A. BRAUER.

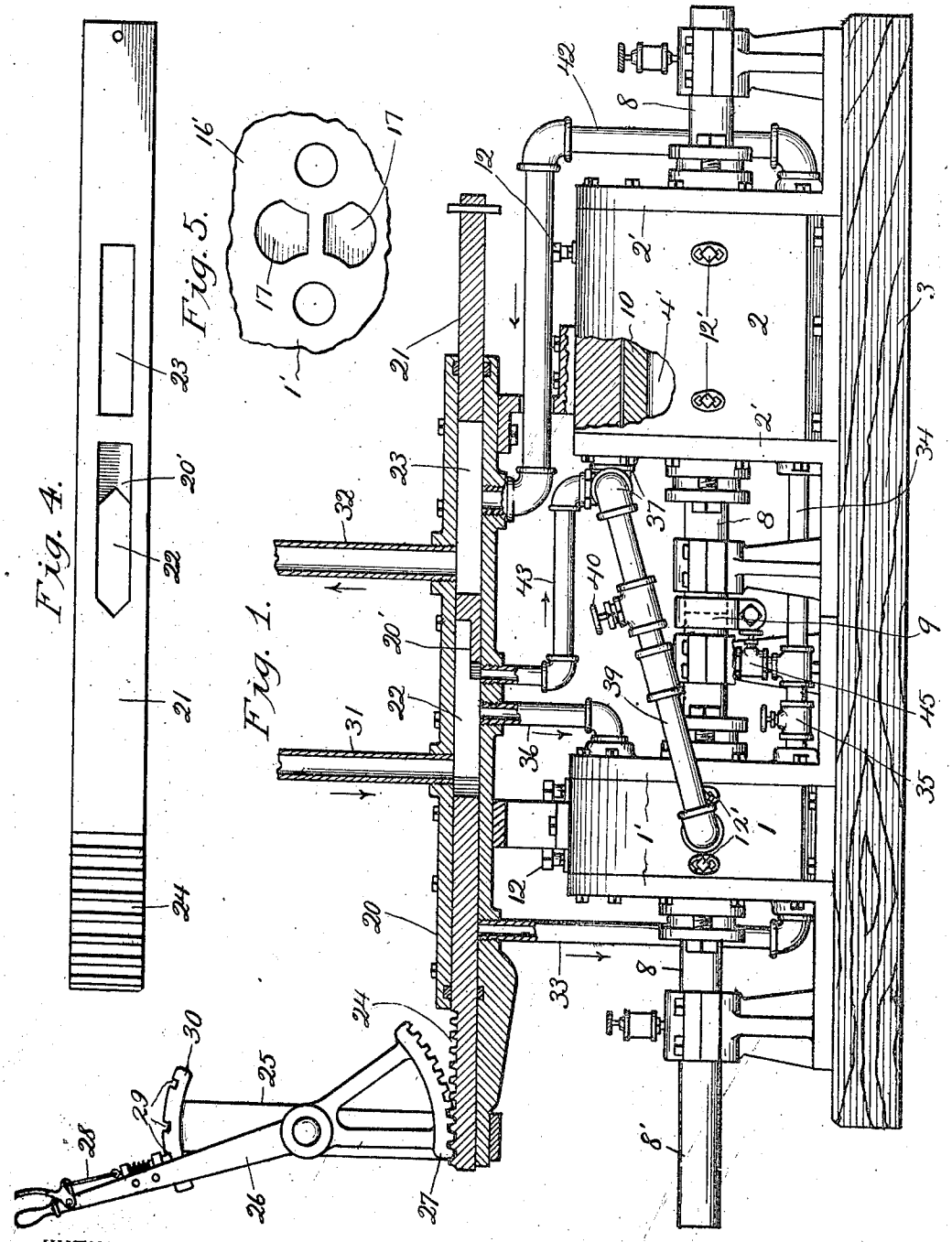
ROTARY MOTOR.

APPLICATION FILED JULY 29, 1910.

1,013,926.

Patented Jan. 9, 1912.

