No. 851,195. PATENTED APR. 23, 1907.

A. L. & R. BAUER.

ENGINE.

APPLICATION FILED MAR. 16, 1906.

2 SHEETS—SHEET 1.

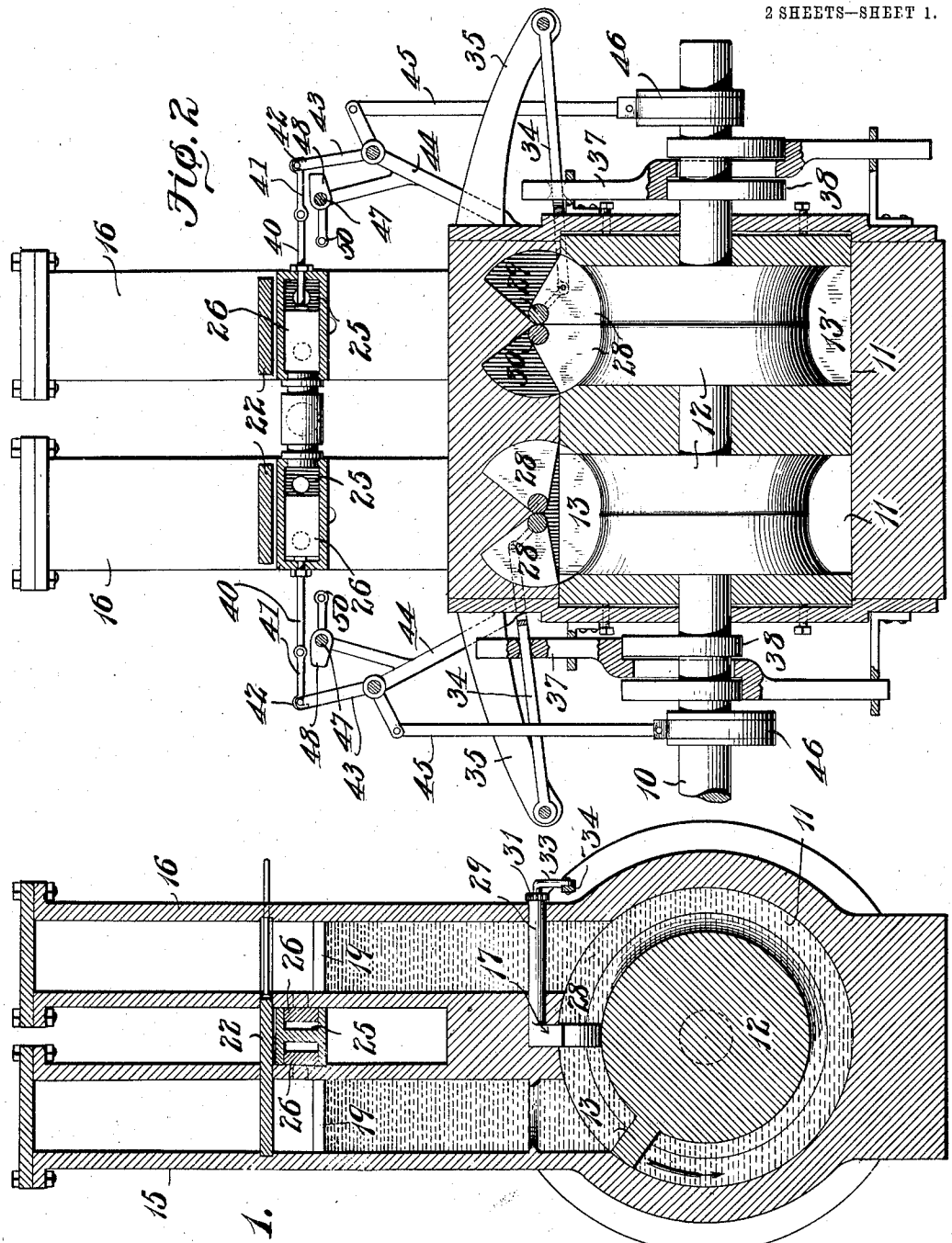


Fig. 2.

Fig. 1.

WITNESSES:

E. F. Stewart

Jno. E. Parker

Albert L. Bauer and Raymund Bauer INVENTORS.

By Cachow & Co

ATTORNEYS

No. 851,195. PATENTED APR. 23, 1907.

A. L. & R. BAUER.

ENGINE.

APPLICATION FILED MAR. 16, 1906.

2 SHEETS—SHEET 2.

Fig. 3.

