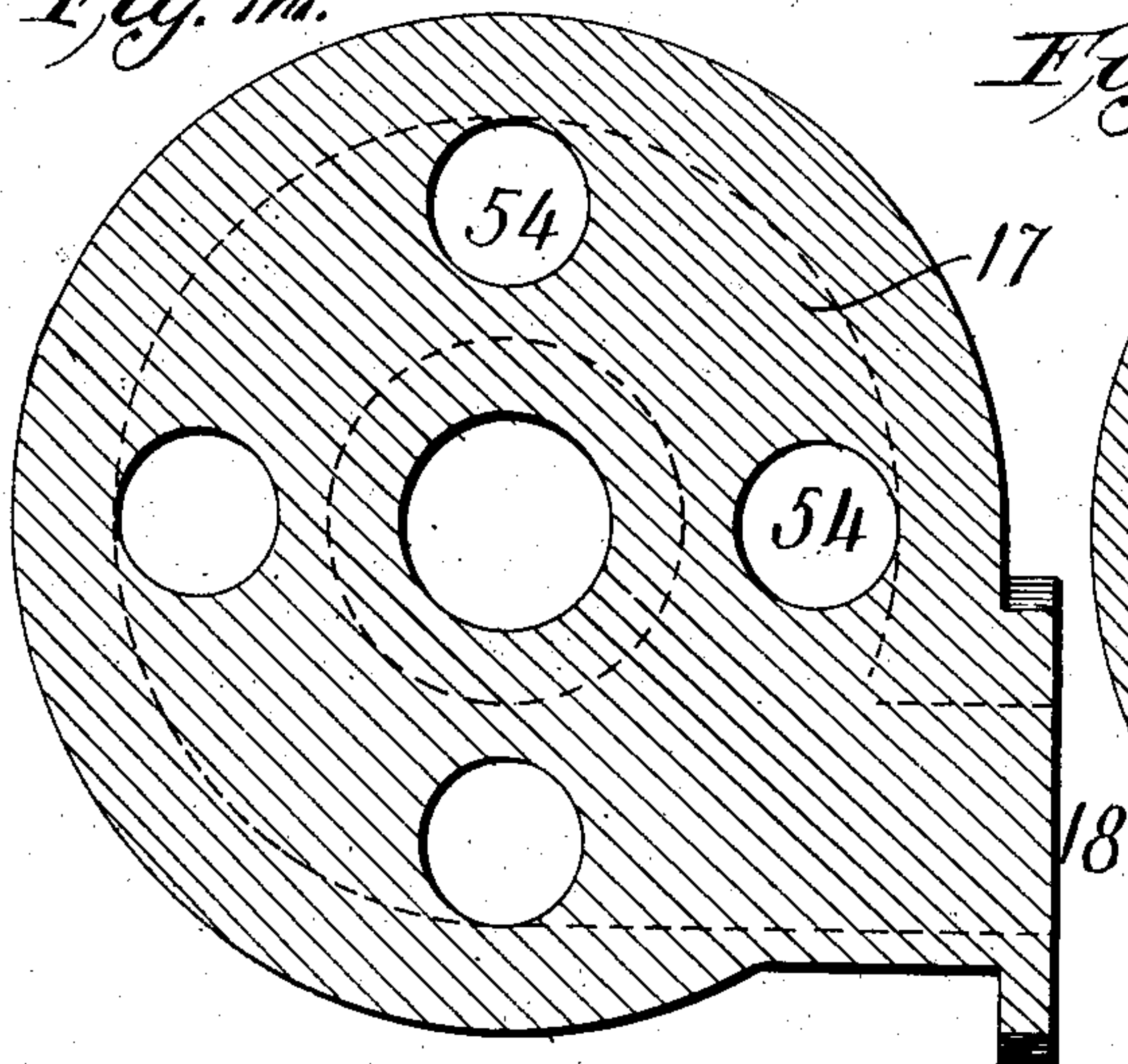
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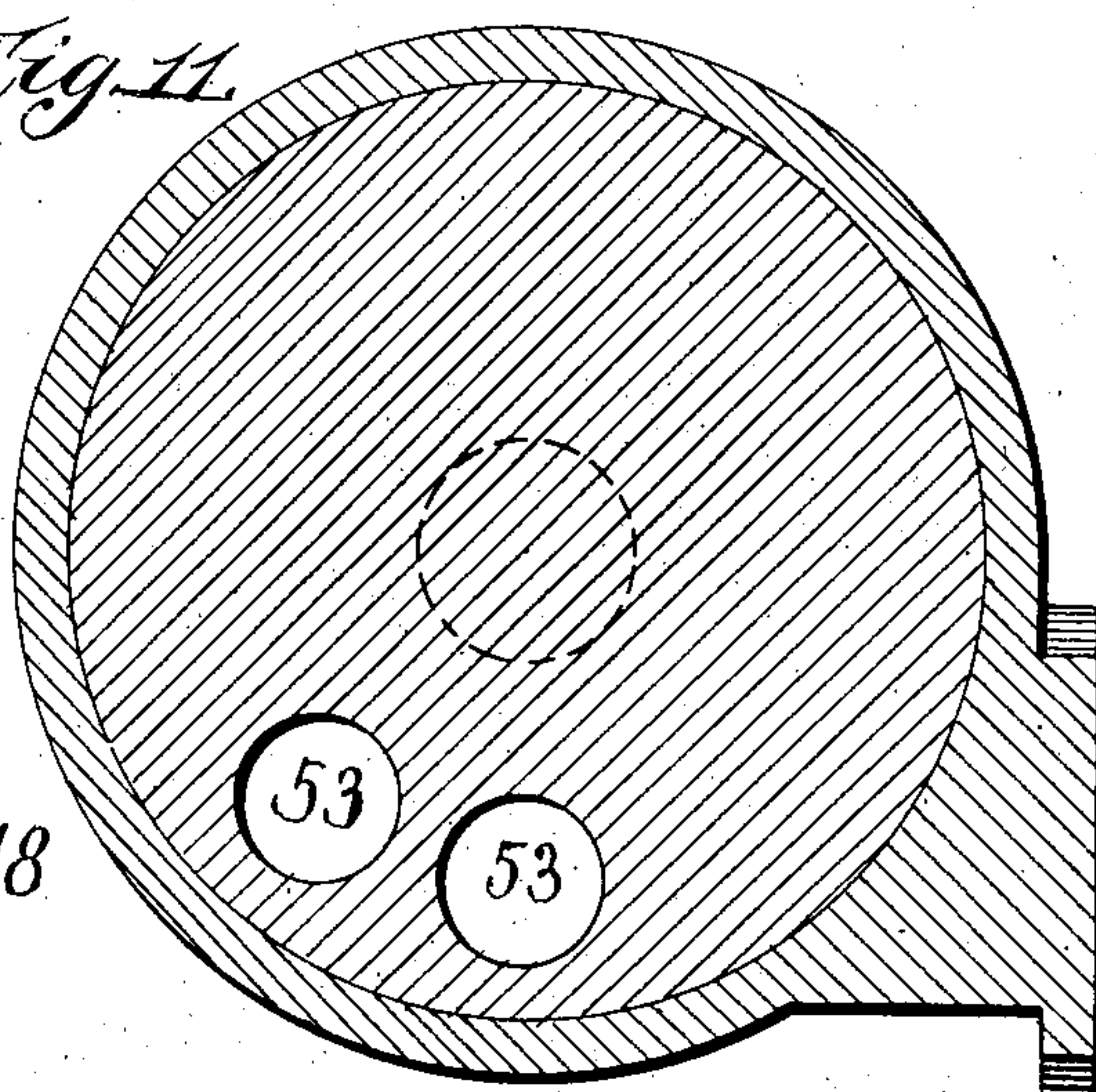
*Fig. 4.*



