(No Model.)

2 Sheets—Sheet 1.

W. H. PHILLIPS.

ROTARY ENGINE.

No. 605,585. Patented June 14, 1898.

Fig. 1.

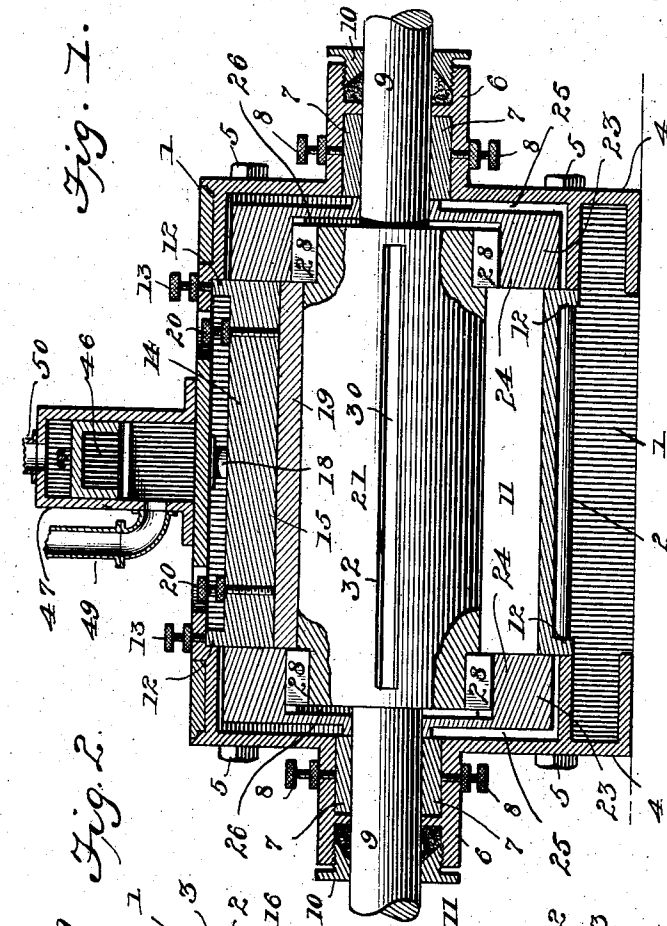


Fig. 4.

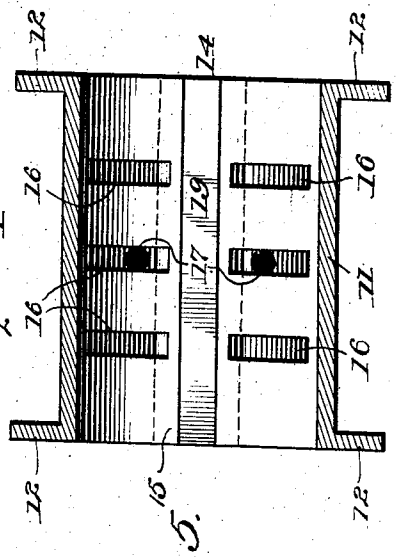


Fig. 2.

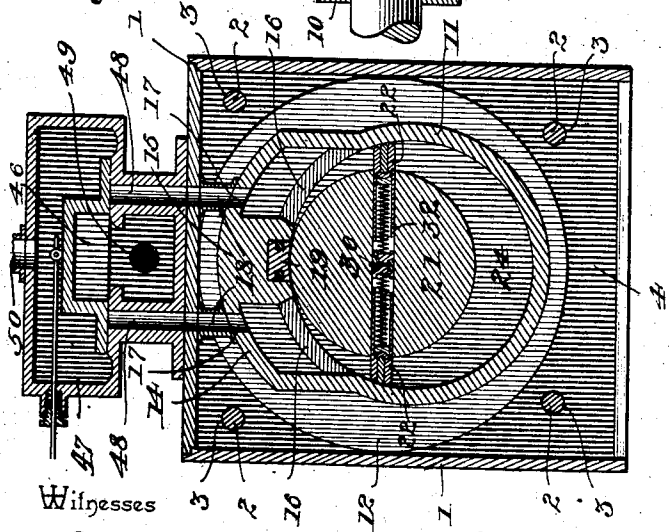
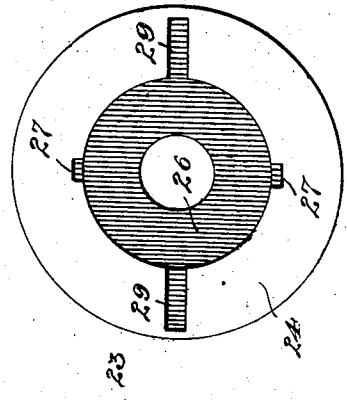


