

No. 741,053.

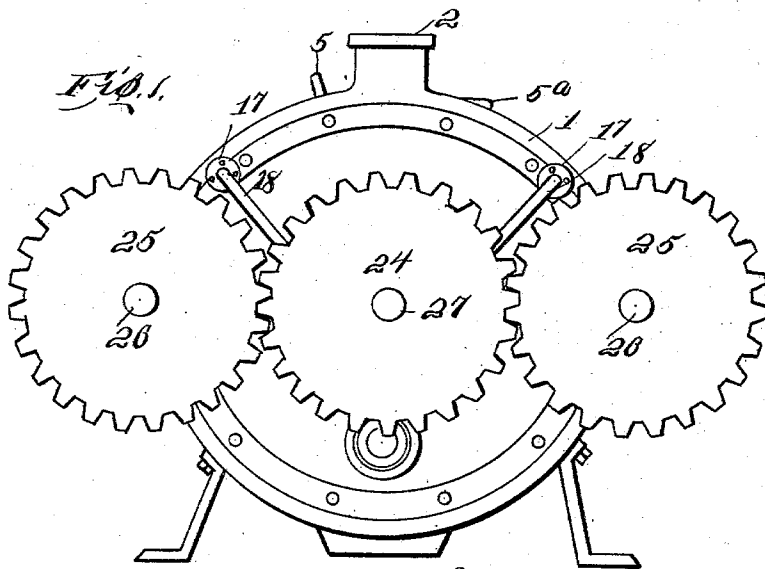
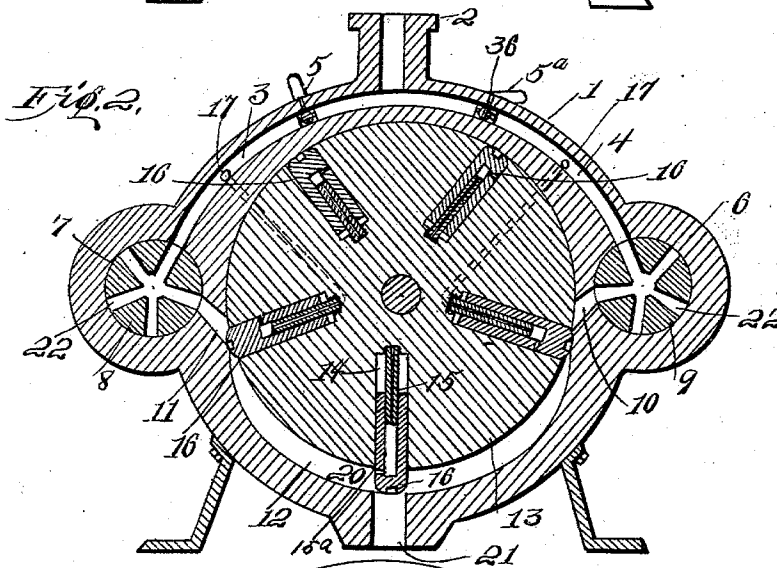
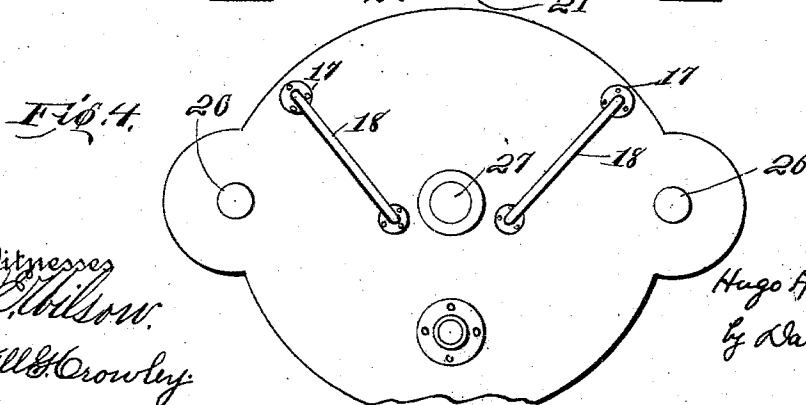
PATENTED OCT. 13, 1903.

