S. A. MILES.

ROTARY ENGINE.

APPLICATION FILED OCT. 7, 1909.

953,964. **Patented Apr. 5, 1910.**

3 SHEETS—SHEET 1.

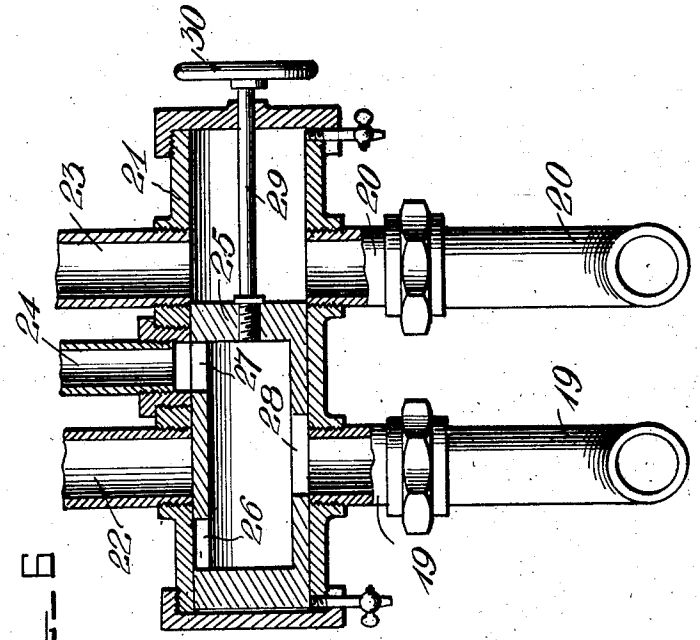

Fig. 9.

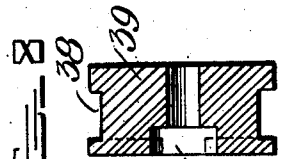

Fig. 8.

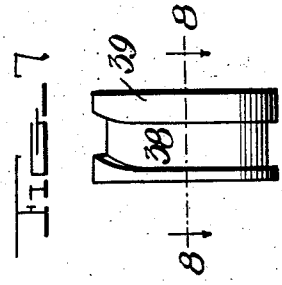

Fig. 7.