2 SHEETS—SHEET 1.



WITNESSES:

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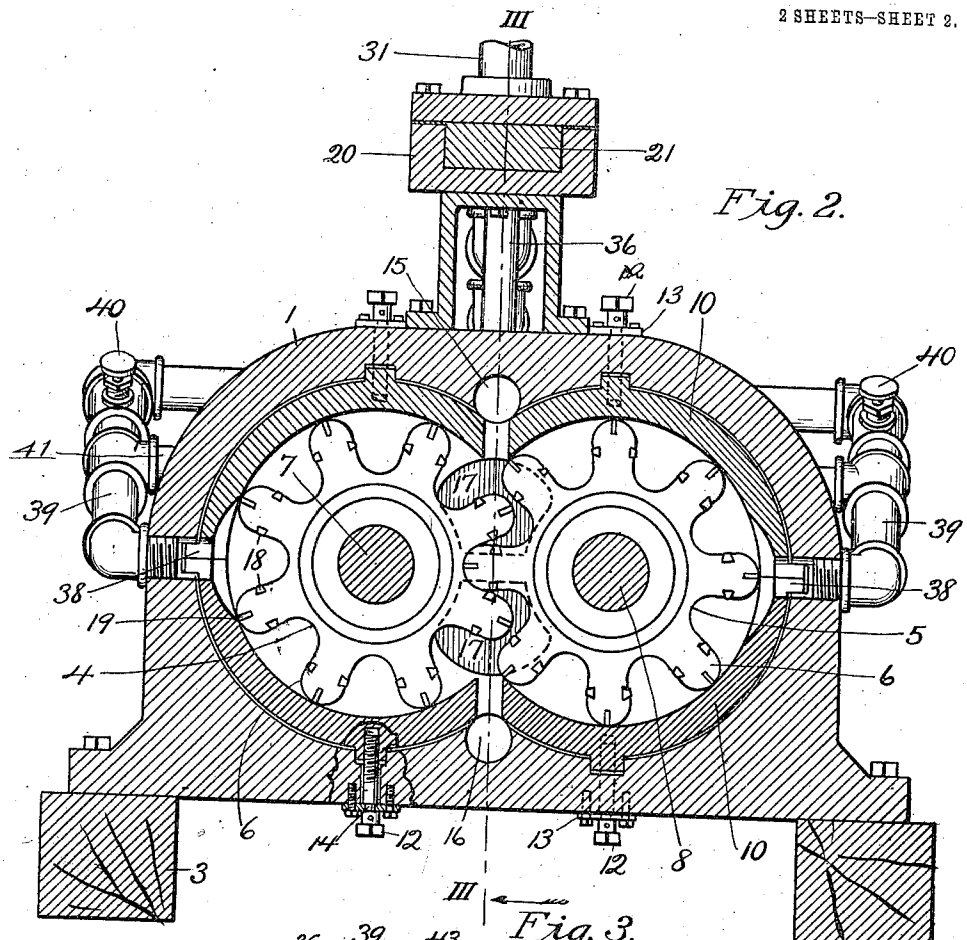

Fig. 2.