H. A. MATTILL.
ROTARY ENGINE.

APPLICATION FILED FEB. 11, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
E. Wilson.
W. H. Crowley.

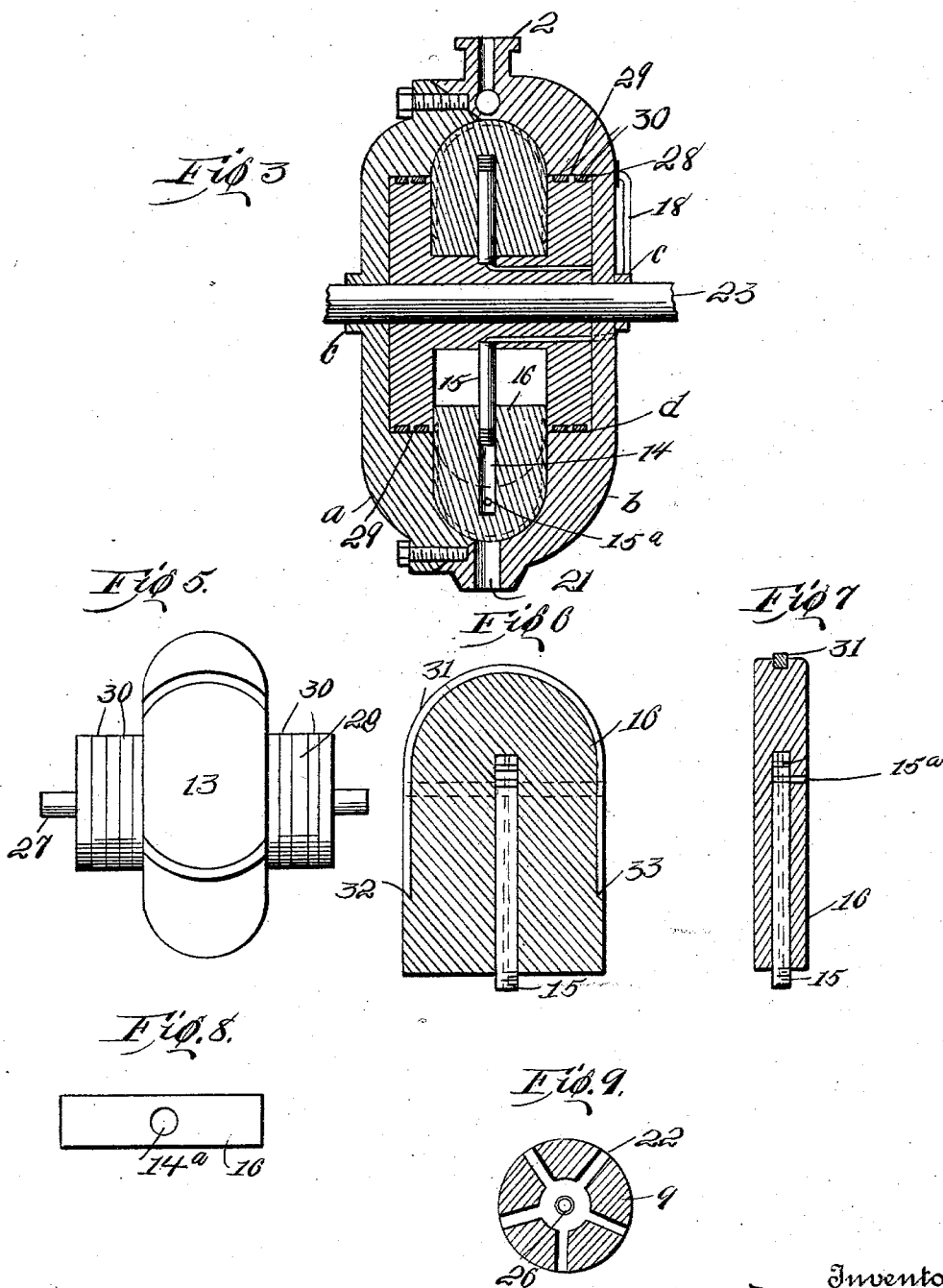
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3 SHEETS—SHEET 2.