*Fig. 10.*



*Fig. 11.*



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6 SHEETS—SHEET 5.

Fig. 13.

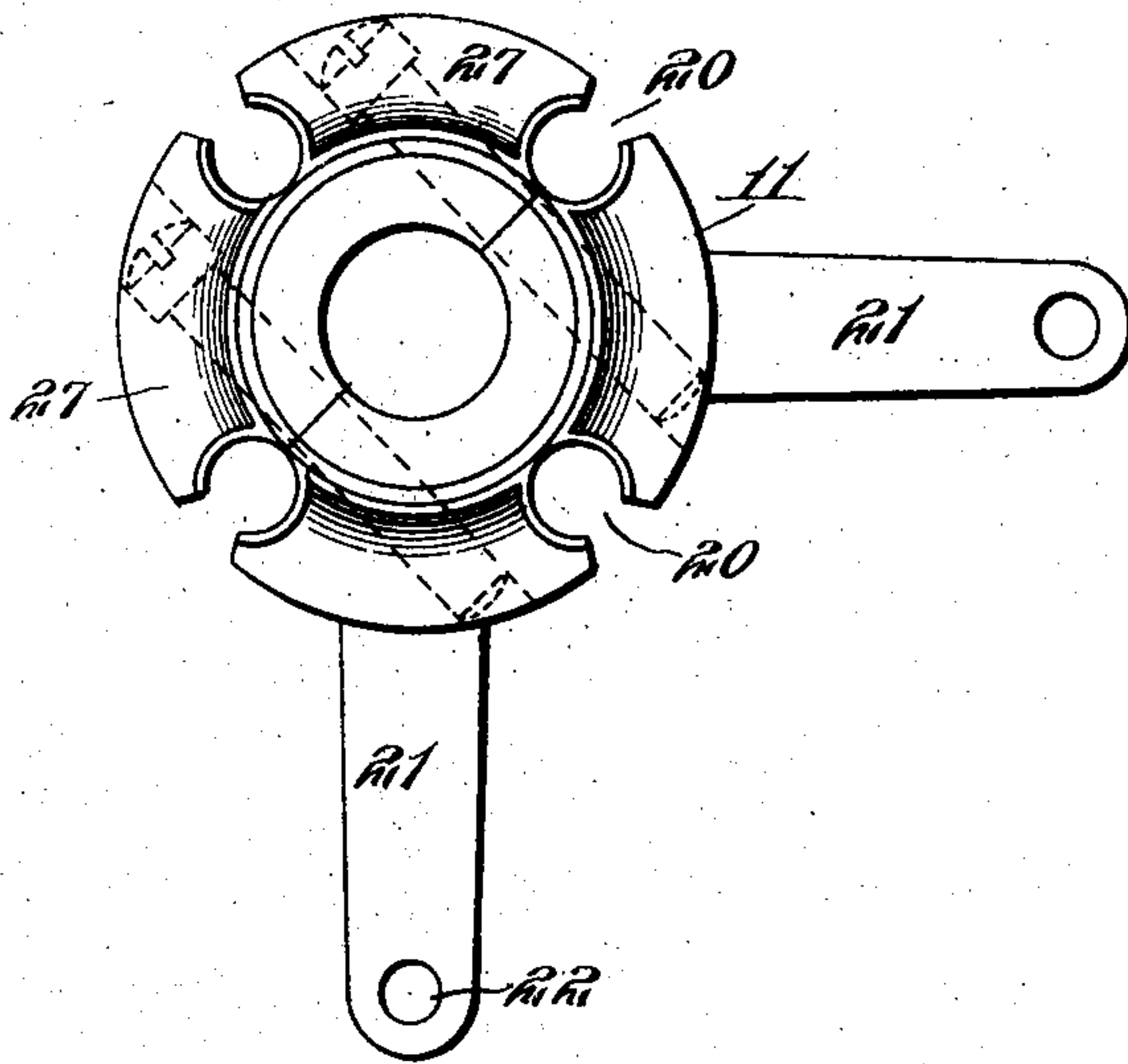


Fig. 14.

