W. W. WHEELER.

ROTARY ENGINE.

APPLICATION FILED MAR. 18, 1909.

935,079.

Patented Sept. 28, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

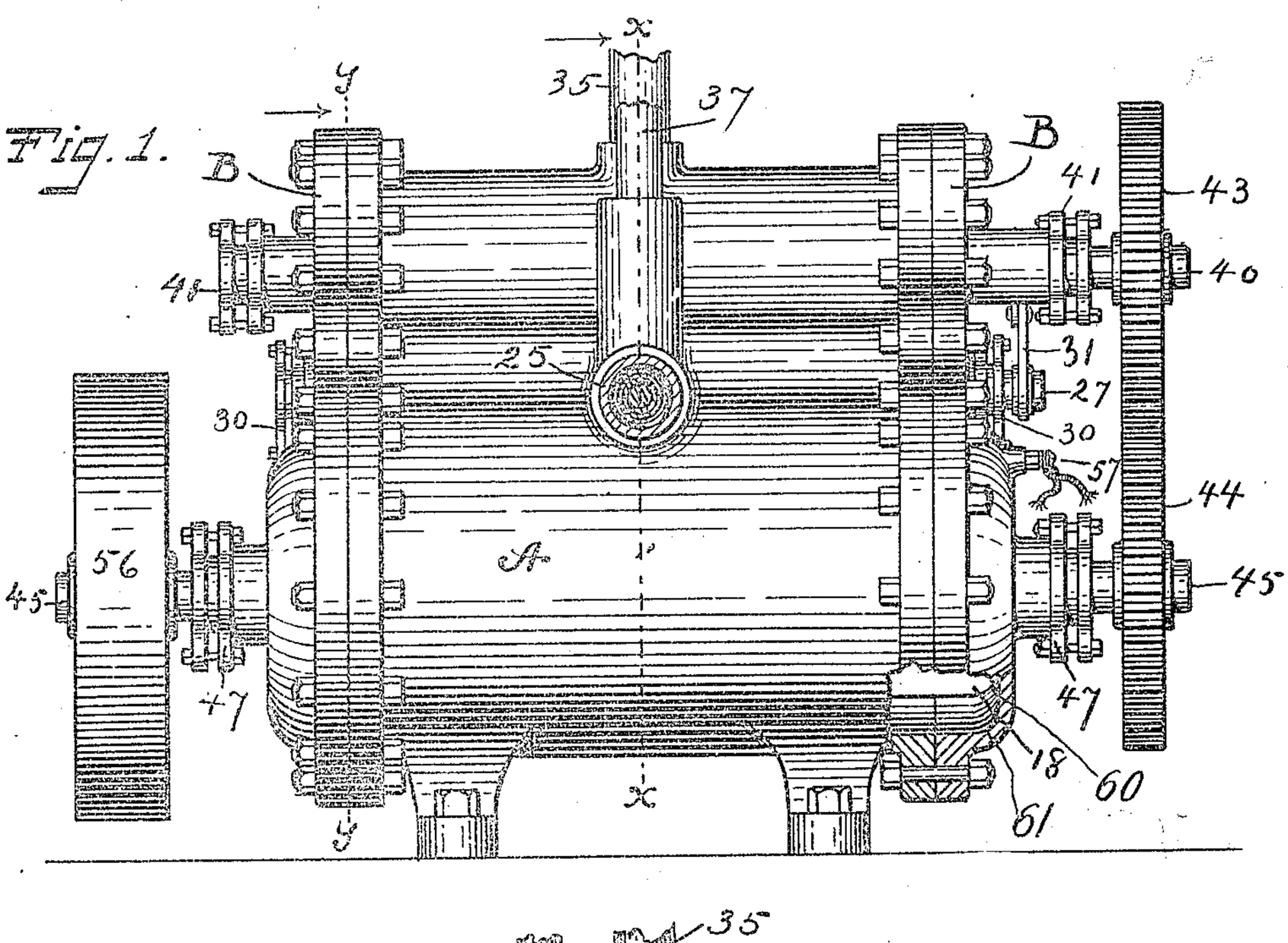
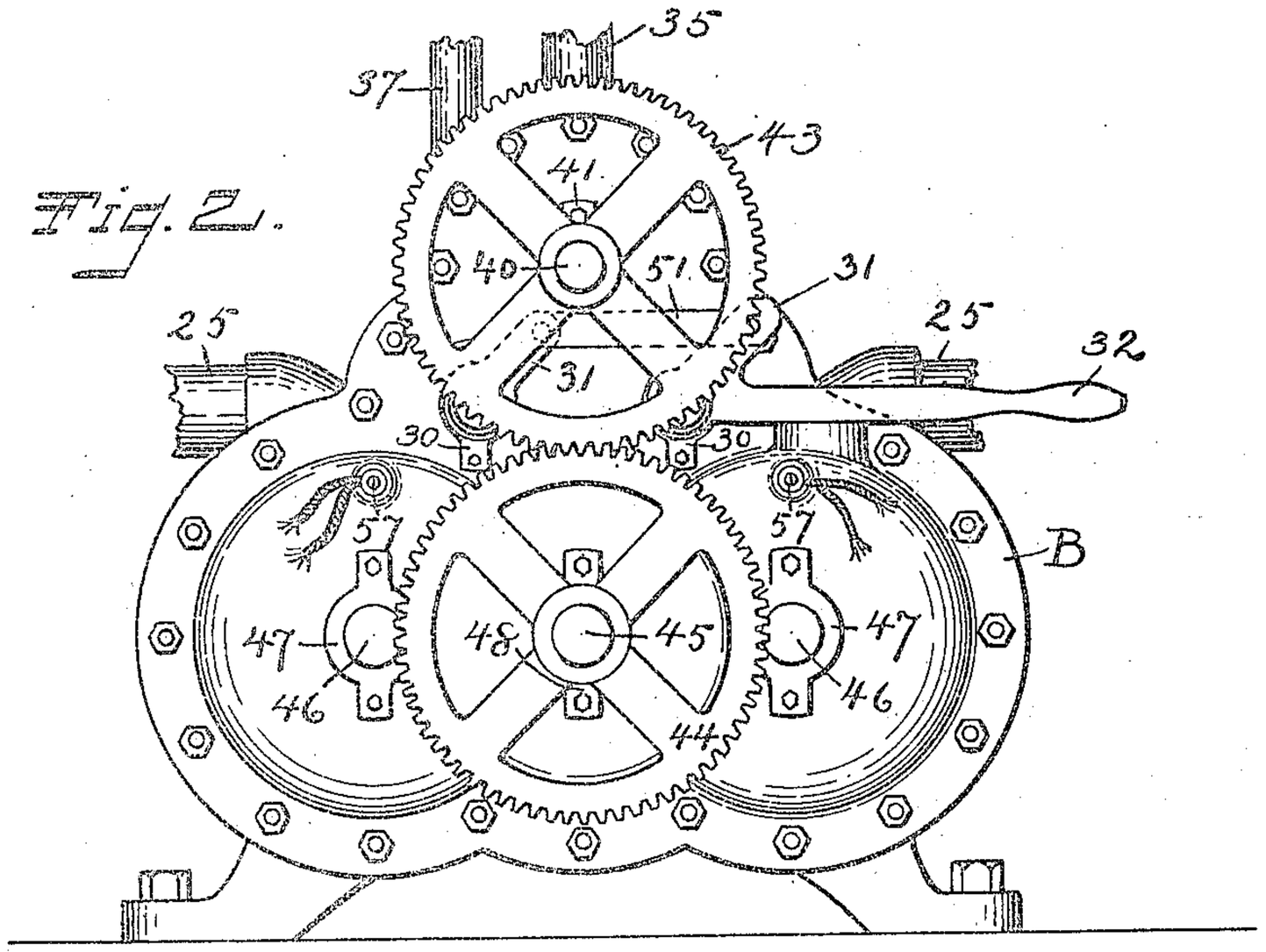


