(No Model.) 2 Sheets—Sheet 1.

J. A. GOODNER & J. M. CHRITTON.

ROTARY ENGINE.

No. 573,179. Patented Dec. 15, 1896.

Fig. 1

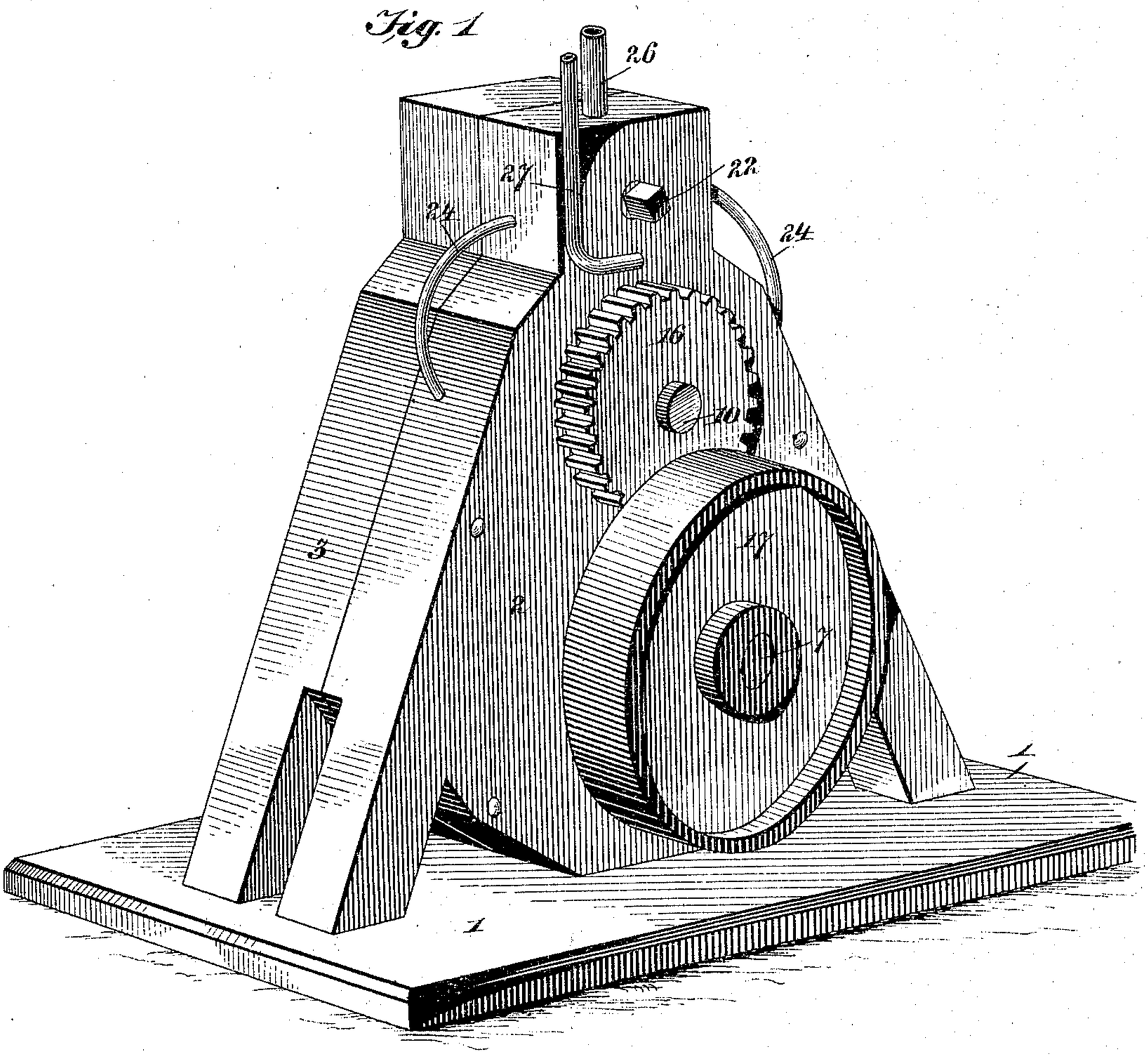


Fig. 7.

