

K. L. POWER.

ROTARY ENGINE.

APPLICATION FILED SEPT. 13, 1910.

Patented June 20, 1911.

2 SHEETS—SHEET 1.

995,717.

Fig. 4.

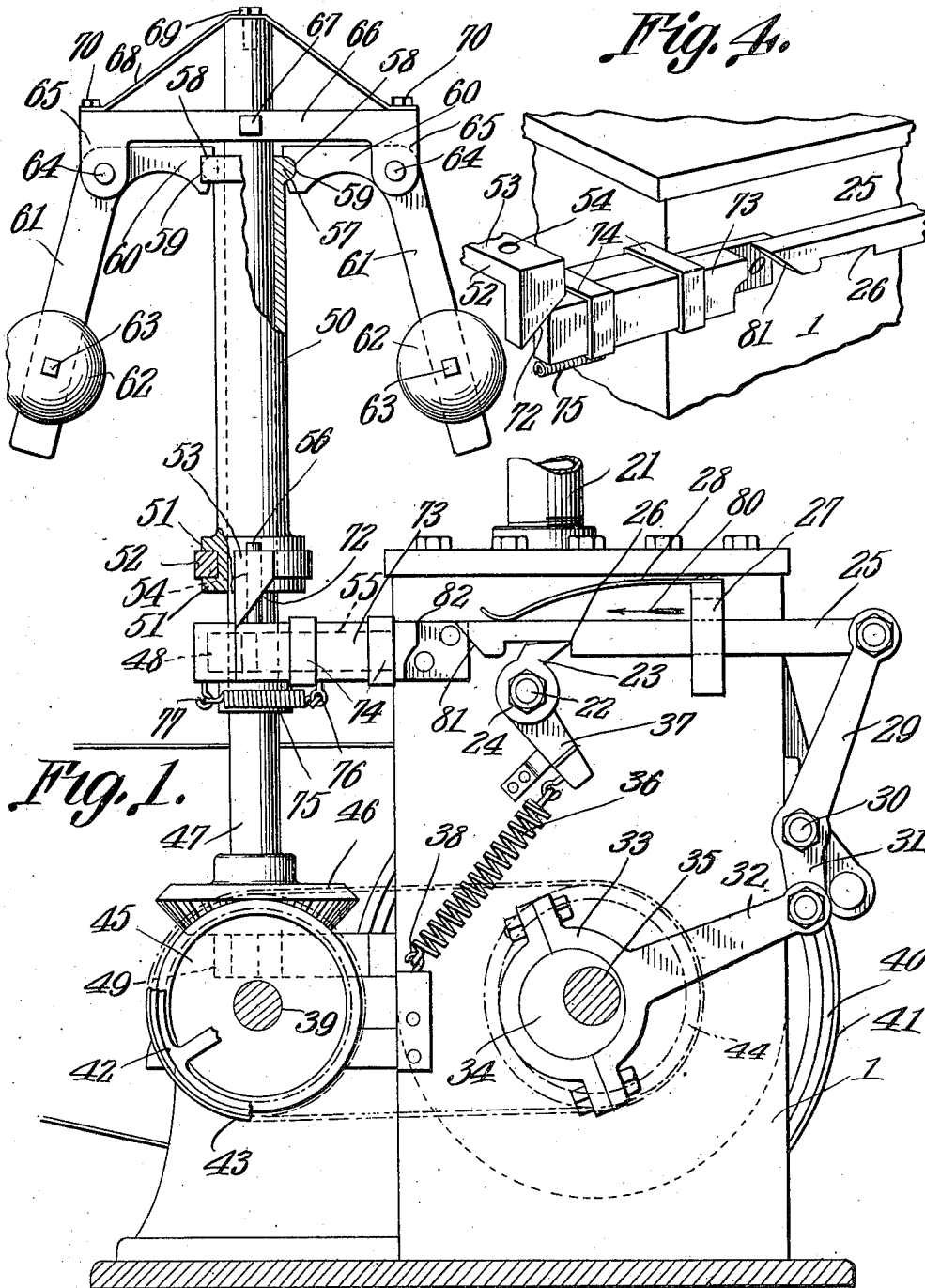


Fig. 1.