Fig. 2.



Witnesses.

S. H. Clarke.

N. L. Lockwood

Inventor.

William W. Wheeler.

By Louis M. Schmidt

Atty.

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3 SHEETS—SHEET 2.

Fig. 3.

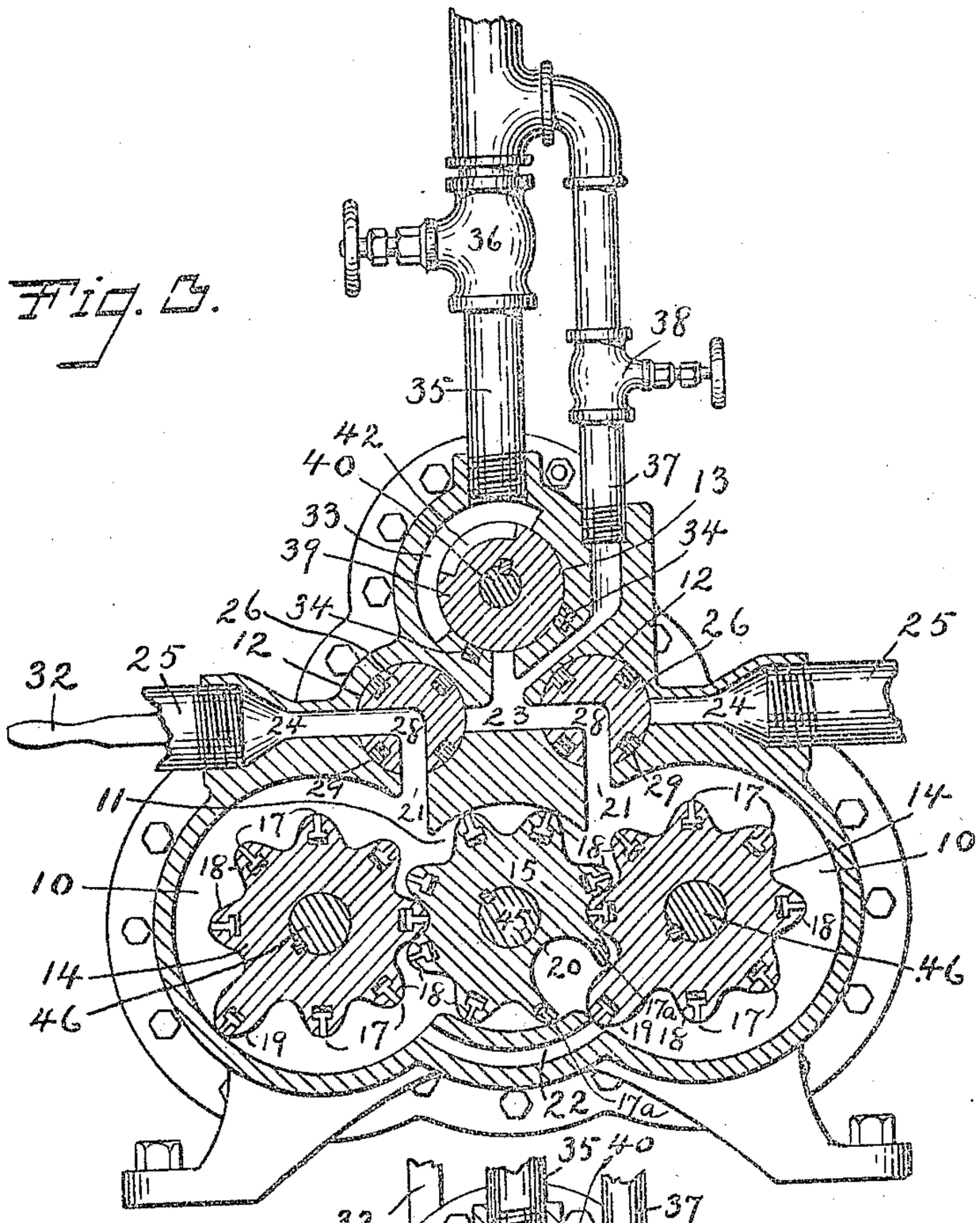
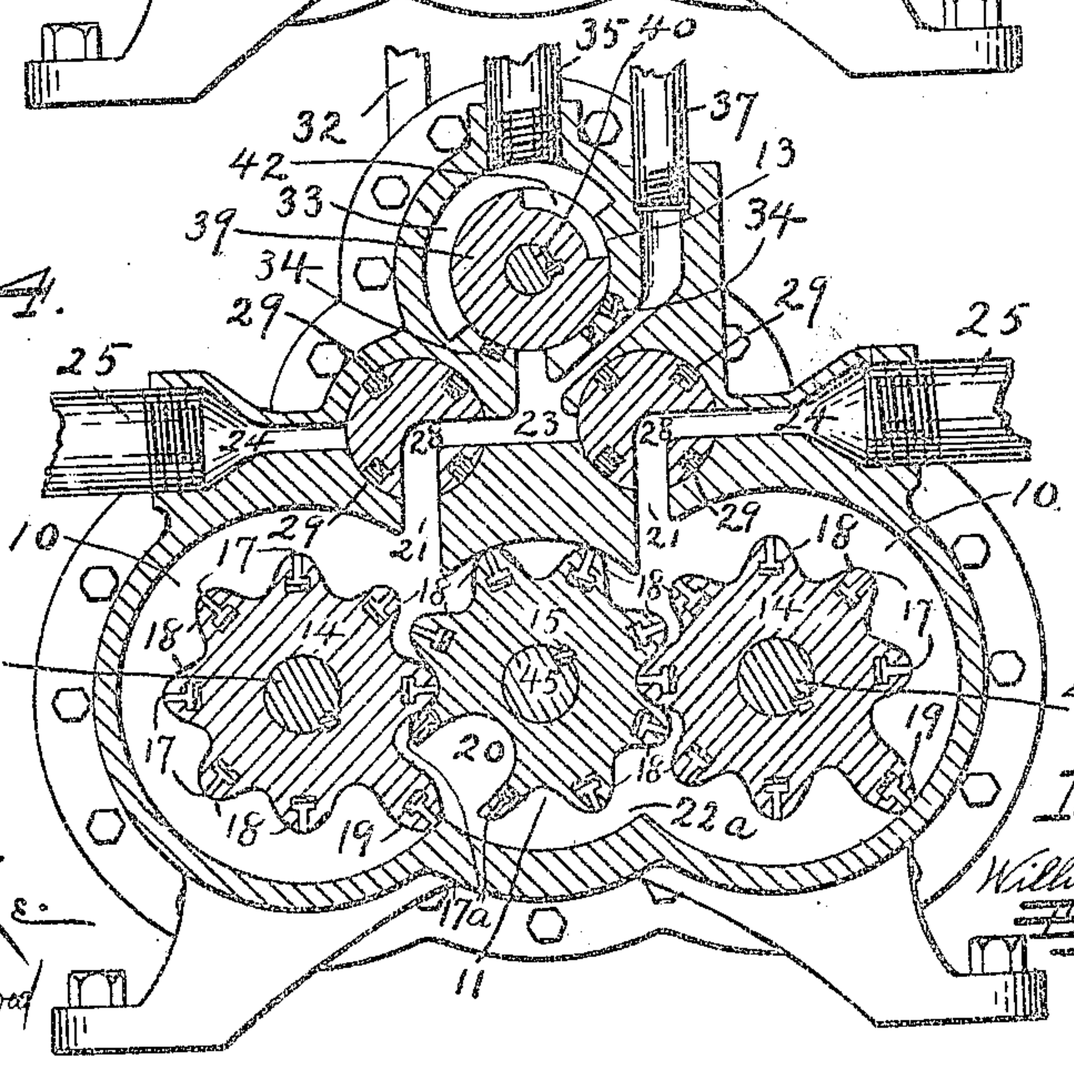