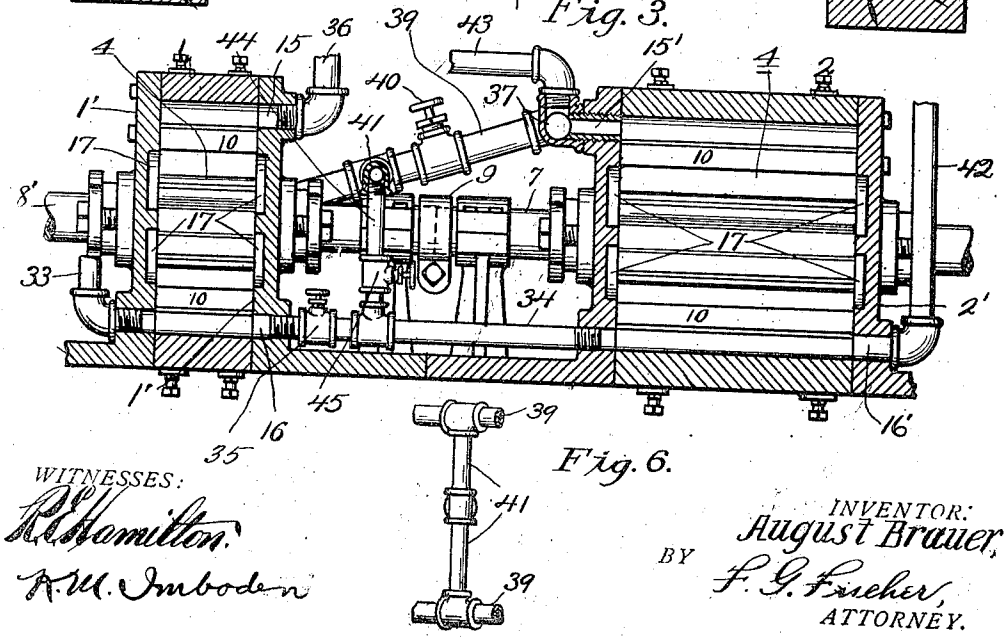

Fig. 3.

Fig. 6.

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AUGUST BRAUER, OF INDEPENDENCE, MISSOURI, ASSIGNOR TO AUGUST BRAUER STEAM ROTARY MOTOR COMPANY, OF INDEPENDENCE, MISSOURI.

ROTARY MOTOR.

1,013,926. Specification of Letters Patent. **Patented Jan. 9, 1912.**

Application filed July 29, 1910. Serial No. 574,500.

To all whom it may concern:

Be it known that I, AUGUST BRAUER, a citizen of the United States, residing at Independence, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Rotary Motors, of which the following is a specification.

This invention relates to rotary elastic fluid motors; and one object is to provide a motor of this character which is adapted to transmit the power of motive fluid—such as steam, air, etc.,—with the greatest efficiency.

A further object is to provide a motor of this type wherein the fluid may be worked either "compound" or in both cylinders at full pressure, by manipulation of valves.

A further object is to prevent stalling or loss in efficiency by preventing any extreme compression of the motive fluid between the working parts.

Further objects are to provide improved piston packings and a simple valve for starting, stopping, reversing, and "compounding" the motor.

In order that the invention may be fully understood, reference will now be made to the accompanying drawings, in which:

Figure 1 is a side elevation of the motor showing the reversing valve in vertical section. Fig. 2 is a vertical section of one of the cylinders showing the pistons in elevation. Fig. 3 is a reduced scale section on line III—III of Fig. 2, omitting the reversing valve. Fig. 4 is a detail plan view of the reversing valve detached. Fig. 5 is a detail view of a portion of the inner wall of either cylinder, showing the anti-pocketing recesses. Fig. 6 is a plan view of a certain connection.

In the drawings I have shown the motor as comprising two cylinders 1 and 2, rigidly mounted on a base 3. Each cylinder is made to receive a pair of pistons 4 and 5 which are formed with intermeshing blades 6. The pistons are fixedly mounted on shafts 7 and 8 which extend through the cylinders and are coupled at 9; the projecting ends 8′ receiving pulleys (not shown) for belt driving. I consider it unnecessary to provide gearing between the shafts, as the pistons themselves form positive gears. Within each cylinder 1 and 2 are two pairs of segmental liners 10, set respectively, above and below the pistons 4 and 5 and providing true surfaces for contacting the tips of the piston blades. Each liner is supported by two set-screws 12 which enter threaded holes therein and pass loosely through unthreaded holes in the cylinders; lengthwise motion of the screws being prevented by cap-plates 13 projecting into grooves 14 in the screws. By adjusting said screws the liners 10 are adjusted to the piston blades, and when the blades and liners become worn the latter are easily and quickly readjusted. At the sides of the cylinders, similar devices 12′ are provided for holding and adjusting the liners at points quartering from the screws 12.

Cylinder 1 is provided with upper and lower ports 15 and 16, either of which may be used as an inlet port directly to the pistons, and the ends of the liners are spaced apart to provide communication between ports 15 and 16 and the pistons.

