

No. 777,035.

PATENTED DEC. 6, 1904.

F. M. LECHNER.  
ROTARY ENGINE.

APPLICATION FILED APR. 25, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

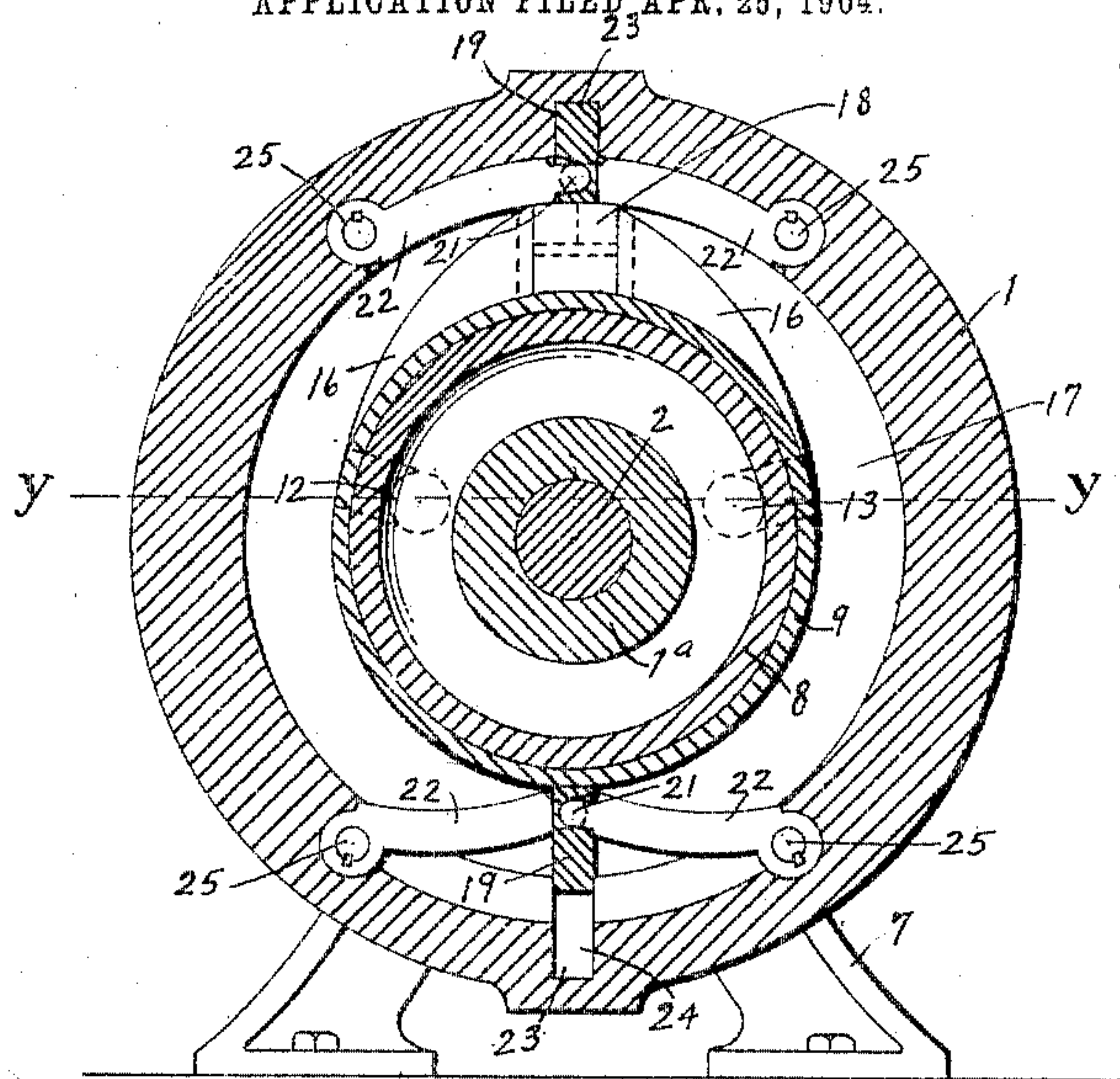


Fig. 1

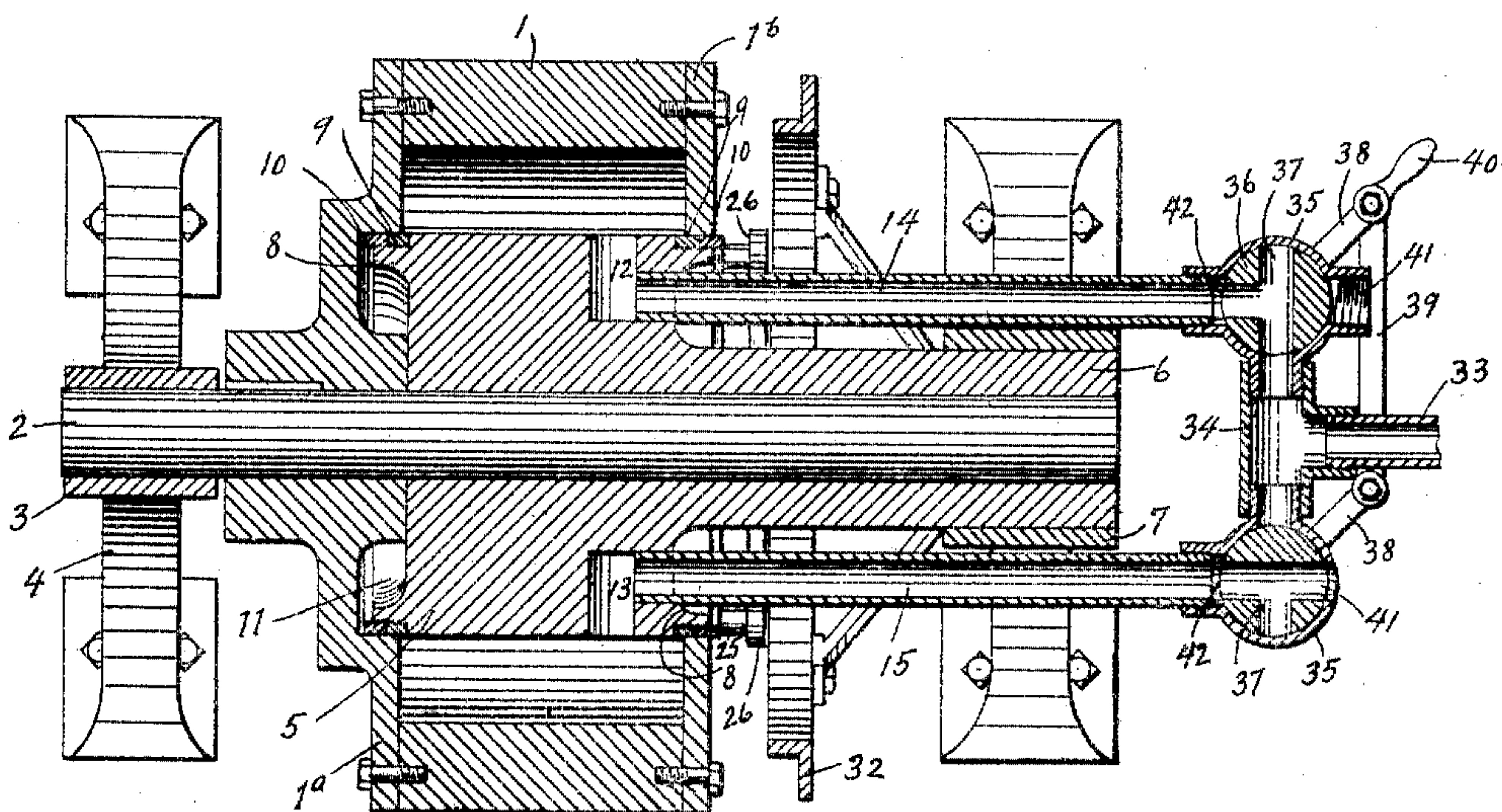


Fig. 2

WITNESSES:

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3 SHEETS—SHEET 2.

