T. F. FAULKNER.

VALVE.

APPLICATION FILED DEC. 31, 1909.

1,045,386. Patented Nov. 26, 1912.

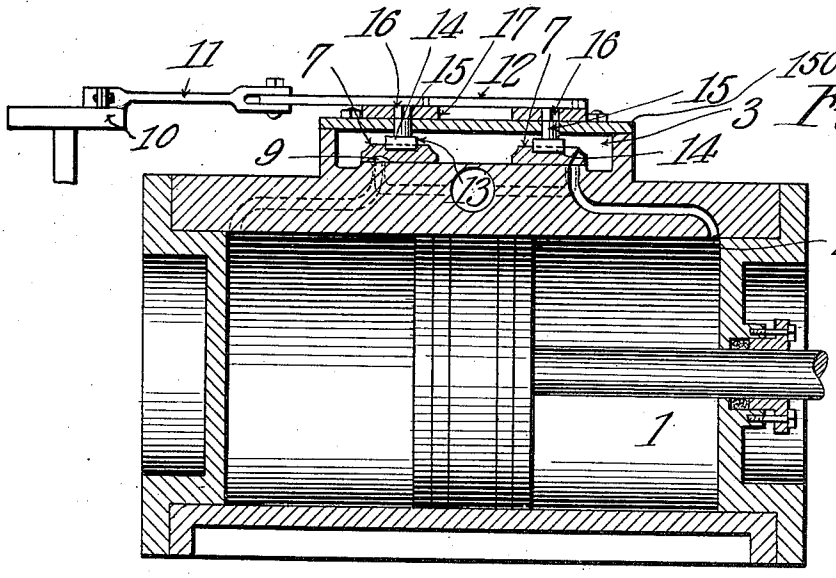

Fig. 1.

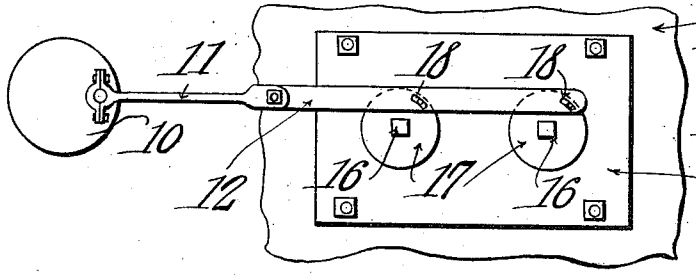

Fig. 2.

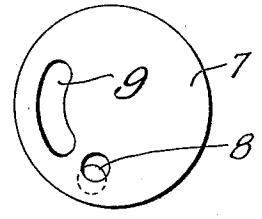

Fig. 4.

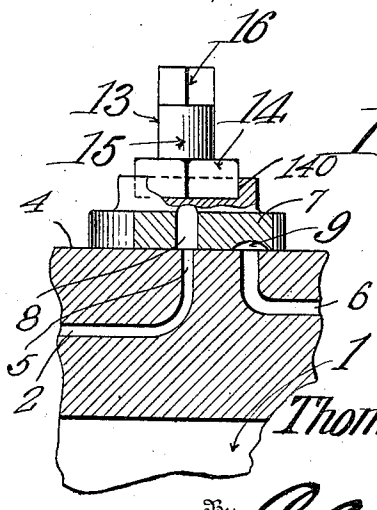

Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

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VALVE.

1,045,386. Specification of Letters Patent. Patented Nov. 26, 1912.

Application filed December 31, 1909. Serial No. 535,772.

To all whom it may concern:

Be it known that I, THOMAS F. FAULKNER, a citizen of the United States, residing at Denton, in the county of Denton and State of Texas, have invented a new and useful Valve, of which the following is a specification.

This invention relates to rotary steam engine valves and has for its object the provision of an easily operated valve by which the admission of steam to and the discharge of the steam from the cylinder of an engine will be controlled without undue friction between the moving parts and in which the working parts will be compactly arranged with a resulting economy in manufacture and efficiency in operation. These objects are attained in the use of the device illustrated in the accompanying drawings, and the invention resides in certain novel features of the same which will be hereinafter first fully described and then more particularly pointed out in the claim, it being understood that details of construction shown in the drawings are merely typical.

In the annexed drawings,—Figure 1 is a vertical longitudinal section of a portion of a steam engine cylinder showing my improved valve fitted thereto. Fig. 2 is a plan view of the steam chest. Fig. 3 is a transverse section through one valve seat and its inlet and exhaust ports. Fig. 4 is a detail view of the under side of one of the valves.

The steam cylinder 1 may be of any desired size and formation and is provided with the usual passages or ports 2 leading from the steam chest 3 to the opposite ends of the working chamber of the cylinder so as to admit steam to the opposite sides of the piston head in the usual manner. The steam chest is secured to or formed on the side of the cylinder around the passages or ports 2 and on the side of the cylinder or the bottom of the steam chest I provide two circular flattened valve seats 4 near the opposite ends of the steam chest, the ends of the ports or passages 2 being located within the said seats, as indicated at 5. Adjacent to the said terminals 5 which constitute the inlet ports I form exhaust ports 6 leading through the wall of the cylinder to a common outlet to the atmosphere, as will be understood. Upon the circular recesses or valve seats 4 are mounted disks or valves 7 provided with openings 8 which extend through the body of the valve near the edge of the same and are adapted to register with the inlet port 5 so as to permit the steam which may be in the steam chest to flow through the valve to said port and consequently act on the piston of the engine. In the under side of the valve disks 7 are formed arcuate grooves 9 which are situated adjacent to the ports 8 and are adapted, when the valve is properly adjusted, to form a communication between the inlet and exhaust ports of the cylinder.

