Jan. 20, 1959 J. H. HEIMAN, JR 2,869,516

FLUID PRESSURE ROTARY ENGINE

Filed May 9, 1958 3 Sheets-Sheet 1

FIG. 1

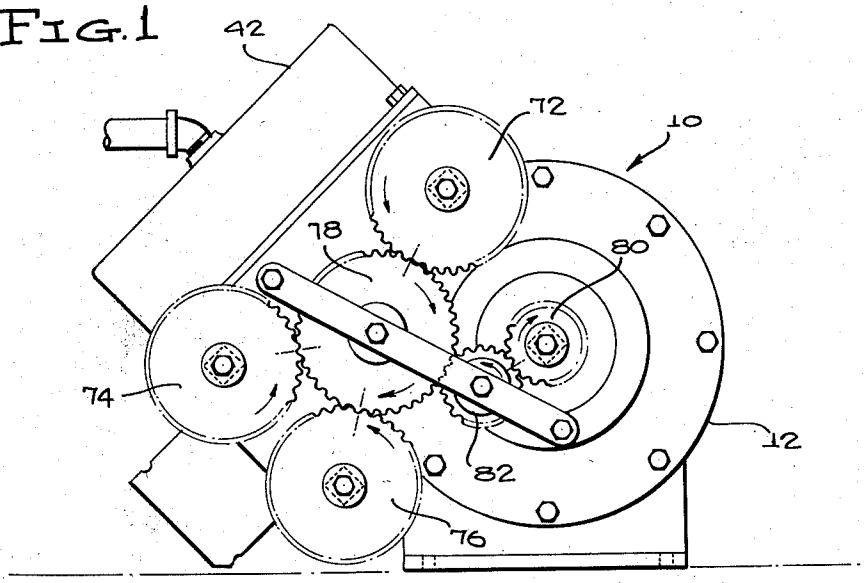
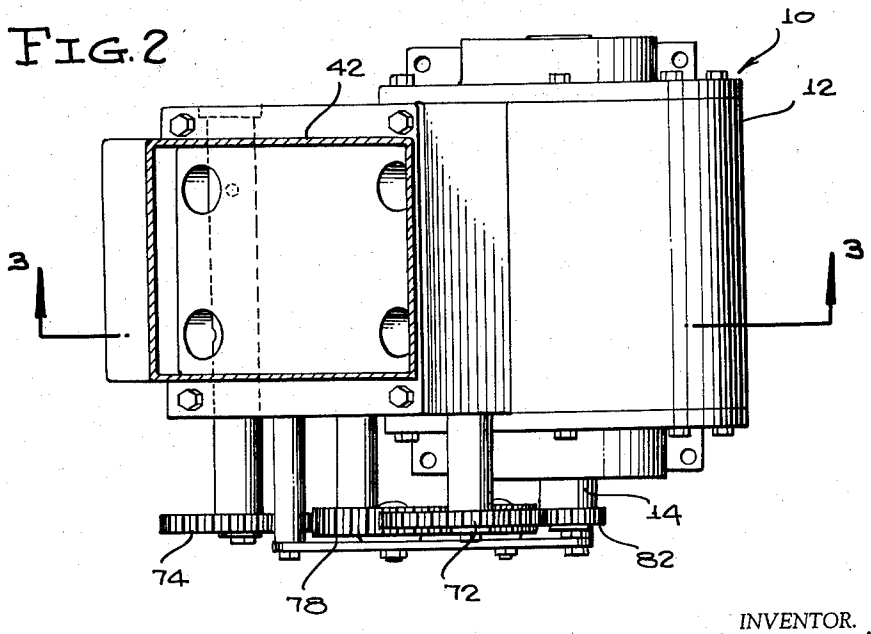


