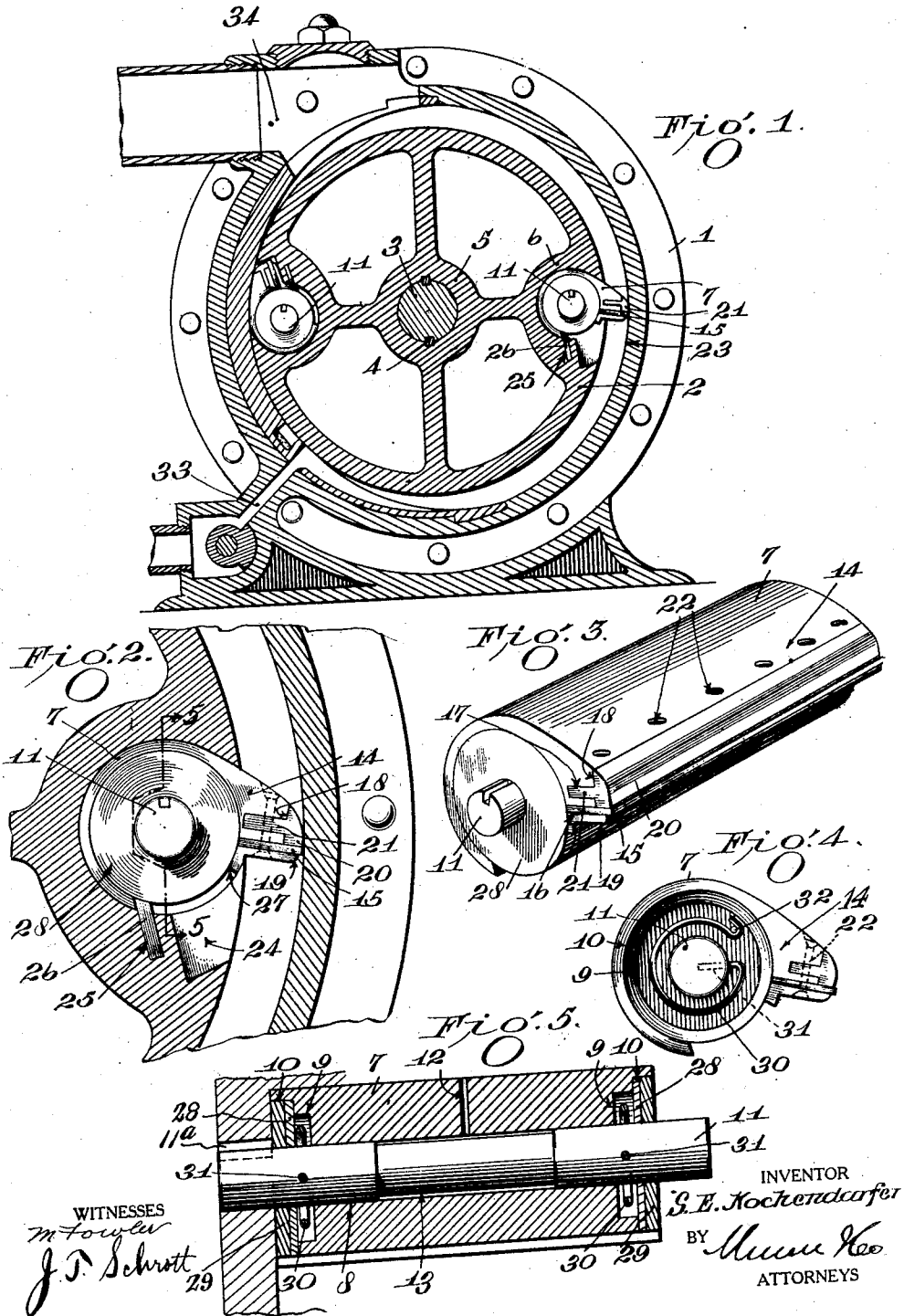


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PACKING FOR ROTARY ENGINE PISTONS
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PACKING FOR ROTARY-ENGINE PISTONS.

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My invention relates to improvements in piston packings and consists in the constructions, combinations and arrangements herein described and claimed.

5 An object of the invention is to provide a packing which is especially designed to meet certain peculiar requirements of the pistons of rotary engines, there being the provision of means for effectively preventing the pas-
10 sage of steam past the moving part of a piston and thereby preventing the loss of power which would otherwise occur.

Another object of the invention is to provide a piston packing consisting of certain
15 packing elements carried by the piston itself and contacting both the rotor and stator, and other packing elements carried by the rotor and contacting the piston.

