A. BRAUER.

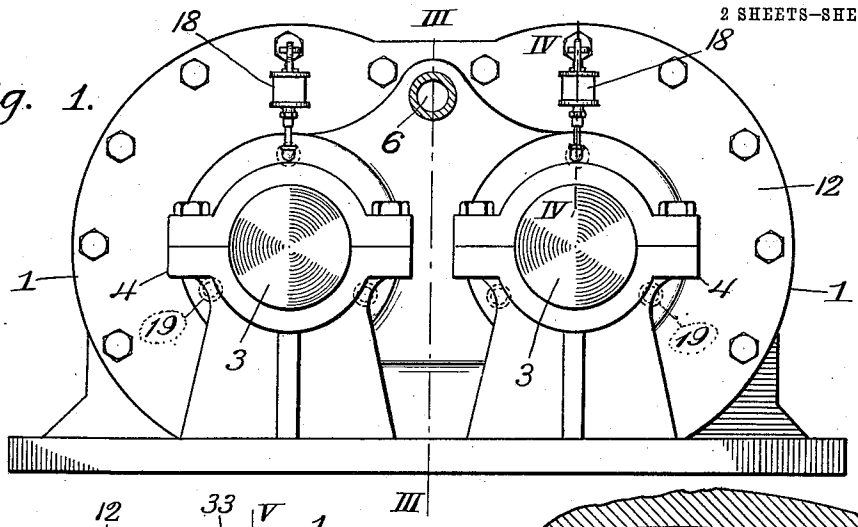
ROTARY ENGINE.

APPLICATION FILED FEB. 6, 1911.

1,023,360. Patented Apr. 16, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



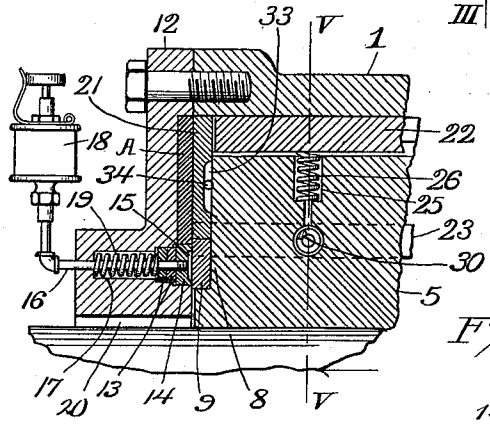


Fig. 4.

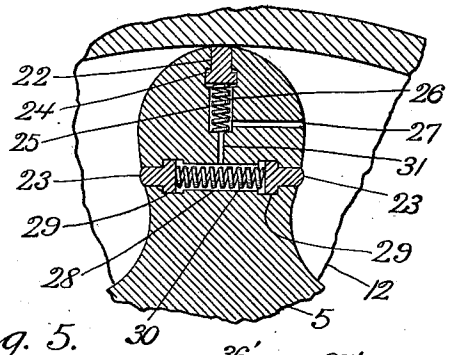


Fig. 5.

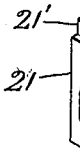


Fig. 7.

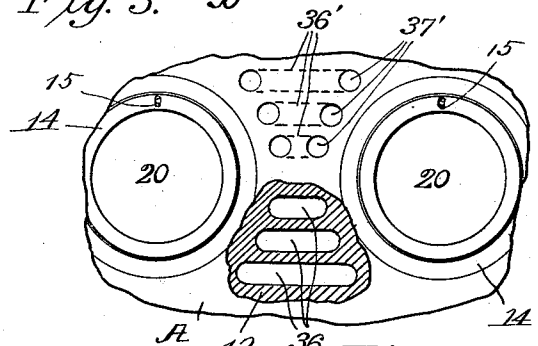
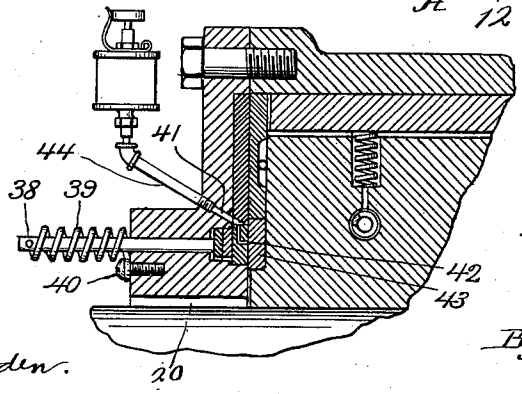


Fig. 6.

