R. W. RIORDAN.

ROTARY VALVE.

APPLICATION FILED AUG. 21, 1909.

958,313.

Patented May 17, 1910.

2 SHEETS—SHEET 1.

Fig. 1

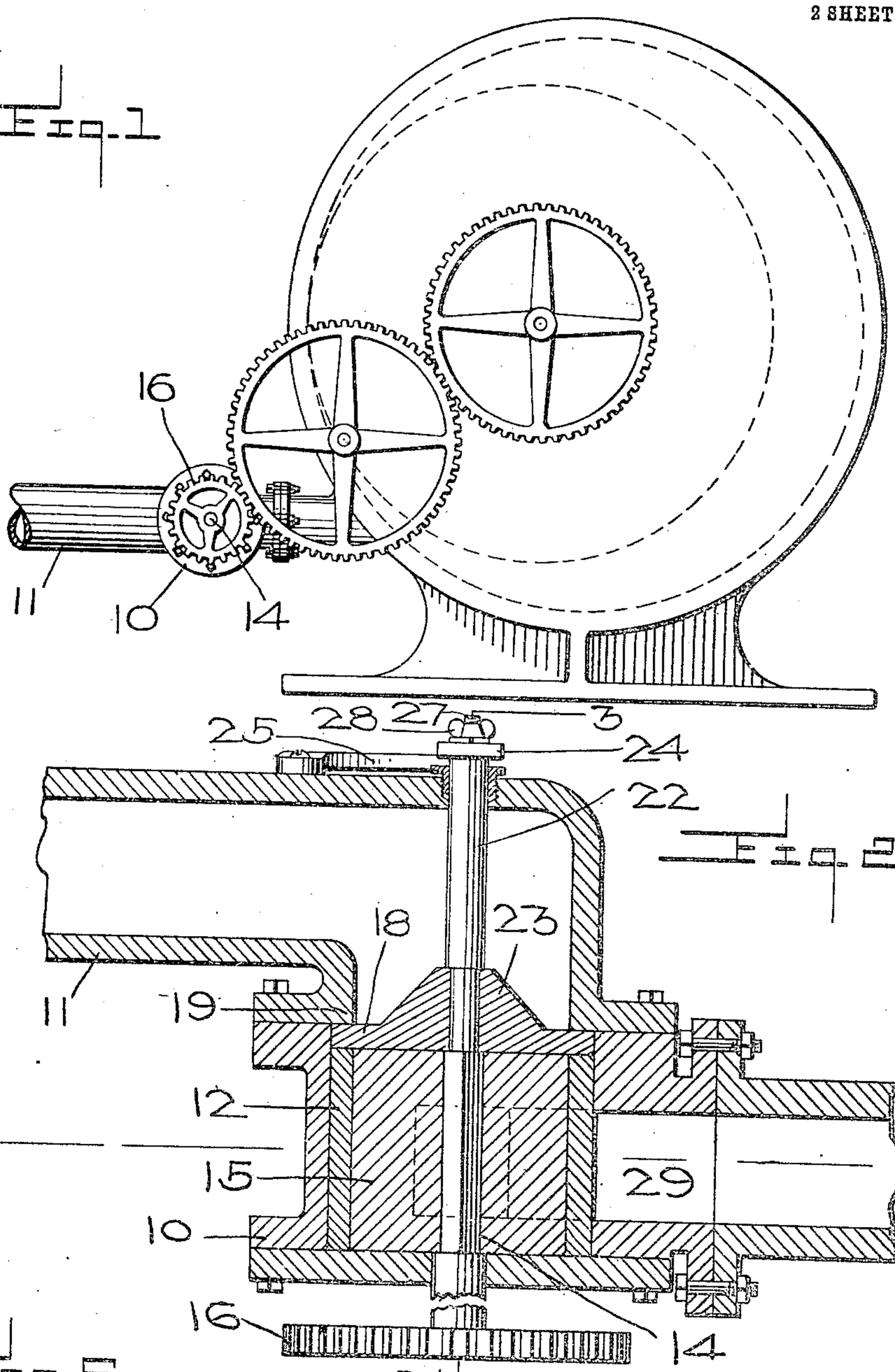

Fig. 2

Fig. 6

Witnesses

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Fig. 3