FIG. 2



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FIG. 3

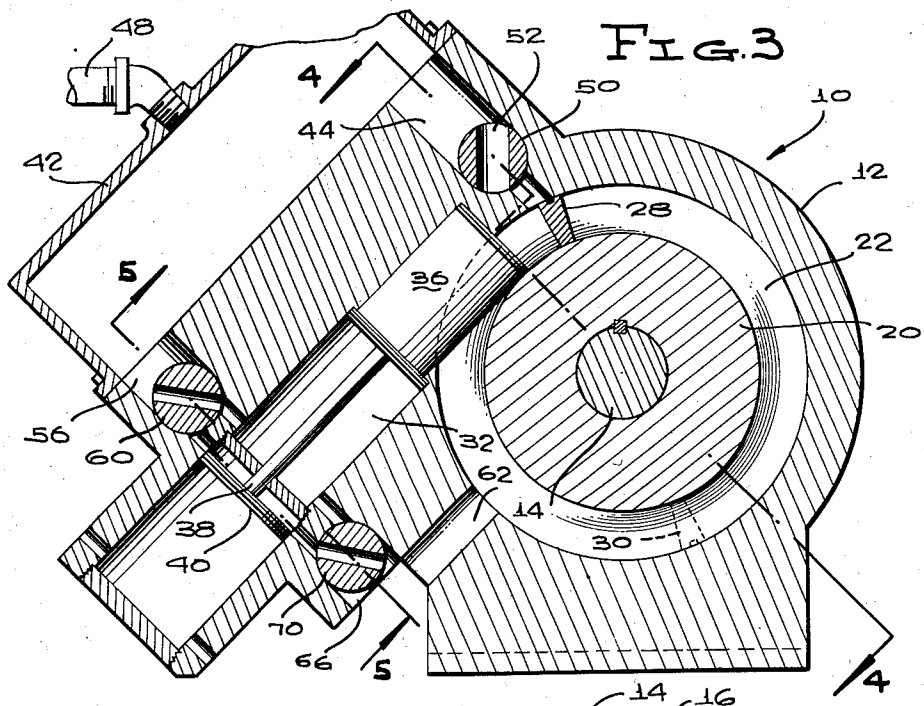
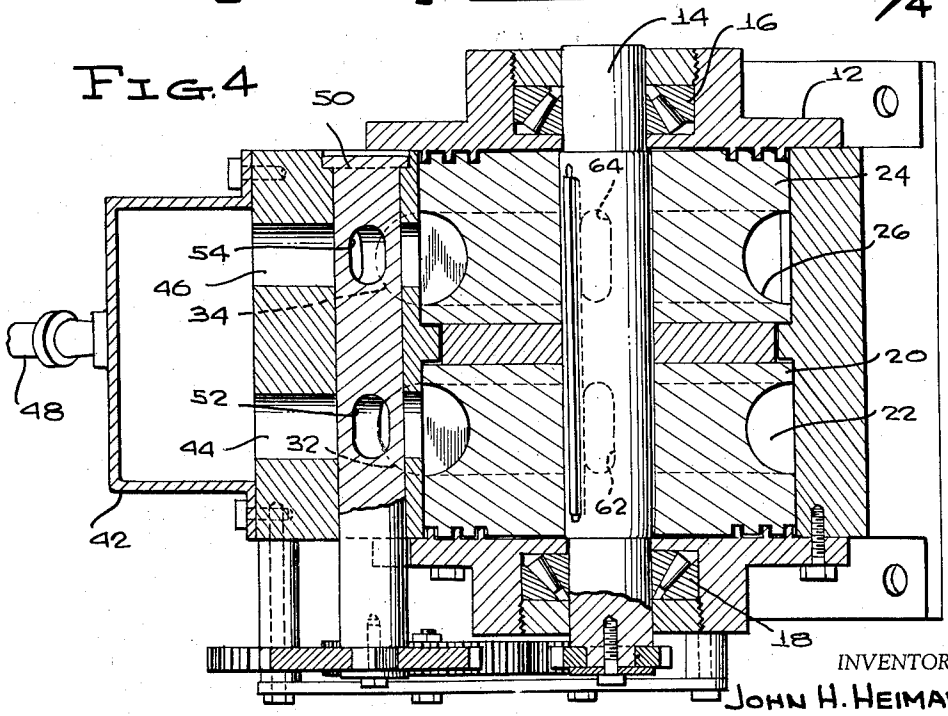