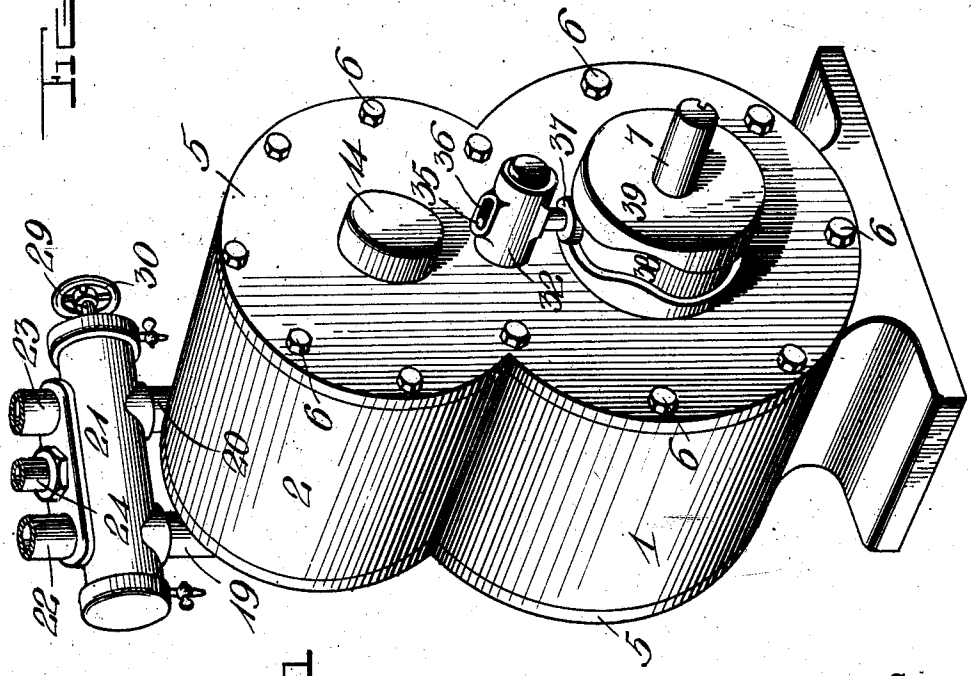

Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

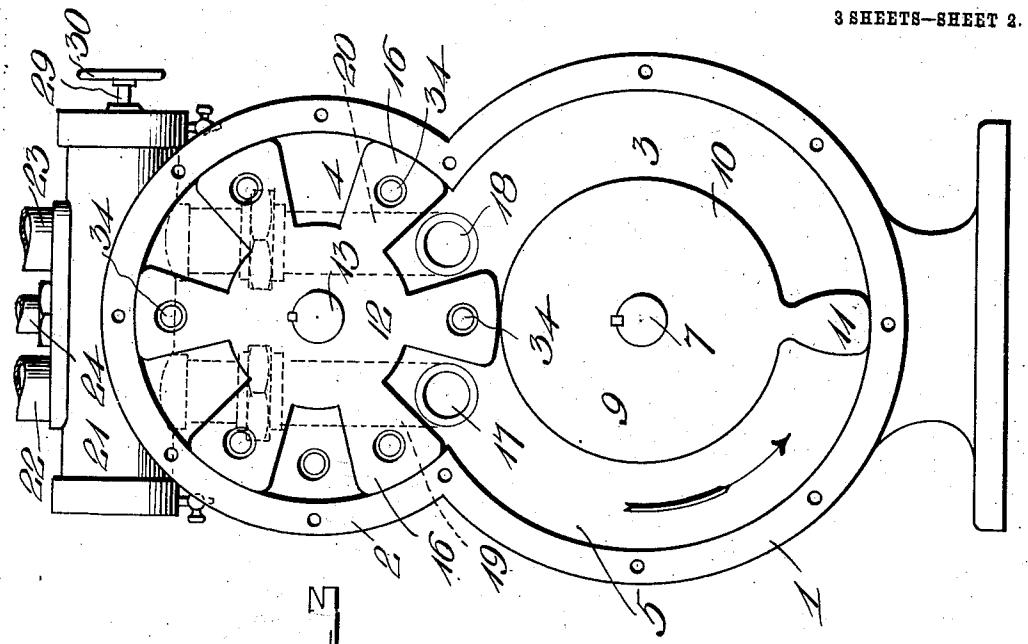

FIG. 1

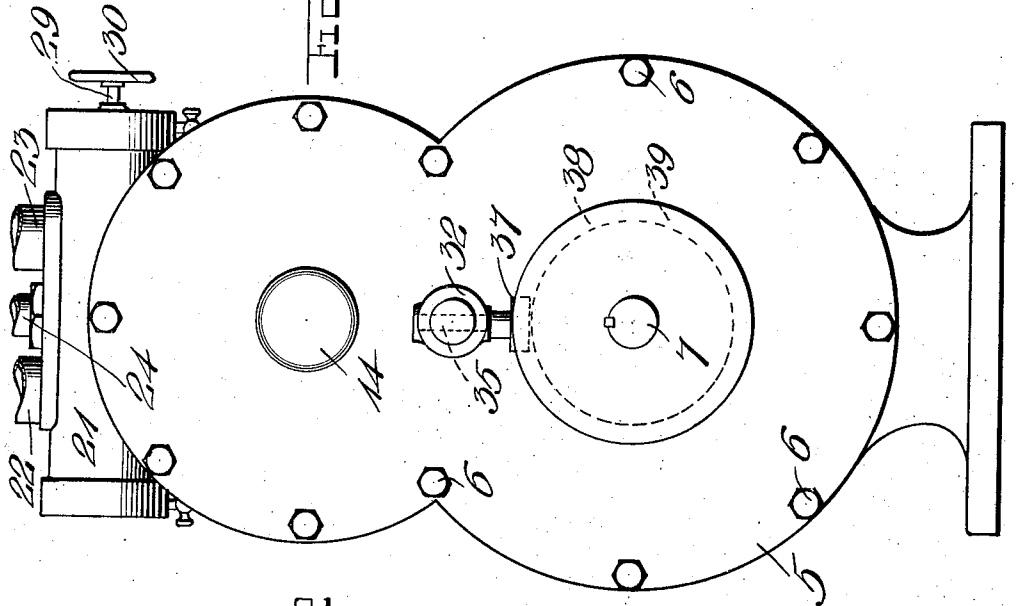

FIG. 2

Witnesses

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3 SHEETS—SHEET 3.