Other objects and advantages appear in
20 the following specification, reference being had to the accompanying drawing, in which

Figure 1 is a central section of a rotary engine, illustrating the application of the improved packing means to a pair of pistons.

25 Figure 2 is an enlarged view of one of the pistons.

Figure 3 is a detail perspective view of one of the pistons carrying one of the packing elements.

30 Figure 4 is an end elevation of the piston, the packing ring and washer being removed to reveal the spring which tends to normally open the piston.

Figure 5 is a longitudinal section of the engine piston taken substantially on the line
35 5-5 of Fig. 2, a portion of the rotor being shown in section to illustrate a manner of fixing the shaft 11.

Reference is made to my patent on rotary
40 engines, Numbered 1,453,683 and granted May 1, 1923 upon which the herein disclosed invention is an improvement in so far as the packing means for the pistons is concerned. It is an important consideration in engines
45 of this nature that the joint between the movable piston and the rotor by which it is carried be loose enough to permit free movement, and yet be effectively packed to prevent the escape of live steam around the piston into the exhaust side of the working
50 chamber.

In Figure 1 the stator 1 houses the rotor 2 which is carried by a shaft 3. The shaft is keyed at 4 in the hub 5 of the rotor. The
55 ends of the shaft are journaled in suitable bearings (not shown) carried by the stator.

Situated in pockets 6 in the stator 2 are pistons 7. Two of these are shown, following the illustration in the patent referred to. Since both pistons are identical in construction and operation the description of one will suffice for both.

The piston 7 is usually a solid metallic body of generally cylindrical shape. It has an axial bore 8 and a pair of concentric
65 counterbores 9 and 10. The latter are formed at the longitudinal ends of the piston (Fig. 5). The bore 8 receives the shaft 11 which is generally fixed at the ends by any known means such as 11^a, Fig. 5, so as
70 to be immovable in respect to the rotor 2 upon which said fixture is made. The piston 7 is capable of oscillation upon the shaft 11, and in order that the moving parts may be properly lubricated provision is made of a duct
75 12 (Fig. 5) in the piston which communicates with a groove 13 in the shaft.

Extending out from the piston 7 at one side is a flange 14 against which the packing strip 15 has bearing. The flange 14 is cut
80 with a pair of parallel longitudinal kerfs 16 and 17 in the former of which the packing strip 15 is situated. The flange 14 is so made that the posterior surface 18 comes lower than the front ridge 19, but the latter, in
85 turn, is a little lower than the packing strip 15 itself, thereby permitting the thrust of steam against the packing strip itself to a small degree at least.

This thrust of the steam presses the other-
90 wise free end of the packing strip 15 against a filler 20 which has a rib 21 fitted into and occupying the second kerf 17. The packing strip 15 as well as the filler 20 are removable and renewable, being held in place by suit-
95 able machine screws 22 (or other suitable means) which pass completely through into the front portion of the flange as clearly indicated in Figure 2.

As stated before, the piston 7 is capable
100 of oscillation upon the fixed shaft 11. The packing strip 15 and filler 20 contacts the interior of the working chamber 23 when at one extremity of the movement (Figs. 1 and 2) and the flange 14 and its carried parts
105 enter a recess 24 in the rotor 2 when at the other extremity of movement. Situated behind the recess 24 is a groove 25 carrying a packing strip 26 for the purpose of bearing against the movable piston 7. It is to
110 be noted that the packing strip 15 is carried by the movable piston and bears against the

stationary stator 1 while the packing strip 26 is carried by the relatively stationary rotor 2 and bears against the movable piston 7. The particular purpose of the packing strip 26 is to prevent the entrance of steam behind the piston 7 in the pocket 6 and thence into the exhaust side of the working chamber 23.

In order that the packing strip 26 may effectively bear against the piston 7 such portion thereof is cut away at 27 as represents the amount of angular motion of the piston in respect to the strip 26. The free or exposed end of the strip 26 occupies the recess produced by the cut away portion. The purpose of the cut away portion is this: The extreme ends of the packing strip 26 engage with a packing ring or washer 28 in each counterbore 10 and thus produce a practically continuous wall of packing around that part of the piston 7 where packing is most necessary, i. e. on the live steam side.

The packing rings 28 back against washers 29, also in the counterbores 10, these in turn providing closures for the counterbores 9 in which springs 30 are situated. One end of each spring is secured at 31 to the fixed shaft 11. The opposite end of each spring is suitably secured at 32 to the movable piston 7. The purpose of the springs is to tend to open the piston, in other words move the piston out of the recess 24 and into engagement with the wall of the working chamber 23. This provision prevents any possibility of the piston sticking in the recess 24 and thus prevents live steam from flowing past the piston and out at the exhaust opening.

