

No. 723,656.

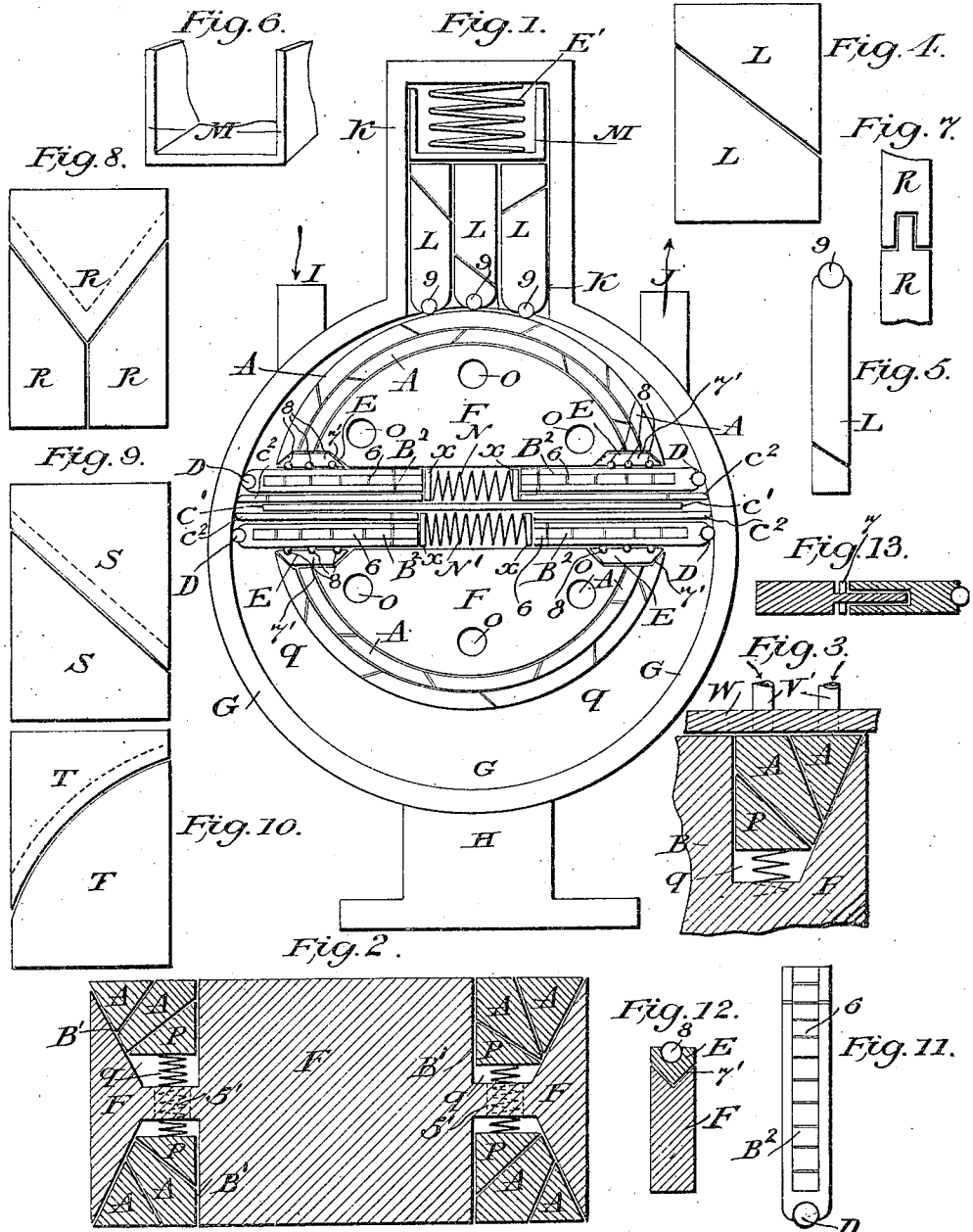
PATENTED MAR. 24, 1903.

