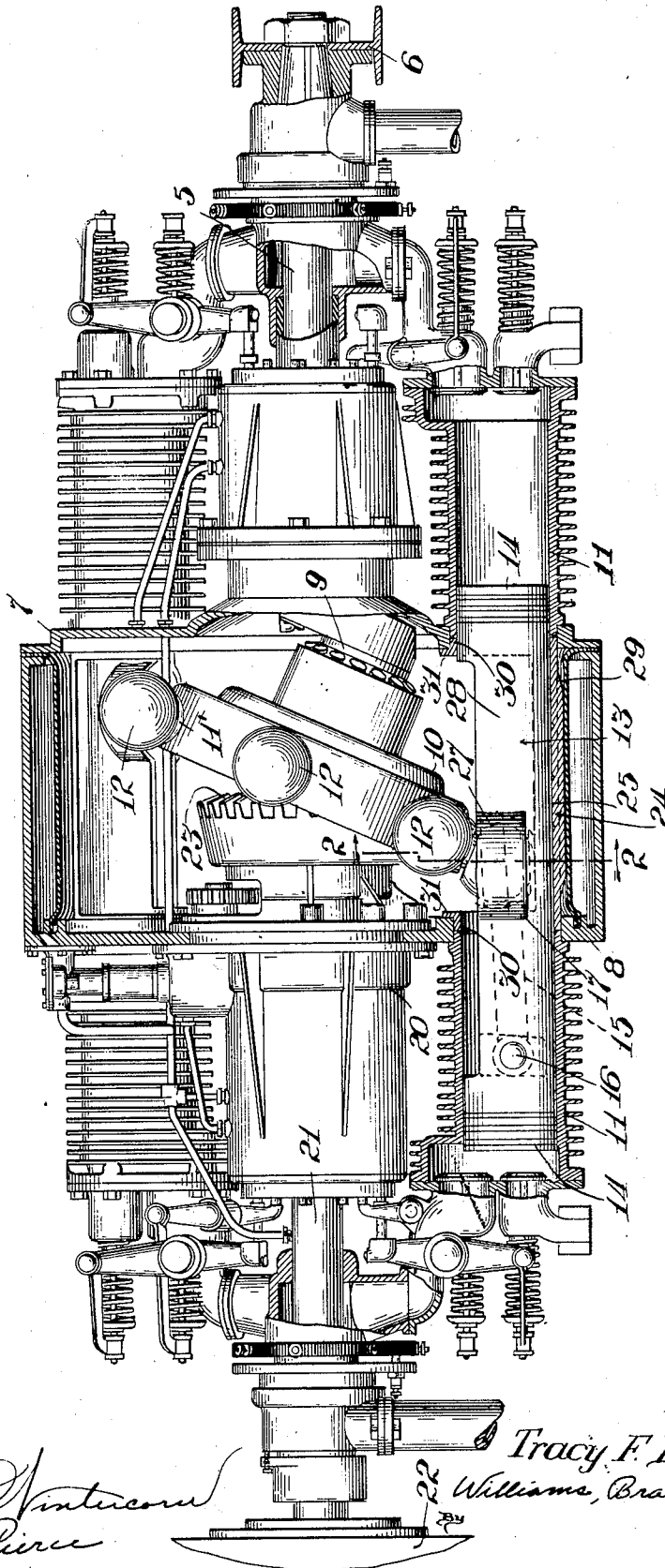


T. F. BRACKETT,
 ROTARY ENGINE.
 APPLICATION FILED MAY 18, 1918.

1,307,480.

Patented June 24, 1919.
 2 SHEETS—SHEET 1.

Fig. 1.