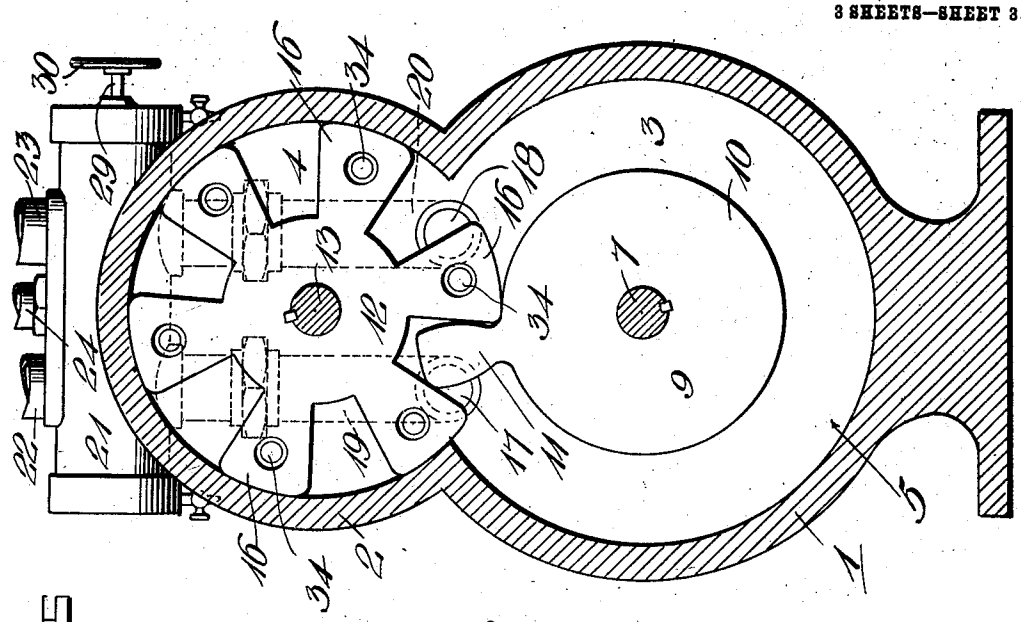

FIG. 5

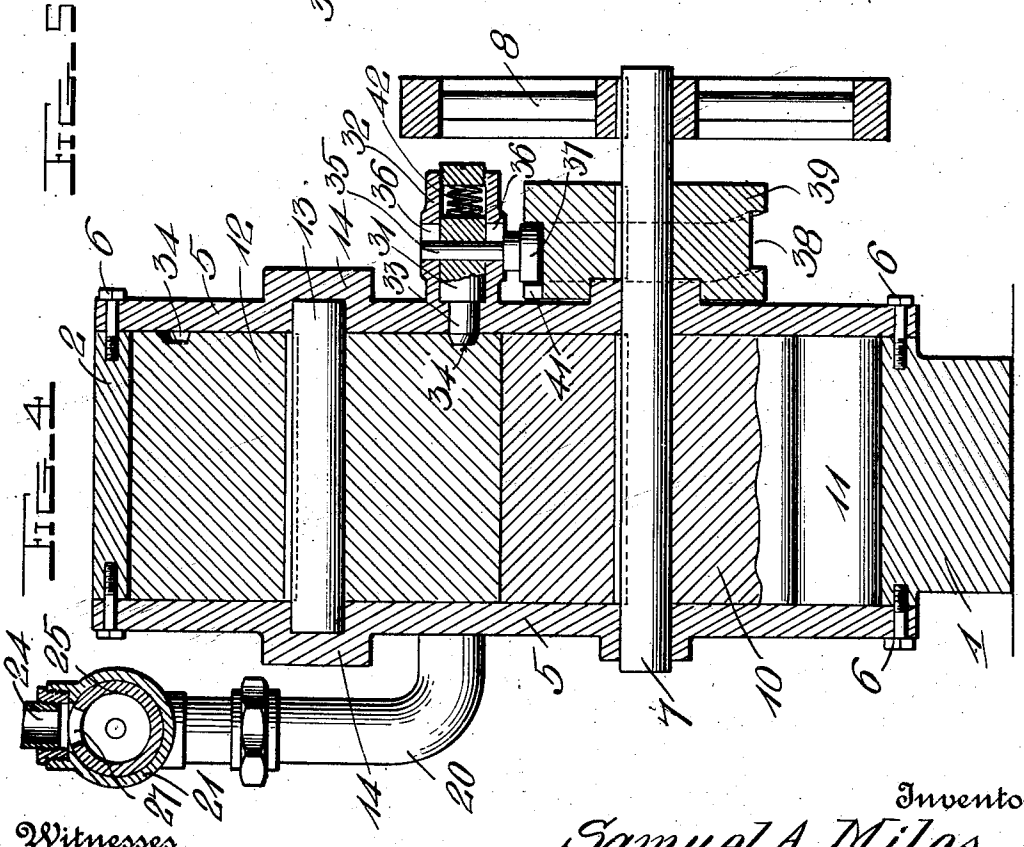

FIG. 4

Witnesses

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UNITED STATES PATENT OFFICE.

SAMUEL A. MILES, OF PHILADELPHIA, PENNSYLVANIA.