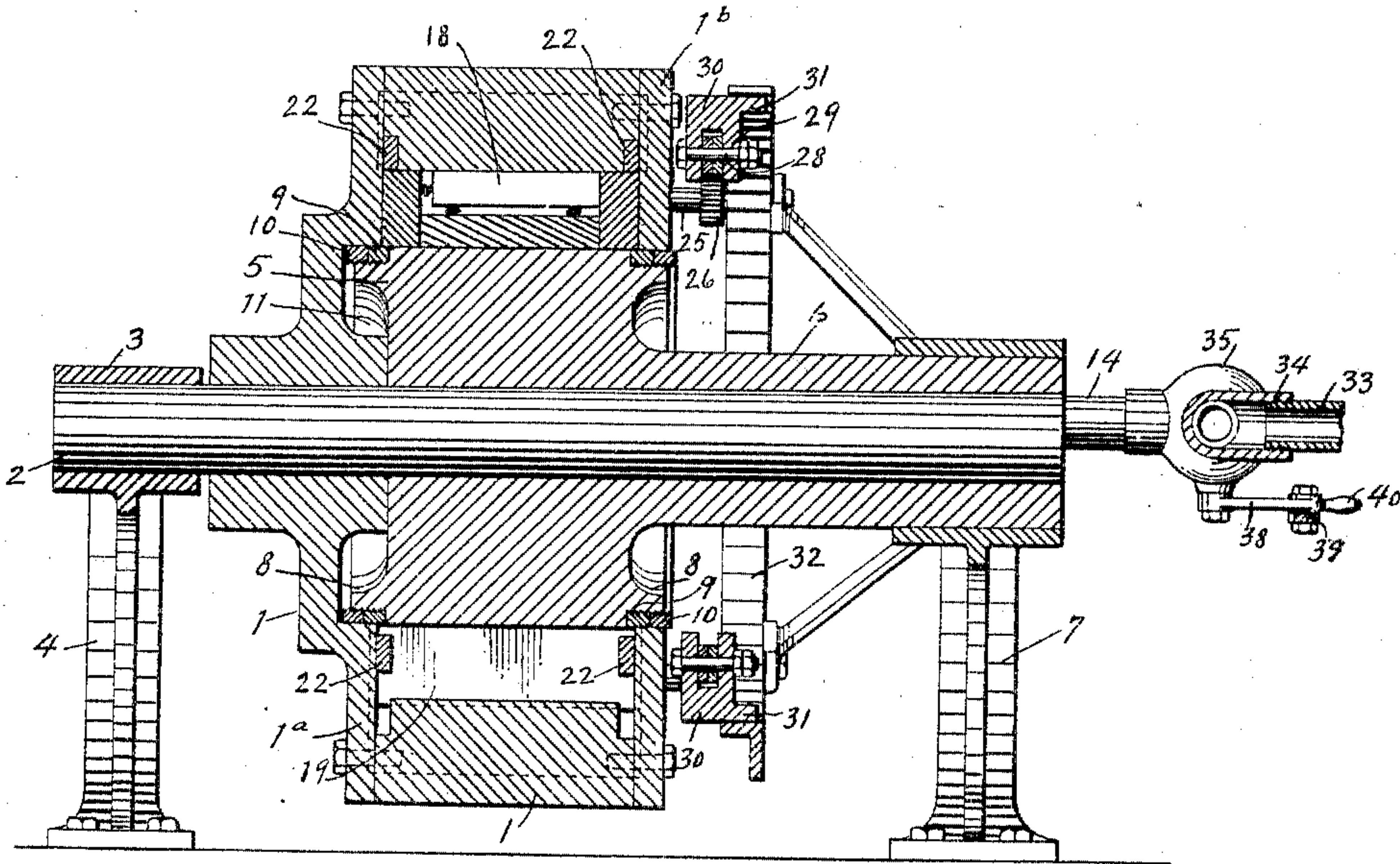


Fig. 3

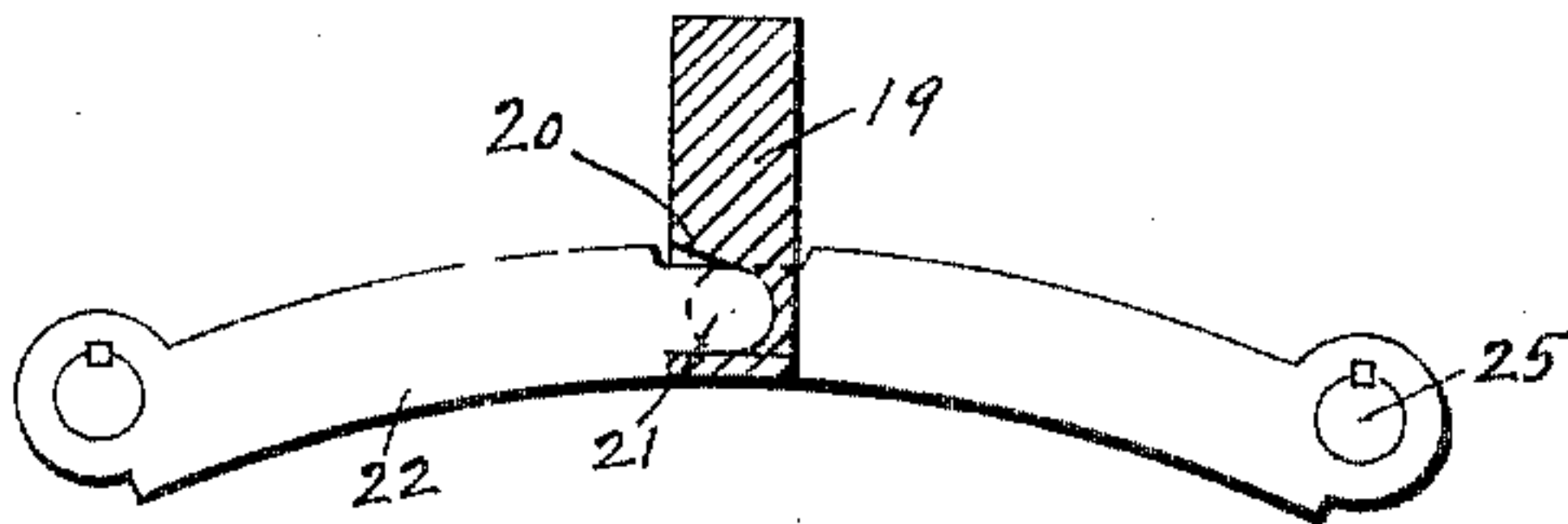


Fig. 4

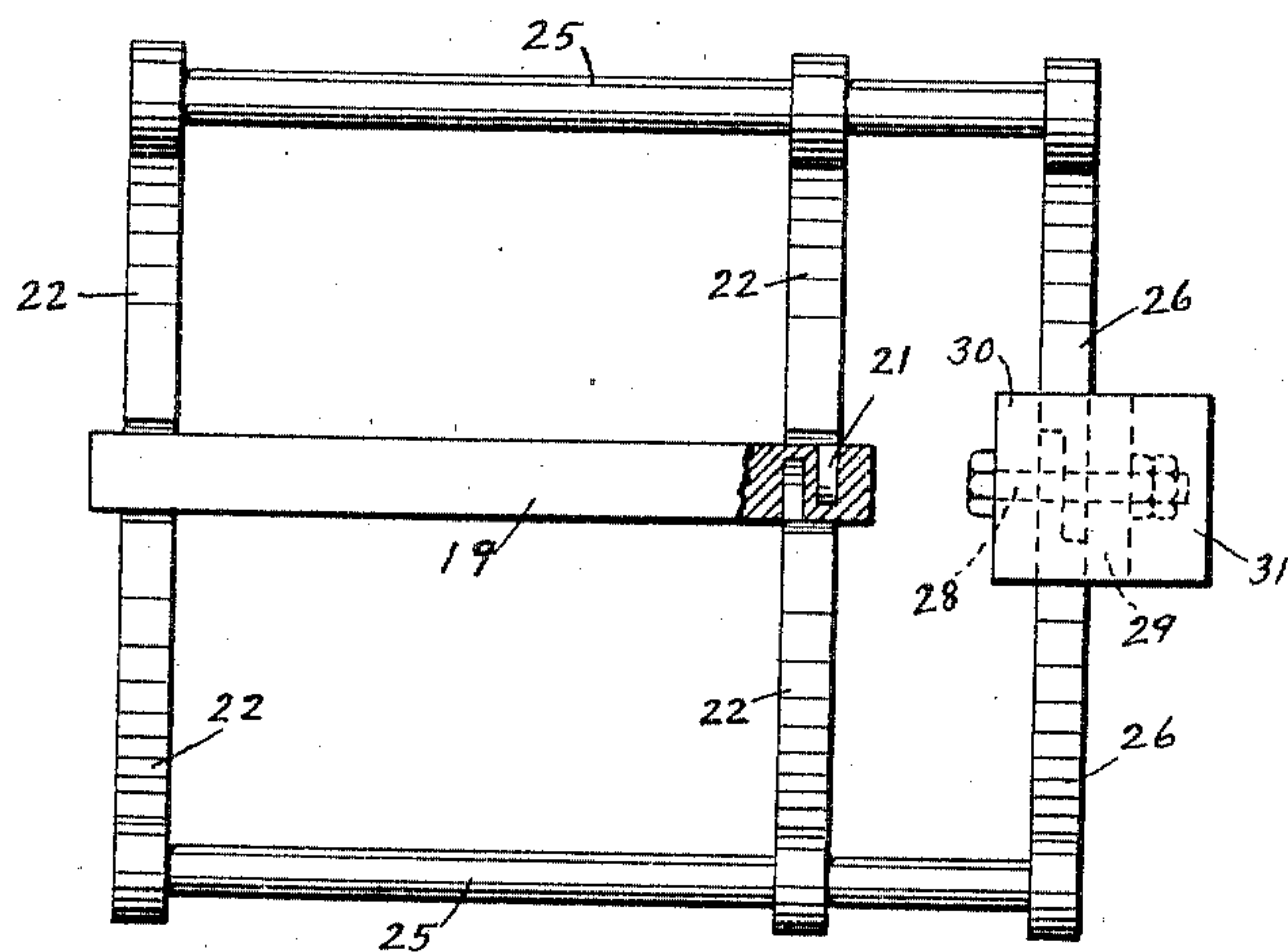


Fig. 5

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F. M. LECHNER.  
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NO MODEL.