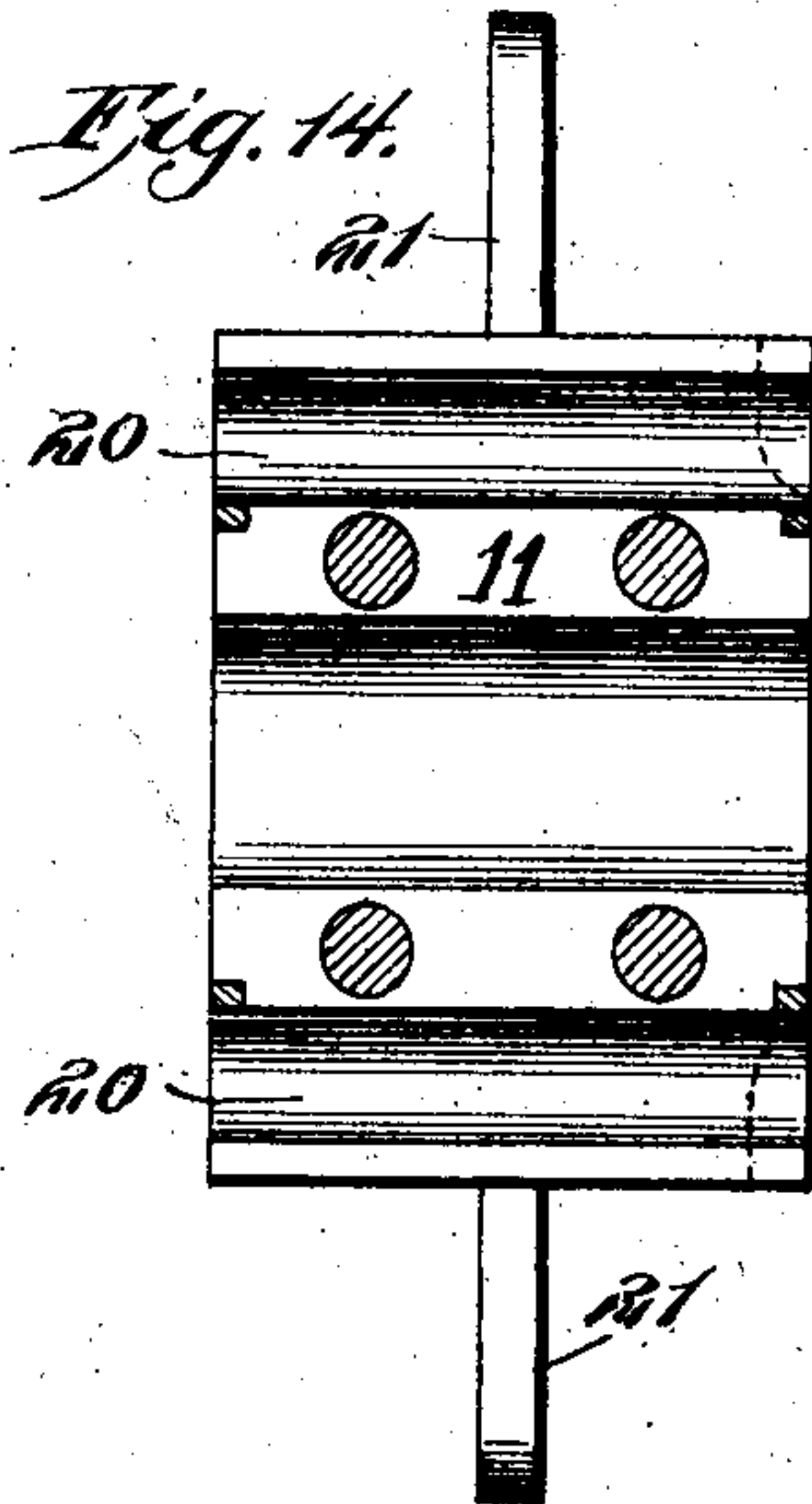


Fig. 15.