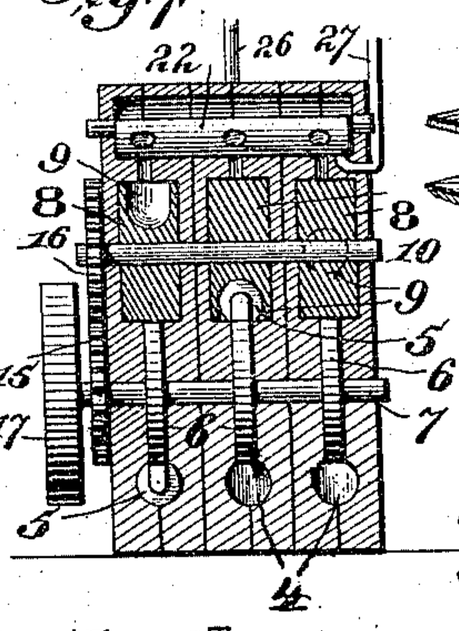


Fig. 6.

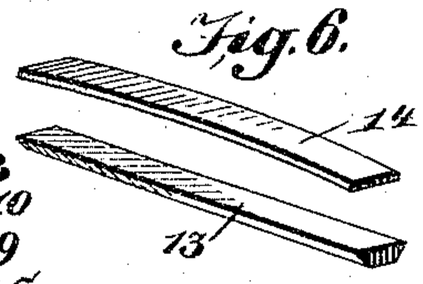
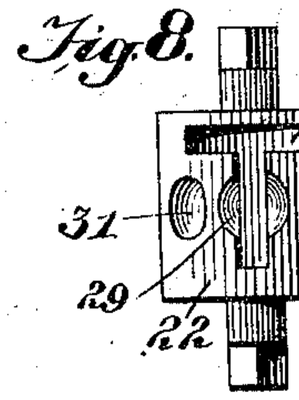