Witnesses
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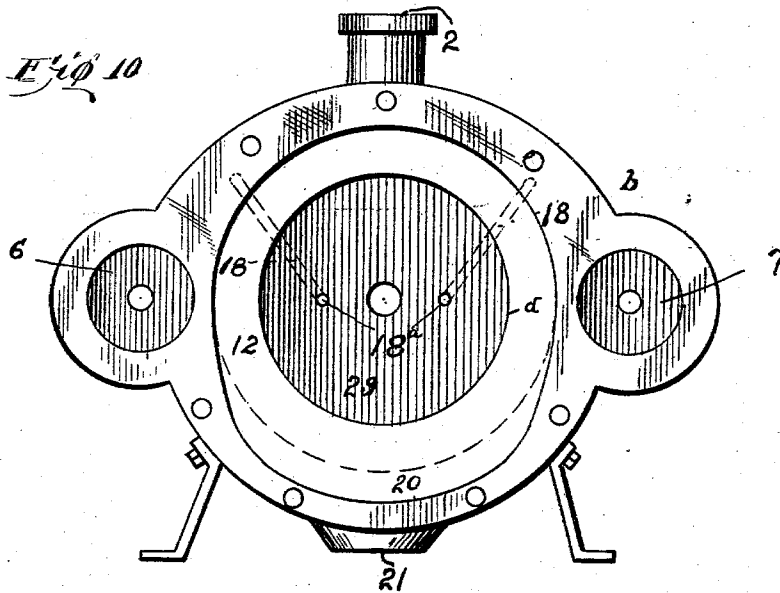
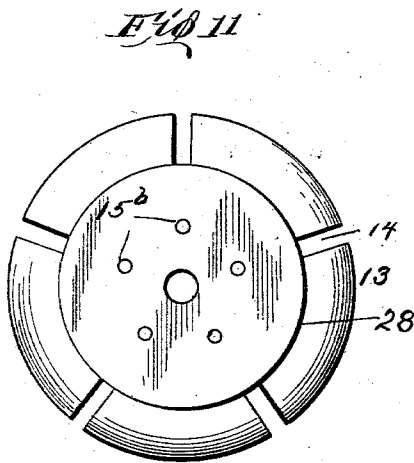
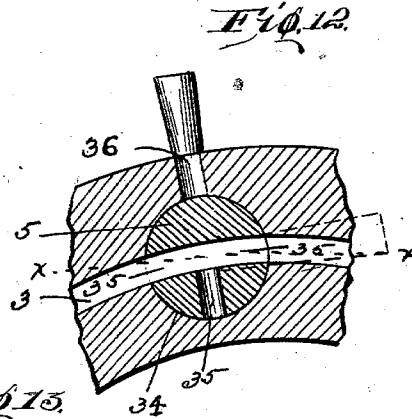
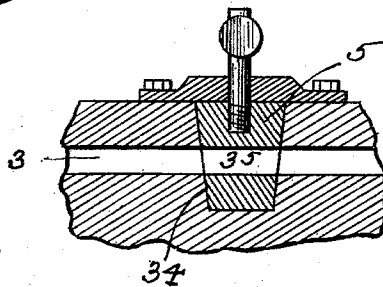
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ROTARY ENGINE.

APPLICATION FILED FEB. 11, 1903.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses
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J. M. Wright.

Inventor
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UNITED STATES PATENT OFFICE.

HUGO A. MATTILL, OF WASHINGTON, DISTRICT OF COLUMBIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 741,053, dated October 13, 1903.

Application filed February 11, 1903. Serial No. 142,901. (No model.)

To all whom it may concern:

Be it known that I, HUGO A. MATTILL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to improvements in rotary engines; and the main object of my invention is the provision of an engine of this character which is operated by the expansion of steam or other fluid-pressure and is economically operated, so that no great amount of pressure fluid is wasted. To further these objects, I provide a rotating motor-cylinder and rotating valves or cut-offs which only admit the pressure fluid at the proper time, and thereby saving the waste should the pressure fluid be allowed to pass through the engine direct from the boiler, novel features of construction, as will presently appear, being combined to produce the desired results.