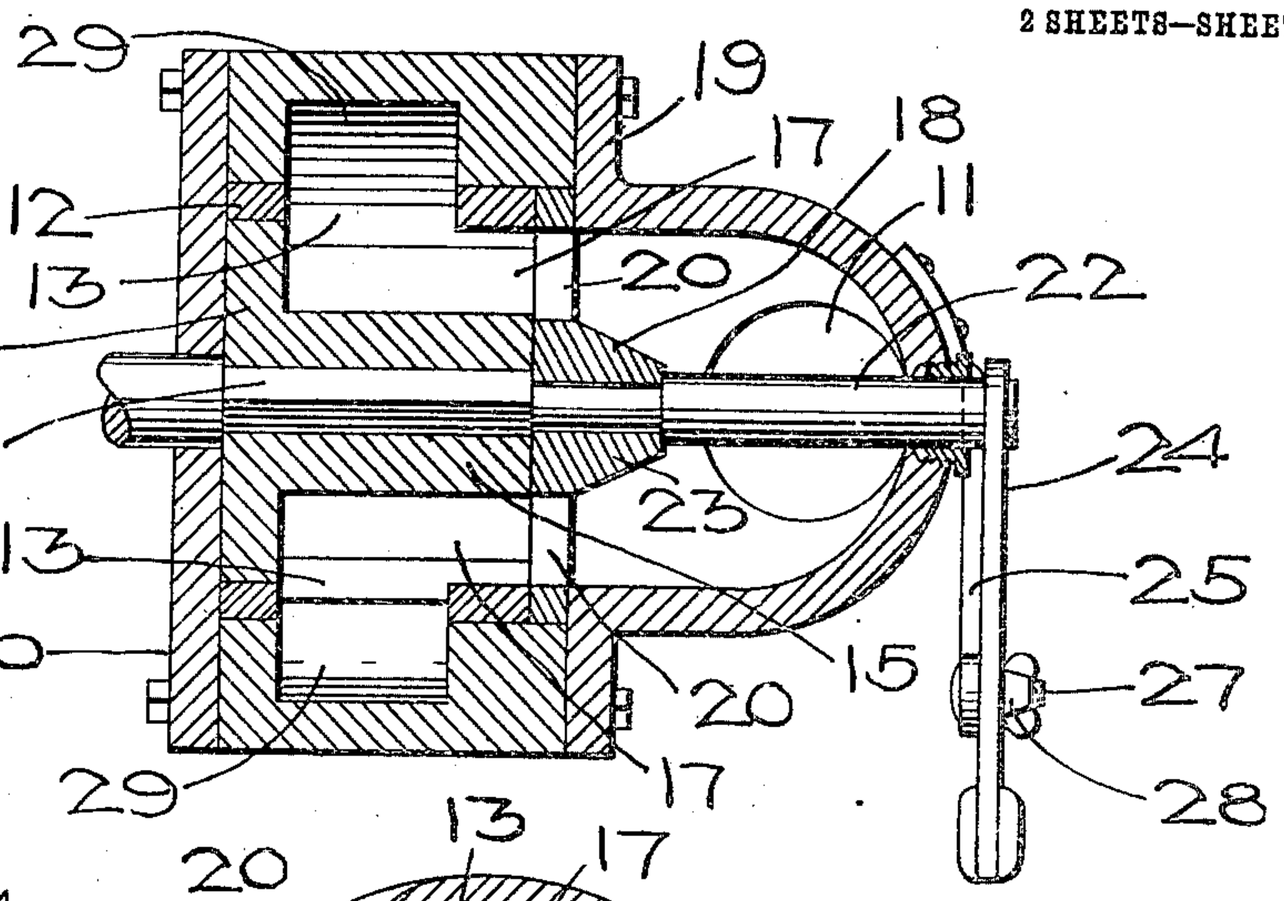


Fig. 4

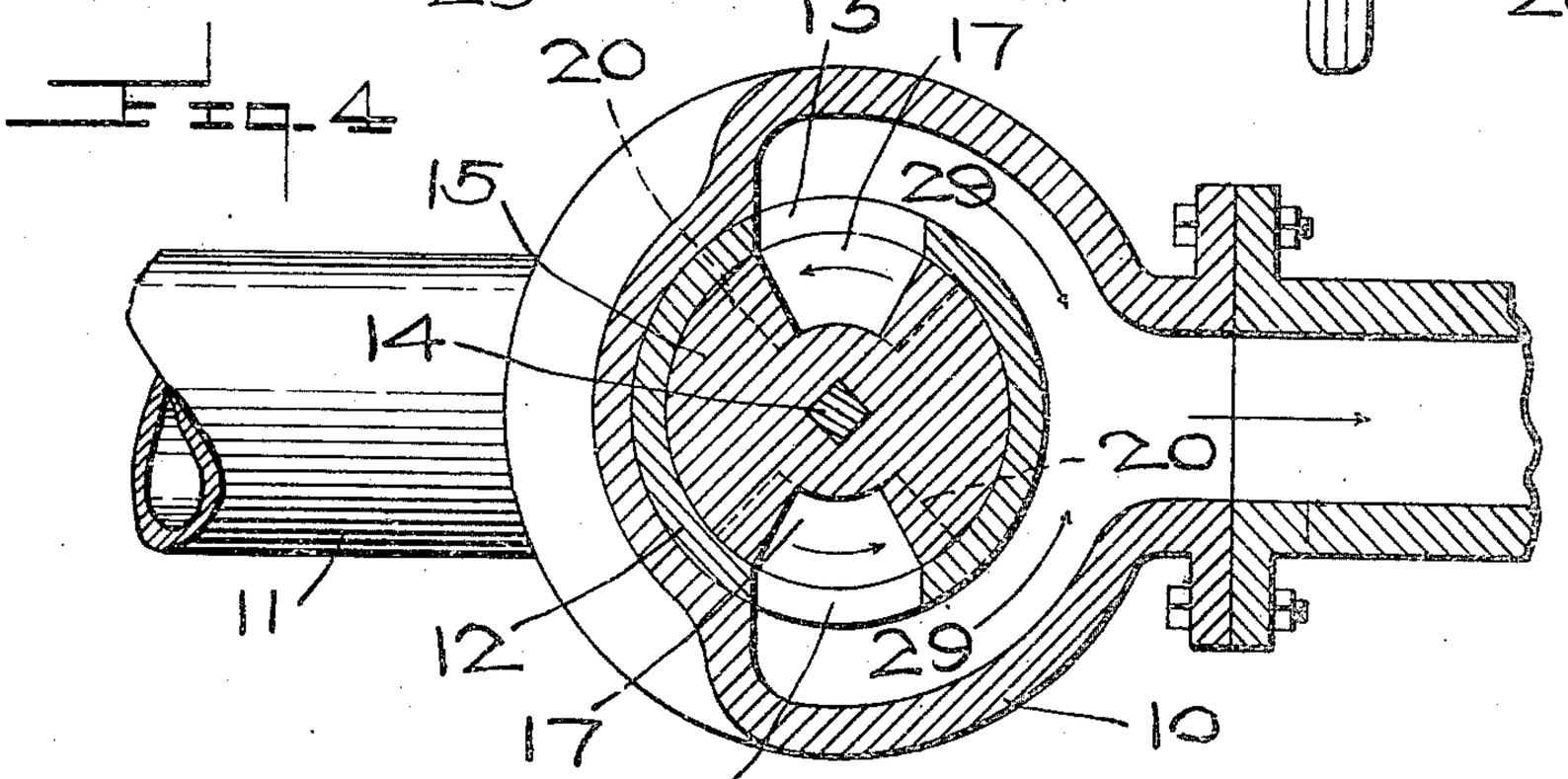
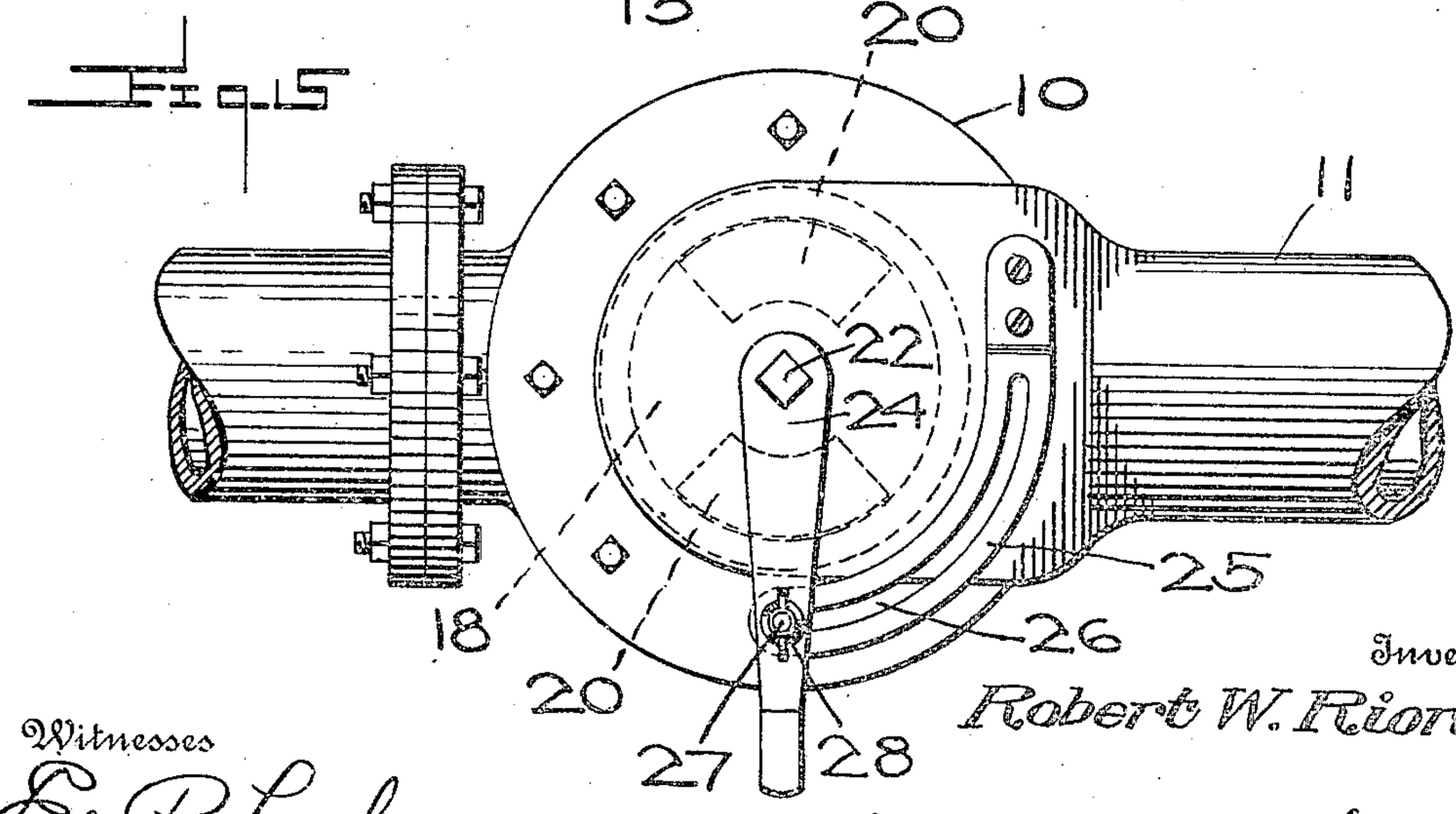


