

(No Model.)

W. BEATY.  
STEAM ENGINE.

No. 466,318.

Patented Jan. 5, 1892.

FIG. 1.

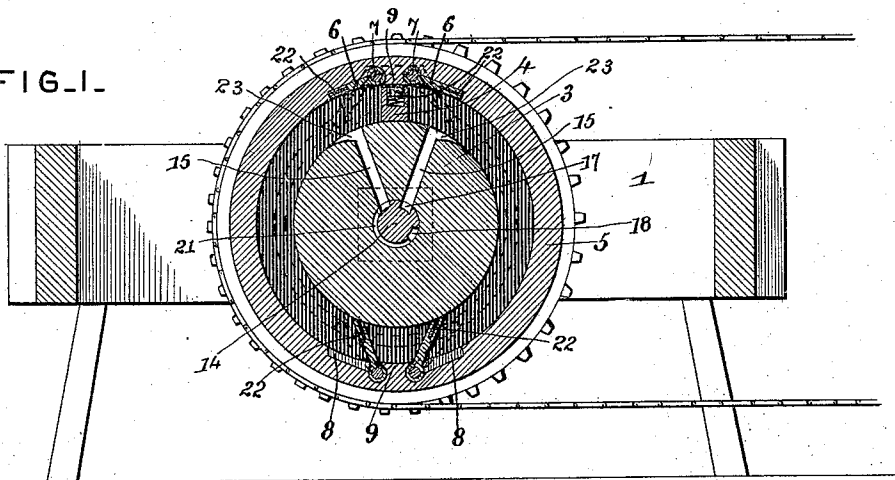


FIG. 2.

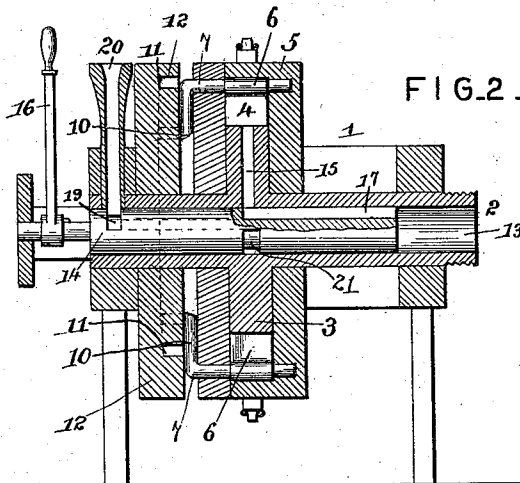


FIG. 3.

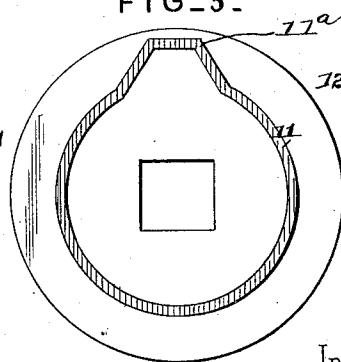
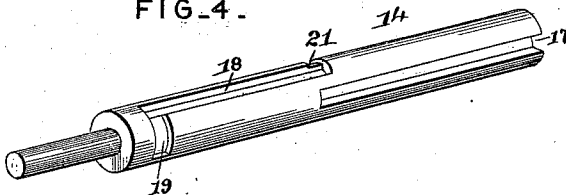


FIG. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

WILLIAM BEATY, OF SILVERTON, WEST VIRGINIA.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 466,318, dated January 5, 1892.

Application filed August 14, 1891. Serial No. 402,665. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM BEATY, a citizen of the United States, residing at Silver-ton, in the county of Jackson and State of West Virginia, have invented a new and useful Steam-Engine, of which the following is a specification.

My invention relates to rotary steam-engines; and it has for its object to provide an engine that will be simple in construction and effective in operation and one that will fully utilize the steam admitted thereto and at the same time will give a greater proportion of power to the amount of steam than in the ordinary engine of this class; and with the objects in view that are to be attained by this improvement the invention consists in a rotating cylinder constructed and operated in the novel manner hereinafter fully described, illustrated in the accompanying drawings, and specifically pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of a rotary steam-engine constructed in accordance with my invention. Fig. 2 is a vertical cross-section of the same. Fig. 3 is a plan view of the stationary valve-operating disk. Fig. 4 is a detail in perspective of the steam-regulating core.

