

E. E. BIDWELL.
 PACKING MEANS FOR ROTARY ENGINES.
 APPLICATION FILED MAY 1, 1920.

1,424,977.

Patented Aug. 8, 1922.

2 SHEETS—SHEET 1.

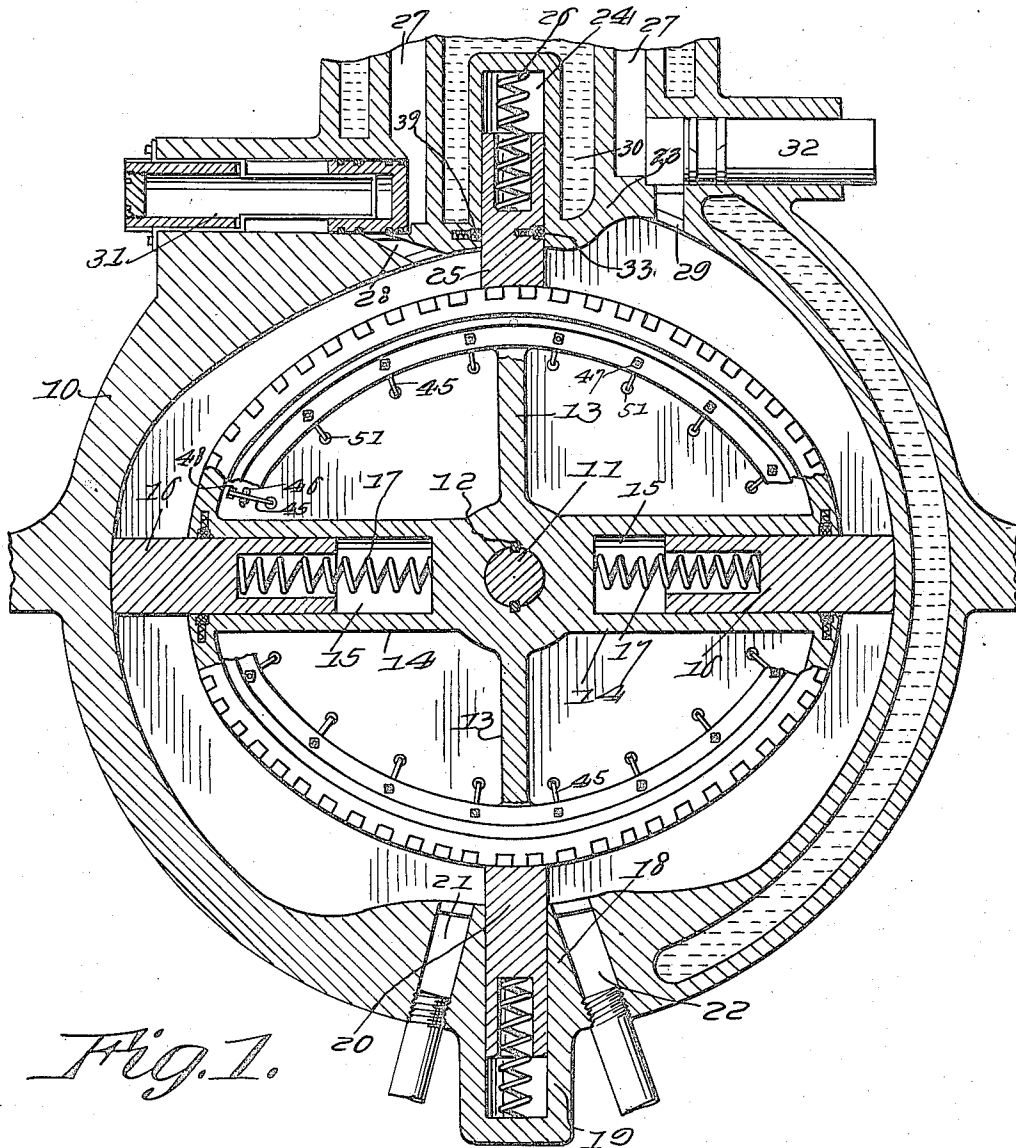


Fig. 1.