Fig. 8.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

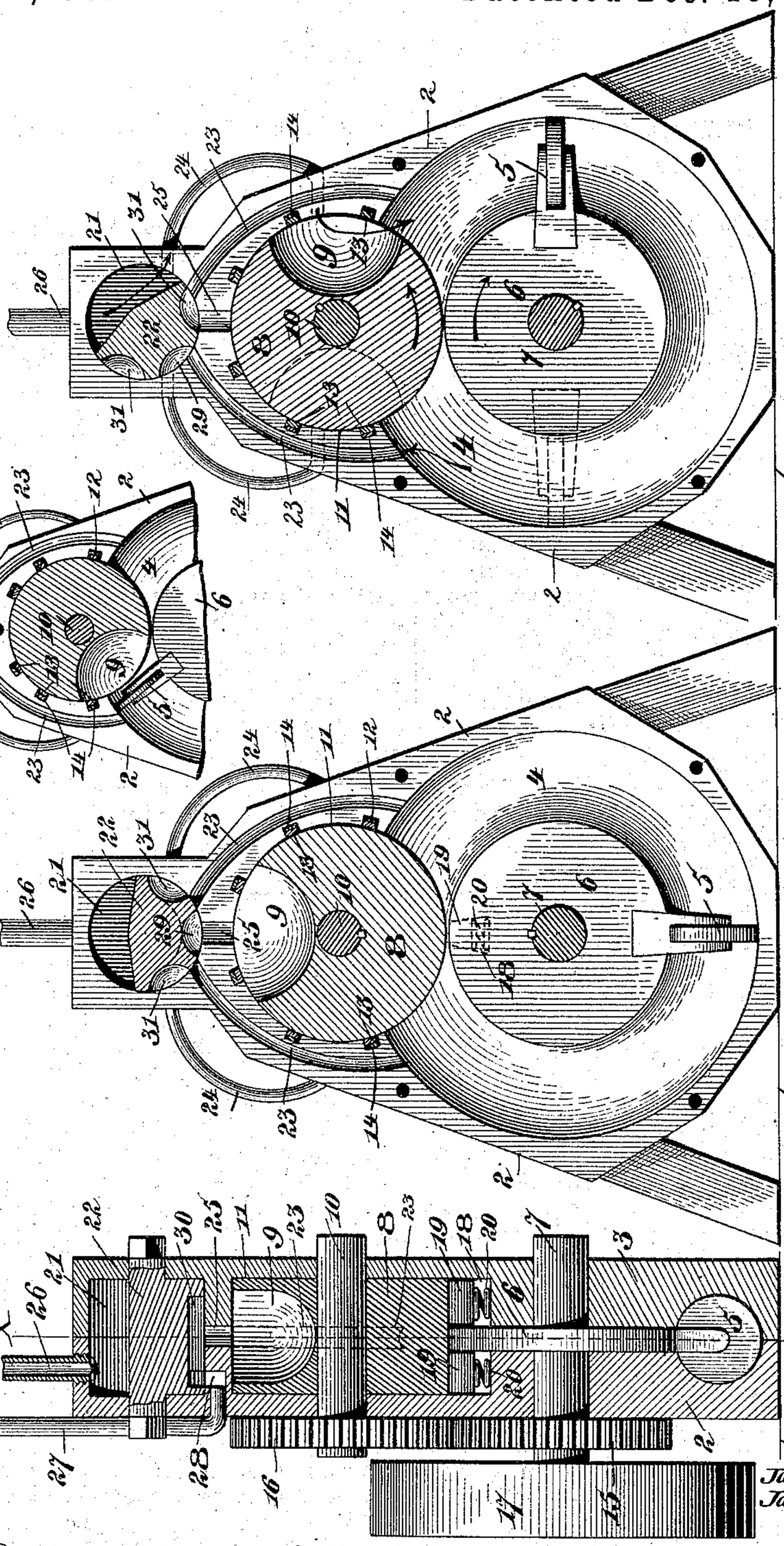

Fig. 3.

Fig. 5.

Fig. 2.

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UNITED STATES PATENT OFFICE.

JAMES A. GOODNER AND JAMES M. CHRITTON, OF MOSCA, COLORADO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 573,179, dated December 15, 1896.

Application filed June 30, 1896. Serial No. 597,609. (No model.)

To all whom it may concern:

Be it known that we, JAMES A. GOODNER and JAMES M. CHRITTON, citizens of the United States, residing at Mosca, in the county of Costilla and State of Colorado, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to rotary engines, and has for its object the provision of an engine which can be used as either a rotary pump or engine and which will be simple in construction and operation, compact in the arrangement of parts, comprise a minimum amount of material consistent with strength, durability, and capacity, and which will run smoothly and be capable of attaining a high rate of speed and be free from backlash, since the exhaust-port is opened in advance of the turning of the throttle for the admission of live steam or other motive medium to the engine for driving the same.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

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 perspective view of a rotary engine constructed in accordance with the principles of this invention for attaining the objects thereof. Fig. 2 is a vertical central transverse section thereof. Fig. 3 is a vertical section on the line X X of Fig. 2, looking to the left, showing the parts in a position with the ingress and egress ports closed. Fig. 4 is a view similar to Fig. 3, showing the egress and ingress ports open. Fig. 5 is a detail view showing more clearly the manner of exhausting the steam or motive medium. Fig. 6 is a detail view of a strip for packing the valve and a spring for pressing the strip against the valve so as to maintain a tight joint. Fig. 7 is a detail view in section of a series of valves and piston-bearing disks mounted upon common shafts. Fig. 8 is a detail view of the valve for controlling the admission and exhausting of the steam.

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 casing for inclosing the operating parts is mounted upon a base or platform 1 and is composed of similar parts 2 and 3, which are bolted or otherwise secured together. These parts 2 and 3 are separable vertically and form halves of the casing and are provided in their meeting faces with corresponding recesses which, when the parts are secured together, provide the spaces, passages, and chambers for the reception of the valves and piston and for the ingress and egress of the steam, compressed air, or other motive medium employed for driving the engine. The casing grows smaller toward its upper end, and its lower or base portion is formed with an annular chamber 4, in which operates a piston 5, the latter being attached to a revoluble disk 6, keyed to a shaft 7, journaled at or near its ends in the parts of the casing.

A rotating valve or abutment 8 is located immediately above the revoluble disk 6 and intersects with the upper portion of the annular chamber 4, and is formed in its periphery with a spheroidal-shaped pocket 9, through which sweeps the piston 5 when the engine is in operation. This valve or abutment 8 is keyed upon a shaft 10, extending parallel with the shaft 7 and journaled in the parts forming the casing. The compartment 11, in which the rotating valve or abutment 8 is fitted, intersects with the upper portion of the annular chamber 4 and is provided with horizontal depressions 12 at intervals in its periphery, which are adapted to receive packing-strips 13, held closely against the peripheral surface of the abutment 8 by bowed springs 14, placed within the said depressions 12. By this means a steam-tight joint is secured between the valve or abutment 8 and its compartment 11.

The revoluble disk 6, with its piston and the rotary valve or abutment 8, are caused to rotate in unison by means of intermeshing gears 15 and 16, the former being secured upon the shaft 7 and the latter upon the

shaft 10, thereby bringing the piston 5 and pocket 9 in opposition, so that in the operation of the engine the piston 5 will sweep through the pocket 9 without causing any interference or detracting in the least from the momentum or power of the motor. A fly-wheel 17 is mounted upon a projecting end of the shaft 7 to cause the engine to run steady and smoothly and to serve as a means for receiving the drive-belt, by means of which motion or power is transmitted from the engine to the mechanism or part to be operated thereby.

