G. P. BUMP.

ROTARY ENGINE.

APPLICATION FILED APR. 15, 1907.

907,732. Patented Dec. 29, 1908.

Fig. 1.

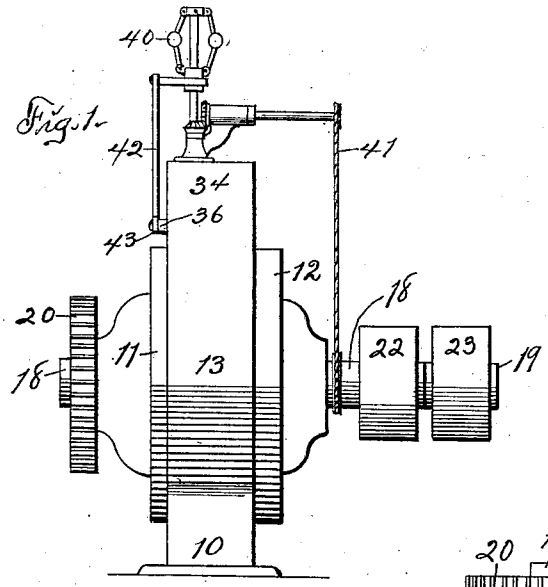


Fig. 3.

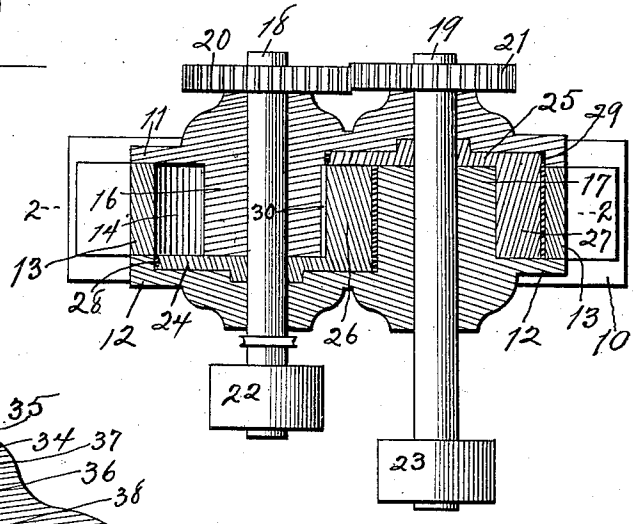
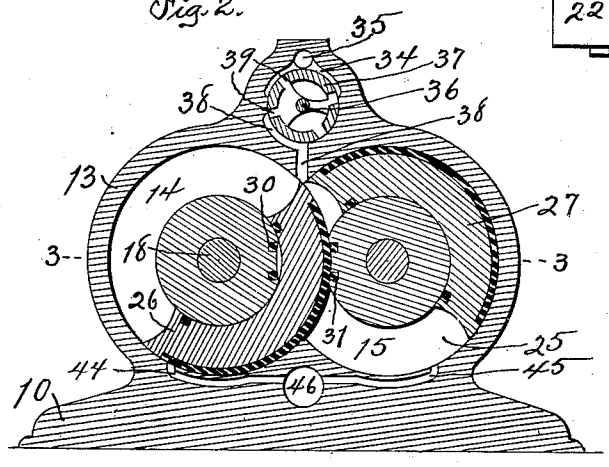


Fig. 2.



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UNITED STATES PATENT OFFICE.

GEORGE P. BUMP, OF NEWTON, IOWA.

ROTARY ENGINE.

No. 907,732. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed April 15, 1907. Serial No. 368,769.

To all whom it may concern:

Be it known that I, GEORGE P. BUMP, a citizen of the United States of America, and resident of Newton, Jasper county, Iowa, have invented a new and useful Rotary Steam-Engine, of which the following is a specification.

The object of this invention is to provide an improved construction for rotary engines.

A further object of this invention is to provide improved means for controlling automatically the supply of steam to a rotary steam engine.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is an end elevation of a complete engine embodying my invention. Fig. 2 is a vertical section on the indicated line 2—2 of Fig. 3. Fig. 3 is a horizontal section on the indicated line 3—3 of Fig. 2.