FIG. 4



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FIG. 5

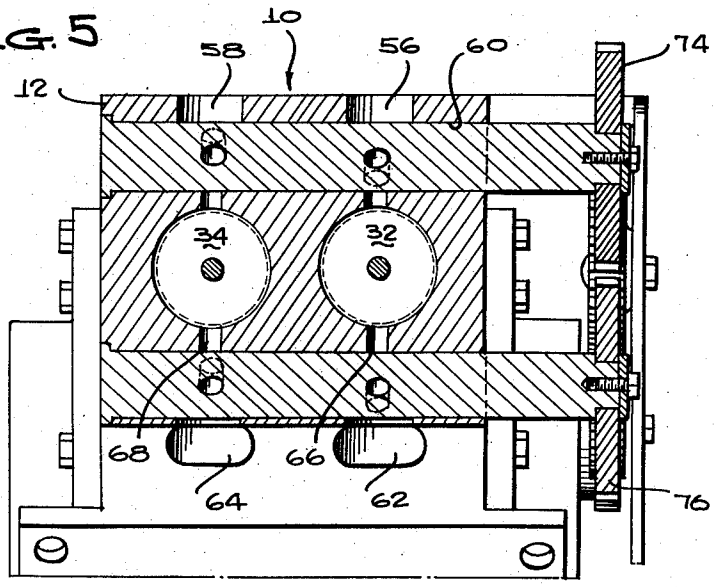


FIG. 6

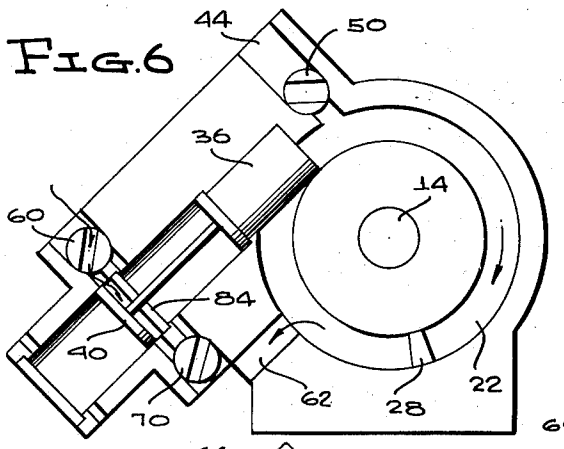


FIG. 8

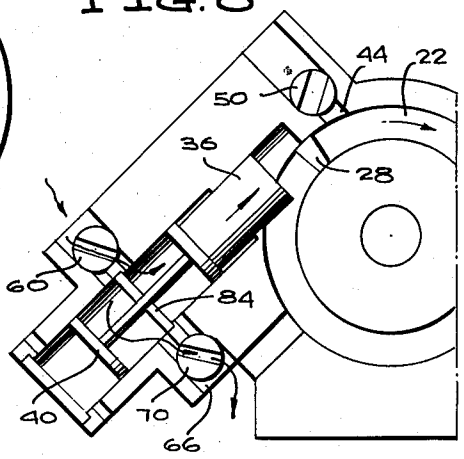
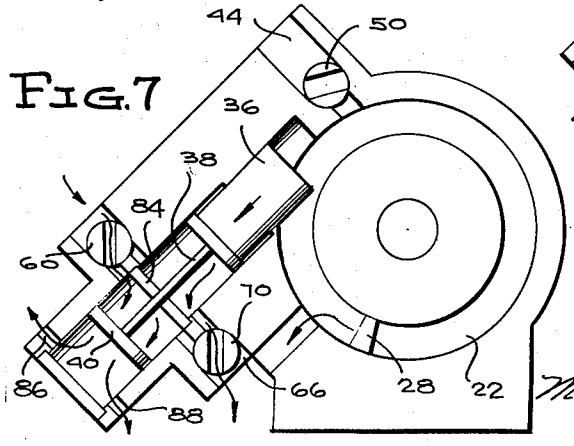


FIG. 7



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2,869,516

FLUID PRESSURE ROTARY ENGINE

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Application May 9, 1958, Serial No. 734,180

5 Claims. (Cl. 121—73)

The present invention relates to a fluid pressure rotary engine of the type having a rotary piston.