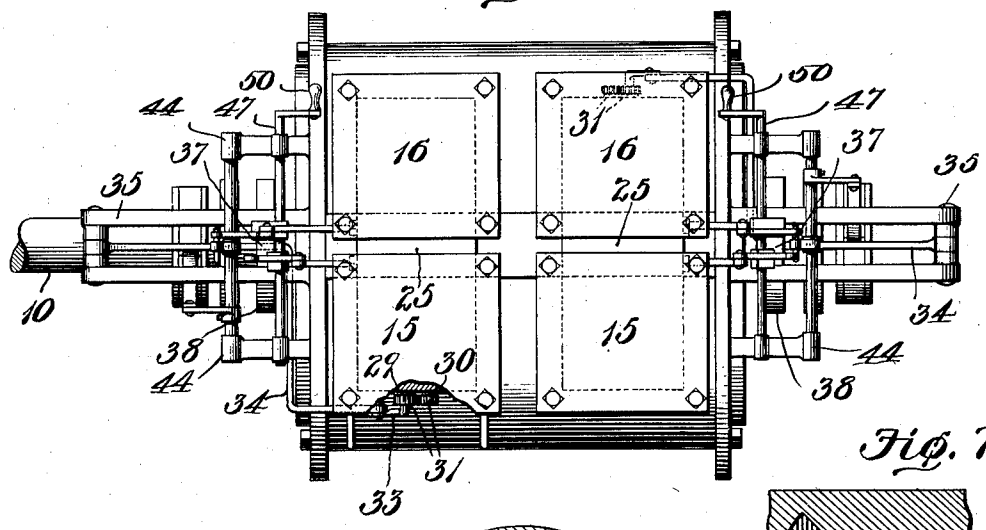


Fig. 7.

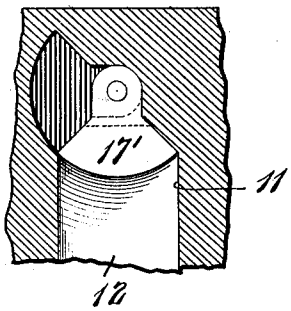
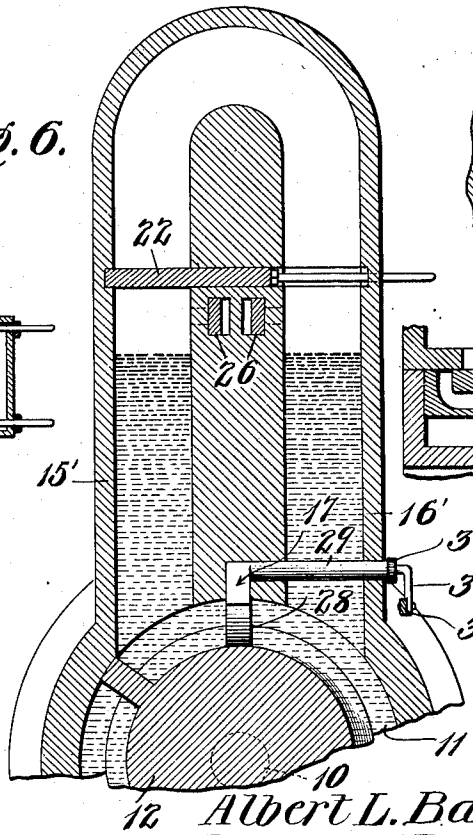


Fig. 6.



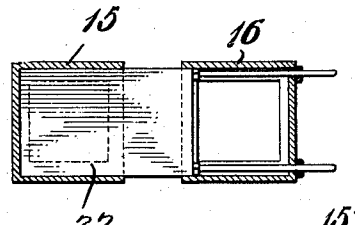


Fig. 4.

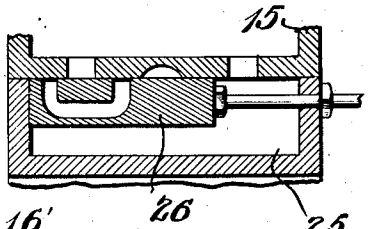


Fig. 5.

WITNESSES:

E. F. Stewart

Jno. E. Parker

Albert L. Bauer and Raymund Bauer INVENTORS,

By C. A. Snow & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALBERT L. BAUER AND RAYMUND BAUER, OF WHEELING, WEST VIRGINIA.

ENGINE.

No. 851,195. Specification of Letters Patent. Patented April 23, 1907.

Application filed March 16, 1906. Serial No. 306,466.

To all whom it may concern:

Be it known that we, ALBERT L. BAUER and RAYMUND BAUER, citizens of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Engine, of which the following is a specification.