In the accompanying drawings, Figure 1 is a side elevation taken from the gear side of the engine. Fig. 2 is a longitudinal sectional view through the engine. Fig. 3 is a cross-section thereof. Fig. 4 is a partial elevation and section of the engine, showing the ports, the ducts for assisting in the operation of the sliding plunger also being shown. Fig. 5 is a plan view of the motor-cylinder removed. Fig. 6 is a section lengthwise of one of the wings. Fig. 7 is a cross-section thereof. Fig. 8 is a bottom plan view thereof, and Fig. 9 is a detail sectional view of one of the controlling-valves. Fig. 10 is an interior plan view of the casing-head *b*, showing more particularly the exit of the fluid-pressure conduits for actuating the slidingly-mounted wings of the motor. Fig. 11 is an end view of the motor with the wings removed therefrom, showing more particularly the channels leading from one end of the motor to receive the fluid-pressure to actuate the wings. Fig. 12 is a detail vertical sectional view showing the form of three-way valve; and Fig. 13 is a section taken substantially on line *x x* of Fig. 12, the handle for operating the valve being shown in elevation.

Referring to the drawings, the numeral 1 designates a casing which is provided at its top with the admission-port 2, which branches

off to form two ducts 3 and 4, which are controlled by means of the valves 5 and 5^a, one of said ducts leading so as to convey the pressure fluid to produce a forward motion of the engine, while the other duct leads to produce a reverse motion thereof. This casing is further provided with the two oppositely-arranged valve-chambers 6 and 7, in which are mounted, respectively, rotatable valves 8 and 9. Leading from these valve-chambers are the two downwardly-inclined inlets 10 and 11, which admit the pressure fluid to the motor-chamber 12. This motor-chamber, as shown in cross-section, is provided with a concaved periphery. Rotatably mounted in the motor-chamber is the motor 13, which has the rounded periphery to fit in the concaved periphery of the chamber, which is also provided with a series of plunger channels or recesses 14, in which are mounted the plungers or pins 15, upon which are slidingly mounted the paddles or wings 16, whose outer edges are rounded to conform to the concaved walls of the chamber and align with the periphery of the motor when closed. These paddles or wings are provided with the cylindrical channel 14^a, which surrounds the pins 15, said channels being provided near their outer ends with the exhaust-port 15^a for the purpose hereinafter to be set forth. Leading from the outside of the exit of the channels 3 or 4 are the fluid-pressure pipes 18, which are in communication with the ducts 3 and 4, so that when the motor 13 revolves so that one of the channels 15^b of the motor is in alinement with the exit 18^a of the proper pipe 18 the pressure fluid will enter said channel 15^b and cause the proper wing to be moved outward, the outward movement of the wings being limited by the periphery of the motor-chamber. It will thus be seen that the pressure fluid entering the proper one of the channels 15^b will pass through one of the plungers 15 into the channel 14^a, and as the exhaust 15^a reaches a point beyond the periphery of the motor the fluid will exhaust within the proper space of the motor-chamber. The lower portion of the motor-chamber is elongated, as at 20, so that as the wings are passing either one of the entrance-ducts through which the fluid-pressure is passing these wings will be pushed outward and follow the contour of the periphery of

the motor-chamber, thereby receiving the pressure from the pressure fluid, which causes the motor-cylinder to be revolved, said pressure fluid exhausting through the exhaust-port 21 in the lower portion of the casing.

The rotary valves are provided with a series of ducts 22, which are the same in numbers as the wings of the motor-cylinder, said ducts being adapted to convey the pressure fluid from the ducts 3 and 4 through the entrance-duct into the motor-chamber, said valves cutting off the flow of the fluid shortly after the wing has passed the entrance in order that the pressure fluid can be expanded sufficiently to give the desired power before the same exhausts through the exhaust-port. In order that the rotary valves will rotate in the proper time, I mount upon the end of the motor-cylinder shaft 23 a pinion 24, which is adapted to mesh with similar pinions 25, carried upon the shaft 26 of the rotary valves.

The motor-casing is made in two sections *a* and *b*, each one of which is provided with bearings *c* for the reception of the shaft 27, carrying the motor 13. This motor is provided with the oppositely-extending cylindrical ends 28, which fit and revolve in the cylindrical chambers 29, provided in the sections *a* and *b*, thus providing a square corner *d* at the junction of the motor-chamber and the chamber 29.