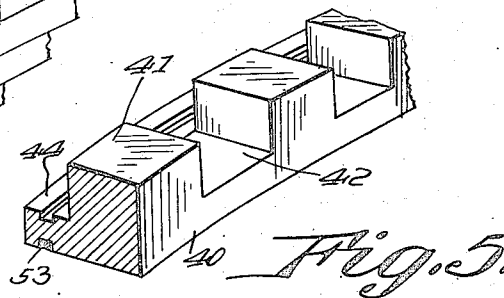
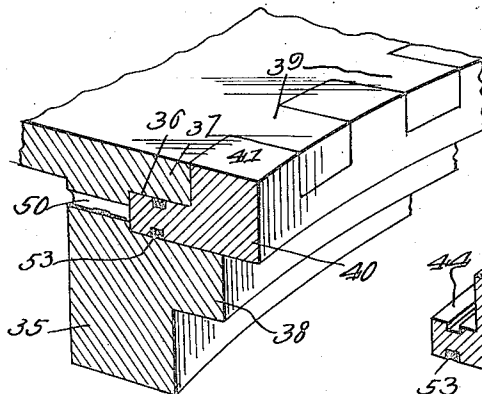
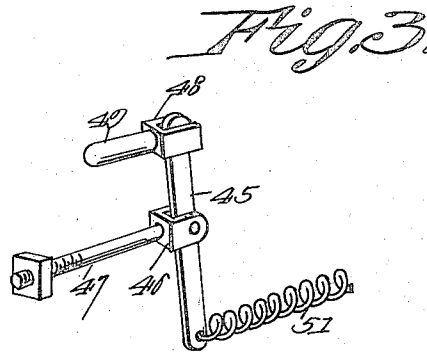
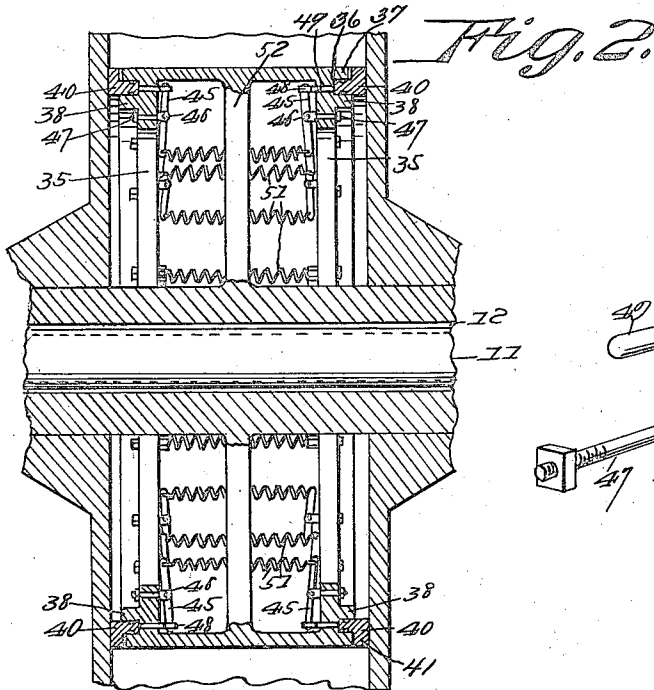
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UNITED STATES PATENT OFFICE.

EARL E. BIDWELL, OF FREDERICK, OKLAHOMA, ASSIGNOR OF FORTY-FIVE ONE-HUNDREDTHS TO PRICE QUESENBERRY, OF FREDERICK, OKLAHOMA.

PACKING MEANS FOR ROTARY ENGINES.

1,424,977.

Specification of Letters Patent.

Patented Aug. 8, 1922.

Application filed May 1, 1920. Serial No. 378,315.

To all whom it may concern:

Be it known that I, EARL E. BIDWELL, a citizen of the United States, residing at Frederick, in the county of Tillman and State of Oklahoma, have invented certain new and useful Improvements in Packing Means for Rotary Engines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to rotary engines, and particularly to an internal combustion rotary engine.

The general object of the invention is to provide improved means for packing the space between the rotor and the rotor casing to prevent the passage of motive fluid into the space between the end walls of the rotor and the end walls of the rotor casing.

A further object is to provide a construction of this character including packing rings supported in annular grooves formed in the periphery of the rotor and urged yieldingly outward by springs disposed within the rotor and thereby protected from the heat of the exploded gases.