A recess 18 is provided in each part of the casing to one side of the space in which operates the revoluble disk 6, and the side walls of this recess converge toward their outer ends, thereby giving to the recess in side elevation an approximately wedge-shaped form. An abutment 19 is fitted in each recess 18 and is wedge-shaped in end elevation to conform to the cross-sectional outline of the recess, and is moved outward by means of a coil-spring 20, so as to hold the part 19 in close engagement with the rotating valve or abutment 8. It will be understood that a recess 18 will be provided upon each side of the revoluble disk 6 and the recesses aline transversely, thereby bringing the abutments 19 in the same straight line, so as to exert an upward pressure against the lower portion of the rotating valve or abutment 8, whereby a practically steam-tight joint is maintained between the said part 8 and the annular chamber 4, it being remembered that the abutments 19 are located opposite the meeting portions of the parts 6 and 8. This construction is rendered necessary by reason of the difference in thickness of the disk and rotating valve, the disk being thinner and the sum of the length of the abutments 19 and the thickness of the disk equaling the thickness of the rotating valve, as shown most clearly in Fig. 2.

The steam-chest 21 is located above the rotating valve or abutment 8 and is circular in outline and receives an approximately semicircular valve 22, by means of which the steam or motive medium is controlled, so as to stop, start, or reverse the engine. Passages 23 connect the steam-chest with the annular chamber 4 and come upon opposite sides of the compartment 11. Pipes 24 connect the steam-chest with the compartment 11 and communicate with the latter about at diametrically opposite points. There is no communication between the pipes 24 and the passages 23, and the latter are used for exhausting the steam or motive medium from the annular chamber 4, and the pipes 24 are designed to convey the live steam or motive medium from the steam-chest into the compartment 11 and from the latter to the annular chamber 4 by way of the pocket 9 in the rotating valve or abutment 8, as shown most clearly in Fig. 4. A vertical passage 25 connects the compartment 11 with the steam-chest 21 and provides means for exhausting the steam from the pocket 9, as indicated in Fig. 3. The steam or motive medium is supplied to the steam-chest by means of a pipe 26, which communicates with a generator or source from whence the motive medium is derived. An exhaust-pipe 27 communicates with a passage 28 in the casing and with the steam-chest through the said passage 28.

The valve 22 is journaled in the sides comprising the casing and is located in the steam-chest 21, and one or both journals are extended and constructed so as to receive a handle or other means for operating the valve to start, stop, or reverse the engine, as required, A cavity 29 is formed intermediate of the ends of the valve and communicates with an approximately T-shaped passage 30, which latter is in communication with the exhaust-passage 28. Cavities 31 are provided at each side of the cavity 29 and are adapted to span and establish communication between either passage 23 and the passage 25, as indicated in Fig. 4, so that the live steam confined in the pocket 9 may expand and assist in driving the engine by its expansive force. It must be borne in mind that the piston and rotating valve or abutment move in unison and that the pocket 9 establishes communication between the compartment 11 and annular chamber 4 during a part of the revolution of each of the parts 8 and 6, and when this communication is interrupted the piston is driven the remaining portion of its rotation by the expansion of the steam admitted into the chamber 4. When the pocket 9 with the live steam confined therein communicates with the passage 25, the steam so confined will expand and escape into the chamber 4 in the rear of the piston 5 through the passages 25 and 23 and the cavity 31, connecting the same, thereby augmenting the force applied for impelling the piston. As shown in Fig. 4, the steam passes from the steam-chest into the right-hand pipe 24 and from thence into the right-hand portion of the annular chamber 4, thereby driving the piston in a clockwise direction, the steam in the rear of the piston exhausting through the left-hand passage 23, cavity 29, passage 30, and exhaust-pipe 27 to the point of discharge. By changing the position of the valve 22, so that the steam will enter the annular chamber 4 by way of the left-hand pipe 24, the engine will be reversed, that is, the piston and its carrying-disk will be rotated in an anticlockwise direction.

When it is required to augment the power, so that the combined action of the direct boiler-pressure and the expansion of the steam may be utilized, a series of valves or abutments 8 are mounted upon a shaft 10, and a series of revoluble disks 6, having pistons 5, are keyed upon a shaft 7, the parts being arranged so that the live steam is admitted successively into the respective annular chambers 4. Where three valves and three piston-bearing disks

are used, they will be related so that the pistons 5 will receive the force of the live steam during a third of the revolution of the shaft 7, that is, when the first piston has made a third of a revolution the second piston will receive the steam, and when the second piston has made a third of a revolution and the first piston two-thirds of a revolution, the third or last piston will receive the steam. Hence the direct boiler action is utilized at all times in conjunction with the expansive action of the steam after the manner of a compound or multiple engine.

