No. 788,179. PATENTED APR. 25, 1905.

W. W. WHEELER.

ROTARY ENGINE.

APPLICATION FILED FEB. 21, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

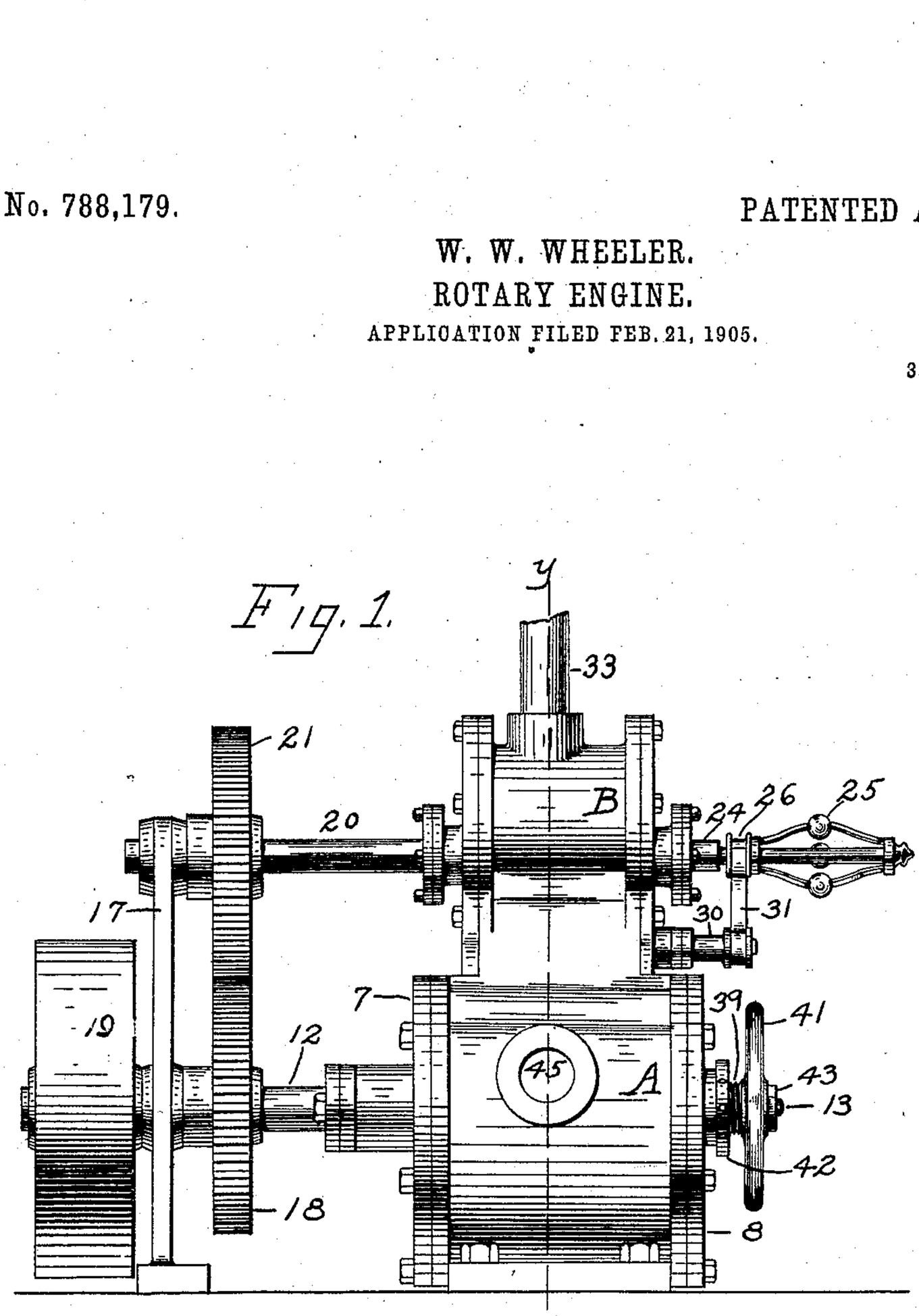
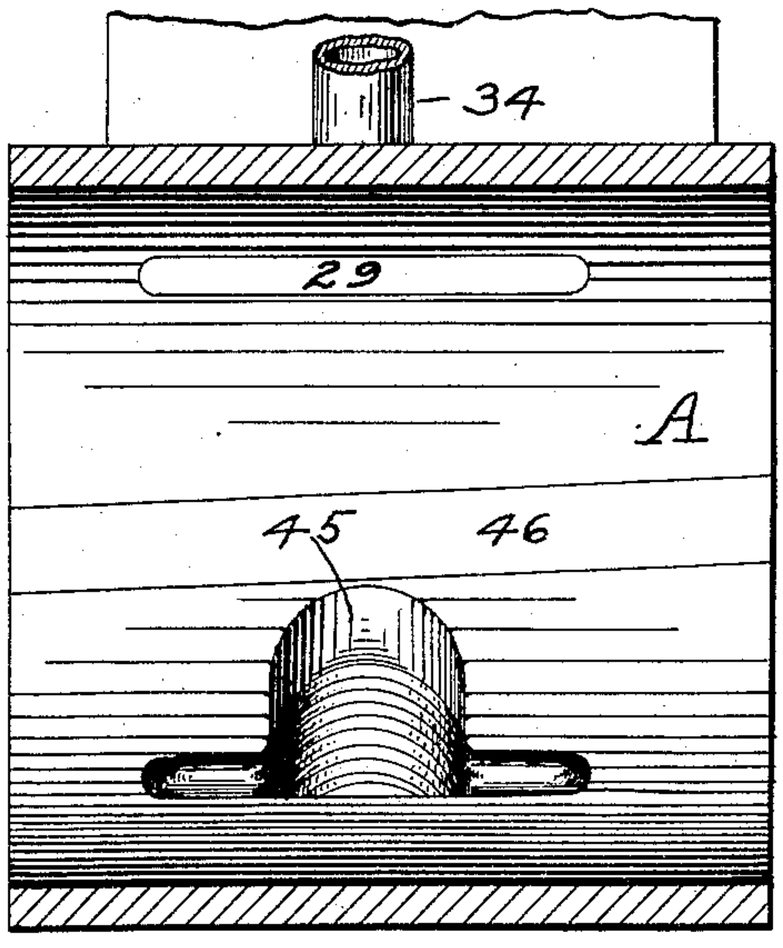