In order to properly pack the motor and prevent the lateral escape of the pressure fluid, I provide the packing or stuffing expansible rings 30, surrounding the ends 28. To prevent the escape of pressure fluid around the wings, I provide the semicircular stuffing-bands 31, mounted in the outer edge of the wings. These bands are provided with the sharp ends 32, which are adapted to enter the groove 33 in the motor, so that the engine can be easily assembled without the parts moving from their relative positions.

As shown in Figs. 12 and 13, the valves 5 and 5^a are adapted to fit within a tapering recess or socket 34 and are provided with substantially three channels 35, forming a three-way valve. In the casing, upon the upper side thereof, is provided the small exhaust-port 36, which is adapted to be used, for instance, when the fluid-pressure is entering the duct controlled by the valve 5, so that any pressure fluid remaining in the motor-chamber which would cause a cushioning effect will enter through the opposite rotary valve, back through the channel 4, through one of the three-way channels 35 of the valve 5^a, and out through the exhaust 36. If it is desired to reverse the engine, the valve 5^a is moved so as to cut off the flow of pressure fluid and have one of its ports in communication with the exhaust 36, while the valve 5^a is turned so as to admit pressure fluid to the opposite side of the engine.

From the foregoing description, taken in connection with the drawings, the operation

of my rotary engine will be fully understood; but, briefly stated, it is as follows: In order to give the engine a forward movement, the admission-valve is turned as in Fig. 2 and the fluid-pressure is fed through the duct 3 into the motor-chamber, where it contacts the wing just passing through the entrance-duct, said wing being gradually forced outward by the pressure exerted internally by the pressure fluid and being guided in its movement by the contour of the periphery of the casing, said wing starting in its outward movement shortly below the entrance and extending its farthest at the point where the rotary valve 8 cuts off the flow of fluid-pressure. At this point the fluid-pressure greatly expands and exerts pressure upon said wing until it has passed the exhaust, when the said pressure fluid passes out through the exhaust. The casing of my engine can be made in two or three parts, as may be desired, but is preferably made in two parts, as all of the mechanism can be assembled with one side removed, and then after the engine is assembled, all the parts in their relative positions, the other part of the casing can be easily put into place.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary engine, the combination of a casing provided with oppositely-arranged valve-chambers and a centrally-arranged motor-chamber, said motor-chamber being provided with an enlarged central portion and two oppositely-arranged reduced chambers, a motor-cylinder mounted in said chamber having an enlarged central portion and two reduced ends to correspond with the shape of the motor-chamber, packing means surrounding the reduced ends, a series of slidingly-mounted wings carried by the enlarged portion of the motor-cylinder, means for admitting pressure fluid through the motor-chamber to one wing at a time to force the wing outward, means for admitting pressure fluid to either one of said valve-chambers, and rotary valves mounted in said chambers adapted to revolve in unison with the motor-cylinder.

2. In a rotary engine, the combination of a casing provided with oppositely-arranged valve-chambers and a motor-chamber provided with a centrally-enlarged portion and two oppositely-arranged reduced portions, a motor-cylinder having a centrally-arranged enlarged portion and two reduced ends corresponding to the shape of the motor-chamber, stuffing means mounted upon the reduced ends thereof, slidingly-mounted wings carried by the enlarged portion of the motor-cylinder, means for normally exerting a downward pressure upon said wings one at a time so that they extend outward as they enter the lower portion of the motor-chamber, means for admitting pressure fluid to one of the valve-chambers at a time, rotary valves mounted in said valve-

chambers, and means connected to the cylinder and valves to admit fluid-pressure at predetermined intervals.

3. In a rotary engine, the combination of a casing provided with a motor-chamber having an enlarged central portion and two oppositely-extending reduced ends, the lower portion of the enlarged portion being elongated, said chamber being further provided with a central induction-port and two branches leading therefrom, a motor corresponding in shape to said motor-chamber having stuffing means upon the reduced portions thereof, a series of slidingly-mounted fluid-pressure-actuated wings carried by the motor adapted to engage the face of the enlarged portion of the chamber, said wings being adapted to be operated one at a time and be forced outward by the fluid-pressure and returned by the contour of the motor-chamber after exhaust of the pressure fluid, and oppositely-arranged valves for admitting the pressure fluid to the motor-chamber revolved simultaneously with the motor.