It will be understood that any required number of piston-bearing disks and pistons may be employed and attached to the same shaft. Thus if six be employed each will be cut off from the direct action of the steam at one-sixth of the revolution of the shaft, the steam acting by expansive force during the remaining five-sixths of the revolution. If four be employed, the direct pressure of the steam will be cut off from each at one-fourth of the revolution of the shaft, and so on according to the number employed in multiple series.

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

1. In a rotary engine, the combination of a casing having a steam-chest, a compartment and chamber, and having supply and exhaust passages between the steam-chest and the compartment and chamber, a valve located in the steam-chest and provided with a cavity to establish communication between the exhaust-passages of the compartment and chamber, a piston operating in the chamber, and a rotating valve or abutment fitted in the compartment and provided with a pocket to establish communication between the supply-pipe and chamber during a portion of its revolution and adapted to communicate with the exhaust-passage during a portion of the same revolution and at a time when the supply of live steam to the chamber is cut off, whereby the live steam confined in the said pocket expands and assists materially in driving the piston, substantially as set forth.

2. In a rotary engine, the combination of a piston, and a rotary valve or abutment having a pocket, which latter during a portion of the revolution of the said valve establishes communication between the steam supply and the chamber in which operates the piston, and which pocket during a portion of the same revolution of the valve communicates with a by-passage leading into the aforesaid chamber, whereby the live steam contained in the said pocket serves to drive the engine by its expansive force, substantially as set forth.

3. In a rotary engine, the combination of a casing having a compartment and chamber in which operate, respectively, a rotating valve or abutment and a piston, the rotating valve having a pocket, and a valve operating in a steam-chest for stopping, starting and reversing the engine, the latter valve being provided with a middle and side cavities, the middle cavity establishing communication between the exhaust-passage and the exhaust-pipe, and a side cavity establishing communication between an exhaust-passage of the said chamber and a similar passage of the compartment, whereby the live steam confined in the pocket of the rotating valve can escape to the aforesaid chamber to assist in driving the piston by expansive force, substantially as described.

4. In a rotary engine, the combination of a casing provided with a steam-chest, a compartment, and a chamber, the compartment and chamber intersecting, supply and exhaust passages between the steam-chest, compartment and chamber, a rotating valve operating in the compartment and having a pocket, a piston operating in the said chamber, and a valve located in the steam-chest for starting, stopping and reversing the engine, and provided with a middle and side cavities and an approximately T-shaped passage communicating with the middle cavity and with the exhaust-passages, substantially as shown and described.

5. In a rotary engine, the combination of a casing having a circular compartment and an annular chamber intersecting and provided with a space midway the sides of the annular chamber, a rotating valve or abutment located in the compartment and having a pocket in its periphery, a revoluble disk operating in the said space and bearing a piston to travel in the annular chamber and sweep through the pocket of the rotating valve, and spring-actuated abutments located in recesses upon opposite sides of the aforesaid space and revoluble disk and adapted to bear against the peripheral surface of the rotating valve, the combined length of the spring-actuated abutments and the thickness of the revoluble disk equaling the thickness of the said rotating valve, substantially as shown for the purpose described.

6. A rotary engine embodying in its organization similar parts or halves having recesses formed in their meeting faces which when the parts are united provide a steam-chest, a compartment, an annular chamber, and exhaust-passages, the latter establishing communication between the steam-chest and annular chamber and between the steam-chest and compartment, a revoluble disk bearing a piston, which latter is adapted to travel in the said chamber, a rotating valve or abutment operating in the compartment and provided with a pocket through which is adapted to sweep the piston, and which pocket is adapted to communicate with the exhaust-passage between the compartment and steam-chest and to establish communication between a supply-pipe and the aforesaid chamber, packing-strips and abutments to bear against the periphery of the rotating valve or abutment to secure a steam-tight joint, supply-pipes between the steam-chest and compartment,

means for causing the rotating valve and revoluble disk to operate in unison, and a valve located in the steam-chest for starting, stopping and reversing the engine, and provided with a middle and side cavities, the middle cavity establishing communication between an exhaust-passage and the exhaust-pipe, and an end cavity adapted to connect the other exhaust-passage and the exhaust-passage between the compartment and steam-chest, substantially in the manner and for the purpose set forth.

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

JAMES A. GOODNER.
JAMES M. CHRITTON.

Witnesses:
N. C. PATTON,
JESSE BOOTH.