

No. 812,588.

PATENTED FEB. 13, 1906.

R. C. McLEAN.  
ROTARY ENGINE.

APPLICATION FILED SEPT. 29, 1905.

Fig. 1

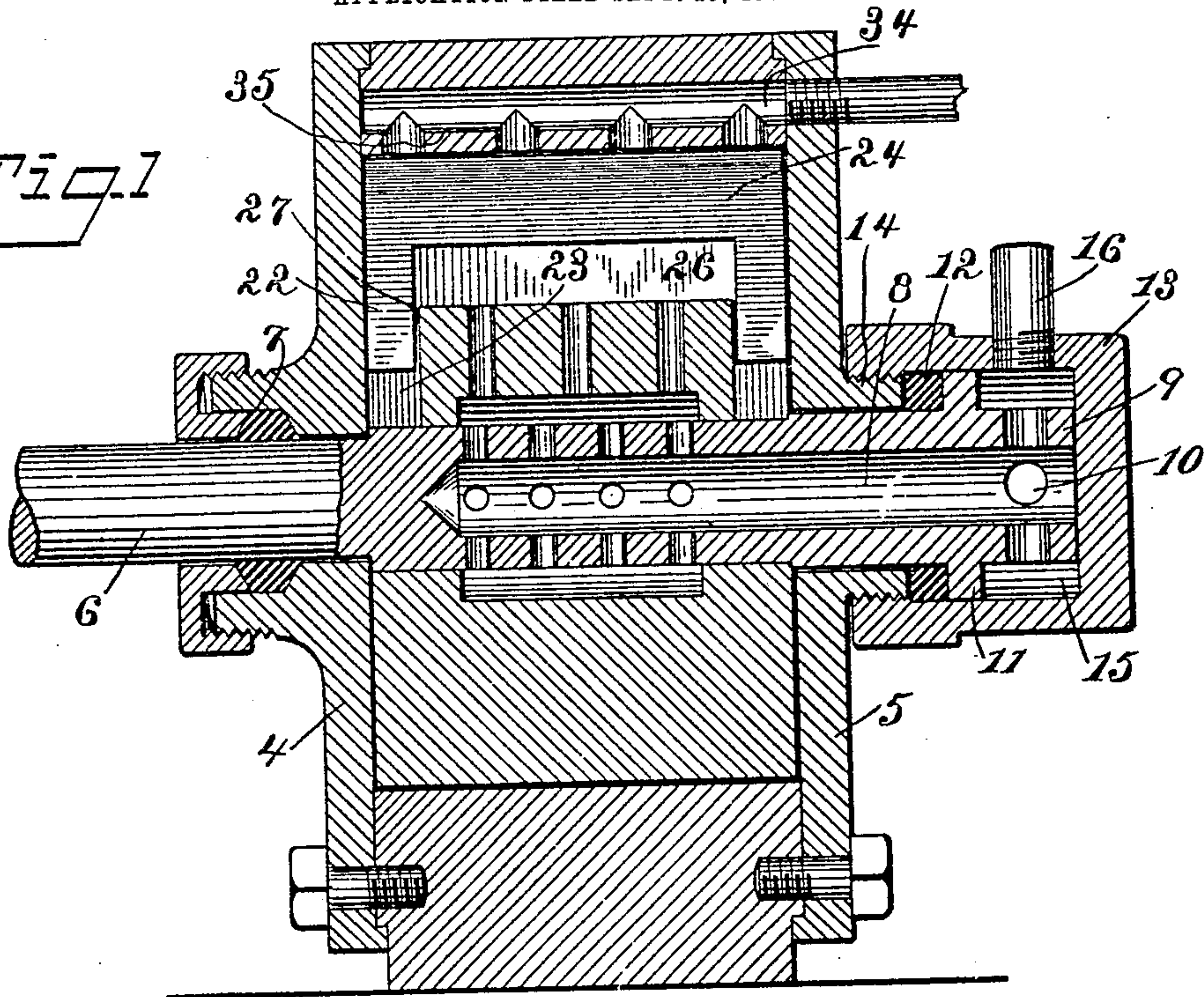
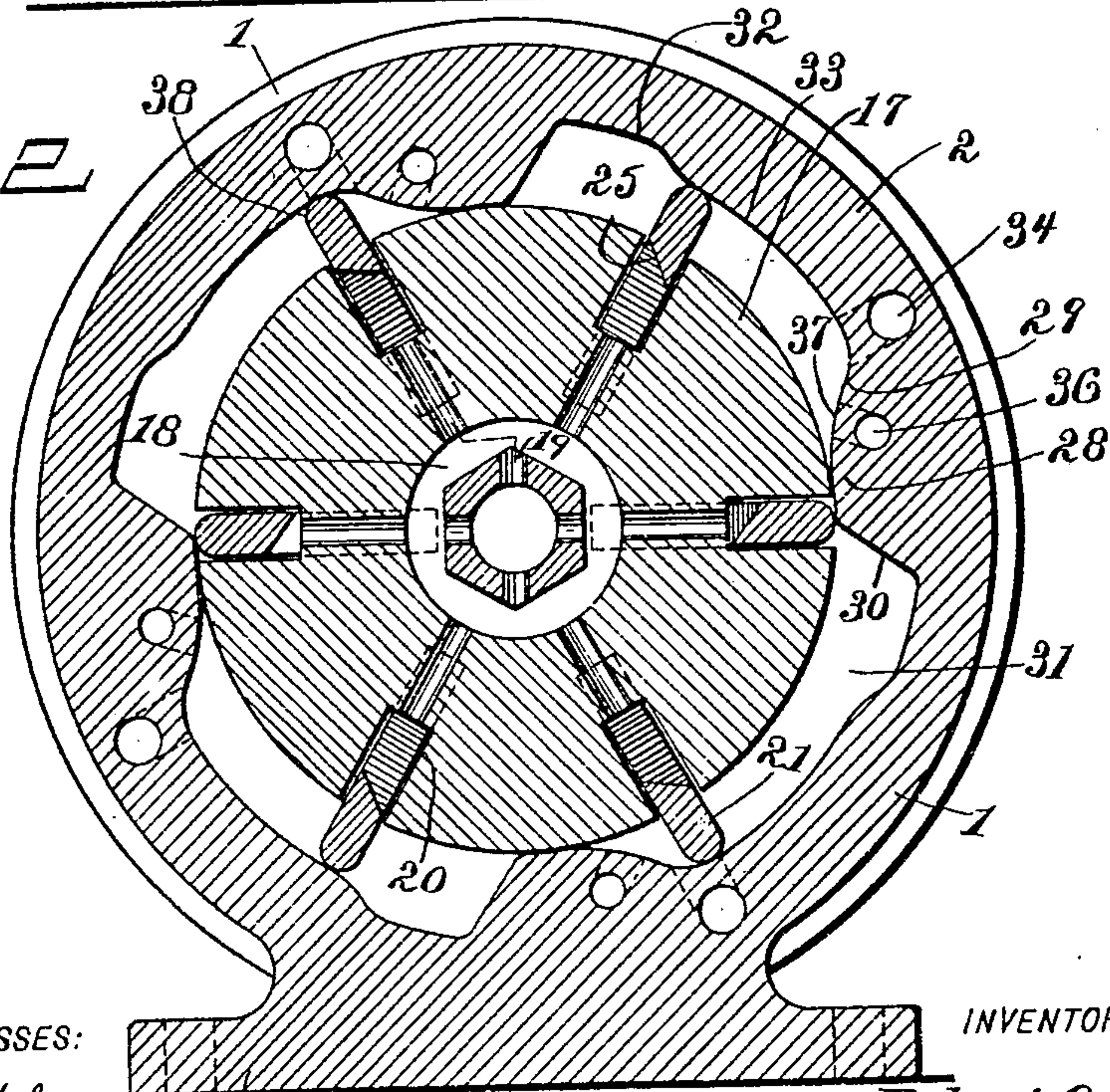