A further object is to provide a construction of this character so formed that the packing rings are held from any longitudinal movement independently of the rotor, the packing ring and the recess in which it operates being interdigitated to form a series of baffles preventing passage of motive fluid through the joint between the packing ring and the rotor.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical sectional view through a rotary engine constructed in accordance with my application executed of even date herewith Serial No. 378,316, filed on the 1st day of May, 1920, the periphery of the rotor being shown partially in elevation;

Figure 2 is a fragmentary diametric sectional view through the rotor and adjacent parts of the casing;

Figure 3 is a perspective view of one of the levers for pressing out the rotor packing ring;

Figure 4 is a perspective view of a portion of the periphery of the rotor and of the packing ring in place;

Figure 5 is a fragmentary perspective view of the packing ring;

Referring to these drawings, 10 designates a rotor casing which may be of any suitable form. Extending through the rotor casing is the shaft 11 upon which the rotor 12 is mounted, the hub of this rotor being provided with radially extending webs 13 and 14, the webs 14 being spaced apart so as to form a recess 15 between them within which is disposed the piston blades 16, these blades being urged outward by springs 17 so that the end edge of the piston blade travels against the inner face of the rotor casing. The rotor casing at diametrically opposite points is formed with abutments, one of these abutments being designated 18 and formed with a recess 19 to receive the abutment valve or blade 20, and on one side of this abutment there is formed the inlet port 21 and on the opposite side the exhaust port 22. The inlet port is connected by a pipe to a suitable carbureter.

Diametrically opposite the abutment 18 the casing is formed to provide an abutment, designated generally 23, formed with a recess 24 within which is disposed the transversely extending abutment blade or valve 25. This valve 25 is urged outward by a spring 26. Arching over this valve or blade there is an explosion chamber 27 and communicating with one end of the explosion chamber is an inlet port 28 leading from the interior of the rotor casing, and on the opposite side of the explosion chamber there is an outlet port 29 leading into the rotor casing. A water space 30 is disposed between the wall of the recess 24 and the explosion chamber so that the abutment valve or blade 25 is kept cool and the spring 26 will not be affected by the heat.

Controlling the inlet of fluid to the explosion chamber 27 is a piston valve 31 which is reciprocated in any suitable manner, and when this valve is closed, that is when it is in the position shown in Figure 1, it closes the port 28 and when it is retracted, opens this port. A piston valve 32 alternately cuts off the port 29 and opens this port, and when this valve is closed it forms a portion of one wall of the explosion chamber 27. Each of these valves is hollow and has the form exteriorly of an ordinary piston valve and is provided with ordinary piston rings. The valve 31 is made

in two sections held together by a longitudinally extending clip, as illustrated in detail in my copending application heretofore referred to. The particular detailed construction of these valves and their means of operation are fully shown in my pending application of even date herewith above referred to. Preferably the blade 25 is provided with a packing strip 33, while the adjacent wall of the recess in which the blade operates is provided with a packing strip 34.

So far, all the parts which I have described are the same as found in my said application for patent above referred to, except that in this said application the rotor is shown as formed in two sections urged laterally by springs to engage against the side walls of the rotor casing, whereas in the present case the rotor is provided with packing rings on its periphery which engage with the side walls of the casing and are laterally urged outward. To this end, each end wall of the rotor casing, which is designated 35 and which is shown in detail in Figure 4, is annularly grooved, as at 36, the outer wall 37 of this groove being less in depth than the inner wall and the inner wall projecting out, as at 38, beyond the lateral face of the end wall of the rotor, as illustrated most clearly in Figure 2. The outer wall 37 of the groove 36 is formed with outwardly projecting tongues 39 disposed at spaced intervals and extending out beyond the inner wall 38. Coacting with each groove 36 is a packing ring 40 which has a width greater than the depth of groove 36 so that it projects out beyond the portion 38 of the rotor end, and the outer face of this ring 40 is formed with a series of outwardly extending tongues 41 which are of such size as to be disposed between the tongues 39 and fit these tongues snugly, the tongues 39 projecting into the space 42 between the tongues 41. These tongues 41 do not extend the whole depth of the ring, but only part of the depth of the ring, as illustrated in Figure 5, so that the body of the ring extends beyond these tongues, as at 44 (see Figure 5).

For the purpose of forcing these packing rings outward against the wall of the casing, I mount within the rotor 12 a plurality of levers 45, one of which is shown in Figure 3. These levers are each mounted in a yoke 46 carried upon a bolt 47 extending through the end wall or web 35 of the rotor. The outer ends of these levers bear against and are engaged with the cleft heads 48 of pins 49 which extend through passages 50 formed at intervals in the wall 35 behind the groove 36. These pins, therefore, bear against the inner edge of each packing ring 40 to force the packing ring outward. The inner ends of the levers are connected to

springs 51, these springs being contractile springs and extending either entirely across the rotor and passing through openings in an intermediate web 52 in the rotor or being connected at their ends to this intermediate web. In either case, these springs act to force the outer ends of the levers outward, causing the pins 49 to press against the rings and force them laterally outward into engagement with the side walls of the rotor casing.