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 4.

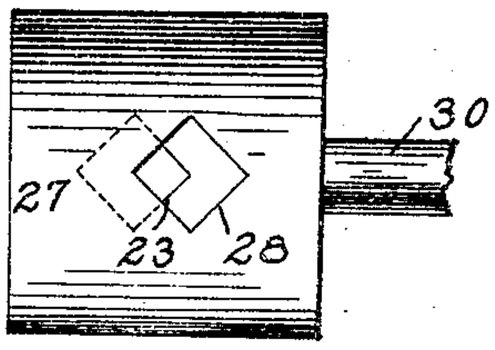
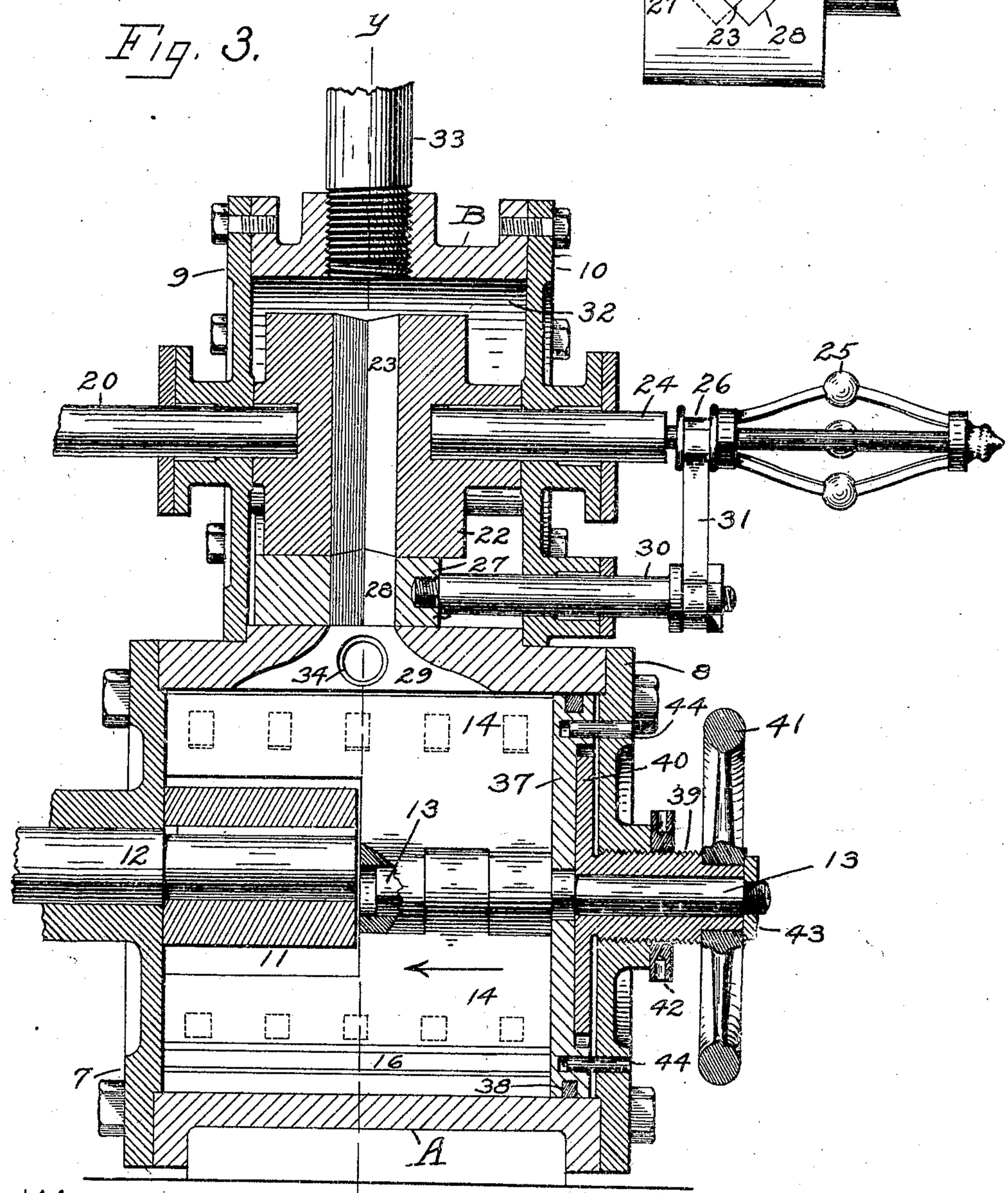