3 SHEETS—SHEET 3.

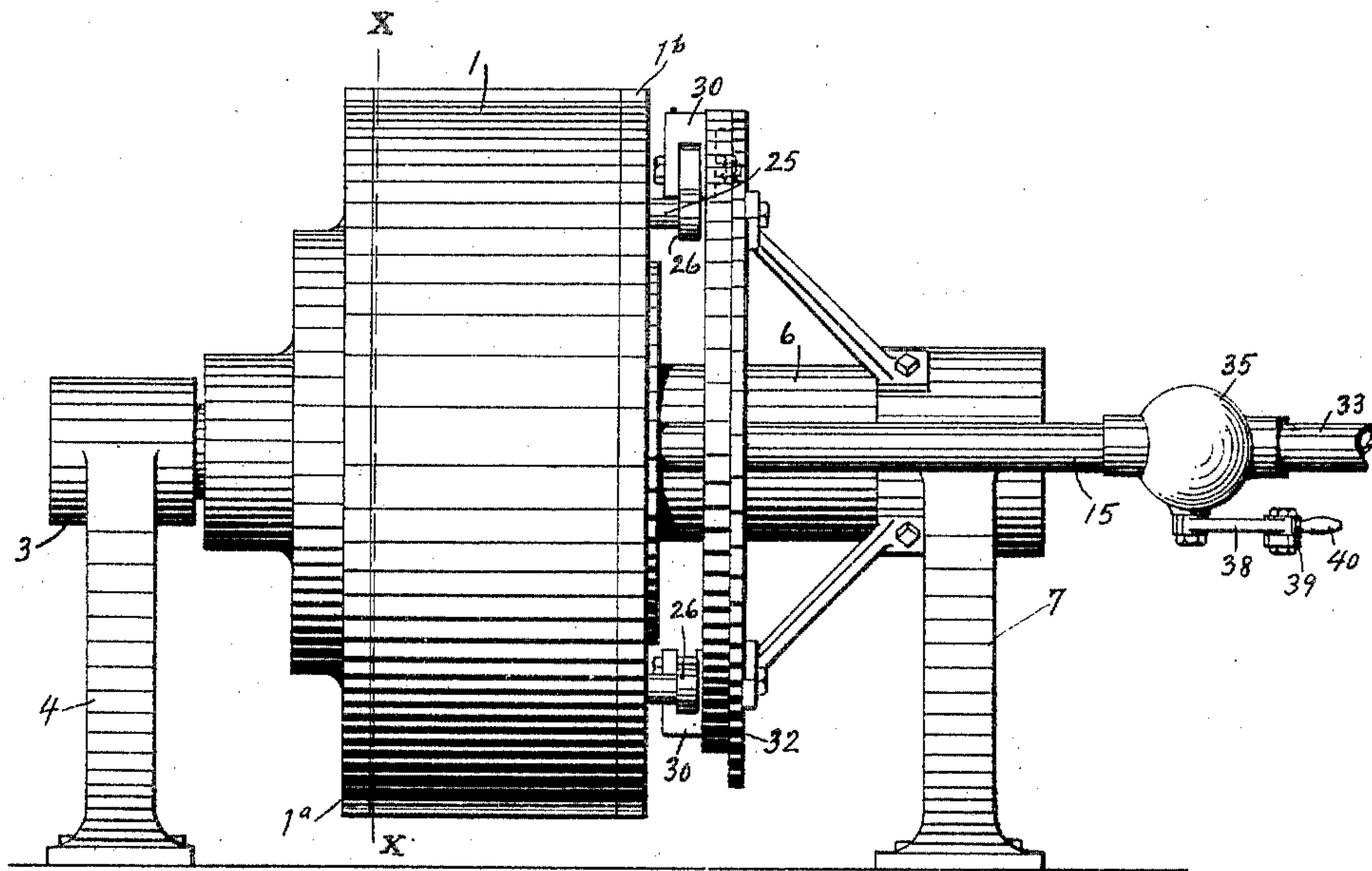


Fig. 6

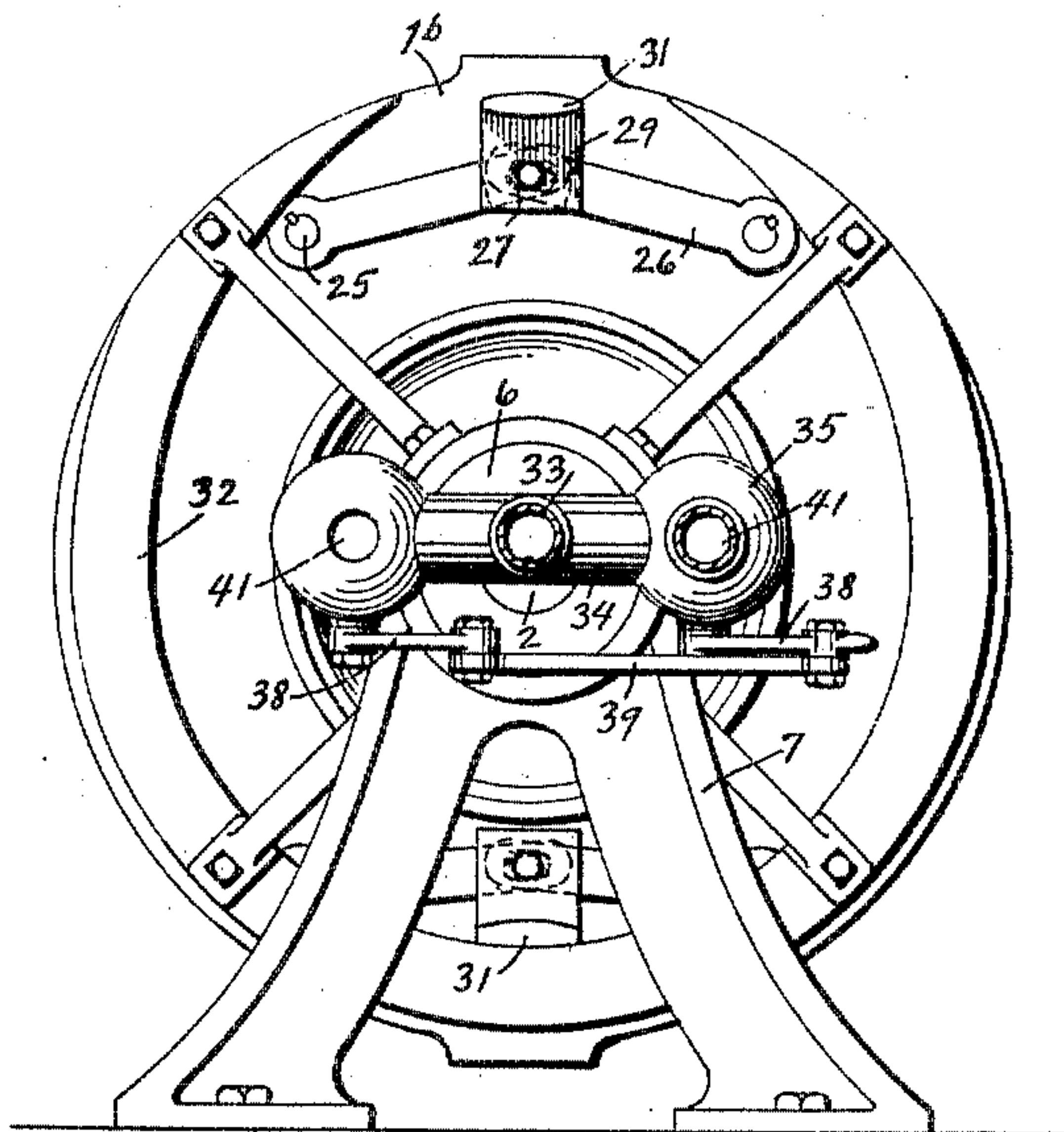


Fig. 7

WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANCIS M. LECHNER, OF COLUMBUS, OHIO, ASSIGNOR OF ONE-THIRD TO  
FRANK E. STEVENS, OF COLUMBUS, OHIO.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 777,035, dated December 6, 1904.

Application filed April 25, 1904. Serial No. 204,693. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS M. LECHNER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention relates to a new and useful improvement in rotary engines.

The object of the invention is to provide a superior construction whereby an increased power and speed is attained.

Another object resides in means whereby the engine may be readily and expeditiously reversed.

Finally, the object of the invention is to provide a device of the type set forth that will be strong, durable, and efficient and one in which the parts will be comparatively simple to construct and which will not be liable to get out of working order.

With the above and other objects in view the invention consists of the novel details of construction and operation, a preferable embodiment of which is described in the specification and illustrated in the drawings, wherein—