Referring to the accompanying drawings, 1 designates a suitably-constructed bed or frame-work supporting the various parts of the engine. Rigidly secured in opposite sides of said bed is a hollow stationary shaft 2, which is provided with a central annular flange or disk 3, provided on its upper periphery with the lug or projection 4. Revolvably mounted upon said stationary shaft and inclosing the flange thereon is the main cylinder 5, into which steam is conducted for the purpose of revolving the same and from which motion is imparted to the machine to be operated by the engine. The said cylinder or casing 5 is provided on opposite sides of its inner periphery with the oppositely-disposed and operating wings or valves 6, which are mounted upon the operating-stems 7. These valves are designed to bear snugly against the annular flange or disk 3 during the revolution of the cylinder therearound, and when the same approach the stationary lug or pro-

jection upon the top of said flange or disk the said valves or wings are designed to be automatically turned away from said flange or disk and into the notched recesses 8, located on the inner periphery of the cylinder-casing, and which, when the valves are seated therein, form a continuous line with the rest of the inner periphery of the casing or cylinder, and thus allow the cylinder to easily pass over said lug or projection, which is designed to bear tightly against the inner face or circumference of the cylinder or casing during its revolution. The valve-stems 7, carrying the wings or valves and located on either side of the inwardly-projecting division lugs or shoulders 9, are journaled in both sides of the casing; but the inner ends of the same project without one side of the casing and terminate in the crank-arms 10, the ends of which are designed to work within the elliptical groove 11, formed in the inner face of the stationary disk 12, mounted rigidly upon one end of said stationary shaft and adjacent to the revolving cylinder, which during its revolution around the annular flange or disk causes the crank-arms to follow said elliptical groove, and as the valves approach the lug or projection thereon the said arms are at the apex of said groove, and thereby immediately throw the valves away from the said flange or disk and into their recessed seats previously referred to. The elliptical groove 11 in said stationary disk 12 at its upper terminal is provided with an upwardly-extending squared portion 11<sup>a</sup>, that allows the said crank-arms to be thrown fully within their seats, in order that they may readily clear the projecting lug 4.

Steam is admitted within the cylinder through the hollow shaft 2 from the inlet end 13 thereof, and the same is regulated by means of the revolving core 14, located and operated therein, and, according to the way in which the engine is desired to be operated, the steam is admitted within the cylinder on either side of the lug or projection on the stationary flange or disk through either one of the steam-openings 15, formed in said flange or disk on both sides of the lug or projection thereon, and communicate with the interior of the hollow shaft. When steam is admitted on one side of the projecting lug, the opening on the opposite side thereof acts in the

capacity of an exhaust-opening, while the same is reversed when steam is admitted in the opposite way. The rotating core 14 extends through the entire length of said hollow shaft from the inlet-opening 13 to the opposite end of the shaft, and extending without the same is connected to and operated by the lever 16, which is designed to either reverse the engine, control the amount of steam, or stop the same, as may be desired. The said core is provided with a longitudinal groove 17, which extends from the steam-inlet up to about the center of said hollow shaft and directly beneath the steam-openings therein and in the annular flange or disk thereon, so as the said core is turned in either direction the end of said groove communicates with either steam-opening, according to the direction in which it is desired to revolve the engine. The remainder of the core 14 for the rest of its length is provided with an exhaust-conducting groove 18, which when the terminal of the live-steam groove communicates with the steam-opening on one side of the lug or projection the inner terminal of the exhaust-groove communicates with the opposite steam-opening and conducts the exhaust-steam to the opposite end of the core, which is provided with a cross-groove 19, communicating with the main exhaust-groove, and which in turn is in communication with the exhaust-pipe 20, located in the side of the supporting-bed. When the engine is reversed and running in the reverse direction, the inner terminal of the exhaust-groove 18 does not register with the opening opposite to the live-steam opening in the annular flange or disk, and to place said groove in communication with the exhaust-opening the core is further provided with a circular or cross groove 21, which communicates with both the longitudinal exhaust-groove and the exhaust-opening in said flange. Spring-packing 22 is inserted in grooves in the ends of the wings or valves in order to reduce the friction between the same and the center flange around which they revolve, and similar packing is also inserted in grooves in the sides and ends of said lug or projection for similar purposes—that is, to reduce friction between the same and the cylinder or casing revolving therearound.

It is thought that the construction and operation of my improved rotary engine are now apparent without further description. The steam being admitted within the hollow shaft is controlled by the revolving core therein and conducted directly to within the revolving cylinder, mounted upon said shaft on either side of the lug or projection upon the annular flange or disk thereon. The steam bears against the wings or valves, which follow the periphery of the said annular flange or disk and are resting upon the division lugs or shoulders 9, and thus causes the cylinder to revolve and impart motion to the machinery desired, and as the valves approach the lug or projection by the mechanism described