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 5

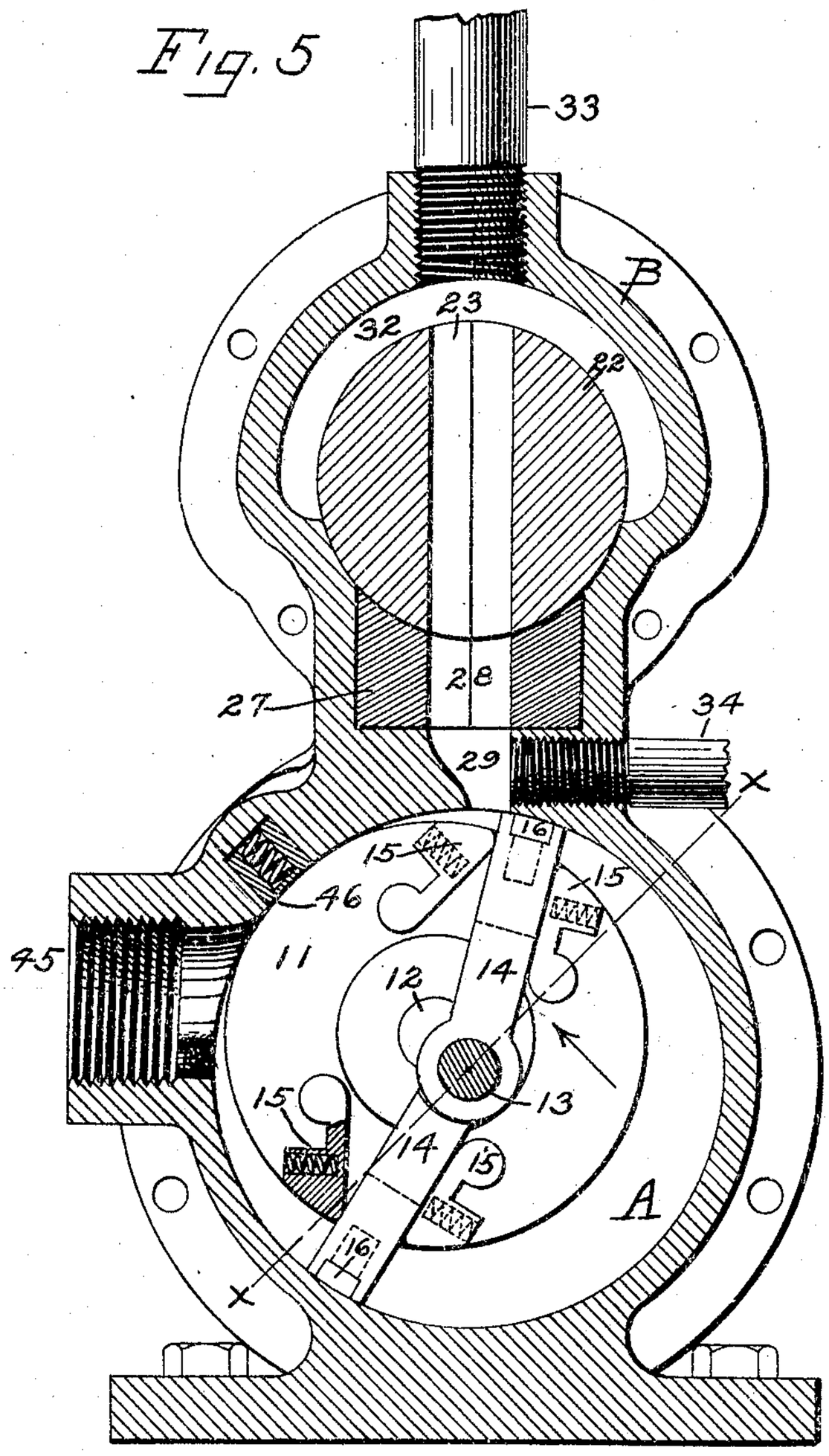
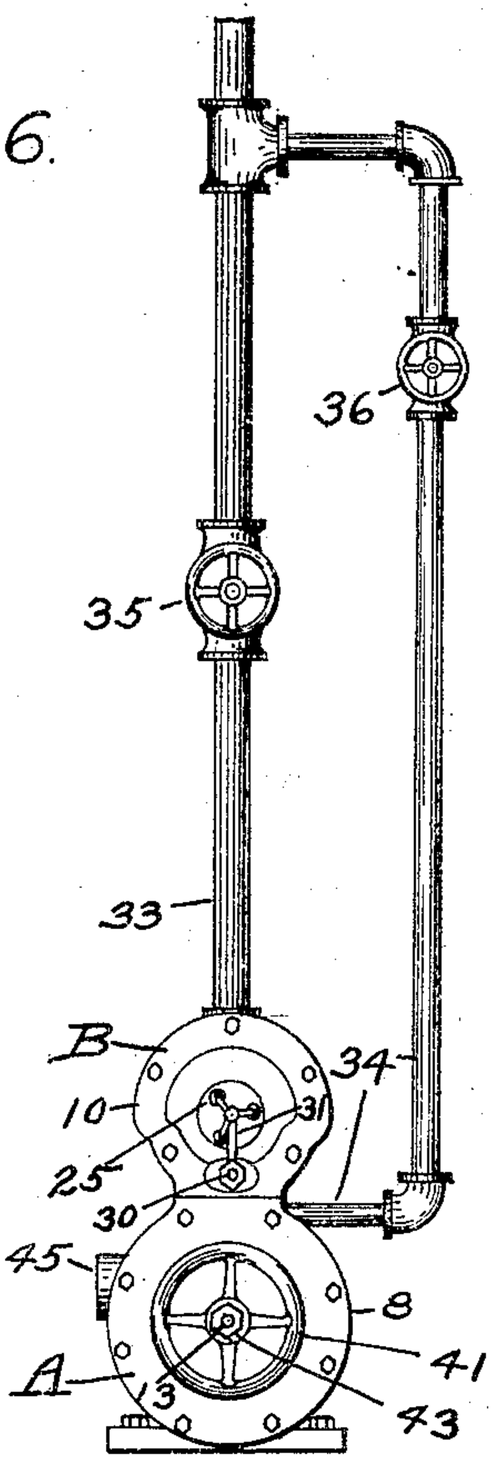