Fig. 8.



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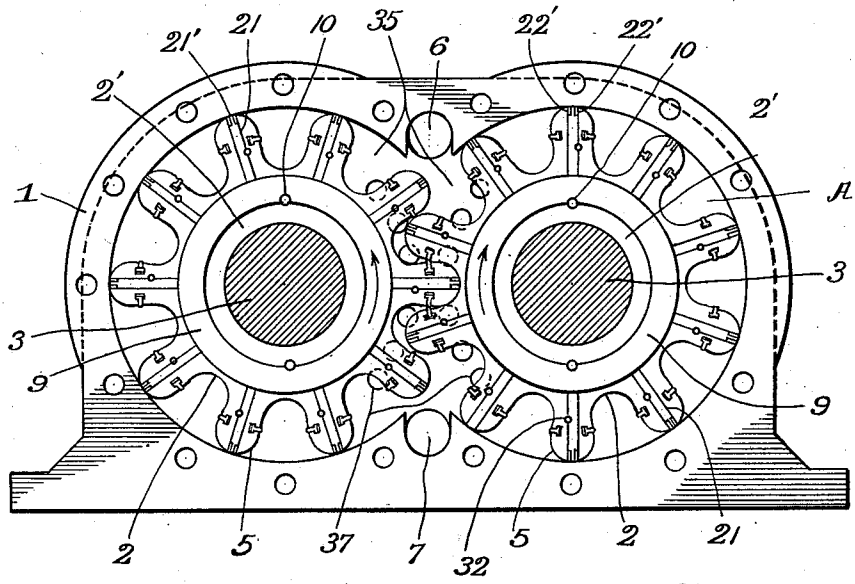
2 SHEETS—SHEET 2.

Fig. 2.



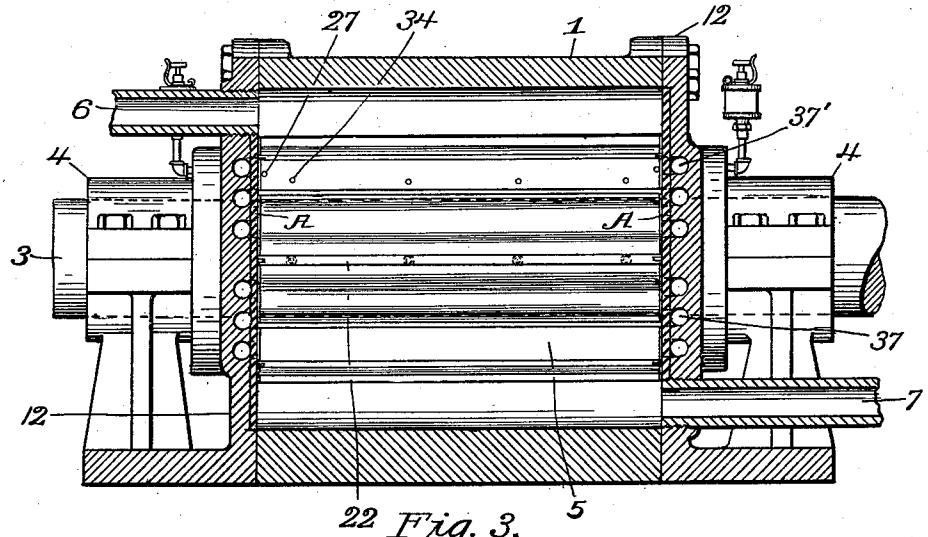


Fig. 3.

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UNITED STATES PATENT OFFICE.

AUGUST BRAUER, OF INDEPENDENCE, MISSOURI.

ROTARY ENGINE.