Fig. 4.



Witnesses.

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By Louis W. Schmidt.

Atty.

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3 SHEETS—SHEET 3.

Fig. 5.

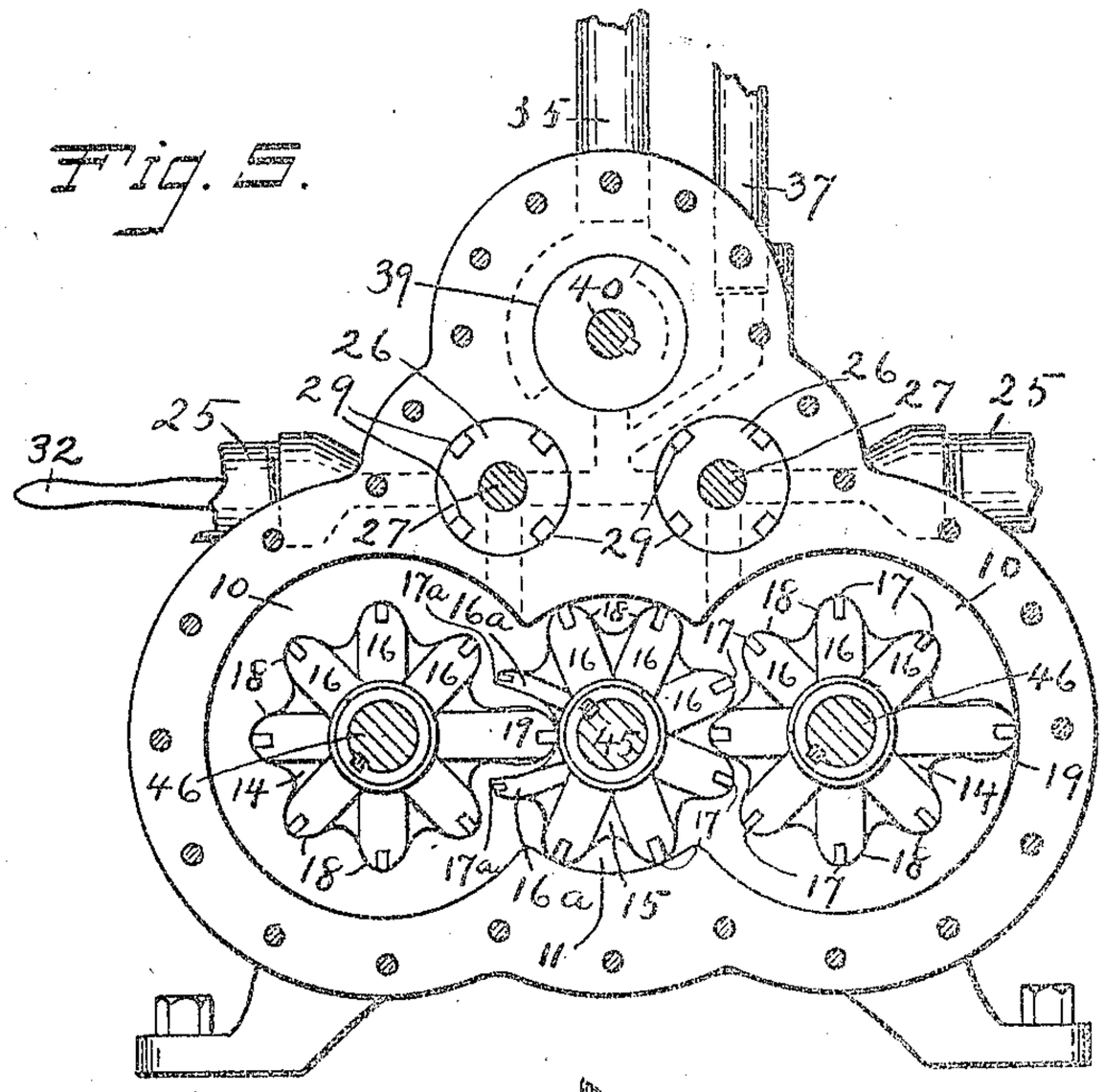
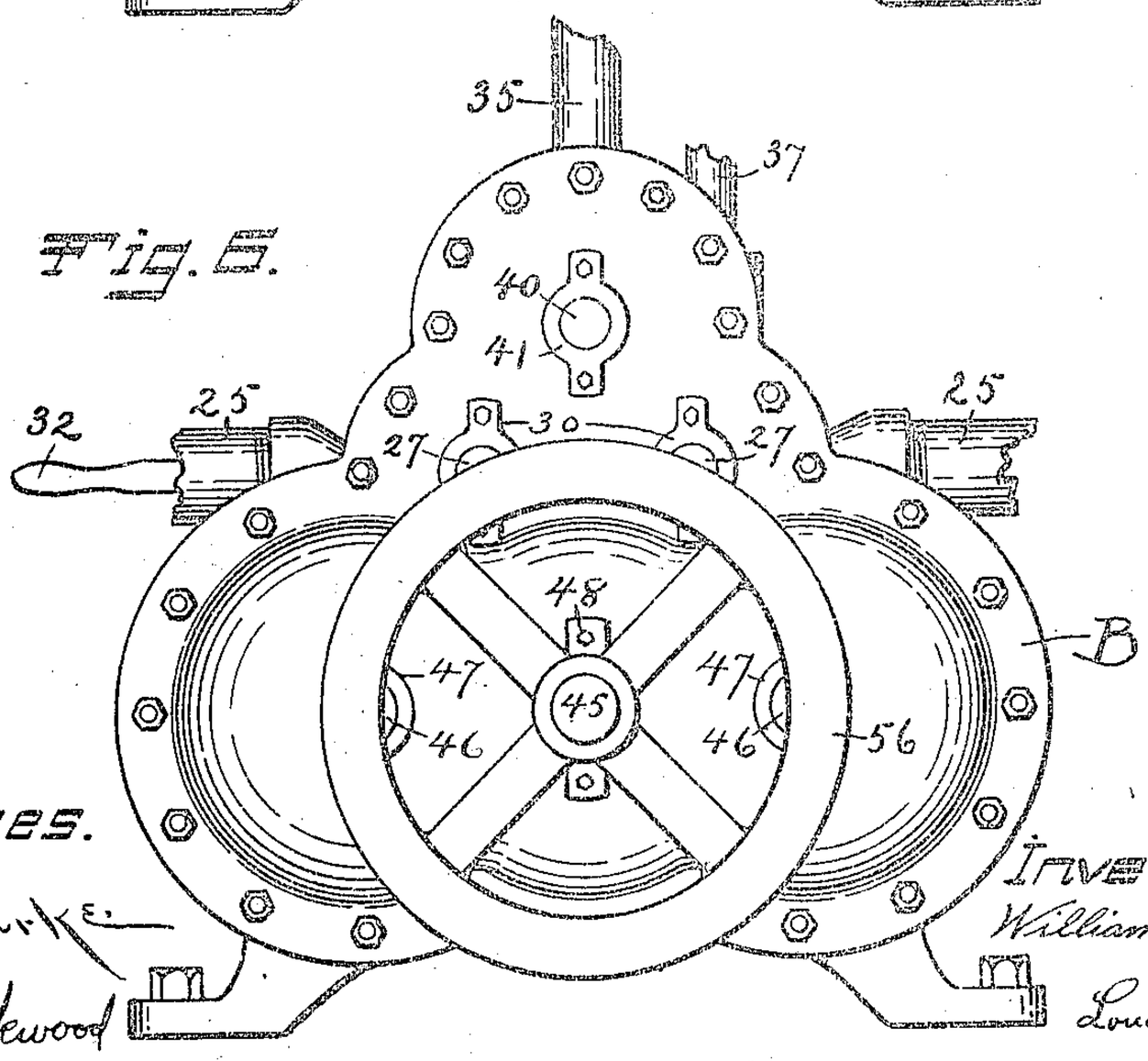