An object of the present invention is to provide a fluid pressure rotary engine which is operable by steam or other fluid pressure, one quiet in operation, one highly efficient when operated on low pressure fluid, and one positive in action.

Another object of the present invention is to provide a fluid pressure rotary engine which has relatively few parts, one which may be constructed in any size with any number of rotors as desired, and one which is economically feasible.

These and other objects and advantages of the present invention will be fully apparent from the following description when taken in connection with the annexed drawings, in which:

Figure 1 is an elevational view of the engine according to the present invention,

Figure 2 is a view from the top of the assembly shown in Figure 1 with the manifold shown cut away to show the inlet openings,

Figure 3 is a view taken on the line 3—3 of Figure 2, and on an enlarged scale,

Figure 4 is a view taken on the line 4—4 of Figure 3,

Figure 5 is a view taken on the line 5—5 of Figure 3,

Figure 6 is a schematic view showing a first step in the operation of the engine,

Figure 7 is another schematic view showing a second step, and

Figure 8 is a schematic view showing still another step in the operation of the engine according to the present invention.

Referring in greater detail to the drawings in which like numerals indicate like parts throughout the several views, the engine of the present invention is designated generally by the reference numeral **10** and includes a chest **12**, constituting a closed casing. A shaft **14** has its end portions mounted in bearing assemblies **16** and **18** and is rotatable within the chest **12** in the clockwise direction when viewed as in Figure 3.

A rotor **20** is secured to the shaft **14** for rotation therewith and is provided with a groove **22** extending completely around the periphery, the groove **22** being semicircular in cross section, as shown most clearly in Figure 4.

A second rotor **24** is similarly provided with a groove **26**, the second rotor **24** being fixedly secured to the rotor **20**. Any number of rotors may be mounted within the chest on the shaft **14**, as desired. For the purposes of illustration only two rotors will be described.

A piston **28** bridges the groove **22** and is fixedly secured to the rotor **20**, as shown in full lines in Figure 3. A second piston **30** is similarly positioned and secured to the rotor **24** and is seen in Figure 3 to be diametrically oppoiste the piston **28** and shown in dotted lines.

A pair of cylindrical piston chambers **32** and **34** are positioned within the chest **12** so as to be tangential with respect to the grooves **22** and **26**, respectively. Each

chamber **32** and **34** has one end in communication with the associated groove **22** or **26**. As shown in Figure 3, with respect to the rotor **20** and chamber **32**, a piston **36** is workable in the chamber **32** and when it is at the limit of its movement upwardly with respect to the chest **12** it projects into the groove **22** and closes the same. The piston **36** has a piston rod **38** projecting from its lower end and the piston rod **38** carries a second piston **40** which has an upper face and a lower face. The piston **36** with the piston **40** constitutes a double piston movable within the chamber **32** as a unit. Another piston (not shown), is workable in the other chamber **34** and is similarly constituted.

A manifold **42** is formed by a cover on a portion of the chest exteriorly of and spaced from the chambers **32** and **34** and is connected by means of passageways **44** and **46** to the grooves **22** and **26** respectively. The manifold **42** is provided with a single inlet **48** connecting it to a source of fluid pressure, such as a steam boiler, or the like.

A first rotary valve **50** is rotatably supported in the chest **12** with the portion adjacent one end extending exteriorly of the chest **12**. The valve **50** bisects the passageways **44** and **46** and controls the flow of fluid pressure from the manifold **42** into the grooves **22** and **26**.