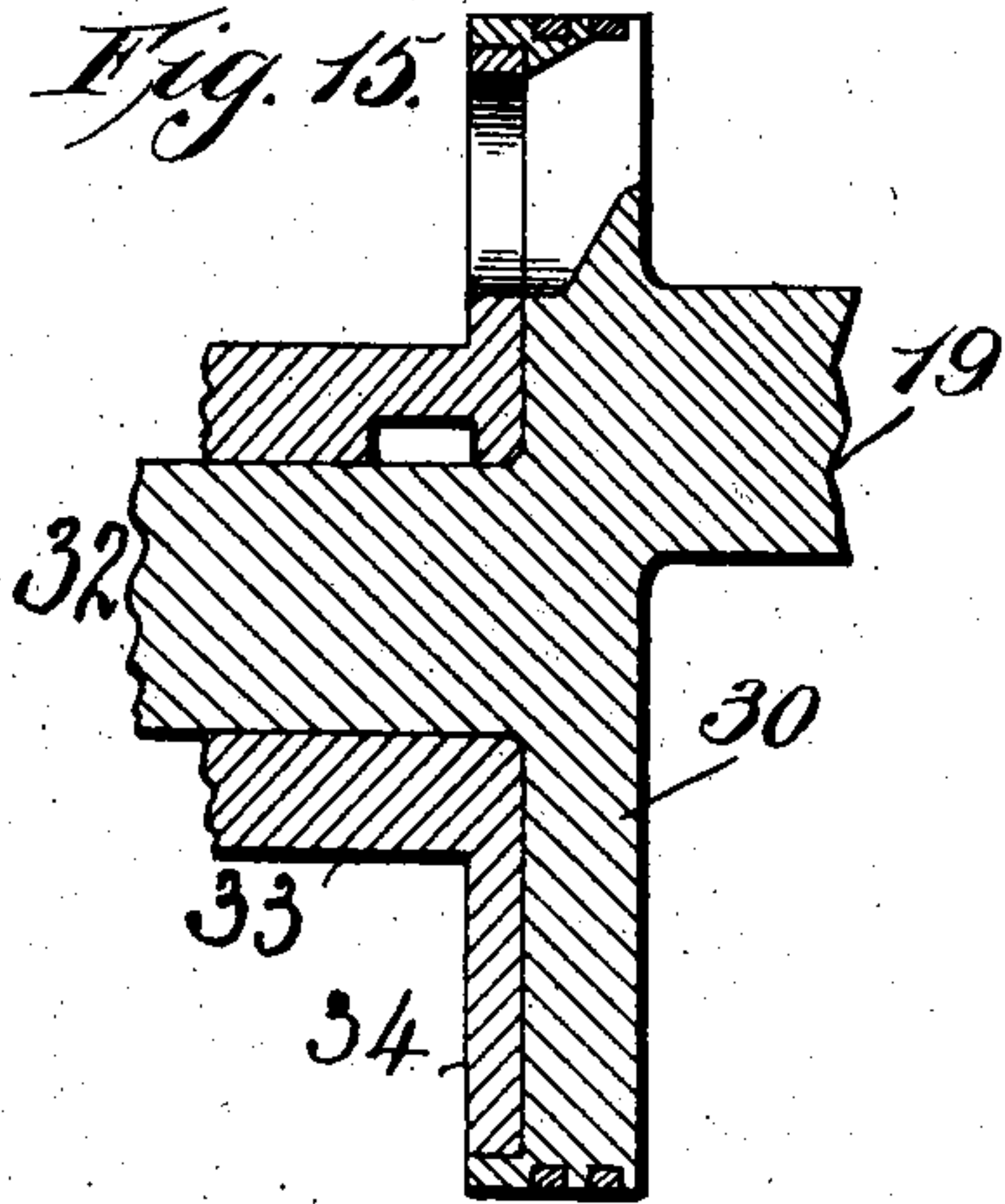


Fig. 16.