Witnesses

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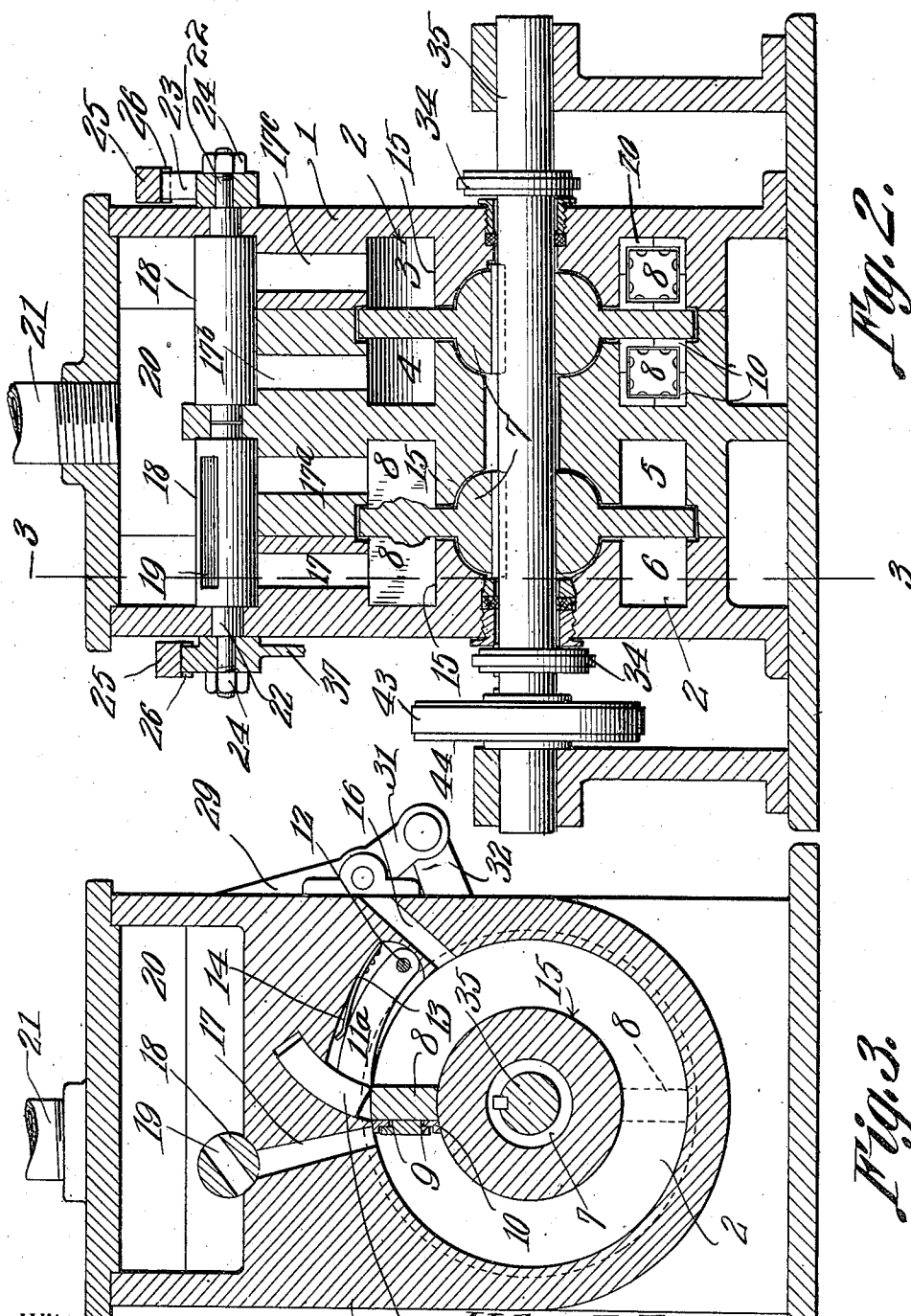


Fig. 2.

Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

995,717.

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To all whom it may concern:

Be it known that I, KELCY L. POWER, a citizen of the United States, residing at Ballinger, in the county of Runnels and State of Texas, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention has relation to rotary engines and consists in the novel construction and arrangement of its parts hereinafter shown and described.

The object of the invention is to provide in an engine of the character indicated an automatically returnable cut-off valve together with a shaft operated valve gear which engages the said cut-off valve. The engine is further provided with a governor operated means for disengaging the valve gear from the cut-off valve whereby the automatic return of the said cut-off valve is permitted to take place.

Referring to the accompanying drawings, Figure 1 is a side elevation of the engine embodying the features of the invention. Fig. 2 is a transverse sectional view of the engine, clearly disclosing the steam chambers, the steam chest and the throttle valves therein. Fig. 3 is a sectional view on line 3-3 of Fig. 2, showing the annular steam cylinder, the piston and its rotary head, the spring retained abutment, and one of the cut-off valves. Fig. 4 is a detail perspective view of one of the spring retained, sliding members or blocks and its guide straps, clearly disclosing a portion of the governor mechanism in closed position to the block, to illustrate how the member or block is actuated.