H. T. DUNN.
ROTARY ENGINE.

APPLICATION FILED JULY 14, 1899.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

William Joseph Flynn
Richard Francis Scamell

Inventor:

Hugh Thomas Dunn

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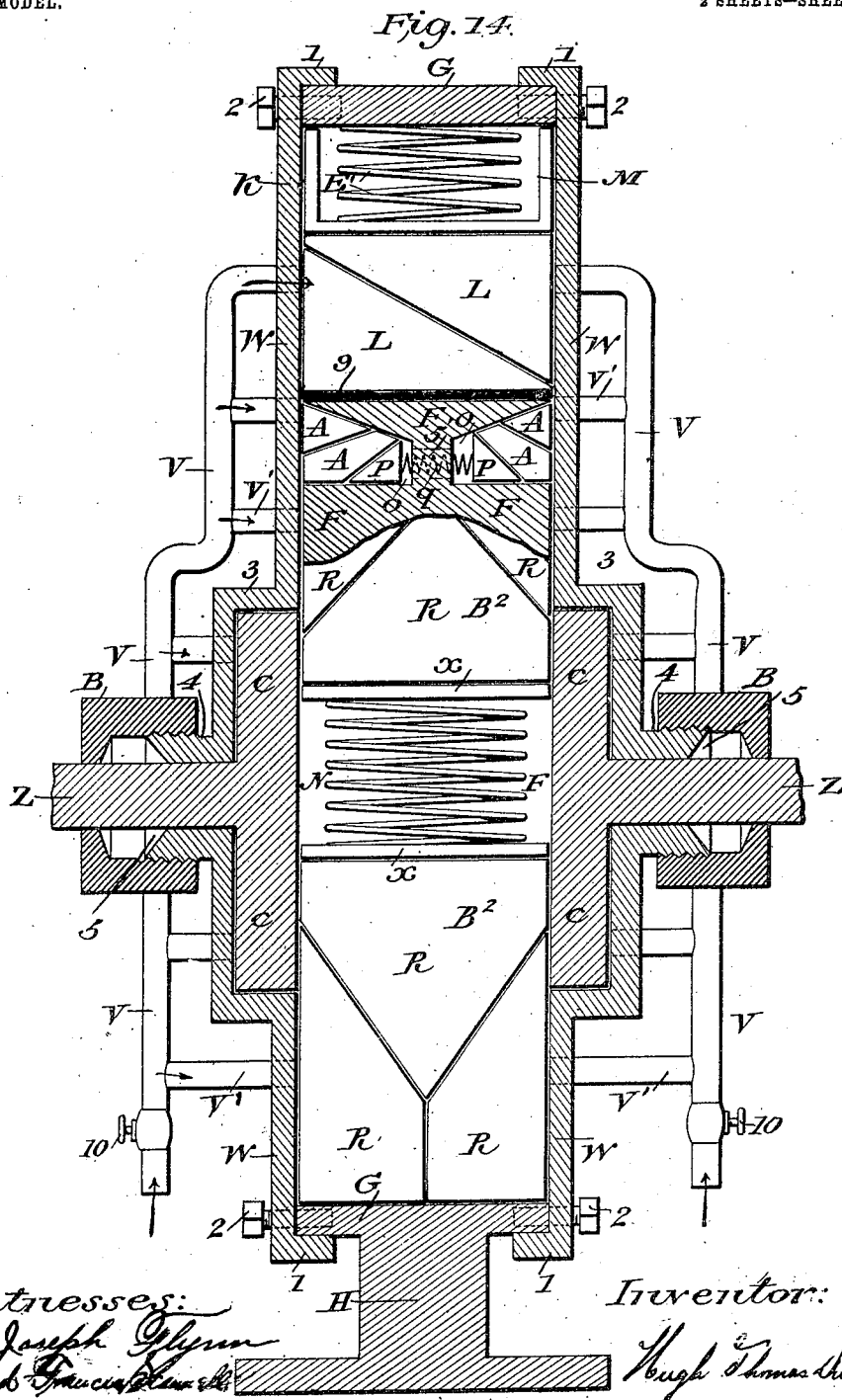
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UNITED STATES PATENT OFFICE.