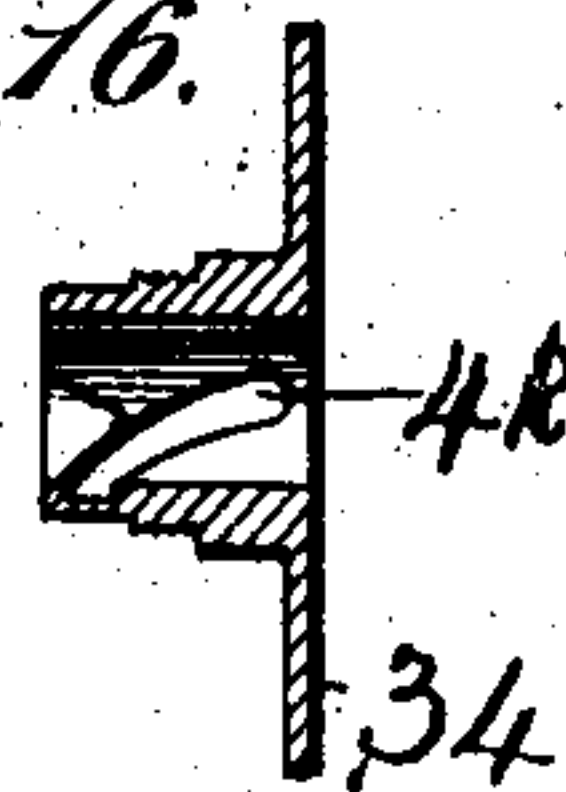
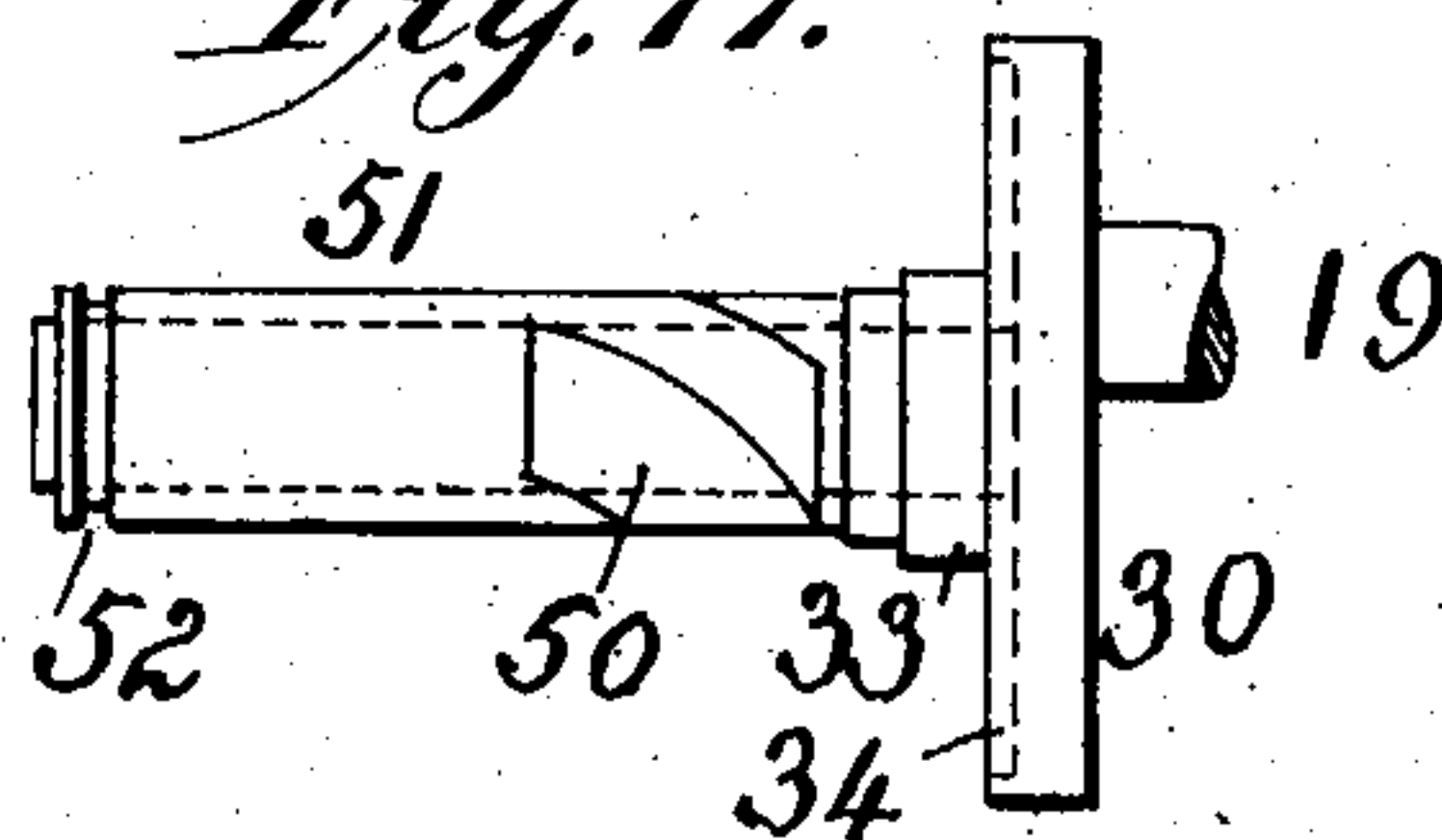