Fig. 5.



Witnesses

E. S. Monroe

V. B. Hillyard.

Inventor

Wilson H. Phillips.

By his Attorneys,

C. A. Snow & Co.

(No Model.)

2 Sheets—Sheet 2.

W. H. PHILLIPS.

ROTARY ENGINE.

No. 605,585. Patented June 14, 1898.

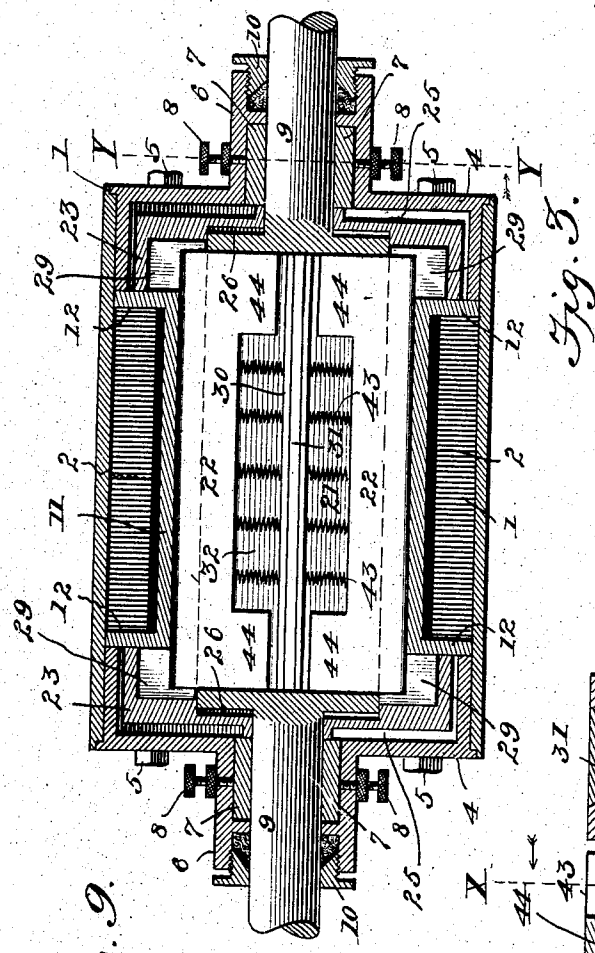


Fig. 5.

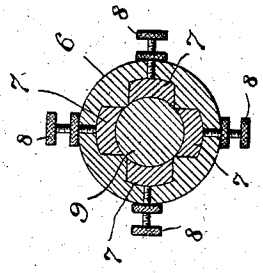


Fig. 8.

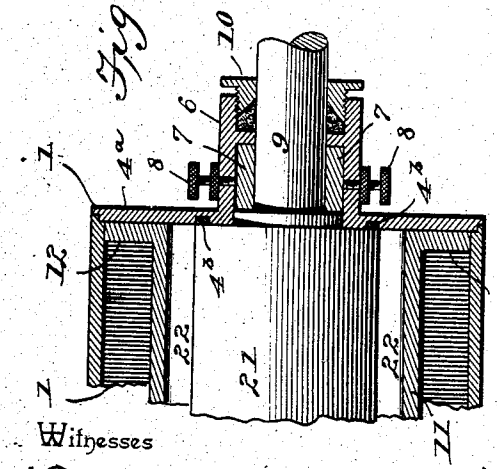


Fig. 9.