This invention relates to rotary engines, and has for its principal object to provide a novel form of engine in which a cylinder is filled with water or other liquid that is in part displaced by the action of a fluid under pressure, or by the formation or combustion of a gas or other compound, the water serving to transmit movement to the revoluble piston and preventing direct contact between the piston and the actuating fluid.

A further object of the invention is to provide a rotary engine in which the force or pressure of the fluid actuating medium is transmitted to the piston through the medium of a liquid.

A still further object of the invention is to provide a novel form of rotary engine in which the cylinder is arranged in communication with a pair of chambers, either of which may serve as the compression chamber, while the other receives a volume of liquid equal to that displaced by the action of the fluid.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of a rotary engine constructed in accordance with the invention. Fig. 2 is a vertical central sectional view of the same. Fig. 3 is a plan view of the engine, parts being broken away to more clearly illustrate the abutment connections. Fig. 4 is a sectional plan view through the plane of the adjustable valve or abutment of the expansion chambers. Fig. 5 is a sectional plan view through one of the valves for controlling the inlet and exhaust of the working fluid. Fig. 6 is a view similar to Fig. 1, illustrating a slight modification of the invention. Fig. 7 illustrates a slight modification of the abutment.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In carrying out the invention, two engines of similar construction are connected to a main shaft 10, and the engines operated in consecutive order, one effecting a half revolution of the shaft, while the other effects the second half revolution, so that both pistons may make the complete rotation.

The cylinder 11 of each engine is circular in form, and within said cylinder is a circular piston drum 12, rigidly secured to the shaft 10 and carrying a radially disposed piston wing 13, which travels in the annular space between the periphery of the piston drum and the inner circular wall of the cylinder. Arranged above, and in communication with the upper portion of the cylinder 11 is a pair of vertically disposed casings 15 and 16, and between these casings is a movable abutment 17. This abutment may be moved to such position as to permit the free passage of the piston wing 13 as the piston drum 12 rotates.

The cylinder and the chambers 15 and 16 are filled with water or other fluid up to the level indicated in Fig. 1, and where steam or similar fluid is to be employed as the working medium, a floating piston 19 is arranged within each of the chambers 15 and 16, the piston serving to prevent direct contact between the steam and the water, thus avoiding unnecessary condensation.

The cubic content of each of the chambers 15 and 16 is approximately equal to the cubic content of the annular space between the piston drum and the inner circular wall of the cylinder, and when the steam or other fluid is operating in one of said chambers, the liquid displaced by the action of the steam will rise in the other chamber.

At a short distance above the normal level of the floating piston 19 is arranged a slidable valve or abutment 22 which may be moved across one or other of the chambers 15 and 16 in order to form one wall of an expansion or pressure space, the opposite wall being formed by one of the floating pistons, and when this slidable valve or abutment is moved across one of the chambers, it leaves the other chamber wholly clear, so that the floating piston may freely rise as the water is displaced.

The adjacent walls of the two cylinders are

provided with ports that communicate with steam chests 25, and in said steam chests are suitable valves 26 which, in the present instance, may take the form of ordinary slide valves, and only one of said valves is in operation at any one time, the function of the valve being to admit the steam or other fluid to the space between the slide valve or abutment 22 and the adjacent floating piston 19, and to permit the exhaust of such fluid after the working stroke.

When steam is admitted below the valve or abutment 22, which will occur at a time when the abutment 17 is down in engagement with the periphery of the piston 12 and the piston 13 has moved to about the position shown in Fig. 1, the pressure and expansive force of the steam will depress the floating piston 19, and this movement will be transmitted through the water or other liquid, compelling the piston wing to move in the direction indicated by the arrow and the liquid ahead of the piston wing will be forced to move upward into the chamber 16.

The volume of liquid normally contained within the chamber 15 is slightly greater than half the volume of fluid in the annular space between the piston drum and cylinder, so that by the time the floating piston 19 has completed its stroke, the piston drum will have made a one-half revolution, and practically all of the water will be displaced from chamber 15, while the chamber 16 will be nearly full. At this stage of the operation, the second engine of the shaft 10 will operate, the piston 13′ of the second engine being at a point diametrically opposite the piston 13 of the first engine, and this second engine will compel the second half revolution of both pistons. Immediately after the steam is admitted to the second engine, the abutment 17 of the first engine is moved from the annular space surrounding the piston and the exhaust valve below the valve or abutment 22 is open, so that the liquid in the two chambers 15 and 16 may assume a common level, and this level will have been attained by the time the piston wing 13 again reaches the position shown in Fig. 1, and is in readiness to commence a second stroke, or second rotation.