Fig. 17.



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# UNITED STATES PATENT OFFICE.

HOSMER TUTTLE, OF CEDAR RAPIDS, IOWA, ASSIGNOR OF ONE-HALF TO  
JAMES DWIGHT LAMB, OF CLINTON, IOWA.

## ROTARY ENGINE.

No. 834,033.

Specification of Letters Patent.

Patented Oct. 23, 1908.

Application filed April 3, 1905. Serial No. 253,401.

*To all whom it may concern:*

Be it known that I, HOSMER TUTTLE, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines; and its objects are to provide a simple and durable construction whereby efficient results shall be obtained and in which the area of power is substantially permanent and constant from the beginning to the end of each rotation; also, to obtain an engine of compact form capable of giving more power relatively to its weight than heretofore obtained, delivering the steam at four points in the circular travel of the crank, using the steam expansively, and retaining it one-half of the revolution of the crank from each of the four points at which it has been admitted. I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a transverse vertical section of the engine and its shaft on line *xx* of Fig. 2 looking in the direction of the arrow thereon. Fig. 2 is a longitudinal vertical section of the same on line *yy* of Fig. 1 looking in the direction of the arrow thereon. Fig. 3 is an end view of the engine to show the steam-inlet and also the exhaust-passage on the right-hand side. Fig. 4 is a horizontal section of the engine-frame with the central portion omitted. Fig. 5 is a perspective view of one of the guides for each one of the oscillating pistons, said guide being constructed to act as a part of said piston. Fig. 6 is a perspective view of one of the oscillating pistons. Fig. 7 is a side view, on a smaller scale, of a portion of one end of the engine and its shaft with a hand-lever to control by hand the point of cut-off of steam to the engine. Fig. 8 is a vertical section on line 2 2 of Fig. 2 through the frame of the engine, showing four steam-passages therethrough. Fig. 9 is a transverse section of the main shaft and part of the engine-frame on line 2 2 of Fig. 2, showing an outer face view of the first or steam crank-disk and the steam-ports therein. Fig. 10 is a transverse section of the hub of the auxiliary disk, used for more or less closing the steam-ports of the steam crank-disk.