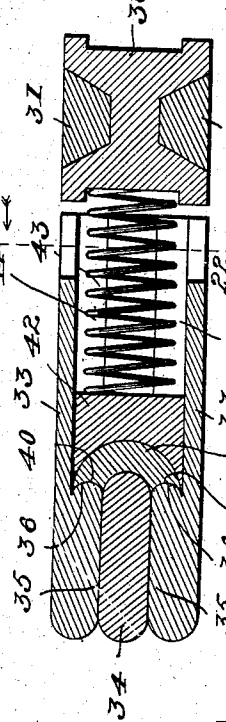


Fig. 6.

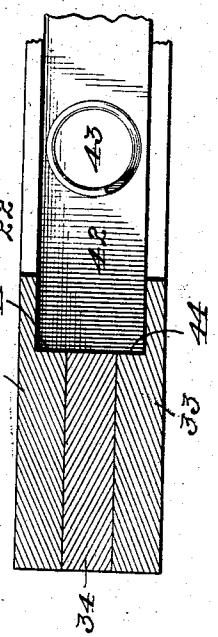


Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

WILSON HULL PHILLIPS, OF WAMPUM, PENNSYLVANIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 605,585, dated June 14, 1898.

Application filed May 18, 1897. Serial No. 637,079. (No model.)

To all whom it may concern:

Be it known that I, WILSON HULL PHILLIPS, a citizen of the United States, residing at Wampum, in the county of Lawrence and State of Pennsylvania, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to rotary engines, the principal objects being to reduce the friction between the moving parts to the smallest amount possible, to insure tight joints and obviate leaking of the steam, which is the chief source of detracting from the efficiency of this class of motors, and to improve the general construction and render the parts accessible for oiling, cleaning, repairing, or for any required purpose.

Objects and advantages other than those herein mentioned will become apparent and suggest themselves to those skilled in the art as the details of the invention are understood; and to this end and such others as appertain to the character of the invention reference is to be had to the following description and the accompanying drawings.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages thereof, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a vertical central longitudinal section of an engine specially designed for attaining the objects of this invention. Fig. 2 is a vertical central transverse section. Fig. 3 is a plan section midway of the engine. Fig. 4 is an inner view of the upper half of the cylinder. Fig. 5 is a detail view of a rotary head as seen from the inner side. Fig. 6 is a transverse section of one of the wings and the spacing-strip, constituting parts of the piston. Fig. 7 is a section on the line X X of Fig. 6, looking in the direction of the arrow. Fig. 8 is a section on the line Y Y of Fig. 3, looking to the right, as designated by the arrow. Fig. 9 is a modification, dispensing with the rotary heads.

Corresponding and like parts are referred to in the following description and indicated in the several views of the accompanying drawings by the same reference characters.

The operating parts of the engine are inclosed within a box-shaped case 1, the ends or heads of which are secured together by tie-rods 2, which have their end portions threaded and extending through openings 3 in the ends or heads 4 and receiving nuts 5, by means of which the said end pieces are held in place. The case is adapted to be secured to a suitable bed or foundation in any of the usual ways. A box 6 is provided on the outer side of each end piece 4 and receives bearing-blocks 7, which are adjustable by means of set-screws 8, so as to center the shaft 9 and secure a close fit between the bearing-blocks and the said shaft. A stuffing-box 10, of ordinary construction, is provided at the outer end of each journal-box 6 to secure a steam-tight joint between the shaft 9 and the end pieces of the case.