Referring to the drawings, 1 represents the casing of the engine, which is provided with two annular steam cylinders 2. Each steam cylinder 2 is divided into two steam passage-ways 3, 4, 5 and 6, by means of the rotary heads or disks 7. Projecting laterally and from each face of the rotary heads or disks is a piston 8. These pistons are rectangular in contour, as shown clearly in Fig. 2, and are provided with angular grooves 9, in which angular packing strips 10 are arranged. These packing strips are shaped to conform to the shape of the grooves in the pistons and are loosely arranged in their positions, in order that by the expansion of the steam in the cylinders, the strips will be forced outwardly against the annular walls of the cylinders. In this

way, the pistons receive the full benefit of the steam expansion.

11 denotes abutment members, there only being one shown, reference being had to Fig. 3. This abutment member is angular in form and comprises the arm 11^a which is pivoted as at 12, in a recess 13 of the casing. Fastened to the wall of the recess 13 is a spring 14 which bears against the arm of the abutment and tends to hold the abutment member against the circumference of the inwardly extending portion 15 of the casing. There is illustrated more than one extension 15, while only one abutment member is shown, but in practice there is an abutment to close each steam passage-way 3, 4, 5 and 6, as the pistons 8 pass through them.

Referring to Fig. 3, it will be clearly understood that when the piston 8 approaches the abutment member, it will contact with the curved arm 11^a thereof and force the abutment member into the recess, against the action of the spring, and when this is taking place the utilized steam is exhausted through the exhaust port 16. When the piston 8 passes the abutment, a new volume of steam is received through the intake passage-way 17 (which is controlled by the cut off valve 18). There are two cut off valves employed, as indicated in Fig. 2. These valves are in the form of cylinders, provided with elongated, transversely disposed slots or openings 19, which slots or openings are alternately placed in registration with the intake passage-ways 17, 17^a, 17^b, and 17^c, which communicate with the annular steam passage-ways 3, 4, 5 and 6. The valves 18 are independent of one another, and are located in the steam chest 20, into which the steam flows through the pipe 21.

The cut off valves are provided with lateral extensions 22, on which the arms 23 are fixed by means of the nuts 24.

25 represents the actuating bars which are provided with recesses 26, into which the arms 23 extend. The actuating bars 25 are slidably mounted in the brackets 27, there being only one shown in Fig. 1. Secured to the bracket 27 is a spring 28, the free end of which frictionally contacts with and bears against the actuating bar 25, to hold the same in coöperation with the arm 23. The actuating bars 25 are pivotally connected to the levers 29, which are pivoted as at 30 to a stationary portion of the casing. To the

lower ends 31 of the levers 29, arms 32 of the eccentric straps 33 are pivotally connected. These eccentric straps encircle the eccentrics 34, which are carried by and rotatable with the driving shaft 35 of the engine (with which the rotary heads move). It will be clearly seen that when the actuating bars 25 are forced toward the arms 23, through the operation of the levers 29, the arms 32 of the eccentric straps and the eccentrics, the cut-off valves are oscillated against the action of the springs 36. These springs, there only being one illustrated, are connected between the arms 37 and a stationary portion of the engine's casing, as at 38.

39 denotes a shaft, which is mounted in suitable bearings of the frame of the engine. Rotatable with the shaft 35 is the usual form of fly-wheel 40, and the pulley 41 which may be belted to any suitable machinery for the purpose of supplying power. Movable with the shaft 39 is a pulley 42 which is belted to the shaft 35, through the medium of the belt 43 and the pulley 44. Through this belt 43 and the pulleys 42 and 44, power may be transmitted from the shaft 39 and thence to the governor mechanism.

Mounted upon and rotatable with the shaft 39 is a beveled gear 45, which in turn meshes with the beveled gear 46. This beveled gear 46 is mounted upon and rotatable with the vertically arranged shaft 47 of the governor mechanism. This shaft 47 is mounted in suitable bearings 48 and 49 of the frame of the engine. The bearing 48 is arranged in a transversely disposed bracket member, while the bearing 49 is disposed in the lower portion of the frame.