said section being on line 3 3 of Fig. 2, showing the steam-ports in said auxiliary disk. Fig. 11 is a transverse section of part of the engine-frame and the exhaust crank-disk on line 4 4 of Fig. 2, showing two exhaust-ports a short distance apart. Fig. 12 is a transverse section of the engine-frame on line 5 5 of Fig. 2, showing four exhaust-passages therein. Fig. 13 is an end view of the main piston and its controlling-arms. Fig. 14 is a side view of the inner side of one of the segments of the main piston carrying its controlling-arms. Fig. 15 is a section of a portion of the crank-shaft and its crank-disk having an opening therein to admit steam and also the disk provided with a succession of steam-ports. Fig. 16 is a section, on a smaller scale, of the disk having a succession of steam-ports and its hub having internal spiral grooves. Fig. 17 is a side view, on a smaller scale, of the crank-shaft and one of its disks with a spirally-slotted sleeve on the shaft, being a modification of the operating means to control the disk, having a succession of steam-ports.

The frame of the engine consists, mainly, of three parts A B C. The part A has the intake 10 to receive the steam. The part B contains the main piston 11, four auxiliary oscillating pistons 12 and guides 13 for the latter, and two rotary disk cranks or cylindrical idlers 14. Said part B is mainly cylindrical, but has two pockets 15 for the idlers 14 and four rectangular pockets 16 for reciprocating guides 13. The part C contains the exhaust-passage 17, which is in the form of a hollow ring, and the exhaust exit-opening and pipe 18 leading from the passage 17. By this construction the steam enters the part A, passes through the central part B, while the piston makes half a revolution and issues through the part C. The eccentrically-moving piston 11 is cylindrical, but made of two segments to permit it to be assembled and mounted upon the crank-pin 19; said segments being united together with four bolts, as shown in Figs. 2, 13, and 14. In the periphery of the piston are four chambered grooves 20 lengthwise thereof, each groove being to receive the inner head of one of the auxiliary pistons 12, the outer head of which is received in a similarly-chambered groove in the reciprocating guides 13. The



periphery of the piston 11 does not touch the inner surface of the casing; but there is only a very small steam-clearance between them. The piston 11 has two radial arms 21, located  
 5 at right angles to each other to prevent said piston from rotating on its axis. The outer end of each arm 21 is pivoted at 22 to one of the disk-cranks 14, the latter being pivoted upon headed pivot-bolts 23, secured to the  
 10 frame. The edges of the auxiliary pistons have packing-strips 24 therein. The ends and sides of the guides 13 for said auxiliary pistons have also packing-strips 25; but said guides have a series of grooves 26 transversely  
 15 thereof to permit steam to enter behind the guides 13 and help the auxiliary pistons to advance the main piston. The side face of the piston 11 is beveled off at 27 adjacent to its periphery to facilitate the entrance of  
 20 steam into the piston-chamber. Said piston is provided with a packing-ring 28 to keep the steam from passing alongside of the crank-pin to the exhaust side. Said crank-pin is shown at 19 and is a part of the crank-  
 25 disks 30 and 31, which carry the main shaft 32. The part A has formed on its interior a ring provided with four holes 29, as shown in Fig. 8, for the passage of steam in four successive admissions.

30 Upon the portion of the shaft 32 adjacent to the entrance of the steam is mounted with a turning fit the hub 33 of a disk 34, (shown in Fig. 9,) which is provided with a series of steam-ports 35. Upon the hub 33 toward its  
 35 outer end is also secured a disk 36, retained by a jam-nut. Said disk is to balance the pressure of steam on both sides of the steam-admission chamber 37. The crank-disk 30 (shown in Fig. 10) has a similar series of  
 40 steam-ports 38, two of which are beveled outwardly to clear the packing-ring 28 on the side of the piston. In the face of the disk 34 are placed radial packing-strips 39 (shown by dotted lines in Fig. 9) between each steam-  
 45 port 35.