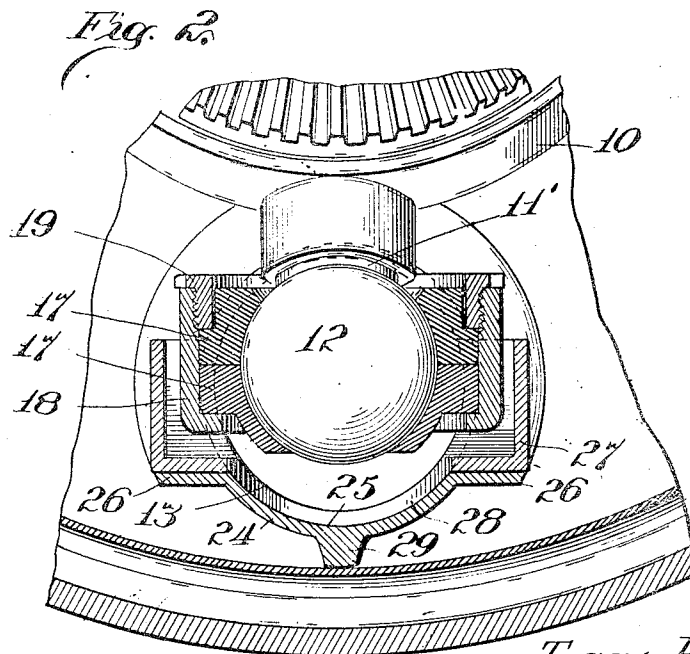
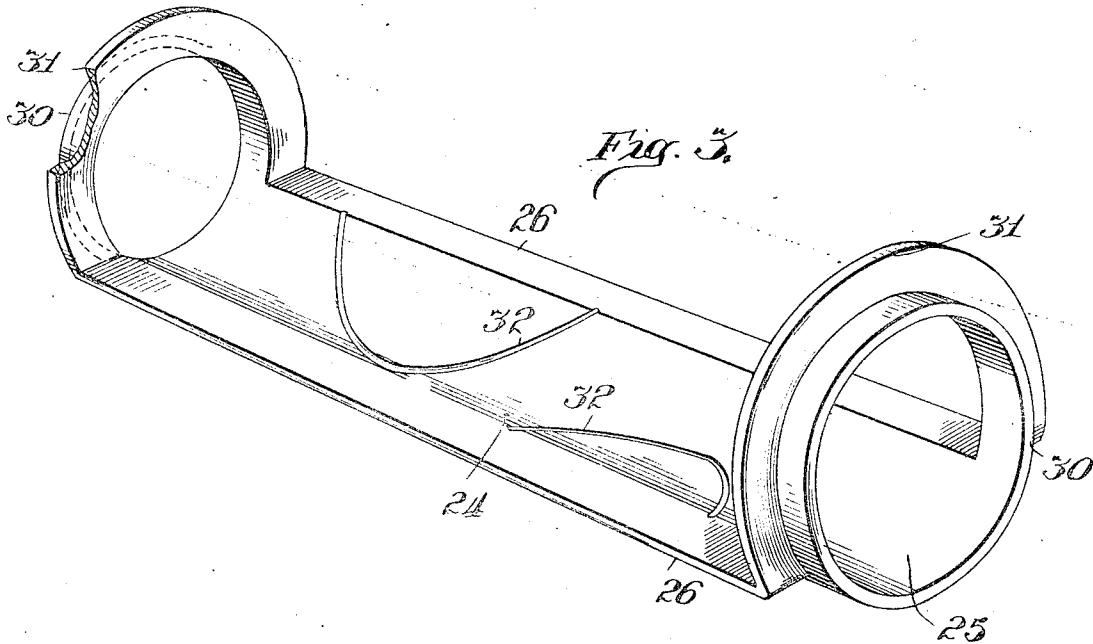
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UNITED STATES PATENT OFFICE.

TRACY F. BRACKETT, OF CHICAGO, ILLINOIS.

ROTARY ENGINE.

1,307,480.

Specification of Letters Patent. Patented June 24, 1919.

Application filed May 18, 1918. Serial No. 235,403.

To all whom it may concern:

Be it known that I, TRACY F. BRACKETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rotary Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in rotary engines and is especially concerned with improvements in rotary engines of the type disclosed in my application Serial No. 218,345, filed February 20, 1918.

The objects of this invention are:

1st. To provide means for relieving the pressure between the outer surfaces of the pistons and the cylinders due to the centrifugal force acting upon the pistons.

2nd. To provide means which will permit the use of lighter pistons and in this manner further reduce the pressure on the bearing surfaces of the pistons and cylinders.

Further objects will appear as the description progresses, reference being had to the accompanying drawings in which:

Figure 1 is a view partially in side elevation and partially in longitudinal section showing certain details of my improvement;

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a perspective view of the bridge bearing for supporting the central portion of each piston.

Similar characters of reference refer to similar parts throughout the several views.

It has been found in the operation of engines of the type to which my invention relates that the wear upon the outer side of the pistons and the adjacent surfaces of the cylinders is very considerable and that in a short time the piston heads assume a more or less elliptical shape and the surfaces of the cylinders co-acting with the outer sides of the pistons wear away very rapidly. This wearing of the pistons and cylinders is very

objectionable for the reason that it permits the charge to escape past the piston heads during the compression stroke and also permits a portion of the exploded gases to escape during the firing stroke, thereby seriously affecting the efficiency of the engine. I propose to overcome these difficulties in two ways: first, by relieving the heads of the pistons of the pressure due to centrifugal force, and, second, by reducing the weight of the pistons whereby the centrifugal force which causes the excessive wear of the pistons and cylinders is correspondingly reduced.

Referring to the drawings, the reference character 5 indicates a stationary shaft, the end of which is secured to a support 6 by any suitable means. This shaft serves as a support for the cylinder carriers 7 and 8, and is provided with an angularly disposed portion 9 about which rotates the angle plate 10. The cylinder carriers 7 and 8 support a plurality of pairs of alined cylinders 11, the opposed ends of which lie upon the opposite sides of the angle plate 10. The angle plate 10 is provided with a plurality of crank pins 11' upon which are rotatably mounted the bearing balls 12, these balls being mounted to rotate about the axis of the pins 11'. Slidably mounted in each pair of cylinders is a trunk piston 13 having the heads 14 one of which slides in each of the alined cylinders. Each of the trunk pistons is connected with one of the bearing balls 12 by means of a pitman 15 which is connected with a piston at the head end by a universal joint 16 and the opposite end of which is connected with the bearing ball 12 by means of the socket bearing members 17 which are secured in the enlargement 18 at the crank end of the pitman by means of a screw threaded collar 19.