1,023,360. Specification of Letters Patent. **Patented Apr. 16, 1912.**

Application filed February 6, 1911. Serial No. 606,967.

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 Engines, of which the following is a specification.

My invention relates to rotary elastic fluid motors, and has special reference to the packings which prevent leakage of the motive fluid.

One object of the invention is to provide a superior packing and lubricating device instead of stuffing-boxes around the shaft, and another object is to provide efficient packings for each of the intermeshing piston cogs.

A further object is to provide improved relief pockets that are adapted to the improved piston packings herein described.

I will proceed to describe the invention by reference to the accompanying drawings, in which:—

Figure 1 is an end elevation of the type of motor to which my improvements are especially adapted. Fig. 2 is an end elevation with the rear cylinder head removed, the shafts in section. Fig. 3 is a vertical section of the cylinder heads on line III—III of Fig. 1, the other parts being in elevation. Fig. 4 is an enlarged section of one of the cogs and surrounding parts of the cylinder, on line IV—IV of Fig. 1. Fig. 5 is a section of one of the cogs on line V—V of Fig. 4. Fig. 6 is a detail view of the inner face of one of the cylinder heads adjacent the shaft holes, showing the relief pockets. Fig. 7 is a perspective of one of the packings. Fig. 8 is a view similar to Fig. 4, showing a modification.

The motor illustrated comprises a cylinder 1—1, containing two intersecting bores adapted for the reception of a pair of rotary pistons 2, fixed on shafts 3, which have ordinary journal bearings 4. Each piston consists of a hub 2′ provided with peripheral cogs 5, which are formed to mesh accurately with the cogs of the other piston.

6 is the admission port and 7 is the exhaust port, for the motive fluid.

Each end of the piston hub 2′ has an annular recess 8, in which is seated a packing ring 9, which is compelled to rotate with the piston by means of pins 10, arranged as shown in Fig. 2.

Cut in each cylinder head 12 is an annular groove, registering with the packing ring 9. In this groove are seated, first, two ordinary snap-rings 13, having their joints overlapped; then a solid packing ring 14, which contacts one of the snap-rings and comes flush with the inner face of the cylinder head. In the wear face of this ring is a shallow annular oil-groove 15. Ring 14 is tapped to receive an oil-tube 16, which passes through holes in the rings 13, and through a spring chamber 17, and out to the exterior, where it is connected with an oil-cup 18. A compression spring 19 is mounted on the tube 16, and bears inwardly upon the adjacent ring 13. This combination of rings prevents leakage of motive fluid out around the shaft, so that the shaft opening 20 may be larger than the shaft, as shown.

Preferably, each set of rings 13, 14 should be provided with a series—say three—of springs like the spring 19 shown in Fig. 4; such springs being indicated by dotted lines in Fig. 1. This does not imply the use of an oil-cup at each spring though such equipment be desirable.

Each cog 5 of either piston is provided with two lateral or radial packings 21, and with three transverse or peripheral packings 22, 23, and suitable grooves are cut in the cog to receive them. The transverse groove is undercut, as shown at 24, to receive an enlargement on the packing 22. A spring chamber 25 is bored into the bottom of the groove, and a compression spring 26 placed therein. A steam duct 27 is drilled from one face of the cog into said spring chamber. To provide for the lateral packings 23, a hole 28 is bored clear through the cog, and at the ends of said hole each face of the cog is grooved transversely, and undercut as at 29, to receive the packings 23. A compression spring 30 between said packings presses them outwardly. A steam duct 31 is drilled from the radial spring chamber 25 into the spring chamber 28.

To receive the radial packings 21, radial

grooves are cut in the end faces of the cog, extending from the ring 9 to the end of the cog. Each packing 21 has a tenon 21′ at its outer end, and each packing 22 has bifurcations 22′ adapted to receive said tenons 21′. This permits the former to extend out to the bore of the cylinder, and the latter to extend the full width of the piston.

32 designates pins which may be provided for holding the packings 21 in position.

As shown in Fig. 4, each radial packing 21, is formed with a chamber 33 in its inner face, for the reception of motive fluid. Into each said chamber, a small hole 34 is drilled from the curved face of the cog (see Fig. 3).