The operation.

In Figure 1, steam is admitted at 33, and the exhaust occurs at the opening 34. The rotor 2 moves counterclockwise. As live steam presses against the extended flange 14 of the piston 7 (right side) the rotor 2 is caused to move.

Steam necessarily enters the recess 24 into which the flange 14 and its carried parts recede while the piston 7 traverses a certain region in the working chamber 23. Were it not for the packing strip 26 the steam from the recess 24 might enter the pocket 6 and escape into the exhaust side of the working chamber and thus occasion a loss of power which should be avoided. The provision of end packing rings 28 and the longitudinal packing strip 26 forms an effective barrier against the ready leakage of steam. It is further to be noted that when the piston is at the limit of its extension (Figs. 1 and 2) the rear edge of the cut out 27 is in contact with the adjacent side of the packing strip 26. This engagement provides an additional check against the escape of steam at this particular moment.

The pressure of steam against the packing

strip 15 forces the free and exposed end thereof against the filler 20 and consequently against the interior wall of the working chamber 23. This provides an effective seal against the escape of steam past the flange 14. The greater portion of the packing strip 15 is protected from any deteriorating effect that the steam may have by virtue of being pocketed in the kerf 16 of the flange. The ridge 19 is lower than the filler 20 thereby exposing a little of the packing strip 15 and permitting the function already noted. Obviously the filler 20 takes most of the wear because it operates in advance of the packing strip. It is therefore necessary that the filler be made renewable. This is accomplished by providing removable screws or other means 22. It is equally necessary that the packing strip 15 be renewable, and this can be done by again removing the screws. The packing strip 26 is also renewable by simply taking the old strip out of the groove 25, it being first necessary to remove the piston 7.

While the construction and arrangement of the improved piston packing is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In combination with the stator and rotor of an engine, a movable piston carried by the rotor having recessed ends, and a longitudinal cut out portion communicating with said recesses, a flange extending from the piston toward the stator and having a kerf, packing means including rings situated in said end recesses to bear against adjacent parts of the rotor, a packing strip situated in said kerf and extending from said packing means to a place of contact with the stator, and a packing strip carried by the rotor extending into the cut out portion and into contact with said packing means at the ends.

2. In combination with the stator and rotor of an engine, a movable piston carried by the rotor and having counterbores at the ends forming recesses and a longitudinally cut out portion communicating with said recesses, a flange extending from the piston having a pair of longitudinal kerfs of which one communicates with said recesses at the ends, packing means including rings situated in each of said recesses and contacting the adjacent rotor, a packing strip situated in the latter kerf engaging said packing means at one place and being arranged to contact the stator at another place, means situated in the second kerf for backing up said packing strip adjacent to its place of contact with the stator, and a longitudinal packing strip carried by the rotor contacting the piston in said cut out portion and

also contacting said packing means at the ends.

3. In combination with the stator and rotor of an engine, a piston movably carried
5 by the rotor, said piston having an axial bore and a pair of counterbores at each end one being larger than the other, said piston also having a longitudinal cut out portion communicating at the ends with the largest
10 of said counterbores, a flange extending from the piston having a pair of longitudinal kerfs of which one communicates with said largest counterbores at the ends, means including packing rings situated in the largest
15 of said counterbores contacting adjacent portions of the rotor and closing the smaller counterbores, a shaft fixed upon the rotor and occupying the piston bore, springs situated in the smallest counterbores each being fastened to the shaft at one end and to
20 the piston at the other thereby tending to move the piston in one direction, a packing strip in that one of the kerfs which communicates with the largest counterbores said
25 strip being engageable with the stator, backing means including a filler occupying the other kerf and receiving the thrust against said packing strip, and another packing strip carried by the rotor extending into said

cut out portion and contacting the packing 30 ring at each end.

4. A rotary engine piston comprising a body having a longitudinal axial bore and a pair of concentric counterbores at each end, one side of the body being cut away 35 longitudinally but communicating with the largest counterbores, packing means including a washer situated in the largest of the counterbores, a spring situated in the smallest counterbores, one end of each being at- 40 tached to the piston and the other ends being attachable to a shaft when occupying said axial bore, a flange extending from the piston having parallel kerfs of which one communicates with the largest counterbores at 45 the ends, the ridge adjacent to one side of said kerf being higher than that adjacent to the other kerf, a packing strip occupying the first kerf contacting the aforesaid packing means at one side and extending slightly 50 beyond said first ridge at the other side, backing means for the packing means including a filler and a rib occupying said second kerf, and means by which said last mentioned strip and backing means are remov- 55 ably held in place upon the flange.

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