Adapted to slide vertically upon the shaft 47 is a sleeve 50. Extending annularly about the lower end of this sleeve are two integral collars 51, between which is arranged a member 52. This member 52 consists of two oppositely arranged, laterally extending arms 53, in the ends of which apertures 54 are formed. The bracket member 55 (which projects laterally from the casing of the engine) is provided with upwardly extending studs 56, which extend through the apertures 54 of the laterally extending arms in order to guide the member 52 as it rises and lowers through the action of the balls of the governor. About the upper periphery of the sleeve 50 a shoulder 57 is formed, and at points directly opposite one another, this shoulder 57 is formed with curved surfaces 58, with which the recesses 59 of the angular pivoted levers 60 contact. Upon the arms 61, balls 62 are adjustably held by the bolts 63. These angular levers are pivoted at 64 to the downwardly extending arms 65 of the member 66. This member 66 is designed to rotate with the shaft 47, through the medium of the bolt 67, and is

held from upward displacement by the strap 68 through the upper portion of which the screw 69 penetrates. This screw 69 enters the extreme end of the shaft 47, as will be clearly seen in dotted lines. The opposite ends of the strap 68 are connected to the member 66 by the aid of the screws 70.

It is clearly evident when the speed of the engine becomes too great, the balls 62 of the governor mechanism will be forced upwardly and outwardly in such wise as to cause sleeve 50 to move telescopically and downwardly upon the shaft 47, and with it the member 52 and its oppositely arranged, laterally extending arms will be forced downward, thus causing the inclined surfaces 72 of the downwardly extending portions of the arms 53 to contact with the sliding blocks or members 73, in order to force them toward the actuating bars 25, the purpose of which will be hereinafter explained. These members or blocks 73 are guided in the straps 74, and are retained in their normal positions by means of the springs 75. These springs are connected between the members or blocks 73 and a portion of the bracket member, as at 76 and 77. These springs are for the purpose of returning the members or blocks 73 to their normal positions, after performing the functions of releasing the actuating bars from the arms 23.

It will be observed that by releasing the actuating bars from the arms 23, the cut off valves are actuated by means of the springs 36 to close the intake passage-ways or ports of the engine, thus cutting off the intake of steam. It will be thus seen that cut-off valves after admitting a certain quantity of steam may be operated or cut-off and that the steam thus trapped will have an expansive action upon the piston. The valve is so constructed and operated as to cut off the steam when the piston travels half-way around the chamber, or approximately near its bottom, then it is carried the remainder of its throw by the steam expansion, until it reaches the exhaust. When the steam is cut off in one chamber, it is permitted to intake in the other chamber, and vice versa. In this way the power is equalized.

In the drawings it will be observed that the drive shaft does not contact with any portion of the casing of the engine, therefore, friction between the moving elements and their attendant parts is eliminated. It will further be seen there is no contact between the central portion of the rotary head and the casing. This feature further assists in preventing friction, between the moving parts of the engine.

As hereinbefore stated, the steam in the rear of the piston 8, after the piston 8 has reached the curved arm of the abutment, exhausts through the port 16. When the actuating bars 25 are operated in the direction

of the arrow 80, the inclined surfaces 81 thereof frictionally contact at 82 with the members or blocks 73, thus causing the actuating bars 25 to be raised upon their fulcrums, which will release the arms 23 of the cut off valves, thus causing the cut off valves to close the intake passage-ways or ports. The contact between the surfaces 81 and the points 82 may occur sooner or later, it depending upon the rate of speed the driving shaft 35 is traveling. When the driving shaft 35 increases in its rotary motion, the shaft 39 is in turn increased in motion; consequently an excess rotary motion is imparted to the shaft 47. This excess rotary motion of the shaft 47 causes the balls 62 of the governor to be turned outwardly and upwardly through the centrifugal force. By so operating the balls of the governor mechanism, the sleeve 50 is forced downwardly and the blocks or members 73 are then operated by the inclined surfaces 72 coming in contact with them. When the members or blocks 73 are thus operated, the cut off valves are then allowed to cut off the intake passage-ways or ports of the engine,

by lifting the actuating bars 25 from the arms 23. The action of the springs 36 causes the cut off valves to close their intake passage-ways or ports.

The invention having been set forth, what is claimed as new and useful is:

In a rotary engine, a cut-off valve journaled for oscillating movement and provided with a lateral extension, a trigger arm connected to said extension, a spring pressed reciprocating bar for operating said trigger, a spring for normally holding the trigger against the bar, a spring return block slidably mounted and opposing the inner end of the bar, a governor mechanism, and means carried thereby adapted to push the slide toward the bar to release the bar from engagement with the trigger.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

KELCY L. POWER.

Witnesses:

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J. E. WILLIAMS.