Fig. 6.



Witnesses.

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W. L. Lockewood

Inventor.

William W. Wheeler.

Louis W. Schmidt

By

Atty.

UNITED STATES PATENT OFFICE.

WILLIAM W. WHEELER, OF MERIDEN, CONNECTICUT.

ROTARY ENGINE.

935,079. Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed March 18, 1909. Serial No. 484,111.

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 States 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 objects of my improvements are simplicity and economy in construction and convenience and efficiency in use.

In the accompanying drawing:—Figure 1 is a side elevation of my rotary engine. Fig. 2 is a front elevation of the same. Fig. 3 is a sectional view on the line *x x* of Fig. 1 with connection pipes and throttle valves in side elevation. Fig. 4 is a similar view with the moving parts turned from the position shown in Fig. 3, in a modified form. Fig. 5 is a view of the track end of my engine with the end plate removed and the movable parts turned from the position shown in Fig. 3. Fig. 6 is a back end view of my engine.

A is the body of my engine which incloses two expansion chambers 10 an abutment chamber 11, two reversing valve chambers 12 and a main valve chamber 13, all generally cylindrical in shape and of the same length and parallel, and are provided with flanged ends adapted to receive flanged end plates B, one plate at each end. The said expansion chambers 10 are separated by the said abutment chamber 11 and each contains a rotary piston 14 adapted to operate in conjunction with a rotary abutment 15 common to both rotary pistons 14 operating in the said abutment chamber 11. The rotary pistons 14 are each mounted on a shaft 46, both ends of which are preferably brought through stuffing boxes 47 in the end plates B. The said rotary abutment 15 is mounted on a driving shaft 45 both ends of which are preferably brought through stuffing boxes 48 in the end plates B. The details of construction of the said rotary pistons 14 and rotary abutment 15, and the methods employed in packing the same by means of radial packing strips 16 along the sides, and longitudinal packing strips 17 on the outer extremities of both the short teeth 18 and the long teeth 19 are the same as shown in my patent No. 906,759, dated Dec. 15, 1908. I have however in addition in the present case provided generally similar radial packing strips 16ª and longitudinal packing strips 17ª for the teeth of the abutment gear on each side of the deep space 20 adapted to mesh with the long teeth 17 of the rotary piston 14, but of special shape to conform to the shape of the said teeth, the said packing strips being let into suitable grooves in the said teeth and backed by springs to keep them in contact with the boundary walls of the abutment chamber. I have also provided a rounded corner for the expansion chamber 10 and the abutment chamber 11 as in the patent referred to, but I obtain the same in the present case by providing a rounded corner entirely within a recess in the head B of the cylinders and abutment chambers, the flange of the said head B being finished entirely plane and flush, the flange on the body A being likewise plane and flush to fit accordingly. In order to fit into the said recesses in the heads the rotary pistons 14 and rotary abutment 15 are made correspondingly longer than the respective cylindrical chambers provided for the same in the said body A, and project beyond the same at each end. In the broken out portion of Fig. 1, are shown the rounded corner 60 of the tooth 18 and the rounded corner 61 in head B.