Fig. 2



WITNESSES:

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INVENTOR

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BY

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# UNITED STATES PATENT OFFICE.

ROBERT CORMACK McLEAN, OF CLEVELAND, OHIO.

## ROTARY ENGINE.

No. 812,588.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed September 29, 1905. Serial No. 280,668.

*To all whom it may concern:*

Be it known that I, ROBERT CORMACK McLEAN, a subject of the King of Great Britain, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

This invention relates to rotary engines. The object of the invention is to provide an engine of this class which is simple in construction and which will operate efficiently with little waste.

A further object is to provide such an engine with an improved arrangement for the exhaust-ports.

The invention consists in the construction and combination of parts to be more fully described hereinafter and definitely set forth in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a longitudinal section through an engine constructed according to my invention, a portion of the shaft thereof being shown in elevation. This section is taken substantially upon the line 1 1 of Fig. 2. Fig. 2 is a vertical cross-section through the engine, taken at right angles to the shaft.

Referring more particularly to the parts, 1 represents the casing of the engine, which is preferably formed of a cylindrical body 2, having an integral base 3 adapted to rest upon a suitable support. The casing also includes side plates 4 and 5, which are bolted to the opposite sides of the body 2, as indicated. In the side plates 4 and 5 a shaft 6 is mounted to rotate. In order to make this shaft substantially steam-tight in the side plate 4, a stuffing-box 7 of suitable construction, such as that shown, is provided. The shaft 6 is provided with a centrally-disposed bore 8, which extends in from the extremity 9 thereof. At this extremity 9 the shaft is provided with openings 10, which pass through the wall thereof, so as to open communication to the bore 8, as indicated. Adjacent to these openings 10 the shaft is provided with an integral collar 11. Under this collar suitable packing 12 is arranged, and a bonnet 13 is disposed over the end of the shaft, the same being screwed upon a threaded nipple

14, which projects from the side plate 5, as shown.

Within the interior of the bonnet 13 beyond the collar 11 an inlet steam-chamber 15 is formed, into which live steam is admitted through a suitable pipe connection 16. The steam in this inlet-chamber 16 flows in through the openings 10 into the bore 8, passing from this point to the interior of the engine.