The end walls 1′ and 2′ of each cylinder are formed with suitably-shaped recesses 17, arranged close to the meshing points of the piston blades as shown in Figs. 2 and 5. Without these recesses the motive fluid would become highly compressed between the revolving pistons with harmful effects. With the recesses the fluid compressed between the pistons will expand or escape into said recesses. The peripheries of the blades may therefore be accurately fitted together as shown in Fig. 2.

Each blade is provided with three peripheral packings 18 and 19, one of which is inserted in the tip or crown of the blade, the others in the flanks thereof. These prevent leakage of fluid between the pistons when the motor is not in operation.

Adjacent to the motor is provided a valve-chest 20, in which is mounted a reversing valve 21. This valve is provided with an inlet port 22, and exhaust port 23, and a racked portion 24. Mounted on a standard 25 is a lever 26 having a gear sector 27 engaging the valve rack 24, and having a latch 28 adapted to engage three notches 29 in an arc 30 on standard 25. The two extreme positions of the valve permit the motor to run, in opposite directions, and the intermediate position thereof cuts off the motive fluid. Connected to the valve chest 20 are the supply pipe 31 and the exhaust pipe 32. One end of the chest 20 is connected to port 16 by a pipe 33. From the same port 16, a pipe 34 leads to a corresponding port in cyl-

inder 2. In pipe 34 is a hand-valve 35. The port 15 of cylinder 1 is connected by a pipe 36 with the valve-chest 20.

Connected to the upper port 15′ of cylinder 2 is a three-way union 37. In opposite sides of cylinder 1 are ports 38, to which are connected, respectively, two pipes 39 which are each connected to the lateral ways of the union 37. In each pipe 39 is a hand-valve 40. These pipes 39 are connected together by a cross-pipe 41. Pipe 34 is connected with cross-pipe 41 by a pipe 44, in which is a hand-valve 45. Connected to the lower port 16′ of cylinder 2 is an exhaust pipe 42, which is connected to the valve-chest 20 adjacent the valve-port 23. From the union 37 a pipe 43 is connected to the valve-chest 20 adjacent the valve-port 22. The valves 40 are between the cross-connection 41 and the union 37.

With the valve 21 in the position shown in Fig. 1, the motor will run in one direction, and the course of the motive fluid will be governed by the open or closed condition of the valves 35, 40, and 45. To use the fluid simple in both cylinders 1 and 2, the valves 40 must be closed. The fluid under pressure now enters valve port 22 and passes to the respective cylinders through pipes 36 and 43. Cylinder 1 exhausts through pipe 34 into cylinder 2, thence through pipe 42, valve port 23, and exhaust pipe 32. Cylinder 2 exhausts also through pipe 42, etc.

To use the fluid compound, the lever 26 is moved to middle position and latched, thereby causing the valve-lip 20′ to close the mouth of pipe 43, shutting off the pressure from cylinder 2. Valves 40 are opened, also valve 35; and valve 45 is closed. The fluid now actuates the pistons as before, and exhausts through ports 38 and 16. From the former it traverses pipes 39 enters the inlet port 15′ of cylinder 2, actuates the pistons 4′ therein, and exhausts as above stated. That portion of the fluid in cylinder 1 which exhausts through port 16, passes through valve 35, pipe 34, into cylinder 2, thence out by way of pipe 42, etc.

The cylinder 2 and its pistons are made proportionately longer than the primary cylinder 1. to the end that the power developed in the former by the reduced pressure may equal the power developed in the latter by the full initial pressure.

The motor may be stopped by causing the valve lip 20′ to cover the mouths of the pipes 36 and 43. The motor may be reversed by throwing the lever 26 to the extreme right, whereby the pipe 42 will be cut off from the exhaust pipe 32, the pipes 36 and 43 communicating with said exhaust pipe 32 through valve port 23, and the pipe 33 connected with the supply pipe 31 through the valve-port 22. The fluid will then enter cylinder 1 at the bottom port 16 and drive the pistons reversely, exhausting through port 15 and pipe 36, also through ports 38, pipes 39, pipes 44, and through pipe 34 into cylinder 2, when it acts upon pistons 5 before escaping through port 15′, pipe 43, and port 23, into exhaust pipe 32. During the foregoing operation valves 40 are closed to prevent the escape of steam into pipe 43, without acting upon the pistons 5.