The cylinder 11 has an outer rim or flange 12 at its ends and is clamped between the end pieces 4 by means of the tie-rods 2 and is centered or adjusted by means of set-screws 13. The cylinder is formed on its upper side with an enlargement 14, which is hollow and constitutes the steam-chest, the inner and outer walls being connected by a longitudinal partition 15, dividing the steam-chest into two compartments, the one serving to receive live steam and the other exhaust-steam, and each compartment communicating with the interior of the cylinder by ports 16, formed in the inner wall of the steam-chest. These ports 16 are located at intervals in the length of the cylinder, so as to admit and exhaust steam at various points between the ends of the cylinder, thereby adding materially to the effectiveness of the engine. The outer wall has ports 17 upon opposite sides of the partition 15, and pipes 18 connect with the ports 17, the one supplying and the other exhausting the steam. The abutment 19, by means of which a steam-tight joint is maintained between the cylinder and piston, is located in a groove formed in the inner side of the partition 15 and is adjustable to allow for wear by means of set-screws 20, which project into openings in the top of the case and are accessible at all times to set the abutment up against the piston to obviate any leakage.

The piston comprises, essentially, a hub or

drum 21 longitudinally slotted, the slot extending transversely and diametrically of the hub and opening through the sides thereof, and wings 22, the latter being located and operating in the slot of the hub. Rotary heads 23 are secured upon the shaft 9 at the ends of the hub 21 and have inwardly-extending rims 24, which bear against the ends of the cylinder, and these heads rotate with the piston and are located in recesses or spaces 25, formed on the inner sides of the end pieces 4. Each rotary head 23 has a recess 26 to receive the adjacent end of the hub or drum 21, notches 27 to receive keys 28, by means of which the rotary heads and hub are secured, so as to revolve together, and radial grooves 29 for the ends of the wings 22 to slide in as the piston rotates, the wings being longer than the cylinder and extending a short distance beyond the ends thereof.

The wings are separated at their inner edges by a strip 30, which is grooved in its opposite sides to receive packing-strips 31, by means of which a tight joint is maintained between the spacing-strip 30 and the sides or walls of the longitudinal slot 32 of the hub or drum 21. Each wing is similarly formed and comprises side plates 33 and an intermediate strip 34, the outer edges of the side plates and the inner and outer edges of the strip 34 being rounded, so as to secure a close fit with the inner wall of the cylinder. Each side plate is thickened on its inner face for a short distance from its outer edge, as shown at 35, and the inner edge of this thickened part 35 is beaded or rounded, as shown at 36, the thickened part being of a depth approximating the width of the strip 34. A rocker-bearing 37 is located in the space formed between the side plates 33, contiguous to the parts 34 and 36, and is curved on its inner face and has a middle and side seats at its outer face, the middle seat 39 conforming to the rounded edge of the strip 34 and the side seats 40 conforming to and receiving the bead or rounded edges 36 of the thickened portions 35. A follower 42 has a curved seat on its outer face to receive the rocker-bearing 37, and its inner face is straight and has the outer end of a spring 43 bearing thereon and tending to move the wing outward, said spring 43 being interposed between the follower 42 and the strip 30, which latter is depressed to receive the inner end of the said spring. The ends of the side plates 33 are flanged, as shown at 44, so as to retain the spring 43 in place. There will be as many of the springs 43 as may be found necessary, and they will be disposed at intervals in the length of the space formed between the inner portions of the side plates 33. As previously intimated, the wings 22 are moved outward against the walls of the cylinder by means of the springs 43, and the several parts of each wing have independent movement by reason of the rocker-bearing 37, which tilts upon the inner edge of the strip 34 and permits one plate 33 to move outward and the opposite plate to move inward, a close joint being maintained by reason of the curved seats 39 and 40 and the rounded edges of the parts fitted therein.

When the engine is to be driven in one direction, no valve other than the throttle will be required; but when the engine is constructed to be reversed a slide-valve 46 is provided to operate in a steam-chest 47 and to control ports 48. The exhaust 49 is spanned by the valve 46 and is adapted to be brought into communication with either of the ports 48, thereby exhausting the steam from either side of the piston, whereas the live steam entering the port 50 passes into the chest 47, and from the latter through the uncovered port 48 into the cylinder, so as to drive the piston in the required direction.

It will be understood that in constructing the engine for special purposes, as for mining and other operations where lightness is a desideratum, to secure portability the rotary heads 23 may be dispensed with, the inner faces of the ends 4^a coming flush with the ends of the cylinder and having packing-rings 4^b to bear against the extremities of the hub or drum.