Upon the shaft 6 within the interior of the casing there is rigidly mounted a drum or barrel 17. This drum, as indicated most clearly in Fig. 2, is of cylindrical form and provided with a central bore or chamber 18, which constitutes a steam-chest. Steam is admitted to this steam-chest through openings 19, which are formed in the shaft and which communicate with the bore 8 thereof, carrying the steam. The outer face of the drum 17 is provided with a plurality of radially-disposed slots or guideways 20, in which there are slidably mounted a corresponding number of pistons or valves 21. These valves consist of flat plates having side extensions or legs 22, as shown in Fig. 1, and these legs extend down at the end faces of the drum, being disposed in slots 23 at these points, which constitute extensions of the slots 20, as will be readily understood. The inner edges of the bodies 24 of the pistons are preferably beveled, as indicated at 25. Between these edges 25 and the bottoms of the slots 20 steam-spaces 26 are formed, and steam is admitted into these steam-spaces by means of ports 27, which pass radially from the steam-chest 18. As indicated, there are preferably six of these pistons 21 operating in the same number of slots 20.

The inner face of the body 2 of the casing is substantially cylindrical in form, but provided with four abutments 28, which project inwardly, so that their inner faces at their innermost points lie substantially against the cylindrical face of the drum 17. With respect to the direction of rotation the forward faces 29 of these abutments are slightly inclined or curved, while the rear faces 30 are more abrupt and preferably straight, as shown. Between these abutments 28 four pockets or expansion-chambers 31 are formed. The walls of these pockets between the abutments are substantially cylindrical, being disposed upon the axis of the shaft 6 as an axis of curvature. Adjacent to the faces



30 the width of the expansion-chambers measured radially is increased by reason of the fact that the bore at this part is depressed away from the drum 17, as indicated at 32. The wall 33 beyond these points is elevated. The purpose of this arrangement will be described more fully hereinafter.

In the abutments 28 and near the angle formed between the inclined faces 29 and the faces 33 I provide main exhaust-ports 34, the same being provided with lateral branches 35, as indicated in Fig. 1, which open into the pockets or expansion-chambers 31, as indicated. Beneath the inclined faces 29 auxiliary exhaust-ports 36 are provided, which are formed with similar branches 37, which open to the pockets 31, as indicated in Fig. 2.

The mode of operation of the engine will now be described with the understanding that the direction of rotation is to the right—that is, with the hands of a clock. It should be understood that the presence of steam in the steam-space 26 forces the pistons or valves 21 outwardly, maintaining their rounded noses 38 against the wall of the casing. In the position in which the drum 17 is shown cut-off has just taken place. This cut-off occurs when the ends of the pistons 21 ride up from the surfaces 32 upon the elevated surfaces 33. When the pistons have their noses resting against the depressed faces 32, the inner edges 25 of the pistons are disposed beyond the periphery of the drum 17, so that the steam behind the valves is allowed to escape. This steam filling the expansion-chambers behind the pistons of course operates to rotate the drum and advance the pistons in the direction of the elevated faces 33 and toward the inclined faces 29. When the rotation has continued sufficiently, the exhaust-ports 34 are uncovered at their branches 35, so that the steam escapes, creating an exhaust from the expansion-chamber. The steam which remains in the chambers in front of the pistons when they have passed beyond the exhaust-ports 34 is expelled through the auxiliary ports 36. In this way no back pressure is developed at the abutments 28 which might tend to prevent the rotation of the engine. When the pistons pass the most elevated points of the abutments 28, they slide down or outwardly on the inclined faces 30 toward the faces 32, admitting steam again to the expansion-chambers. This admission of the steam con-

tinues, of course, until cut-off occurs by the inward movement of the pistons, when they pass up to the elevated faces 33.

While I have described the engine as a steam-engine, its use is by no means confined to this gas, and it may be operated by any other gas, such as compressed air. Indeed, it could be operated by water.

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

1. In a rotary engine, in combination, a casing presenting a substantially cylindrical body, a drum rotatably mounted within said body, a plurality of pistons projecting radially from said drum and normally engaging the inner face of said body, said body having abutments projecting inwardly and substantially abutting the cylindrical face of said drum, said casing further having exhaust-ports near said abutments, said abutments presenting inclined forward faces along which said pistons pass and auxiliary ports in said inclined faces.

2. In a rotary engine, in combination, a casing presenting a substantially cylindrical body, a drum rotatably mounted within said body, said casing having a plurality of abutments projecting toward said drum and substantially abutting the outer surface thereof whereby a plurality of expansion-chambers are formed between said abutments, said abutments having inclined faces disposed forwardly with respect to the direction of rotation of said drum, means for admitting steam to the interior of said drum, said drum having steam-spaces, a plurality of pistons guided in said drum and backed by said steam-spaces whereby the steam operates to maintain said pistons in engagement with the said casing, said casing having exhaust-ports adjacent to said abutments adapted to be uncovered by the advance movement of said pistons, and further having auxiliary exhaust-ports opening on said inclined faces, said auxiliary exhaust-ports affording escape for steam held before said pistons after passing said first exhaust-ports.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT CORMACK McLEAN.

Witnesses:

THOMAS C. RUSSELL,  
JAMES A. FREW.