Figure 1 is a transverse sectional view on line *xx* of Fig. 6. Fig. 2 is a longitudinal sectional view taken on line *yy* of Fig. 1. Fig. 3 is a vertical sectional view. Fig. 4 is a detailed elevation of the gate-lowering arms, showing the gate in section. Fig. 5 is a plan view of the gate lifting and operating means. Fig. 6 is a front elevation of the engine, and Fig. 7 is an end elevation of the same.

In the drawings the numeral 1 designates the casing of the engine, which revolves and is keyed upon the shaft 2, which latter is supported at one end in the box 3 of the standard 4 and extends through the head 5 and sleeve 6. The sleeve 6 is rigidly supported in the standard 7 and carries the integral head 5, which is formed with screw-threaded collars 8, on which are threaded bearing-washers 9, securely locked in place by binding-rings 10. The side plates 1<sup>a</sup> and 1<sup>b</sup> of the outer casing bear on the washers and rings, thus forming a steam-tight joint. The side wall 1<sup>a</sup> is formed

with a recess 11, which allows the head 5 to set well in the casing. The head 5 is formed with radial ports 12 and 13, which communicate with pipes 14 and 15, disposed at right angles thereto and inserted in the head 5. The pipes support on their outer ends a reversing mechanism, which will be hereinafter described. The head 5 supports a bridge 16, having a height equal to that of the steam-space 17, formed between the head and the outer casing, and the said bridge is provided with a packing 18, resiliently held in contact with the surface of the casing 1 and its side walls, so as to form a steam-tight joint