4. In a rotary engine, the combination of a casing, provided with a motor-chamber having an enlarged central portion and oppositely-arranged reduced portions, ducts leading from the top to the opposite sides of the motor-chamber, a motor provided with oppositely-extending cylindrical portions and an enlarged central portion journaled in the motor-chamber, stuffing means surrounding the reduced portions thereof, and rotary valves for controlling the admission of pressure fluid to the motor-chamber operated simultaneously with the motor.

5. In a rotary engine, the combination of a casing, provided with a motor-chamber having two oppositely-extending cylindrical portions and a centrally-arranged enlarged portion with a downward extension, a motor having two oppositely-extending cylindrical portions rotatably mounted in the motor-chamber, packing-rings surrounding said oppositely-extending cylindrical portions, slidingly-mounted wings carried by the centrally-arranged portion of the motor and adapted to follow the contour of the central portion of the motor-chamber, said casing being provided with an induction-port and two branches terminating oppositely, and rotary valves to control the admission of pressure fluid to the chamber operated simultaneously with the motor.

6. In a rotary engine, the combination of a casing, provided with a motor-chamber having two oppositely-extending cylindrical portions and a centrally-arranged enlarged portion with a downward extension, a motor having two oppositely-extending cylindrical portions rotatably mounted in the motor-chamber, packing-rings surrounding said oppositely-extending cylindrical portions, slidingly-mounted wings carried by the centrally-arranged portion of the motor and adapted to follow the contour of the central portion of the

motor-chamber, outwardly-extending packing means carried by each wing, said casing being provided with an induction-port and two branches terminating oppositely and rotary valves to control the admission of pressure fluid to the chamber operated simultaneously with the motor.

7. In a rotary engine, the combination of a casing, provided with a motor-chamber having an enlarged central portion with a lower expansion-chamber, a rotary motor journaled in the casing and having packing-rings upon the reduced ends thereof, said motor being provided with radiating channels with ducts leading to the inner ends thereof, said casing being provided with an induction-port having two oppositely-extending branches and a reduced channel leading from each of said branches to supply pressure fluid to the ducts of the motor, plungers slidingly mounted within said radiating channels of the motor, adapted to normally receive pressure upon the inner ends thereof and be forced outward, wings carried by said plungers and guided by the contour of the enlarged portion of the motor-chamber, and mechanism revolved simultaneously with the motor for admitting pressure fluid to the expansion-chamber.

8. In a rotary engine, the combination of a casing provided with a motor-chamber having an enlarged central portion with a lower expansion-chamber, a rotary motor journaled in the casing and having packing-rings upon the reduced ends thereof, said motor being provided with radiating channels with ducts leading to the inner ends thereof, said casing being provided with an induction-port having two oppositely-extending branches and a reduced channel leading from each of said branches to supply pressure fluid to the ducts of the motor, plungers slidingly mounted within said radiating channels of the motor adapted to normally receive pressure upon the inner ends thereof and be forced outward, wings carried by said plungers and guided by the contour of the enlarged portion of the motor-chamber, and rotary valves adapted to control the admission of pressure fluid to the expansion-chamber revolved simultaneously with the motor.

9. In a rotary engine, the combination of a casing provided with a motor-chamber having an enlarged central portion with a lower expansion-chamber, a rotary motor journaled in the casing and having packing-rings upon the reduced ends thereof, said motor being provided with radiating channels with ducts leading to the inner ends thereof, said casing being provided with an induction-port having two branches in opposite directions terminating in oppositely-arranged valve-chambers, plungers slidingly mounted within said radiating channels of the motor adapted to normally receive pressure upon the inner ends thereof and be forced outward, wings carried by said plungers and guided by the contour of the enlarged portion of the motor-chamber,

and rotary valves adapted to control the admission of pressure fluid to the expansion-chamber revolved simultaneous with the motor.