HUGH THOMAS DUNN, OF NEW YORK, N. Y.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 723,656, dated March 24, 1903.

Application filed July 14, 1899. Serial No. 723,877. (No model.)

To all whom it may concern:

Be it known that I, HUGH THOMAS DUNN, a citizen of the United States, residing in New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of my invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in rotary engines, the objects being to provide an improved packing, combined with means for supplying lubricating material thereto, and also to provide means whereby to lessen the friction engendered during the operation of my device.

To this effect my improvements are directed toward the provision of a steam, gas, and air tight cylinder in a rotary motor by means of pressure-head cam-plates and also in the provision of a dividing bridge or abutment between the inlet and outlet ports, as well as providing packing at the edge of the piston, which packing will contact with the cylinder-heads, and to reduce the friction by means of roller-bearings located on the movable parts, and a supply of lubricant to the motor.

My invention further consists in the provision of new and improved mechanisms in connection with the working parts of the motor, all of which will be more fully described hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation having the cylinder-head, shaft, and circular plates removed to show the interior of my rotary motor with the piston and connected parts in position. Fig. 2 is a sectional view showing the piston and arrangement of packing-rings. Fig. 3 is a detail showing the contact of the packing-rings with the cylinder-head. Fig. 4 is a detail of the bearing-blocks in the dividing-bridge. Fig. 5 is an edge view of the same. Fig. 6 is a detail of the plate M. Fig. 7 shows the mortise by which the cam-sections of the plates are joined to each other. Figs. 8, 9, and 10 are views of cam-plates constructed on different lines. Fig. 11 is an edge elevation of one of the cam-plates. Fig. 12 is a detail of one of the wedge-plates. Fig. 13 is

a detail showing the roller-bearings, and Fig. 14 is an end elevation in section of my entire construction.

My invention comprises a cylinder-band G, suitably supported upon a base H. This cylinder-band is provided with inlet and exhaust ports I and J, respectively. The cylinder-band, support, and inlet and exhaust ports may be cast in one piece, if so desired.

Cylinder-heads W W, provided with flanges 11, which embrace the cylinder-band, are secured to the band by means of bolts 2 2, as shown in Fig. 14. These heads are provided with annular offsets 3 3, located eccentrically of the heads, and these offsets are each provided with exteriorly-threaded journals 4 4. The outer ends of these bearings are conically recessed, as at 5 5. Received within the recessed offsets are circular plates C C, having centrally-located shafts Z Z secured thereto and extending out through the journals 4 4. Internally-threaded stuffing-boxes B B fit over the projecting ends of the shafts Z Z and are secured upon the internally-threaded ends of the journals 4 4, between and within the conically-recessed ends of the journals and the stuffing-boxes to located suitable packing to render the bearing steam-tight.

The plates C C are secured to a circular piston F by means of countersunk bolts received within the recesses C O in the piston. This piston is located eccentrically of the piston-chamber and is provided with oppositely-located annular grooves B' B' at its outer periphery. These grooves are provided with a vertical inner wall and a slanting outer wall, the line of which starts a short distance below the periphery of the piston. It will thus be noted that by this construction the periphery of the piston is slightly narrower in width than is the main body portion of the piston and is dovetailed in cross-section, as shown in Fig. 2. Apertures 5' 5' connect the two oppositely-located grooves B'. Within these grooves is located a plurality of packing-rings, each ring composed of segmental sections, the adjacent ends of the sections being beveled or chamfered, the opposite ends of each section being beveled in opposite directions, as shown in Fig. 1. These packing-ring sections are also angular in cross-section and adapted to be received with-

in the grooves B' B'. The inner ring P is generally of metal of triangular form. Springs q q are located within apertures 5' 5' and contact with the sections of the inner ring P, whereby the angular sections of the packing-rings are continually forced out of the groove and against the cylinder-heads to preserve a tight joint. The packing-rings A A engage the sides of the cylinder-heads a little in advance of the dovetailed periphery of the piston. When these segmental packing-rings have been worn down so that the ring P has approached the outer end of the groove, new packing may be supplied to the groove.