The holes **52** and **54** in the valve **50** are at right angles to each other. As seen in Figures 3 and 5, other pasasgeways **56** and **58** connect the manifold **42** to the chambers **32** and **34** and a second rotary valve **60** is mounted in the chest **12** with the portion exteriorly of the chest **12** so that it bisects the passageways **56** and **58** and controls the flow of fluid pressure from the manifold **42** into the chambers **32** and **34**.

The grooves **22** and **26** have outlets **62** and **64**.

Other passageways **66** and **68** connect the chambers **32** and **34** to the atmosphere, as shown most clearly in Figure 3, with reference to the passageway **66**. A third rotary valve **70** bisects the passageways **66** and **68** and controls the exhausting of the fluid pressure from the chambers **32** and **34**. All of the valves **50**, **60** and **70** have portions exteriorly of the casing or chest **12** and each carries a spur gear on the projecting end portions as shown in Figures 1 and 2. The gears for the valves **50**, **60** and **70** are designated by the numerals **72**, **74** and **76**, respectively. All of the gears **72**, **74** and **76** are in mesh with an idler gear **78**. The driven shaft **14** carries on its projecting end portion a drive gear **80** which is in mesh with a reversing gear **82**, the latter being in mesh with the idler gear **78**. Clockwise rotational movement of the shaft **14** causes the gears **72**, **74** and **76** to rotate in the directions indicated by the arrows in Figure 1.

The operation of the engine of the present invention will be fully understood with reference to Figures 6 to 8 inclusive, in which the piston **20** is shown in the groove **22** and the piston **36** is working in the chamber **32**. It is to be understood that the sequence of operation will apply also to the piston **30** working in the annular groove **26** and the other piston in the chamber **34**. In Figure 6, the piston **28** is shown moving in the direction of the arrow approaching the outlet **62** and forcing before it the spent air within the groove **22**. The valve **50** is shown as just closing the passageway **44**. The valve **60** is shown just opening by reason of its rotation in the direction of the arrow and admitting steam or other fluid under pressure to the side of the piston **40** nearest the piston **36**. This results in shifting of the piston **36** out of the groove **22**, moving in the direction of the arrows shown in Figure 7. A partition **84** divides the chamber **32** and the piston rod **38** travels through the partition **84**. The valve **70** is shown in Figure 7 to be open and allowing the air on the side of the partition **84** nearest the piston **36** to be exhausted to atmosphere. The air on the side of the piston **40** remote from the piston **36** is being exhausted

through outlets 86 and 88. The piston 28 now is not impeded in its path in the groove 22 and moves to the position shown in Figure 8. The valve 60 has now turned to the position in which it admits fluid under pressure to the side of the partition 84 adjacent the piston 36 and the valve 70 is moved to the position in which it permits the fluid pressure on the side of the piston 40 adjacent the piston 36 to escape through the passageway 66. Fluid pressure on the side of the piston 36 adjacent the partition 84 effects the movement of the piston 36 to the position in which it bridges and closes the groove 22. The piston 28 in the meantime has traveled past the passageway 44 and the valve 50 is moved to open the passageway 44, permitting fluid under pressure to again exert pressure on the side of the piston 28 adjacent the piston 36.

Meanwhile, the piston in the chamber 34 and the piston 30 in the groove 36 are similarly operated and the shaft 14 is driven with smooth impulses applied to it for every 180 degrees of revolution.

A machine to be driven may be connected to either projecting end portion of the shaft 14 as desired.

What is claimed is:

1. In a fluid pressure rotary engine, a closed chest, a shaft to be rotated mounted in said chest, a rotor secured to said shaft for rotation therewith, said rotor being provided with a groove extending completely about the periphery thereof, a piston bridging the groove and carried by said rotor, a cylindrical piston chamber within said chest and arranged tangentially with respect to said groove and having part of one end in communication with said groove, a piston working within said chamber, a manifold within said chest and spaced from said piston chamber, an inlet into said manifold for introducing fluid pressure into said manifold, a first passageway connecting said manifold to said groove, a second passageway connecting said manifold to said piston chamber intermediate the ends thereof, an outlet from said groove, a first rotary valve in said first passageway for controlling the flow of fluid pressure from said manifold to said groove, and a second rotary valve in said second passageway for controlling the flow of fluid pressure from said manifold to said piston chamber.