Fig. 5



Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT WHITING RIORDAN, OF BROOKLYN, NEW YORK.

ROTARY VALVE.

958,313. Specification of Letters Patent. Patented May 17, 1910.

Application filed August 21, 1909. Serial No. 514,002.

To all whom it may concern:

Be it known that I, ROBERT W. RIORDAN, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Rotary Valves, of which the following is a specification.

This invention relates to new and useful improvements in valves, and more particularly to a rotary valve which is particularly designed for use with that type of rotary engines, wherein a plurality of vanes or blades are employed, such as is disclosed in my prior application for patent filed March 16, 1908, Serial Number 421,417, allowed April 17, 1909.

The primary object of my invention is to provide a valve of this character, by means of which the steam may be admitted to the expansion chamber of the engine, at predetermined intervals, and to provide suitable means whereby the time of admittance of the steam may be regulated as desired.

A further object is to provide a rotary engine, the various parts of which are so constructed and assembled that the admission of the steam to the main rotating valve member may be altered with relation to the exhaust ports so as to correspondingly alter the time of cut-off of the steam, whereby the valve may be readily employed in connection with an engine irrespective of the number of vanes or actuating members employed in the construction thereof.

A further object is to provide a valve which is of extremely simple construction, and whereby the high degree of efficiency vital to the proper operation of engines of the rotary type may be maintained.