Various means may be used for partially rotating and adjusting the cut-off disk 34 relatively to the crank-disk 30. The means shown in Figs. 7 and 8 consist of a pin 40,  
 50 having rollers 41 at each end, said rollers being adapted to travel in two grooves 42, formed in the hub 33 of the disk 34. Said grooves 42 are in the form of a spiral of short length, as the disk 34 is not to be shifted  
 55 more than a quarter-revolution. The pin 40 passes through a slot 43 in the main shaft 32 and through a rod 44 in the axis of said shaft. Said rod has on its end a grooved head 45 to control it by means of short studs 46, engag-  
 60 ing with said grooved head. The studs 46 project inwardly from the two branches of a forked lever 47, which is suitably pivoted at its lower end and has at its opposite end a latch 48 to engage with a segmental rack 49,  
 65 suitably secured in proper position.

In the modification shown in Fig. 17 the hub 33 of the disk 34 is provided with an additional sleeve 50, having two spiral branches extended outward but lengthwise  
 70 of the main shaft. Said branches are made to engage and interlock with corresponding branches extended inwardly from a controlling-sleeve 51, retained connected with a  
 75 feather to the shaft 32. The outer end of the sleeve 51 has a peripheral groove 52 to receive the studs 46 of the operating-lever 47.

The above-described parts relate to hand-operated devices for the adjustable cut-off; but when it is desired to employ an auto-  
 80 matic cut-off said parts can be connected with a wheel-governor or a ball-governor in any well-known manner.

If the engine is intended to be reversible, the disk 34 (shown in Fig. 9) should be provided with five additional ports on the right-  
 85 hand side of said figure or with an additional disk having said ports, said second disk being also provided with a sleeve and means to operate it.

At the exhaust end of the engine the crank-  
 90 disk 31 (shown in detail in Fig. 11) has two exhaust-ports 53 a short distance apart to prolong the flow of the exhaust. They are preferred to a single long hole, so as not to interfere with the packing-rings around the  
 95 four holes of the part C of the frame shown in Fig. 12. Said part C contains the annular passage 17, leading to the exit-pipe 18, and has four holes 54 to receive the four successive discharges of steam into the annular  
 100 passage 17.

Although the engine is mainly intended for use with steam, it can be used with gas or other fluid.

It will be obvious to those skilled in the art  
 105 to which the invention appertains that modifications may be made in details without departing from the spirit and scope of the same. Hence I do not limit myself to the precise arrangement and combination of parts herein-  
 110 above described; but,

Having described my invention fully, what I claim is—

1. In an engine the combination of a cylindrical casing having a series of radial pockets  
 115 reciprocating guides therein, a cylindrical main piston mounted eccentrically of said casing, and a series of auxiliary pistons having one end pivotally connected to the main piston and the other end received into said  
 120 pockets.

2. In an engine the combination of a casing having a series of pockets reciprocating guides therein a main piston mounted eccen-  
 125 trically of said casing, and a series of auxiliary pistons mounted on the main piston in operative relation to said pockets and guides, substantially as described.

3. In an engine the combination of a cylindrical casing having two radial pockets, a ro-  
 130



tary idler in each pocket, a cylindrical main piston mounted eccentrically in said casing, two arms projecting radially from the main piston and having their outer ends pivotally connected to the rotary idlers.

4. In an engine the combination of a cylindrical casing having a series of radial pockets, a cylindrical main piston having a series of chambered grooves in its periphery, chambered guides in the radial pockets, and a series of auxiliary pistons having one end pivotally received in the chambered grooves of the main piston and the other end pivotally received in the chambered grooves of the guides.

5. In an engine the combination of a cylindrical casing having a series of radial pockets, a cylindrical main piston having a series of chambered grooves in its periphery, chambered guides in the radial pockets, and a series of auxiliary pistons pivotally connected to the main piston and to the chambered guides, said guides having a series of grooves for the passage of steam through and behind the guides into the pockets.

6. In an engine the combination of its casing, its crank-shaft and crank-disk 30 having a series of steam-ports, the main shaft,

the disk 34, provided with steam-ports, and its hub slidingly mounted upon said shaft. 30

7. In an engine the combination of its casing, its crank-shaft and crank-disk 30, having a series of steam-ports, the main shaft, the disk 34 provided with steam-ports, and its hub slidingly mounted upon said shaft with means to partially rotate said disk and hub, substantially as described. 35

8. In an engine the combination of its casing, its crank shaft and disk 31, having exhaust-ports, an annular exhaust-chamber having four exhaust-passages leading therein and a pipe for the issue of steam therefrom. 40

9. In an engine, the combination of a cylindrical casing having a series of radial pockets, a cylindrical main piston mounted eccentrically of said casing, and a series of auxiliary pistons having one end pivotally connected to the main piston and the other end received into said pockets with means to guide said pistons. 45

In testimony whereof I affix my signature in presence of two witnesses. 50

HOSMER TUTTLE.

Witnesses:

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