When the motive fluid is admitted at port 6, it fills the space 35 between some of the cogs and passes through the duct 27 thereof into the spring chambers 25, 28, so as to exert outward pressure upon the packings 22, 23. Said fluid also enters the ducts 34 of said cogs and the chambers 33 in packings 21, thereby pressing the latter outwardly against wear-plates A, countersunk in the cylinder heads. The pistons will rotate in the direction of the arrows, Fig. 2, and the fluid will exhaust through the lower port 7.

In order to permit the pistons to rotate, provision must be made to relieve the compression that will occur between the meshing ascending piston cogs. To this end, I provide each cylinder head with a set of horizontal relief pockets, 36, 36′, the ends of which register with small holes 37, 37′, respectively, drilled in pairs in the wear-plates A. These holes 37, 37′ register with the spaces between the cogs, and receive the compressed fluid as the pistons rotate.

It will be noted that the pairs of holes 27, 27′ are arranged on lines parallel with a line connecting the piston centers, which in this case is horizontal.

The openings 37 37′ are as small as practical, so that the packings 21 which pass them will not contact with the edges thereof.

The spring packing arrangement shown in Fig. 4 is practical with steam power at moderate pressure; but where very high steam pressures are used it is desirable to locate the springs 19 outside of the metal, to prevent loss of their temper through overheating. A suitable construction is illustrated in Fig. 8, in which a rod 38 is substituted for the oil tube 16, said rod being slidably fitted. A tension spring 39 is fixed by a screw 40 to the cylinder head, and its outer end is secured to said rod, thereby pressing same inwardly. The oil duct 41 is drilled at an angle through the cylinder head, and connects with a duct 42 drilled in the ring 43. The oil tube 44 is screwed into the duct 41. It is evident that the spring 39 will not become sufficiently heated to draw its temper.

Having thus described my invention what I claim, and desire to secure by Letters Patent, is:

1. In a rotary motor, a piston member provided with three transverse grooves, packings in said grooves, and springs pressing outwardly upon the respective packings, one of said springs acting upon two of said packings.

2. In a rotary motor, a piston member provided with a radial groove in its end face, a packing in said groove, said packing having a chamber, and a duct through the piston member into said chamber; said duct being adapted to admit a motive fluid behind said packing.

3. In combination, a cylinder head provided with an annular groove in its inner face; packing rings in said groove, a spring pressing inwardly upon said rings, an oil tube passing through said rings, the innermost ring having an annular oil chamber; a rotary piston having an annular recess; and a packing ring in said recess, contacting said chambered ring and rotating with the piston.

4. In combination, a cylinder head provided with an annular groove in its inner face; packing rings in said groove; a slidable rod contacting one of said rings; a spring pressing inwardly upon said rod; the innermost ring having an oil duct opening on its wear face; an oil tube entering said duct; a rotary piston having an annular recess; and a packing ring in said recess, contacting said innermost ring and rotating with the piston.

5. In a rotary motor, a cylinder, a pair of rotary pistons, each having intermeshing cogs adapted for propulsion within the cylinder, and a cylinder head provided with a pair of relief holes arranged on a line parallel with a line connecting the piston centers, and registering with a space between approaching cogs of the piston, and with a duct connecting said holes.

6. In a rotary motor, a cylinder, a pair of rotary pistons therein, each having intermeshing cogs within the cylinder and a cylinder head provided with a plurality of pairs of relief holes arranged on lines parallel to a line connecting the piston centers, and registering with a space between approaching cogs of the pistons, and with a duct connecting said holes.

7. In a rotary motor, the combination with a pair of cylinder heads, wear-plates countersunk in said heads, a pair of rotary pistons within said cylinder, and packing on the ends of said pistons contacting with said wear-plates.

8. In a rotary motor, a cylinder, a pair of rotary pistons therein, each having intermeshing cogs within the cylinder, cylinder heads provided with relief pockets registering with a space between approaching cogs of the pistons and wear-plates countersunk in said cylinder heads, and provided with holes arranged in pairs, each pair registering with one of said pockets.

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