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM W. WHEELER, OF MERIDEN, CONNECTICUT.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 788,179, dated April 25, 1905.

Application filed February 21, 1905. Serial No. 246,687.

To all whom it may concern:

Be it known that I, WILLIAM W. WHEELER, a citizen of the United States, residing at Meriden, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to improvements in rotary engines; and the main objects of my improvements are convenience and efficiency in operation, particularly with reference to controlling the steam, packing the end of the piston, and smoothness of running.

In the accompanying drawings, Figure 1 is a rear elevation of my engine. Fig. 2 is an enlarged sectional view of the cylinder on the line *x x* of Fig. 5. Fig. 3 is a central vertical and longitudinal section of the engine with parts in elevation. Fig. 4 is a detached reverse plan view of the governor-slide, together with a diagram of the orifice through the valve that coacts with the said slide. Fig. 5 is a transverse vertical section of the engine on the line *y y* of Figs. 1 and 3, with some of the parts in elevation. The piston and its wings are shown in end view. Fig. 6 is a detached elevation, on a reduced scale, illustrating the arrangement of the steam-supply pipes.

A designates the piston chamber or cylinder, the interior of which is of a cylindrical form, the said cylinder being closed at its ends by the heads 7 and 8. The valve-chamber B surmounts the cylinder A and is closed at its ends by the heads 9 and 10. As shown, the engine is of the class disclosed in Patent No. 43,744 of August 2, 1864, the cylinder being provided with a round and longitudinally-slotted piston 11, mounted on the shaft 12 in the cylinder-head 7 eccentrically to the cylindrical interior of the piston-chamber A. The said shaft extends only part way through the said piston-chamber, and in the opposite cylinder-head 8 there is fixed another shaft or stud 13 concentric with the piston-chamber, upon which shaft the two wings 14 are mounted. The said wings may be packed in any ordinary manner—as, for example, by spring-pressed swinging strips 15 at the sides and plain spring-pressed strips 16 at their edges.