The piston is composed of two semicircular sections, and between these sections is formed a space within which are located the pressure cam-plates. These cam-plates B² B² are slidingly retained within the space or slot and are composed of angular plates loosely connected by tongue-and-groove joints, as shown in Fig. 13. These cam-plates extend the entire width of the cylinder-band and are provided at their longitudinal outer sides with packing 6 6, which contacts with the cylinder-heads to make a tight joint. As shown in Figs. 8, 9, and 10, the number and shape of the angular sections composing one of these plates may be varied, and I do not wish to limit myself to any particular form. For instance, Fig. 8 shows a cam-plate composed of three sections R R R, which are connected by means of tongue-and-groove joints, the sections having a slight sliding connection with relation to one another. Figs. 9 and 10 show other forms in which the sections may be made, the sections in each case being connected by means of tongue-and-groove joints, as shown in Fig. 7. The outer ends of these plates contact with the cylinder-band and are provided with roller-bearings D, whereby to lessen the friction. These roller-bearings are automatically forced outward against the cylinder-band by means of springs 7. There are four of these plates shown in Fig. 1, two upper plates and two lower plates, and a dividing-plate C', extending the entire length of the space or slot between the two halves of the piston, serves to separate the two upper from the two lower plates.

On either side of the dividing-plate C' is located a pair of auxiliary cam-plates C² C², constructed similarly to plates B', but not provided with roller-bearings at their outer ends. The outer ends of cam-plates B' B' and C² C² are formed of any suitable bearing metal.

Narrow alinement-plates x x are located within the space between the half piston-sections and directly behind the sliding plates B' B' and C² C² on either side of the dividing-plate C', and springs N N' extend between and have their ends contacting with the alinement-plates x x, whereby to force them out of the space and against the cylinder-band.

At each end of the semicircular piston-sections are formed wedge-shaped grooves 7' 7'

opening into the space therebetween, and within these wedge-shaped grooves are located antifriction-rollers 8 8, set in bearing metal E E. The rollers contact with the sliding plates B' B' and tend to lessen the friction between the plates and the sides of the piston-sections.

The cylinder-band is provided with an integral offset K of rectangular shape, within which is received the movable dividing bridge or abutment, the offset being located between the inlet and outlet ports. This movable abutment comprises a plurality of plates L, each formed of angular sections in the same manner as are the cam-plates B' B' and, like them, provided with bearing metal at their outer ends, in which are located antifriction roller-bearings 9 9, as shown in Figs. 1 and 5. The sections of which these bridge-plates are formed are adapted to slide upon each other slightly, and the angular section of each plate breaks joint with the angular sections of the adjacent plates.

A U-shaped stop-plate M is located above the sliding bridge-plates L L and is of a size to register with the area of the offset. The upper free ends of the stop-plate are adapted to abut against that portion of the cylinder-band forming the top of the offset. A spring E' is located within the offset between the arms of the U-shaped stop-plate. This spring has its ends bearing against the cylinder-band and stop-plate, respectively, whereby to exert a continual pressure upon the latter to force the sliding bridge-plates downwardly in contact with the periphery of the piston. The stop-plate operates to force the bridge-plates equally out of the offset and also provides a limit to regulate the compression of the spring.

A system of pipes V V, provided with turning plugs 10 10, are connected with any suitable oil-reservoir, (not shown,) which forces the oil therethrough. Branch pipes V' V' connect the main pipes V V with the interior of the rotary engine through the cylinder-heads W W, the oil being supplied to the points of greatest friction at the points where the sectional packing-rings contact with the cylinder-heads, to the bridge or sliding abutments, and to the sliding cam-plates. A drip-cock (not shown) permits the withdrawal of the oil in the usual manner.

As a convenient means for forcing the oil through the pipes into the motor I may employ a pump connected to the shaft of the motor by means of a crank or an eccentric.