2. In a fluid pressure rotary engine, a closed chest, a shaft to be rotated mounted in said chest, a rotor secured to said shaft for rotation therewith, said rotor being provided with a groove extending completely about the periphery thereof, a piston bridging the groove and carried by said rotor, a cylindrical piston chamber within said chest and arranged tangentially with respect to said groove and having part of one end in communication with said groove, a piston working within said chamber, a manifold within said chest and spaced from said piston chamber, an inlet into said manifold for introducing fluid pressure into said manifold, a first passageway connecting said manifold to said groove, a second passageway connecting said manifold to said piston chamber intermediate the ends thereof, an outlet from said groove, a first rotary valve in said first passageway for controlling the flow of fluid pressure from said manifold to said groove, a second rotary valve in said second passageway for controlling the flow of fluid pressure from said manifold to said piston chamber, a third passageway connecting said piston chamber with the atmosphere, and a third rotary valve in said third passageway for controlling the flow of fluid pressure from said piston chamber to the atmosphere.

3. In a fluid pressure rotary engine, a closed chest, a shaft to be rotated mounted in said chest, a rotor secured to said shaft for rotation therewith, said rotor being provided with a groove extending completely about the periphery thereof, a piston bridging the groove and carried by said rotor, a cylindrical piston chamber within said chest and arranged tangentially with respect to said groove and having part of one end in communication with said groove, a double piston working within said chamber, a manifold within said chest and spaced from said piston chamber, an inlet into said manifold for introducing fluid pressure into said manifold, a first passageway connecting said manifold to said groove, a second passageway connecting said manifold to said piston chamber intermediate the ends thereof, an outlet from said groove, a first rotary valve in said first passageway for controlling the flow of fluid pressure from said manifold to said groove, and a second rotary valve in said second passageway for controlling the flow of fluid pressure from said manifold to each side of one of said pistons.

4. In a fluid pressure rotary engine, a closed chest, a shaft to be rotated mounted in said chest, at least two rotors arranged in end to end relation secured to said shaft for rotation therewith, each of said rotors being provided with a groove extending completely about the periphery thereof, a piston bridging each groove and carried by the adjacent rotor, a cylindrical piston chamber within said chest and arranged tangentially with respect to each of said grooves and having part of one end in communication with said groove, a piston working within each of said chambers, a manifold within said chest and spaced from said piston chambers, an inlet into said manifold for introducing fluid pressure into said manifold, a first passageway connecting said manfold to each of said grooves, a second passageway connecting said manifold to each of said piston chambers intermediate the ends thereof, an outlet from each of said grooves, a first rotary valve in each of said first passageways for controlling the flow of fluid pressure from said manifold to the adjacent groove, and a second rotary valve in each of said second passageways for controlling the flow of fluid pressure from said manifold to the adjacent piston chamber.

5. In a fluid pressure rotary engine, a closed chest, a shaft to be rotated mounted in said chest, at least two rotors arranged in end to end relation secured to said shaft for rotation therewith, each of said rotors being provided with a groove extending completely about the periphery thereof, a piston bridging each groove and carried by the adjacent rotor, a cylindrical piston chamber within said chest and arranged tangentially with respect to each of said grooves and having part of one end in communication with said groove, a double piston working within each of said chambers, a manifold within said chest and spaced from said piston chambers, an inlet into said manifold for introducing fluid pressure into said manifold, a first passageway connecting said manifold to each of said grooves, a second passageway connecting said manifold to each of said piston chambers intermediate the ends thereof, an outlet from each of said grooves, a first rotary valve in each of said first passageways for controlling the flow of fluid pressure from said manifold to the adjacent groove, and a second rotary valve in each of said second passageways for controlling the flow of fluid pressure from said manifold to each side of one of said pistons in the adjacent piston chamber.

No references cited.