The abutment 17 is preferably formed of two segmental plates 28 that are pivoted on shafts 29 and 30, these shafts being provided with reduced end portions having intermeshing gears 31 to insure simultaneous movement of the abutment members to open and closed position. The curved outer ends of the abutment members are arranged to fit against the correspondingly concaved surface of the piston drum 12, and when in closed position the abutment is sufficiently tight to prevent the leakage of the liquid from one side of the cylinder to the other. One of the shafts, 29, is provided with a rocker arm 33, which is connected to one end of a lever 34 that is pivoted on a bracket 35 carried by the frame, and this lever 34 is pivoted at a point intermediate of its ends to a vertically movable bar 37 that is under the control of a cam 38 carried by the main shaft.

When the actuating fluid is not of such nature as to rapidly condense when brought into contact with liquid, the floating pistons 19 may be dispensed with and the fluid allowed to operate directly against the water or other liquid. For this purpose compressed air or an explosive compound may be employed, and the upper ends of the chambers 15′ and 16′ may be placed in communication with each other, thus permitting the employment of chambers of less height than where the floating pistons are used. The liquid displaced from the lower portion of one chamber is then free to flow upward into the second chamber, while the space above the valve or abutment in the first chamber serves to receive the air above the fluid, which air being placed under slight pressure, will tend to assist in restoring the normal level of the water after the abutments 17 have been moved to open position.

In some cases the abutment may be formed of a single plate 17′, and in this case provision must be made for a greater range of movement of the abutment, than where the abutment is divided into two sections, as in the preferred construction.

The valves 26 are provided with stems 40 from which extend hooks 41 that engage pins 42 carried by the bell crank levers 43. The bell crank levers are pivoted to brackets 44, projecting from the frame of the engine, and said bell crank levers are connected by rods 45 to eccentrics 46 on the main shaft.

To provide for the reversal of the engine, a shaft 47 is carried by the brackets 44 and to said shaft is secured a pair of cams 48, and the cams of each pair or set are disposed at a right angle to each other. At the end of the shaft is an operating lever 50 which may be turned for the purpose of throwing one hook out of gear with the pin 42, while the hook of the mating valve is allowed to drop into gear with its pin 42. This affords a central means for disconnecting the valves of those chambers in which the water or other liquid is to rise.

We claim:—

1. In a rotary engine, the combination with a cylinder, of a pair of chambers communicating therewith, the cylinder and chambers being arranged to contain a liquid, a revoluble piston drum, a piston wing carried thereby, an abutment movable into and out of the path of the piston wing to place the chambers in communication with each other, and means for admitting a fluid under pressure to one of the chambers at a

point above the liquid level, whereby the liquid in said chamber is displaced and the movement transmitted to the piston wing.

2. In a rotary engine, the combination with a cylinder, of a pair of liquid containing chambers in communication therewith, a revoluble piston drum, a piston wing extending therefrom, an abutment movable into and out of the path of the piston wing to permit communication between said chambers, means for controlling the admission and exhaust of an operating fluid to one or other of the chambers at a point above the liquid level, whereby the liquid may be displaced from one chamber and rise in the other, and transmit movement to the piston wing.

3. The combination in a rotary engine, of a cylinder, a pair of vertically disposed liquid containing chambers in communication therewith, a movable valve or abutment adjustable across either of the chambers and forming the fixed wall of a pressure space, a valve controlling the admission and exhaust of fluid under pressure to this pressure space, a piston drum, a wing projecting therefrom, an abutment, and means for moving the abutment into and out of engagement with said piston drum.

4. The combination in a rotary engine, of a cylinder, a pair of vertically disposed liquid containing chambers in communication therewith, float pistons arranged within the chambers, a slidable valve or abutment movable across either of the chambers to form one wall of a pressure space, a valve for controlling the admission and exhaust of a working fluid to the pressure space, a piston drum in the cylinder, a piston wing carried by the drum, an abutment, and means for actuating the abutment.

5. In a rotary engine, the combination with a shaft, of a pair of cylinders surrounding the same, a pair of piston drums secured to the shaft and having piston wings, the wing of one drum being diametrically opposite the wing of the other drum, a pair of liquid containing chambers connected to each cylinder, means for introducing a fluid under pressure to one chamber of each pair to displace the liquid therein, the operations alternating in the respective chambers, and abutments movable into and from the cylinders to permit communication between the liquid containing chambers of each pair.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

ALBERT L. BAUER.
RAYMUND BAUER.

Witnesses:
THOS. H. WILLIAMS,
GILBERT CANTERBURY.