- 5 10. In a rotary engine, the combination of a casing having a motor-chamber with a centrally-enlarged portion and two oppositely-
arranged reduced portions, an expansion-
10 chamber in the lower end of the enlarged portion, an induction-port having two branches
in opposite directions in communication with
the upper end of the expansion-chamber, and
an exhaust-port centrally of the expansion-
15 chamber; a motor having an enlarged central
portion and two oppositely-arranged reduced
ends mounted within the motor-chamber;
stuffing means mounted upon said reduced
20 ends, slidingly-mounted pressure-actuated
wings carried by the enlarged portion of said
motor, means for conducting pressure fluid
to one of the wings at a time to force the
same outward, said wings being moved to
their normal positions by the contour of the
expansion-chamber after exhaust, and mechanism
25 for controlling the flow of pressure
fluid from either side of the motor-chamber
operated simultaneously with the motor.

11. In a rotary engine, the combination of a
casing having a motor-chamber with a centrally-
30 enlarged portion, an expansion-chamber,
an induction-port having two branches
in opposite directions in communication with
the upper end of the expansion-chamber, a
motor rotatably mounted within the motor-
35 chamber, means for exerting an outward pressure
upon paddles, one at a time, said paddles
being slidingly mounted and carried by the
motor, and rotary valves for controlling the
admission of pressure fluid from either
40 side of the expansion-chamber revolved simultaneously
with the motor.

12. In a rotary engine, the combination of a
casing provided with a motor-chamber having
a centrally-enlarged portion, an expansion-
45 chamber, an induction-port having two oppositely-
arranged branches in communication with the
expansion-chamber, valve-chambers at the
terminal of each branch and in communication
with the expansion-chamber, an exhaust
50 centrally of the expansion-chamber, a motor
mounted in said motor-chamber, paddles
slidingly mounted in the motor, means for
exerting an outward pressure upon the
paddles one at a time, and rotary valves
55 mounted in said valve-chambers adapted to
control the admission of the pressure fluid to
the expansion-chamber.

13. In a rotary engine, the combination of a
casing having a motor-chamber, an expansion-
60 chamber forming the lower portion of the motor-
chamber, an induction-port, two oppositely-
arranged channels in communication with the
induction-port, valve-chambers at the ends
of the oppositely-arranged channels in
65 communication with the expansion-chamber,
an exhaust-port for the expansion-chamber,
two valves adapted to control the admis-

sion of pressure fluid through the said oppositely-
arranged channels one at a time, one of said
valves acting as a pressure-reliever when the
other valve is admitting pressure fluid, an
exhaust for each of said valves, the exhaust
of one being in operation while the other is
admitting pressure fluid to the motor-
70 chamber, a motor mounted in the motor-
chamber, and rotary valves mounted in the
valve-chamber for admitting pressure fluid
to the expansion-chamber.

14. In a rotary engine, the combination of a
casing having a motor-chamber, an expansion-
80 chamber forming the lower portion of the motor-
chamber, an induction-port, two oppositely-
arranged channels in communication with the
induction-port, valve-chambers at the ends
of oppositely-arranged channels in communication
85 with the expansion-chamber, an exhaust-port
for the expansion-chamber, two valves adapted
to control the admission of pressure fluid
through said oppositely-arranged channels
one at a time, one of said valves acting as
90 a pressure-reliever when the other valve is
admitting pressure fluid, an exhaust for each
of said valves, the exhaust of one being in
operation while the other is admitting pressure
fluid to the motor-chamber, a motor mounted
95 in said motor-chamber, slidingly-mounted
paddles carried by said motor, means for
normally exerting an outward pressure upon
said paddles, and rotary valves for controlling
the admission of pressure fluid to the expansion-
10 chamber.

15. In a rotary engine, the combination of a
casing having a motor-chamber, an expansion-
chamber forming the lower portion of the motor-
105 chamber, an induction-port, two oppositely-
arranged channels in communication with the
induction-port, valve-chambers at the ends
of the oppositely-arranged channels in communication
with the expansion-chamber, an exhaust-port
110 for the expansion-chamber, two valves adapted
to control the admission of pressure fluid
through the said channels one at a time, an
exhaust for each of said valves, the exhaust
of one of said valves being adapted to be open
115 when the other valve is admitting pressure
fluid to the motor-chamber, a motor rotatably
mounted in the motor-chamber provided with
a series of radiating channels having reduced
pressure-fluid ducts, leading to the inner ends
120 of said channels, paddles slidingly mounted
in said channels, said casing being provided
with reduced channels leading from the oppositely-
extending induction-channels so as to exert
an outward pressure upon the paddles one at
125 a time, and rotary valves mounted in the
valve-chambers for controlling the admission
of pressure fluid to the expansion-chamber.