With these and other objects in view, the present invention consists in the combination and arrangement of parts as will be hereinafter more fully described and particularly pointed out in the appended claims, it being understood that changes in the specific structure shown and described may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming a part of this specification and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a side elevation of my improved valve showing the same geared to the main shaft of an engine. Fig. 2 is a horizontal section therethrough. Fig. 3 is a section taken on the line 3—3 of Fig. 2. Fig. 4 is a vertical section taken on the line 4—4 of Fig. 2. Fig. 5 is an elevation illustrating the means for securing the cut-off valve plate in its adjusted position. Fig. 6 is a detail perspective view of the rotary valve member.

In the construction of the engine above referred to, the pressure upon the vanes is equal at all times, due to the fact that after the steam inlet point has been passed, the pressure of steam in pounds per sq. in. varies inversely to the effective area of the vane in sq. in., or very nearly so.

It is for the purpose of introducing the steam into the expansion chamber of the engine casing, at the proper time with relation to the position of the vanes, whereby the full effect of the expansion of the steam will be utilized and a high degree of efficiency of the engine thus attained. To this end I have provided a suitable valve casing 10, which may be of any desired form, and to which the inlet pipe communicating with the engine, is suitably connected. A steam entrance pipe 11 is integrally formed in the casing, and connected to the steam supply pipe. Secured within the valve casing, is a tubular sleeve 12 which is formed with the ports 13 disposed at diametrically opposite points therein. Mounted upon a transversely positioned shaft 14 and positioned within the sleeve 12, is a valve 15. The end of the shaft 14 which extends through the valve is square in cross section, and upon the outer end thereof a gear wheel 16 is keyed and is suitably geared to the main shaft of the engine as shown in Fig. 1.

Steam chambers 17 are formed at diametrically opposite points in the valve member 15, and are adapted to register with the ports 13 in the sleeve 12, upon the rotation of the transverse shaft 14 through the medium of the train of gears whereby it is cooperatively connected to the main shaft of the engine. At one end of the sleeve 12 and rotary valve 15, a cut-off valve plate 18 is rotatably disposed, and is held against transverse movement by the shoulder 19 formed in the valve casing at the point of connection of the steam entrance pipe 11. At diametrically opposite points in the cut-off plate 18, arcuate openings 20 are formed therethrough, and are of the same depth as the steam chamber 17. The outer periphery of the plate 18 is in transverse alinement

with the periphery of the sleeve 12. It will be noted from reference to Fig. 4 of the drawings, that the openings 20 are of somewhat greater area than the steam chambers 17. The relative proportions of these openings and steam chambers is regulated in accordance with the size and requirements of the engine. The steam chambers 17 do not extend the entire transverse length of the valve 15, but terminate a slight distance from one end thereof, to provide a suitable strengthening wall 21.

The plate 18 is adapted to be rotated to adjust the openings therein with relation to the ports 13 of the sleeve 12, and to effect this rotary movement of the plate, a transverse shaft 22 is extended centrally therethrough and through the outer wall of the entrance pipe 11. The plate 18 is formed with a central strengthening boss or enlargement 23 to provide a secure bearing for the end of the shaft. Upon the outer extremity of the shaft 22 a lever 24 is secured, and extends radially therefrom. Secured at one end to the side of the pipe 11, a substantially quadrant shaped guide plate 25 extends downwardly therefrom and is formed with a slot 26, through which a threaded pin 27 extends, said pin being secured to the lever 24. This guide plate 25 is concentrically disposed with relation to the cut-off plate 18, and when the lever 24 is actuated to rotate the plate, it may be securely held to prevent any further rotation of the cut-off plate 18 by means of a wing nut 28 which is threaded on the outer end of the pin 27 and has frictional engagement with the face of the guide member 25. By this construction it will be seen that the openings 20 in the cut-off plate can be positioned relatively to the ports 13, whereby the cutting-off of the steam supply can be regulated with relation to the number and position of the rotor vanes or blades.