The particular advantage of this construction is that it permits the packing rings to be readily removed, that the packing rings cannot rotate independently of the rotor, and that no gas can possibly pass circumferentially around the joints formed by the interdigitations of the packing ring with the rotor. Furthermore, by this construction the springs which act on the packing rings may be made of good size, which is not possible where the springs are placed in the wall of the rotor itself, and the springs are disposed in such position that they will not be deleteriously acted upon by the heat of the engine. It is obvious that oil may be injected into the space between the end wall of the rotor and the end of the rotor casing, and as the end webs of the rotor are skeletal in form to form the perforations, it is obvious that this oil will pass into the interior of the rotor and that the springs will be kept bathed in oil, and this oil will act as a cooling medium, provision being made whereby the oil may be drawn off for circulation through a suitable pump. I have not shown any oil circulating system, as this is illustrated in my pending application and may be of any usual and suitable construction.

In order to absolutely prevent any possible chance of the explosive gases passing around the packing ring 40, I may provide in the projecting portion 44 of the packing ring the small packing rings, illustrated in Figure 4 and designated 53.

The operation of this invention will be obvious from what has gone before. The charge is compressed on one side of the rotor and forced into the explosion chamber 27 when the valve 31 is open and the valve 42 is closed. The sweep of piston blade 16 from the explosion chamber compresses the gas therein, and when the valve 31 has closed, and a blade 16 has passed the abutment valve or blade 25 and the port 29, the valve 32 is opened and the charge ignited by usual spark plugs (not shown). As far as this invention is concerned, the engine may be of any suitable construction. I have merely illustrated generally the form of engine which I have illustrated in detail in my copending application of even date herewith, but this is purely for illustrative purposes.

It will be seen that, broadly speaking, the

rotor of this engine is formed in sections, namely the section 12 and the sections 40, and that each section 40 is urged away from the section 12 by springs, these springs being
5 contained within the body of the rotor.

I claim:—

1. A rotary engine including a casing and a rotor therein, the side edges of the periphery of the body of the rotor being
10 formed with a circumferentially extending groove, an annulus having a tongue extending into said groove and projecting laterally beyond the rotor body and into contact with the adjacent end of the rotor casing,
15 the rotor body being hollow and there being a series of passages extending from the rotor body and parallel to the axis thereof into the groove therein, a series of pins disposed in said passages and bearing against
20 the tongue of the annulus, and a series of springs disposed within the hollow rotor body and operatively engaged with the pins to urge them laterally outward.

2. A rotary engine including a casing and
25 a rotor therein, the side edges of the periphery of the body of the rotor being each formed with a circumferentially extending groove, an annulus having a tongue extending into said groove and projecting laterally
30 beyond the rotor body and into contact with the adjacent end of the rotor casing, the rotor body being hollow and there being a series of passages extending from the rotor body and parallel to the axis thereof into
35 the grooves therein, a series of pins disposed in said passages and bearing against

the tongues of the annuli, a series of levers mounted within the interior of the rotor body on each side thereof and bearing at their outer ends against said pins, and a
40 series of springs disposed within the rotor body engaged with the inner ends of said levers and urging their outer ends outward.

3. A rotary engine including a rotor casing, a hollow rotor body therein having end
45 webs and a peripheral wall, the peripheral wall of the rotor body at its ends being formed with circumferentially extending grooves communicating by a series of spaced passages with the interior of the rotor body,
50 rings disposed at the ends of the peripheral wall of the rotor and having annular tongues engaging in said grooves, the outer face of each ring being formed with transversely extending, spaced recesses and the
55 peripheral wall of the rotor body being formed with transversely extending tongues engaging in said recesses, pins disposed in said passages and extending parallel to the axis of the rotor, a series of radially ex-
60 tending levers pivotally mounted upon the end webs of the rotor body on the inside thereof, the outer ends of said levers being provided with yokes operatively engaging the pins, and transversely extending springs
65 connected to the inner ends of the levers and urging the outer ends outward to thereby, through said pins, urge the rings outward against the wall of the rotor casing.

In testimony whereof I hereunto affix my
70 signature.

EARL E. BIDWELL.