Secured to the cylinder carrier 8 through the instrumentality of the valve gear casing 20 is the power shaft 21 the end of which is mounted in a suitable bearing 22. Thus far the structure described is substantially the same as that disclosed in my co-pending ap-

plication above referred to, and since the details of the valve operating mechanism, the lubricating system, and other portions of the apparatus disclosed in said application form no part of my present invention they will not be herein further described. It is sufficient to state that the motion of the pistons is communicated to the angle plate and from the angle plate to the cylinder carriers through the instrumentality of a bevel gear 23 which is secured to the cylinder carrier and co-acts with a bevel gear, not shown, which is secured to the angle plate 10. In engines of this type when rotating at high speed the centrifugal force developed by each piston is many times greater than the weight of the piston and imposes a very heavy thrust or pressure upon the outer sides of the piston and upon the co-acting surfaces of the cylinder. As stated above, this results in very rapid wearing of both the piston heads and the cylinders and is, therefore, very objectionable.

In order to overcome these objections I provide a bridge bearing member shown in perspective in Fig. 3 and indicated generally by the reference character 24 which comprises a cylindrical shaped bearing portion 25 having the outwardly extending flanges 26 which by coacting with the enlargements 27 on opposite sides of the central portion of the cylinder perform two functions, namely, to relieve the piston heads of the centrifugal force developed by each piston and at the same time prevent the pistons from rotating in the cylinders. The enlargements 27 are necessary to permit the proper lateral movement of the crank ends of the pitman. As shown in Fig. 2 each trunk piston is also provided with a cylindrical portion 28 which co-acts with the cylindrical portion 25 of the bridge member to relieve the piston heads of the thrust due to centrifugal force. A rib 29 extends longitudinally of the bridge member to provide the maximum resistance against the centrifugal force with the least weight. Each end of the bridge member is provided with a ring shaped extension 30 which is received in the openings in the cylinder carriers, which receive the opposed ends of the cylinders. Flanges 31 are also provided to prevent any longitudinal movement of the bridge member. The reference characters 32 indicate oil grooves which open into the interior of the crank case formed by the cylinder carriers 7 and 8 and supply the necessary lubrication to the bearing surfaces.

I preferably make the bore of the bridge member slightly smaller than the bore of the cylinders in order that it will sustain substantially all of the pressure or thrust due to the centrifugal force acting on each piston.

While I have described the preferred embodiment of my invention it is to be understood that it is capable of other adaptations and modifications within the scope of the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A rotary engine comprising a shaft having spaced alined bearing portions separated by an angularly disposed bearing portion, an angle plate rotatably mounted on said angularly disposed bearing portion, a plurality of pairs of alined cylinders rotatably mounted upon said spaced bearing portions, the opposed ends of said cylinders lying on opposite sides of said angle plate, a trunk piston reciprocally mounted in each of said cylinders, pitman rods connecting each of said pistons with said angle plate, and means between the opposed ends of each pair of cylinders for relieving the heads of said pistons from pressure due to centrifugal force comprising bridges secured between the opposed ends of said cylinders and provided with bearing surfaces co-acting with bearing surfaces on said pistons to receive the thrust due to centrifugal force.

2. A rotary engine comprising a shaft having an angularly disposed bearing portion, an angle plate rotatably mounted upon said angularly disposed bearing portion, a plurality of pairs of alined cylinders rotatably mounted upon said shaft, the opposed ends of said cylinders lying on opposite sides of said angle plate, a trunk piston reciprocally mounted in each of said pairs of cylinders, connections between said pistons and said angle plate, and means for supporting said pistons on their outer sides at points immediately adjacent the opposed ends of said pairs of cylinders and at intermediate points to relieve the heads of said pistons from pressure due to centrifugal force.

3. A rotary engine comprising a shaft having an angularly disposed bearing portion, an angle plate rotatably mounted upon said angularly disposed bearing portion, a plurality of pairs of alined cylinders rotatably mounted upon said shaft, the opposed ends of said cylinders lying on opposite sides of said angle plate, a trunk piston reciprocally mounted in each of said pairs of cylinders, connections between said pistons and said angle plate, and means between the adjacent ends of opposed cylinders for supporting said pistons on their outer faces at all points between the adjacent ends of said cylinders to relieve the heads of said pistons from pressure due to centrifugal force.

4. A rotary engine comprising a shaft, a plurality of pairs of alined cylinders mounted to rotate upon said shaft, the ends of

each pair of cylinders being opposed to each other, piston heads in each of said cylinders, a cylindrical member connecting the pistons in each pair of cylinders, the surface of said cylindrical member being substantially flush with the walls of said piston heads, and bearings for supporting the central portions of said cylindrical members so as to

relieve said piston heads of the thrusts imposed thereon due to centrifugal force. 10

In witness whereof I hereunto subscribe my name this 14th day of May, A. D. 1918.

TRACY F. BRACKETT.

Witnesses:

R. C. MOORE,

EARL F. PIERCE.