The salient features of the invention, as herein described, may be applied to air-compressors, pumps, and like mechanisms comprising a cylinder and piston or rotary part, as will be readily understood.

Having thus described the invention, what is claimed as new is—

1. In a rotary engine, the combination of a case having the inner sides of its heads formed with circular recesses, a cylinder located within the case and secured between the heads thereof with its bore eccentric to the recesses in the heads of the case, a piston concentric with the circular recesses in the heads of the case and eccentric with reference to the cylinder and having its end portions projecting beyond the cylinder into the recesses of the heads of the case, and rotary heads secured upon the shaft of the piston to revolve therewith and located in the aforesaid recesses and bearing against the ends of the cylinder, substantially as set forth.

2. In a rotary engine, the combination of a case having circular recesses formed in the inner sides of its heads, a cylinder located within the case and secured between the heads thereof and eccentrically disposed with reference to the said circular recesses, a piston concentric with the circular recesses and eccentric with respect to the cylinder and having its end portions projecting beyond the ends of the cylinder and entering the recesses formed in the heads of the case, and having a diametrical slot extending beyond the extremities of the cylinder, wings slidably mounted in the said diametrical slot, and rotary heads secured to the end portions of the piston-shaft and located in the afore-described circular recesses with their inner faces abutting against the ends of the cylinder, and

recessed to receive the projecting end portions of the piston and having radially-disposed grooves in which operate the end portions of the wings, substantially as set forth.

3. In a rotary engine, the combination of a case having circular recesses formed in the inner sides of its heads, a cylinder located within the case and secured between the heads thereof with its bore eccentric to the said circular recesses, a piston concentric with the said circular recesses and eccentric to the cylinder and having its end portions projecting beyond the ends of the cylinder into the recessed heads of the case, and having a diametrical slot, wings slidably mounted in the said diametrical slot, rotary heads mounted upon the end portions of the piston-shaft and located in the aforesaid circular recesses with their inner faces bearing against the ends of the cylinder and having their inner faces recessed to receive the projecting end portions of the piston and formed with radial grooves, and notches, the latter corresponding with similar notches in the projecting ends of the piston, and keys fitted in the notches of the rotary heads and piston to cause these parts to revolve in unison, substantially as set forth.

4. In a rotary engine, the combination with a cylinder, and a slotted hub, of a wing comprising side plates having their outer edge portions thickened on their inner sides, a rocker-bearing, a follower forming a seat for the rocker-bearing, and a spring exerting an outward pressure on the follower, substantially as set forth.

5. In a rotary engine, the combination with a cylinder, and a slotted hub, of a wing comprising side plates thickened on their inner faces at their outer edges, an intermediate strip between the thickened portions of the side plates, a rocker-bearing having seats to receive the inner edges of the thickened parts of the side plates and the inner edge of the intermediate strip, a follower, and a spring exerting an outward pressure on the follower, substantially as set forth.

6. In a rotary engine, the combination with a cylinder, and a piston having a diametrical slot, of a strip movable laterally in the said slot and of a corresponding width thereto, packing-strips located in grooves in the sides of the said strip and bearing against the walls of the aforesaid slot, wings at opposite sides of the strip and bearing against the inner wall of the cylinder, and springs housed and protected by the wings and interposed between the latter and the aforesaid strip, substantially as set forth.

7. In a rotary engine, the combination with a cylinder, and a slotted hub, of a strip located and movable transversely within the slotted hub, wings upon opposite sides of the strip, each comprising side plates thickened at their outer edges on their inner sides, a strip intermediate of the thickened portions, a rocker-bearing provided with seats to receive the inner edges of the intermediate strip and thickened portions, a follower, and a spring interposed between the follower and a side of the strip, substantially as and for the purpose set forth.

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

WILSON HULL PHILLIPS.

Witnesses:
D. I. CAMPBELL,
JAS. A. GARDNER.