In the construction of the machine as shown, the numeral 10 designates a base on which is mounted, fixed or formed a cylinder. The cylinder is of twin formation and comprises end plates or heads 11, 12 and a rim or casing 13 between and rigidly connected to said heads. The interior of the cylinder is divided into intersecting and overlapping annular chambers 14, 15 by means of hubs 16, 17 arranged parallel with each other and extending inward from the respective heads 11, 12. Shafts 18, 19 are mounted for rotation in the heads 11, 12 axially of the hubs 16, 17 and project at both ends from the cylinder. Gears 20, 21 of the same diameter, are mounted on the shafts 18, 19 adjacent to the head 11 and mesh with each other. A pulley 22 is mounted on the shaft 18 adjacent the head 12 and a pulley 23 is mounted on the shaft 19 adjacent the gear 21. Piston plates 24, 25, of annular form and of the same size, are mounted rigidly on the shafts 18, 19 within the cylinder. The plate 24 is between the inner end of the hub 16 and the adjacent face of the head 12 while the plate 25 is parallel therewith and spaced apart therefrom and located between the inner end of the hub 17 and the adjacent face of the head 11. Segmental pistons 26, 27 are fixed to the plates 24, 25 and occupy and are arranged to travel in the annular chambers 14, 15 in the cylinder. The segmental pistons 26, 27 are of the same size and each of them is of such capacity or cubic contents that it occupies less than one-half the annular chamber in which it is arranged for travel. The segmental pistons 26, 27 are fixed to their respective plates in such manner that they revolve freely in the annular chambers 14, 15 in sequence, so that at the points of intersection of the annular chambers the forward end of one piston will follow closely the rear end of the opposite piston and the pistons travel in opposite directions and are connected for uniform travel through the medium of the gears 20, 21. Packing rings 28, 29 are mounted on the peripheries of the piston plates 24, 25. Packing strips 30, 31 are mounted in the hubs 16, 17 parallel with the axes of the shafts 18, 19 and packing rings 32, 33 are mounted on the segmental pistons 26, 27.

Packing strips or rings are provided at every point where the use thereof would prevent leakage of steam from the annular chambers 14, 15.

A valve chamber 34 is formed on the upper portion of the cylinder, and a steam supply pipe 35 leads into the upper portion thereof. A valve stem 36 is mounted for rotary oscillation in the valve chamber 34 and a valve 37 is fixed to said stem within said chamber. An ingress port 38 leads from the valve chamber 34 downwardly to the uppermost point of intersection of the annular steam chambers 14, 15 and said ingress port also extends along the lower portion of the circumferential wall of the chamber 34 approximately one-quarter of the circumference thereof. The valve 37 is provided with steam ports 39 on its quarters, that is to say, four radial steam ports equally spaced apart throughout its circumference, and passages on the interior of said valve admit steam to balance the valve and to supply said ports. The uppermost port 39 takes steam from the valve 34 to the interior of the valve from whence it may be discharged through whichever of the ports 39 may at the moment be open to the ingress port 38 at any point in the length thereof. A governor 40 is mounted on the valve chamber 34 and is driven by connection, such as a belt 41, to the shaft 18. The governor is connected by a rod 42 to a crank 43 on the valve stem 36, whereby the governor determines and controls oscillation of the valve 37 and consequently controls the positions of the ports 39 relative to the ingress port 38. Exhaust ports 44, 45 open

from the lower portions of the annular steam chambers 14, 15 to a common cavity or chamber 46 communicating with the atmosphere.

In practical operation of the machine, assuming the parts to be in the positions shown in Fig. 2, steam is admitted through the pipe 35 to the chamber 34 and passes through the uppermost port 39 to the interior of the valve 37. From the valve 37 the steam passes through a port 39 into the ingress port 38 and thence into the space (a portion of the annular chamber 15) at the rear of the segmental piston 27. The steam forces the segmental piston 27 in the direction of the arrow *a* and the segmental piston 26 is constructed to travel in the opposite direction by reason of the gear connection between the shafts on which the pistons are mounted. When the forward end portion of the segmental piston 27 reaches the point of intersection with the path of travel of the piston 26, the rear end portion of said piston 26 has passed beyond said point of intersection. Then when the rear end portion of the piston 26 passes the uppermost point of intersection of the annular chambers 14, 15, the steam entering through the ingress port 38 is applied to the rear end of said piston and forces it forwardly. Thus the segmental pistons 26, 27 successively receive the impulse of the steam supplied through the valve 37 until such speed is attained that the governor acts on said valve and reduces or cuts off the supply of steam through oscillation of valve in its chamber and adjustment thereby of the ports 39 relative to the port 38.

I claim as my invention—

1. A rotary steam engine, comprising a cylinder, hubs arranged parallel with each other within said cylinder, whereby the interior of the cylinder is divided into intersecting annular chambers, shafts mounted for rotation in the cylinder and hubs and geared together, piston plates on said shafts adjacent the ends of said hubs, segmental pistons on said plates within said annular chambers, packing devices between said plates and cylinder and the hubs and pistons, a valve chamber on said cylinder, ingress communication between said valve chamber and the annular chambers, a valve mounted for oscillation in said valve chamber, a centrifugal governor on said valve chamber, connections between said governor and said valve, and driving connections between said governor and one of said shafts.

2. A rotary steam engine, comprising a cylinder, hubs arranged parallel with each other within said cylinder, whereby the interior of the cylinder is divided into intersecting annular chambers, shafts mounted for rotation in the cylinder and hubs and geared together, piston plates on said shafts adjacent the ends of said hubs, segmental pistons on said plates within said annular chambers, packing devices between said plates and cylinder and the hubs and pistons, means for supplying steam to said annular chambers and means for exhausting steam from said annular chambers.

Signed by me at Newton, Iowa, this first day of April, 1907.

GEORGE P. BUMP.

Witnesses:
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