The shaft 12 extends outwardly through the frame or support 17 and is provided with a gear-wheel 18 and driving-wheel 19. A valve-shaft 20 is also supported at one end in the said frame 17, while its other end passes through and is supported by the head 9 of the valve-chamber B. This valve-shaft has a gear-wheel 21 like the wheel 18, so that the valve-shaft 20 and piston-shaft 12 both rotate together. Within the valve-chamber B is a cylindrical valve 22, mounted on the valve-shaft 20, so as to rotate therewith. This valve has a transverse orifice 23 extending diametrically through it, the said orifice being preferably of a rectangular form diagonally arranged with reference to the length of the valve or some equivalent form that will make the ends of the orifice of less width than the middle. The end of the valve which is opposite the valve-shaft 20 is provided with a governor-shaft 24 in alinement with the shaft 20 and passing through the head 10, so that the shafts 20 and 24 as connected by the valve 22 act substantially the same as one continuous shaft. On the governor-shaft 24 is an ordinary governor 25, having a grooved and sliding collar 26, which is moved longitudinally on the shaft as the governor changes its position under varying speeds. In the lower part of the valve-chamber there is a governor-slide 27, moving in suitable guides in the longitudinal direction of the valve-shaft and having an orifice 28 through it of the same form as the orifice 23 through the valve and which may register therewith. This governor-slide 27 lies between the partition-wall of the piston and valve chambers, within which wall the port 29, leading from the valve-chamber to the piston-chamber, is formed. After the governor-slide 27 has been fitted to the valve-chamber the lower part of the said chamber, together with the upper face of the said slide, is bored or turned out to fit the periphery of the valve. The upper part of the valve-chamber is preferably enlarged, so as to form a steam-space 32 for reducing friction. The said governor-slide is provided with a stem 30, that extends through the head 10 of the valve-chamber, the outer end of which stem is connected by a suitable strap 31 to the sliding collar of the

governor, whereby the said governor-slide is moved longitudinally in one direction (toward the right, as shown in Fig. 3) when the speed increases, so as to expand the arms of the governor, and in the opposite direction when the speed decreases, all in the well-known manner of moving a regulating device by a governor.

Steam is admitted to the valve-chamber in any proper manner—as, for example, through the pipe 33. For the purpose of starting the engine in case it should happen to stop with the valve in a closed position and for the further purpose of giving a continuous supply of steam for extra occasions, if desired, I arrange a secondary supply-pipe 34, which may be called a "by-pass," as the steam supplied therefrom passes by instead of through the valve-chamber. This by-pass or secondary supply-pipe 34 taps the main steam-pipe 33 at a point back of the cut-off 35, as shown in Fig. 6, and is provided with a globe or cut-off valve 36. I prefer to have the pipe 34 deliver its steam into the port 29, so that the steam will enter the piston-chamber through the same port by which it enters when passing through the valve.

At one end of the cylinder or piston-chamber is the packing-disk 37, having any ordinary packing-ring 38 at its edge. The stud 13 on which the wings 14 are pivoted passes centrally through this disk; but instead of mounting the said stud directly in the head 8 I mount it in the hub 39 of the adjusting-disk 40, which hub 39 is exteriorly threaded and screwed into the interiorly-threaded hub of the head 8. On the outer end of this hub 39 I mount the hand-wheel 41, and on the middle portion is the set-nut 42 for screwing up against the hub of the head 8 to secure the hub 39 and adjusting-disk 40 against accidental displacement. The stud 13 is shouldered at its junction with the disk 40, and its outer end is provided with a nut 43, whereby the said stud is rigidly mounted in the hub 39 of the said disk 40. In order to prevent the packing-disk 37 from rotating with the piston or with the adjusting-disk 40, I employ the dowel-pins 44. The cylinder or piston-chamber is provided with a suitable exhaust 45.

The cylinder or piston-chamber is provided with a longitudinal spring-pressed packing-strip 46 on that side of the chamber with which the piston most nearly comes in contact; but instead of arranging this parallel to the wings and piston I set it at a slight angle of inclination thereto, as best shown in Fig. 2. The groove for this strip is first formed and the strip fitted thereto, after which the cylinder, together with the face of this strip, is turned out so that the face of the strip corresponds to the rest of the wall of the piston-chamber.