The principal upon which my valve operates will be readily understood from the foregoing description, it being clear that the valves are so timed that when one valve is admitting steam at one end of the cylinder, the other valve will be so arranged that the groove 9 therein will extend over the inlet and exhaust ports at the corresponding end of the cylinder and thereby permit the steam at that end of the cylinder to escape to the atmosphere. At the end of the stroke of the piston, the valves will be automatically shifted through any convenient form of valve gear, an eccentric or crank 10 being illustrated in the accompanying drawings acting upon a pitman 11 which has one end pivoted to a slide 12 connected with the stems of the valves in such manner as to partly rotate the said valves at each end of the stroke of the piston. The valve stems 13 are provided at their lower ends with angular enlargements 14 which fit in angular sockets 140 in hubs formed on the upper sides of the valves so that movement of the valve stems will be imparted positively to the valves. The valve stem is provided immediately above the angular enlargement 14 with a cylindrical portion 15 which fits within the top 150 of the steam chest so as to form a bearing for the rotation of the stem and the valve, and above this cylindrical portion 15 is an angular portion 16 which is engaged by an operating disk or crank arm 17 extending over and resting upon the top of the steam chest and connected to the slide 12 by a pin and slot connection, as shown at 18. As the slide 12 is actuated by the eccentric 10 and the link 11 it will be caused to reciprocate and the ends of the slots in the said slide will be thereby brought against the pins rising from the crank arms or operating disks 17, and the said crank arms or disks will be thereby oscillated so that the valve stems 13 and the valves engaged therewith will be partly rotated to

shift the position of the valves and consequently change the course of the steam.

To those skilled in this art it will be obvious without further illustration or detailed description that when the opening 8 of one valve registers with the inlet port 5 at that end of the cylinder and live steam is flowing from the valve chest into the cylinder to move the piston in one direction, the groove 9 in the other valve will stand over and connect the inlet port from the opposite end of the cylinder with the exhaust port 6 so that the expanded steam at that side of the piston can pass out of the cylinder. By a well known principle the crank on the eccentric 10 will hold the slide 12 practically stationary as it passes the dead center shown in Fig. 1 and where the position of parts will be as just above described, and to lengthen this period I have made use of the lost motion which occurs in the pin-and-slot connection 18. As the crank passes the dead center and the pivot 11 begins to move the slide 12 at first slightly and then more rapidly as the crank nears a position half way to the other dead center, the slots in the slide slip over the pins rising from the disks 17 so that the latter are not actuated at first. Finally the far ends of the slots in the slide will strike said pins rising from the disks 17 while the slide is moving quite rapidly, and each valve will be quickly shifted to its opposite position, after which the crank passes around the extreme side of the eccentric and the operation is repeated on its return. As each valve is shifted, however, the round hole or opening 8 prevents the admission of any live steam to the inlet port until it registers with its extremity 5, and conversely it cuts off the inlet when the valve begins its movement in the opposite direction. Meanwhile the arcuate groove 9 has had some portion of its length in constant register with the common outlet to the atmosphere, and as soon as the turning of the valve has completely cut off the inlet of steam through the opening 8 that end of the groove 9 nearest said opening moves over the extremity 5 of the inlet port 2 and the latter is thereby thrown in communication with the common outlet and becomes the outlet port for that end of the cylinder. Thus it will be seen that there is always live steam within the steam chest pressing the valves against their seats, and as the grooves 9 are in constant communication with the common outlet to the atmosphere there is no tendency whatever to lift a valve off its seat while it is admitting steam, and even when it is exhausting steam such tendency is thoroughly overcome by the pressure of the live steam upon the valve. It follows that this improved valve mechanism does not need packing, and as the valves rest flat upon their seats they will work for a long time without leakage. Nor do I need to hold them mechanically thereupon, and hence I am enabled to form the stems separate from the valves and journal them through the top of the steam chest, so that when the latter is removed the stems come off with it and the valves are exposed for easy repair or substitution.

It will be readily seen from the foregoing description, taken in connection with the accompanying drawings, that I have provided a construction in which the parts will be very compactly arranged and in which the size of the steam chest may be appreciably reduced without any loss of efficiency of the engine and the steam will, consequently, be caused to flow more directly to the engine cylinder instead of circulating within the steam chest without accomplishing any results. As the steam will be more effectively maintained at its working temperature less fuel will be consumed in the furnace and the engine will, consequently, be more economically operated. The operating parts by which the valves are adjusted are located outside of the steam chest and the number of points where packing is necessary will be thereby reduced so that there will be less chance for the steam to escape and be lost than is now the case.

Having thus described my invention, what I claim is:

In a device of the class described, a cylinder; a piston operating therein; a steam chest upon the cylinder; a valve disk rotatable upon the cylinder within the steam chest and provided in its outer face with a polygonal recess; a cover for the chest, the cover being provided with an opening; a stem having a cylindrical portion rotatable in the opening, the stem having at one end a polygonal head registering removably in the recess, and having at its other end, a polygonal shank, located outside of the cover, the cross sectional area of the shank being less than the cross sectional area of the cylindrical portion; an operating disk mounted upon the shank and resting against the outside of the cover and extending across the periphery of the opening in the cover; a pin projecting from the disk; and an operating member having a slot in which the pin is received for limited movement.

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

T. F. FAULKNER.

Witnesses:
C. E. MERCER,
W. E. SUMROW.