The expansion chambers 10 are each provided with a reversing port 21 leading upward through the upper wall of the said expansion chambers 10 to the bottom of one of the two reversing valve chambers 12 and with an interconnecting port 22 interconnecting the lower portions of the two expansion chambers 10. The two reversing valve chambers 12 are interconnected by a horizontal supply port 23 connecting the inner sides of the said reversing valve chambers 12. The said supply port 23 is provided at its middle with a vertical branch connecting with the bottom of the supply valve chamber 13, and a lateral branch adapted to receive a by-pass connection 37. The said reversing valve chambers 12 are provided each with an exhaust port 24 leading from a point diametrically opposite the said supply port 23 laterally outside or to an exhaust pipe 25. The said reversing valve chambers 12 are provided each with a reversing valve 26 comprising a cylindrical valve rotatively mounted on a reversing valve

shaft 27 of full cylindrical cross section at the ends as shown in Fig. 5, provided along the middle length with a two way port 28 having a 90 degrees turn, adapted according to its position to connect the reversing ports 21 of the expansion cylinders 10 either with the supply port 23 or the discharge port 24. The said reversing valves 26 are each provided with four longitudinal packing strips 29 backed by springs spaced 90 degrees apart so that when in either operative position there will always be a packing strip 29 each side the ports provided in the said reversing valve chamber 12.

I prefer for convenience in construction to bring both ends of the reversing valve shaft 27 through stuffing boxes 30 provided in the heads B. An extension of the said reversing valve shaft 27 at the front is utilized for operating the said reversing valve 26. The said reversing valve 26 when in operative position connects one expansion cylinder 10 with the supply port 23 or an exhaust port 24. In order to operate both of the said reversing valves in unison I provide at the said extensions of the reversing vale shafts 27 a crank 31 connected by a link 51, an operating handle 32 being made integral with one of the said cranks 31.

The supply valve chamber 13 is generally cylindrical in shape and is provided along the middle of its length with a longitudinal recess to form a steam chest 33 and on each side of the said supply port 23 has a longitudinal packing strip 34 backed by springs. The said steam chest 33 is provided with an opening adapted to receive a supply pipe 35 provided with a throttle valve 36, above which is connected the said by-pass connection 37, provided with a throttle valve 38. The said supply valve chamber 13 is provided with a supply valve 39, generally cylindrical in shape, being of full cylindrical cross section at the ends, as shown in Fig. 5, mounted on a supply valve shaft 40, passing through stuffing boxes 41 in the end plates B, and provided along the middle length with a longitudinal recess 42 adapted to connect the supply port 23 with the steam chest 33. An extension of the said supply valve shaft 40 at the front carries a gear 43 which meshes with a gear 44 on the driving shaft 45, by means of which the said supply valve 39 is rotatively operated during normal conditions of operation. A fly wheel 56 is mounted on the driving shaft 45. In my engine either of the two expansion chambers may be used as a high pressure or low pressure cylinder, so that by providing the open interconnecting port 22 between the two expansion chambers 10 with a proper setting of valves I can run my engine in either direction as a compound engine, the said interconnecting port 22 serving as a combined discharge from the expansion chamber 10 used as a high pressure cylinder and as a supply of low pressure steam to the expansion chamber used as a low pressure cylinder in either direction according to the direction of revolution. Furthermore I have accomplished this result by a construction that is symmetrical, compact, simple and reliable, as well as economical. While my engine is well adapted to be operated as a compound reversible steam engine, the same may be operated by other mediums, as by an explosive mixture, for which purpose spark plugs 57 have been provided.