By admitting steam into the valve-chamber when the parts are in the position shown in Fig. 5 the engine will be set in motion and the piston and valve rotate together. As soon as the valve rotates so far as to take its orifice out of register with the orifice through the governor-slide, the steam is cut off and the engine is run by the expansive force of the steam until the valve at approximately a half-revolution opens the valve-orifice again. As the wings 14 reach the packing-strip 46 only their ends first come into engagement therewith, whereby all shock is avoided and the engine runs smoothly over this strip. As the speed of the engine increases above the desired or intended rate the governor expands and moves the governor-slide toward the right as viewed in Fig. 2. This brings the orifices in the slide and valve into a position where the slide partially or wholly covers the orifice in the valve. In Fig. 4 the slide is represented in a position to partially close the valve-orifice. This not only reduces the area of the effective steam-supply, but varies the time of supply and cut-off by reason of the effective orifice growing narrower in the direction of the movement of the valve as the said orifice grows smaller, and consequently the steam is cut off at a relatively earlier point in the rotation of the valve than would be the case if the effective orifice were wider. As the engine slows up the governor will move the slide in the opposite direction to increase the supply of steam and also increase the fraction of a revolution of the valve that acts to admit steam to the port 29. If the engine should be stopped with the valve in a position to close the inlet therethrough, the by-pass or secondary steam-supply 34 may be used to start the engine and then closed to let the supply come through the valve-chamber only. If for extra occasions greater power or speed is desired at the expense of a waste of steam, the by-pass 34 may be opened and used in addition to the regular supply, so as to feed the engine continuously without cutting off to utilize the expansive force of the steam.

By means of the hand-wheel and adjusting-disk the end packing can be quickly and effectively adjusted so as to pack the end of the piston tightly. The stud 13, on which the wings are hung, moves out and in with the adjusting-disk; but the necessary adjustment is so small that this movement of the said stud is not detrimental.

It is apparent that some changes from the specific construction herein disclosed may be made, and therefore I do not wish to be understood as limiting myself to the precise form of construction shown and described, but desire the liberty to make such changes in working my invention as may fairly come within the spirit and scope of the same.

I claim as my invention—

1. In a rotary engine, the combination of a cylinder having a cylindrical piston-chamber with a longitudinally-slotted piston mounted in the said chamber for bearing on one side of

the said piston-chamber, a piston-wing mounted within the said slotted piston for bearing on the walls of the said piston-chamber, and a packing-strip in the wall of the said piston-chamber for bearing on the said piston and wing, the said strip extending longitudinally of the said piston-chamber at a slight angle to the length of the said wing against which it acts.

2. In a rotary engine, the combination of a cylinder having a cylindrical piston-chamber, a piston mounted therein, a packing-disk at one end of the said piston-chamber, and an adjusting-disk having an exteriorly-threaded hub mounted in the cylinder-head at that end of the said cylinder having the said packing-disk.

3. In a rotary engine, the combination of the cylinder and piston with a valve-chamber and cylindrical valve having an orifice that opens at the periphery of the said valve, a governor-slide mounted to move parallel to the axis of the said valve in the wall of the said valve-chamber and forming a part of the curved wall of the said valve-chamber to which the said valve is fitted, and a governor operatively connected with the said slide for moving it in the longitudinal direction of the valve-axis to cover and uncover the peripheral orifice of the said valve.

4. In a rotary engine, the combination of the cylinder and piston with a valve-chamber and a cylindrical valve having an orifice that opens at the periphery of the said valve and is wide at the middle portion and narrower toward each end, a governor-slide having a similarly shaped and disposed orifice, the said slide being arranged between the said valve and the piston-chamber to move in the longitudinal direction of the valve-axis and in the line of the narrowed ends of the said orifices, and means for moving the said slide, whereby a movement of the said governor-slide parallel to the axis of the valve acts to vary the effective width of the valve-orifice in the transverse direction of the said axis.

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