therebetween. Mounted in the casing are a pair of vertically-sliding gates 19, diametrically oppositely disposed and provided with recesses 20, into which the rounded ends 21 of swinging arms 22 project. The gates are swung up into recesses 23, formed in the casing, and are guided in grooves 24, formed in the side walls 1<sup>a</sup> and 1<sup>b</sup>, which prevents displacement of the gates and assures their alinement. The arms 22 are keyed to laterally-extending shafts 25, which have keyed on their outer ends levers 26, which overlap one another, and are provided with slots 27, through which passes the pivot-bolt 28. The levers 26 are pivoted on the bolt 28 between the lugs 29 of the shoe 30, which latter is formed with a toe 31, adapted to engage the inner surface of the open cam-ring 32 as the casing revolves to lower the gates. It is to be understood that on revolving the casing 1 the bottoms of the gates resting on the head 5 will ride up over the bridge 16, thus being forced into the recesses 23, by which they are enabled to clear the bridge. As the gate rests on the top of the bridge the shoe 30 will stand centrally between the ends of the open cam-ring 32, as shown in Fig. 7. As the revolution of the casing is continued the toe 31 engages into the end of the cam-ring 32, and the shoe 30 is forced downward, which in turn, through the levers 26 and arms 22, causes the gate to be gradually lowered and travel down the opposite side of the bridge.