The operation of my improved valve is as follows:—Upon starting the operation of the engine, rotary movement will be imparted through the train of gears to the transverse shaft 14, upon which is secured the main valve member 15. The cut-off valve plate 18 may now be adjusted by moving the lever 24, and when the proper position of the openings 20 with relation to the ports 13 has been secured, the lever is securely held in its adjusted position as before described. It will be obvious that the shutting off of the steam supply to the inlet pipe of the engine will be determined by the extent of the movement of the cut-off plates 18 in the direction of the arrow as shown in Fig. 4. The time of the shutting off of the steam is regulated by the relative positions of the openings 20 and the steam chambers 17, and it will be seen that as the ends of the steam chambers are covered by the face of the valve plate 18, that the point of registration of the plate openings and the valve chambers will be altered with respect to the ports 13 provided in the sleeve 12. These ports communicate with the steam passages 29 formed in the valve casing, and which communicates with the bore of the inlet pipe of the engine. As shown in Fig. 4, the valve is opened to its fullest extent and the steam supply will not be shut off until the steam chambers 17 have passed the ports 13. The openings 20, steam chambers 17, and ports 13, are made as large as practicable in the manufacture of the valve, so as to reduce to the greatest possible extent the friction created by the steam in passing through the various passages. It will be understood, however, that these various ports or openings are not of sufficient area to cause any material loss in the expansion of the steam which enters the passages 29 upon every half revolution of the rotary valve member 15. Presuming that the cut-off valve 18 is in the position shown in Fig. 4, in which the rotary valve member 15 is in registration with the ports 13, and that the vane of the rotor is just passing the steam inlet opening in the wall of the engine, with the main valve rotating in the direction of the arrow shown thereon; the ports 13 will remain open during approximately two-thirds of the effective stroke of the rotor vanes, the remainder of the stroke of the vanes being accomplished by the expansion of the steam which has been admitted to the steam chamber of the engine. The effective stroke of the vanes comprises the interval of time that elapses while each succeeding vane passes the steam inlet opening. Upon moving the cut-off valve plate 18 as before described, the steam will still be admitted to the steam chambers 17, but the cut-off of the steam with relation to the ports 13 will be quicker, and the time of the cutting-off of the steam will depend entirely upon the extent to which the valve plate 18 has been moved. By the time another of the rotor vanes has arrived at the steam inlet opening, and is in position to receive the impact of the steam, the valve 15 has completed one half of a revolution and the ports 13 and steam chambers 17 are again in register and the steam allowed to pass through the passages 29, to the steam inlet pipe.

From the foregoing it will be seen that I have devised a rotary valve which is admirably adapted for use in connection with that class of engines where an intermittent supply of steam of great expansive force is essential for the proper operation of the engine. It will be understood, however, that my improved valve is not limited to use with the particular type of rotary engine as above set forth, but may be employed in connection with a large variety of constructions which

require a sudden and voluminous admission of steam into the expansion chamber of the engine and a correspondingly early cut-off of the steam. The above handling of the steam is absolutely essential to a high degree of efficiency in any of the various types of engines.

My improved valve is extremely simple in its construction and is capable of a wide range of adjustment, which will allow of its use in the operation of high or low powered engines. The parts may be readily assembled, and are of such construction that the expense of manufacture will be exceedingly small without in any way impairing the durability of the valve.

What is claimed is:

1. A valve of the character described comprising a valve casing and an entrance pipe communicating therewith, a sleeve mounted in said casing having exhaust ports formed therein, a rotary valve mounted in said sleeve, said valve having transversely extending steam chambers formed therein, the walls of said steam chambers being radially positioned, a cut-off valve plate mounted upon the inner ends of a transversely positioned shaft and adapted to be rotated thereby, said valve plate being located at one end of the rotary valve and having arcuate openings formed therein of greater area than the transverse area of said steam chambers, and means secured to the outer ends of said shaft to adjust the openings of said valve plate with relation to the exhaust port.

2. A valve of the character described comprising a valve casing, a sleeve mounted in said casing having exhaust ports formed therein at diametrically opposite points, a rotary valve mounted in said sleeve and provided with steam chambers adapted to register with said exhaust ports, a supply pipe secured to one side of the valve casing, a valve plate mounted upon the inner end of a transversely positioned shaft and located between the end of said valve and the supply pipe, a lever secured to the outer end of said shaft, a quadrant shaped guide member secured at one end to the supply pipe and depending therefrom, said guide member having a slot formed therein adapted to receive a pin secured in said lever, said lever being adapted to rotate said shaft and guide plate to adjust the openings in said plate with relation to the exhaust ports, and a thumb screw threaded upon the outer end of said pin adapted to retain the lever in its adjusted position.

In testimony whereof I affix my signature, in presence of two witnesses.

ROBT. WHITING RIORDAN.

Witnesses:

LAURA TEXTOR,

R. TEXTOR.