It is obvious that many changes might be made in the form and arrangement of the several parts described without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction herein set forth; but,

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

1. In a rotary motor, the combination with

a piston provided with grooves, one wall of which is formed on an angle to the point to be packed, a plurality of rows of angularly-formed packing material set in the grooves, spring-placed in the grooves, and an angularly-formed block located between the springs and the packing, the block forced against the packing by the tension of the spring to cause the packing to fit tightly against the cylinder-head and form a tight joint as well as take up wear in the packing.

2. In a rotary motor, the combination with a piston, the piston comprising two semicircular sections spaced apart from each other, of a plurality of series of oppositely-extending cam-plates slidingly received in the space between the piston-sections, the cam-plates composed of a plurality of angularly-formed sections having tongue-and-groove connections with each other, means for forcing the cam-plates outward, and a dividing-plate located between the upper and lower sections.

3. In a rotary motor, the combination with a piston having a slot therein, of cam-plates movably located in the slot, the cam-plates each comprising a plurality of angular sections meshed one with the other, and a second integral plate interposed between the cam-plates, alinement-plates located in the rear of each cam-plate and springs bearing against the alinement-plates whereby to force the cam-plates outward, the cam-plates also forced outward by centrifugal action.

4. In a rotary motor the combination with a rotatable piston, of sliding cam-plates located in the piston, the ends of the cam-plates adapted to bear continuously against the sides of the rotary motor, roller-bearings located in the piston, the cam-plates in contact with the roller-bearings, the plates composed of sections having loose connection with each other and means located between the sections whereby to automatically force them apart, the roller-bearings received in apertures formed in the piston parallel with the cam-plates.

5. A rotary motor comprising a piston having oppositely-located grooves therein, a plurality of rows of angularly-formed packing material set in the grooves, springs located in apertures connecting the oppositely-located grooves, an angularly-formed ring located between the spring and packing, the ring forced against the packing by the tension of the spring to cause the packing to fit tightly against the cylinder-heads and form a tight joint, the springs operating to take up wear in the packing.

6. In a rotary motor, the combination with a cylinder-band having a closed offset formed therein, and cylinder-heads secured to the band, of a plurality of abutment-plates freely and slidingly received in the offset, the abutment-plates each comprising a series of beveled-edged sections, the beveled edges of one plate breaking joints with the beveled edges of the other plate, a stop-plate located within the offset, means for automatically forcing the plurality of plates out of the offset, the stop-plate inclosing the automatic means and operating to prevent the abutment-plates from being forced too far into the offset.

7. A rotary motor comprising a cylinder-band having an offset therein, cylinder-heads secured to the band and corresponding in shape to the outline thereof, a rotary piston mounted within the casing thus formed, a plurality of cam-plates slidingly received in the offset, the bridge comprising a plurality of plates, the plates each composed of sections loosely connected together, roller-bearings located at the outer ends of each plate in contact with the piston, a stop-plate located in the rear of the bridge-plates, the stop-plate serving to align the bridge-plates and limit their movement in one direction, means located within the stop-plate for constantly forcing the bridge-plates into contact with the piston, the dividing-bridge located between the inlet and outlet ports.

8. A rotary motor comprising a casing provided with inlet and outlet ports, a piston mounted to rotate therein, the piston provided with automatically-extensible packing, the packing bearing against the casing and an automatically-extensible abutment located between the inlet and exhaust ports, the outer end of the abutment bearing continuously against the periphery of the piston.

9. A rotary motor comprising a cylinder-band, cylinder-heads secured thereto, a piston mounted to rotate therein, automatically-extended cam-plates loosely and slidingly received within the piston, the ends of the cam-plates in contact with the cylinder-band, and packing material located in the side edges of the cam-plates, the packing adapted to bear against the cylinder-heads.

Having thus described my invention, I hereby affix my signature in the presence of two witnesses.

HUGH THOMAS DUNN.

Witnesses:

JOHN KIERNAN,
JOHN J. COLBERT.