they are thrown off and away from the annular flange and pass over said lug, while the steam escapes through the opposite opening to that from which it was admitted and passes through the hollow shaft without the engine. By reversing the core within the hollow shaft, in order to direct the steam in a reverse direction, the engine is rotated in the opposite direction, while, when desired, the said core may be so turned as to prevent the steam from entering either opening within the cylinder or casing, and may be thus stopped or started at will. It can be readily seen that by the arrangement of the operating-valves on both sides of the division lugs or shoulders formed by the recess valve-seat within the sides of the casing when the said valves are resting upon the flange or disk the pressure of the steam exerted thereon will not be upon the operating-cranks and the flange, but upon said shoulders, which form more compact and steam-tight joints with said valves as the pressure of the steam increases in the force which it exerts upon said valves. Slanting steam-grooves 23 are formed in the periphery of said flange or disk and communicate with the steam-openings on either side of the post thereon, the purpose of which is to permit the steam to begin to escape before the valve begins to rise up within its seat, inasmuch as the pressure of the steam would prevent the valve from rising within the same if it was not allowed to escape prior to the rising of the valve. It may also be noted at this point that the engine may be constructed having one or more posts or lugs, each of which is designed to have two separate sets of valves for operating thereover, and other minor details of construction may be used without departing from the spirit of my invention.

Various methods may be employed to impart motion from the revolving cylinder to the machinery to be operated. A simple and convenient expedient is to provide the periphery of the cylinder with one or more rows of teeth 23, which are designed to engage the links of an ordinary chain belting, which connects with sprocket-gear of the machinery to be operated. As implied, several rows of the teeth or cogs may be placed around the cylinder to operate different belting and different machinery. This method is of course only a preferable one, for motion can readily be imparted from the engine to the machinery by means of ordinary belting or other suitable connecting means without departing from the spirit of the present invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a rotary steam-engine, a hollow stationary shaft, a central annular flange or disk arising integrally from said shaft and provided with a projecting post or lug, and steam-openings on either side thereof communicating with the interior of said shaft, a revolving

cylinder mounted upon said shaft, valve-stems carrying operating-valves within said cylinder, means for operating said stems, an oscillating steam-regulating core located within said hollow shaft and snugly fitting within and extending the entire length of said shaft, the same being provided with a longitudinal live-steam groove communicating with one of said steam-openings in said flange, and a longitudinal exhaust-groove communicating with the opposite opening and the exhaust at one end of said shaft, said grooves forming with the interior surface of said shaft the passage by the steam, substantially as set forth.

2. In a rotary steam-engine, a hollow stationary shaft, a central annular flange or disk stationary upon said shaft and provided with a projecting post or lug, and steam-openings on either side thereof, a revolving cylinder mounted upon said shaft and provided with opposite pairs of valve seats or recesses, opposite pairs of valves mounted upon operating valve-stems located within said cylinder and designed to bear normally upon the periphery of said annular flange or disk and adapted to be thrown back by the operating-stems into said seats or recesses, said valve-stems terminating without the cylinder in crank-arms, a stationary disk mounted upon said shaft adjacent to the cylinder and provided with an elliptical groove engaged by said crank-arms, and an oscillating steam-regulating core closely fitting within and extending the full length of said shaft, substantially as set forth.

3. In a rotary steam-engine, a hollow stationary shaft, a central annular flange or disk arising integrally from said disk and provided with a projecting post or lug, and steam-openings on either side thereof communicating with the interior of said shaft, slanting steam-grooves formed in the periphery of said flange and communicating with said steam-openings, a revolving cylinder mounted upon said shaft, valve-stems carrying operating-valves within said cylinder,

means for operating said stems, spring-packing located in the bearing-faces of the valves and said post or lug, and an oscillating steam-regulating core located within said hollow shaft and snugly fitting within and extending the entire length of said shaft, the same being provided with a longitudinal live-steam groove communicating with one of said steam-openings in said flange, and an exhaust-groove comprising a longitudinal groove and end, cross, or circular grooves communicating with the opposite steam-opening in said flange and the exhaust-pipe at one end of said shaft, said grooves forming with the interior surface of the stationary shaft inclosed passages for the steam, substantially as set forth.

4. In a rotary steam-engine, a stationary shaft, a central flange or disk upon said shaft and provided with a projecting post or lug, a cylinder or casing revolvably mounted upon said shaft and over said flange and provided with valve recesses or depressions, on its inner periphery and intermediate division lugs or shoulders between said recesses, valve-stems projecting through said recesses in pairs on opposite sides of said lugs or shoulders, valves mounted upon said stems within the valve-recesses and designed to normally bear upon said flange or disk and against said division lugs or shoulders, which latter act in the capacity of stops or braces for said valves under the pressure of steam, said valve-stems terminating without the cylinder in crank-arms, a stationary disk mounted upon the shaft adjacent to the cylinder and provided with a continuous elliptical groove engaged by said crank-arms, and an oscillating steam-regulating core closely fitting within and extending the full length of said shaft, substantially as set forth.

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

WILLIAM BEATY.

Witnesses:

J. M. WHITE,

A. L. S. VARNER.