I wish it understood that I employ two diametrically oppositely disposed gates and that



while one of said gates is passing over the bridge in its raised position the other gate is in contact with the head 5 in its lowered position.

5 Steam is supplied to the engine through a pipe 33, provided with a T-head coupling 34, into which is threaded valve-casings 35. Rotary valves 36, having T-shaped ducts 37, mounted in the casings 35, are provided with  
10 arms 38, which project laterally therefrom and are connected by a link 39, through which they are moved simultaneously by means of the handle 40, carried on one of the arms 38. Each valve-casing 35 is formed with an ex-  
15 haust-opening 41 and an outlet-passage 42, into which is threaded the outer end of the pipes 14 and 15.

It will readily be seen by observing Fig. 2 that steam entering through the pipe 33 passes  
20 into the coupling 34 and through the T-passage 37 of the valve 36 into the pipe 14 to the head 5 and out through the radial port 12 into the steam-space 17, where it acts against the lowered gate, forcing the same around the head  
25 toward the exhaust-port 13, thus giving motion to the outer casing and exhausting through the port 13 when the gate has passed that point. The exhaust from the port 13 passes through the pipe 15 and through the straight  
30 portion of the T-passage 37 out the exhaust-opening 41.

It will be noted that the rotary valves 35 are disposed with their T-passages at right angles to each other, so that when the handle  
35 40 is thrown into the position indicated in Fig. 2 one of said valves will be open to receive steam from the coupling 34 and convey it to the pipe 14, while the other will be closed to the coupling 34 and in position to convey  
40 exhaust from the pipe 15 through the casing 35 and out through the passage 41. It is obvious that upon swinging the handle 40 toward the steam-pipe 33 the positions of the valves will be reversed and steam will be con-  
45 ducted through the pipe 15 to the port 13 and will be exhausted from the port 12 by means of the pipe 14. Thus the motion of the engine may be reversed. This, however, should

preferably be done when the gates occupy the position indicated in Fig. 1. 50

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

1. In a rotary engine, the combination with a fixed head having inlet and outlet ports, and  
55 means for conveying steam to and from said ports, of a casing having grooved side and top walls adapted to revolve around the head, a gate sliding in the grooves, oppositely-disposed arms adapted to lower said gate, shafts  
60 supporting said arms and projecting through said casing, levers mounted on said arms, a shoe pivotally connecting the levers, an open cam arranged to be engaged by the shoe, and means for reversing the motion of the casing. 65

2. In a rotary engine, the combination with a fixed head and the bridge thereof, of a revolving casing having its inner surface in contact with the top of the bridge, packing-rings arranged to form a steam-tight joint between  
70 the head and the casing, said casing having a recess in its outer wall and communicating grooves in its side walls, a sliding gate having arm-receiving recesses guided in said grooves and adapted to be moved into said re-  
75 cess by the bridge, oppositely-disposed arms having rounded ends bearing in said recesses of the gate, and means for operating said arms to lower the gate.

3. In a rotary engine, the combination with  
80 a fixed head having steam supply and exhaust passages and the bridge thereof, of a revolving casing supported about said head so as to provide a steam-space therebetween into which the bridge projects, said casing having its in-  
85 ner surface in contact with the bridge and formed with a grooved recess and oppositely-disposed grooves, a gate adapted to be guided and seated in said grooved recess, and arms for moving said gate adapted to be moved into  
90 said grooves so as to lie flush with the inner surface of the said casing.

FRANCIS M. LECHNER.

In presence of—

A. L. PHELPS,

PHIL S. KARSHNER.