It will be understood that the pipes 39 when open serve to conduct the exhaust from the one cylinder to the intake of the other, when the motor is running compound. It will also be understood that the pipe 34 when open may serve either of two purposes; to connect the exhaust of cylinder 1 with the exhaust pipe 42 through a part of the cylinder 2, when running in one direction; or to convey the live fluid from pipe 33 to the intake of cylinder 2 when running in the other direction.

When desired the motor may be employed to good advantage for pumping water in which case it may be driven by any other suitable motor, or piston 5 may be utilized for pumping water while driven by piston 4.

Having thus described my invention, what I claim is:

1. A rotary motor comprising two cylinders of unequal dimensions, two coupled shafts extending through the cylinders, twin intermeshing pistons fixedly-mounted on the shafts, within each cylinder, means for supplying fluid at full pressure to the smaller cylinder, connections between the exhaust of the smaller cylinder and the intake of the larger cylinder, a connection between one intake or exhaust port of the smaller cylinder and one intake or exhaust port of the larger cylinder, and a connection between the last-named connection and the above-named connections.

2. A rotary motor comprising two cylinders of unequal dimensions, two coupled shafts extending through the cylinders, twin intermeshing pistons fixedly-mounted on the shafts within each cylinder, means for supplying fluid at full pressure to the smaller cylinder, a pipe 34 connecting a port of the smaller cylinder with a port of the larger cylinder, pipes 39 connecting exhaust ports of the former with an inlet port of the latter, a pipe 41 connecting the pipes 39, a connection between pipes 41 and 34, and exhaust connections to both cylinders.

3. A rotary motor comprising two cylinders, two coupled shafts passing through the cylinders, twin intermeshing pistons fixedly-mounted on the shafts within each cylinder, a valve-chest, connections between said chest and the inlets and exhausts of each cylinder, a valve in said chest, adapted to start and stop the motor and also to govern the flow of the fluid for compound or other operation, connections for fluid be-

tween the cylinders, and manual valves in said connections.

4. A rotary motor comprising two cylinders, two coupled shafts passing through the cylinders, twin intermeshing pistons fixedly-mounted on the shafts within each cylinder, a valve-chest, connections between said chest and the inlets and exhausts of each cylinder, a valve in said chest, adapted to start and stop the motor and also to reverse the running direction of the motor, connections for fluid between the cylinders, and manual valves in said connections.

5. A rotary motor comprising two cylinders, two coupled shafts passing through the cylinders, twin intermeshing pistons fixedly-mounted on the shafts within each cylinder, a valve-chest, pipes 33 and 36 connecting opposite ports of one cylinder to the valve chest, pipes 42 and 43 connecting opposite ports of the other cylinder to the valve-chest, a valve adapted to connect pipes 36 and 43 simultaneously to pressure and pipe 42 to exhaust, or to close pipe 43 only, or to connect pipe 33 to pressure and pipes 36 and 43 to exhaust while closing pipe 42; connections between exhaust ports of one cylinder and a port of the other cylinder, and a connection 34 between other ports of the cylinders.

6. In a rotary motor, the cylinders 1, 2, the shafts 7, 8, the pistons 4, 5, the pipes 39, the valves 40 in the pipes 39, the valve-chest, the pipes 43, 33, and 42, the pipe 34, the valve 35 in pipe 34, the cross connections 41, the connection 44 between 41 and 34, and the valve 45 in connection 44.

7. In a rotary motor, a cylinder, two shafts extending therethrough, twin intermeshing pistons fixedly-mounted on the shafts, a plurality of adjustable segmental liners contacting each piston and covering substantially, the entire interior surface of the cylinder, and screws for adjusting said liners.

8. In a rotary motor, a cylinder having end walls, twin intermeshing pistons rotatively-mounted within the cylinder, said pistons having interfitting blades, and said end walls being formed with recesses adapted to relieve excessive pressure between coengaged blades of the two pistons, said recesses extending above and below the coengaged blades.

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

AUGUST BRAUER.

Witnesses:

F. G. FISCHER,

M. COX.