16. In a rotary engine, the combination of a
casing having a motor-chamber having an enlarged
130 central portion, an expansion-chamber forming
the lower portion of the motor-chamber, an
induction-port, two oppositely-arranged
channels in communication with the

induction-port, valve-chambers at the ends of the oppositely-arranged channels in communication with the expansion-chamber, an exhaust-port for the expansion-chamber, two valves adapted to control the admission of pressure fluid through the said channels one at a time, an exhaust-port for each of said valves, one of said exhaust-ports being in operation while the other valve is admitting pressure fluid to the motor-chamber, a motor rotatably mounted within the chamber having a centrally-enlarged portion and a series of radial channels extending from the periphery of the enlarged portion inward, paddles slidingly mounted in said channels, means for exerting pressure upon said paddles, and rotary valves for controlling the admission of pressure fluid to the expansion-chamber.

17. In a rotary engine, the combination of a casing having a motor-chamber having an enlarged central portion, an expansion-chamber forming the lower portion of the motor-chamber, an induction-port, two oppositely-arranged channels in communication with the induction-port, valve-chambers at the ends of the oppositely-arranged channels in communication with the expansion-chamber, an exhaust-port for the expansion-chamber, two valves adapted to control the admission of pressure fluid through the said channels one at a time, an exhaust-port for each of said valves, one of said ports being in operation when the other valve is admitting pressure fluid to the motor-chamber, a motor provided with a centrally-enlarged portion rotatably mounted in the motor-chamber and also provided with radially-extending channels in the enlarged portion thereof, paddles slidingly mounted in said channels, stuffing means carried by the outer edges of said paddles, means for forcing the paddles outward, and rotary valves for controlling the admission of pressure fluid to the expansion-chamber.

18. In a rotary engine, the combination of a casing having a motor-chamber having an enlarged central portion, an expansion-chamber forming the lower portion of the motor-chamber, an induction-port, two oppositely-arranged channels in communication with the induction-port, valve-chambers at the ends

of the oppositely-arranged channels in communication with the expansion-chamber, an exhaust-port for the expansion-chamber, two valves adapted to control the admission of pressure fluid through the said channels one at a time, an exhaust-port for each of said valves, one of said exhaust-ports being open when the other valve is admitting pressure fluid to the motor-chamber, a motor provided with a centrally-enlarged portion, said centrally-enlarged portion being provided with a series of radiating channels, paddles slidingly mounted in said channels, means for exerting an outward pressure upon said paddles, stuffing means carried upon the reduced ends of said motor, and rotary valves for admitting pressure fluid to the expansion-chamber.

19. In a rotary engine, the combination of a casing having a motor-chamber having an enlarged central portion, an expansion-chamber forming the lower portion of the motor-chamber, an induction-port, two oppositely-arranged channels in communication with the induction-port, valve-chambers at the ends of the oppositely-arranged channels in communication with the expansion-chamber, an exhaust-port for the expansion-chamber, two valves adapted to control the admission of pressure fluid through the said channels one at a time, an exhaust-port for each of said valves, one of said ports being open when pressure fluid is being admitted to the motor-chamber through the other valve, a motor provided with a centrally-enlarged portion, said centrally-enlarged portion being provided with radiating channels, paddles slidingly mounted in said channels, stuffing means mounted in the outer ends of said paddles, means for exerting an outward pressure upon said paddles, stuffing-rings carried upon the reduced portions of the motor, and rotary valves for controlling the admission of pressure fluid to the expansion-chamber.

In testimony whereof I affix my signature in presence of two witnesses.

HUGO A. MATTILL.

Witnesses:

DAVID P. MOORE,
WILL G. CROWLEY.