A special form of interconnecting port 22ª, Fig. 4, is formed by providing a passage underneath the abutment 15 by dropping the lower wall of the abutment chamber 11.

By means of the by pass controlled by the throttle valve 38 live steam may be supplied directly to the expansion chambers to force the engine in an emergency.

I claim as my invention:

1. A reversible compound rotary engine, having an abutment chamber and two expansion cylinders adapted to be used alternatively as high pressure and low pressure cylinders separated by said abutment chamber.

2. A reversible compound rotary engine, having an abutment chamber and two cylinders adapted to be used alternatively as high pressure and low pressure cylinders separated by said abutment chamber, the said cylinders being interconnected by an open port adapted to deliver the discharge from the cylinder used as a high pressure cylinder to the expansion side of the cylinder used as a low pressure cylinder.

3. A reversible compound rotary engine, having an abutment chamber and high and low pressure cylinders, the said cylinders separated by said abutment chamber and interconnected by an open port, each cylinder provided with a port adapted to be used alternatively for a supply port for high pressure fluid and a discharge port for final exhaust.

4. A compound reversible rotary engine having an abutment chamber and two adjoining cylinders separated by the said abutment chamber, each cylinder provided with a port and with a two way valve adapted to connect said port alternatively with the main fluid supply and with the exhaust.

5. A compound rotary reversible engine having an abutment chamber and two cylinders adjoining the said abutment chamber, said cylinders interconnected by an open port and adapted to be each connected alternatively by a two way valve with the main fluid supply and the final exhaust, and a main fluid supply valve adapted to control the main fluid supply to said cylinders during normal conditions of operation.

6. A compound rotary reversible engine, having an abutment chamber and two cylin-

ders separated by the said abutment chamber, a main fluid supply valve, and a by-pass around said valve for use in starting and forcing the engine.

7. A compound rotary reversible engine, having an abutment chamber and two cylinders adjoining the same, and means for interchanging the fluid supply to the said cylinders corresponding with a change in direction of operation, so that with one direction of operation one cylinder will operate as a high pressure cylinder and the other as the low pressure cylinder, and vice versa.

8. A compound reversible rotary engine, having two cylinders adapted to use alternatively as high pressure and low pressure cylinders, an abutment chamber connecting the said cylinders, an open port interconnecting the said cylinders, valves for connecting the said cylinders alternatively with the fluid supply and the exhaust, a main supply valve controlling the supply of fluid during normal conditions of operation, a rotary piston in each of the said cylinders, each piston mounted on a shaft co-axial with the said cylinders, a rotary abutment operating in conjunction with the said pistons and mounted on a shaft co-axial with the said abutment chamber and a main driving shaft consisting of an extension of the said shaft for the said rotary abutment.

9. In a compound reversible rotary engine, having a rotary abutment and rotary pistons operating in conjunction with the said rotary abutment, said pistons and abutment having teeth adapted to inter-mesh during such operation, said teeth provided with packing strips along the sides and separate packing strips at the outer periphery.

10. In a rotary engine having a cylinder provided with a rotary piston and cylinder heads for said cylinder, said piston projecting beyond the said cylinder at the ends and having rounded outer corners, and said cylinder heads recessed to fit said projecting ends and rounded corners.

11. In a compound reversible rotary engine, having a body with two plane flat parallel flanged ends, said body containing two cylinders provided with rotary pistons, an abutment chamber provided with a rotary abutment, two valve chambers provided with rotary two-way valves for alternatively connecting the said cylinders with the supply or exhaust, a main supply valve chamber provided with a rotary main supply valve for controlling the main fluid supply, the said cylinders, abutment chamber and valve chambers parallel and of the same length between the said flanged ends.

12. A rotary engine having a cylindrical rotary supply valve operating in a cylindrical valve chamber provided with longitudinal packing strips backed by spring pressure.

13. A rotary compound reversible engine having a cylindrical reversing valve, operating in a cylindrical valve chamber provided with longitudinal packing strips.

WILLIAM W. WHEELER.

Witnesses:
AUGUST H. RIECKE, Jr.,
WALTER J. RIGNEY.