ROTARY ENGINE.

953,964. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed October 7, 1909. Serial No. 521,496.

To all whom it may concern:

Be it known that I, SAMUEL A. MILES, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in engines of the rotary type and has for its object to provide an engine of this type which may be driven by any suitable working fluid such as steam, gas, or water, and which includes a revoluble element or wheel adapted to form an abutment for the motive fluid whereby the motive fluid is caused to drive the piston in the proper direction.

A further object of the invention is to provide means for turning the rotary element one notch forward at the proper time and at each revolution of the piston.

A still further, and one of the principal objects of the invention is to provide a locking mechanism for locking the rotary element against rotation and for releasing said element at certain periods during the revolution of the piston.

Another object of the invention is to provide a feeding device for the steam or motive fluid adapted to so control the passage of such fluid into the piston chamber that the piston may be driven in either direction with equal efficiency.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1 is a perspective view of a complete rotary engine, embodying my improvements; Fig. 2 is a side elevation thereof; Fig. 3 is a similar view with the cover plate removed showing the normal position of the abutment forming member and the piston at the completion of a half revolution in the casing; Fig. 4 is a vertical longitudinal section of the complete device; Fig. 5 is a vertical section through the casing showing the abutment forming member and the piston in elevation and showing the position of the piston when about to be acted upon by a new charge of the steam or other motive fluid; Fig. 6 is a central longitudinal section of the feeding device for the motive fluid; Fig. 7 is an edge elevation of the operating cam for the locking pin; and, Fig. 8 is a horizontal section taken on line 8—8 of Fig. 7.

Referring to the drawings for a more particular description of the invention, the device comprises a casing having a lower cylindrical body 1 and an upper cylindrical head or portion 2, which form the main and secondary piston and abutment chambers 3 and 4, respectively. These chambers are closed in at opposite sides by the removable cover plates 5, which are secured in position by the screws 6 or other equivalent means. The main or power shaft 7 extends centrally through the piston chamber 3 and has keyed to one end a fly-wheel 8 of any suitable form. The piston 9 comprises a cylindrical body 10 provided with a piston head 11, which works against the wall of the piston chamber. A rotary wheel 12 is mounted upon the shaft 13 extending through the secondary chamber 4 with its ends mounted in the bearings 14 of the cover plates. This wheel is provided with a series of radially projecting outwardly tapering arms or blades 16 which work against the inner surface of the secondary chamber and one of which fits against the periphery of the body 10 of the piston and forms an abutment for the incoming steam or other motive fluid.

The motive fluid is admitted into the piston chamber at a point between the arm or blade of the rotary wheel in abutment forming position and the piston head 11 through either of the ports 17 and 18, respectively, either of which is adapted to act as an inlet port, or the exhaust port, depending on which direction the piston is to be driven. Steam is admitted to and discharged from the ports 17 and 18 by the pipes 19 and 20, the upper ends of which are suitably connected with a steam chamber or casing 21. Steam pipes 22 and 23, respectively, extend vertically from the top of the steam chamber or casing 21 in alinement with the pipes 19 and 20, while a steam pipe 24 is connected with the top of the steam casing 21 between the pipes 22 and 23. A cylindrical hollow slide valve 25 is mounted in the steam casing 21 and is provided in its top and near opposite ends with a pair of inlet openings 26 and 27, respectively, either of which is adapt-

ed to be brought into registration with the lower end of the supply pipe 24. The slide valve 25 is also provided in its bottom with the discharge port 28, which is adapted to be brought into registration with the upper end of either of the pipes 19 and 20. When the inlet port 27 of the slide valve is moved into registration with the supply pipe 24, the discharge opening 28 of said valve is brought in registration with the supply pipe 19, in which case steam is fed into the piston chamber through the inlet port 17 and drives the piston to the left, the exhaust steam passing through the port 18 and through the pipe 20 and steam casing 21 to the pipe 23 which, under these conditions, acts as an exhaust.

Should it be desired to reverse the direction of rotation of the piston, the slide valve is moved to the opposite end of the steam casing, which brings the inlet opening 26 of said valve into registration with the supply pipe 24 and the discharge opening 28 in registration with the pipe 20, when steam will be admitted into the piston chamber through the port 18 and exhausted from the piston chamber through the port 17. The slide valve is provided with a handle 29 which extends through one end of the steam casing and is provided with the hand wheel 30 for convenience of operation. The rotary wheel 12 is held stationary by suitable locking means, which will be hereinafter described, while the piston is making its revolution, but when the piston nearly reaches or completes its revolution, the rotary wheel is released by said locking means and is turned by means of the piston head to bring the next arm or blade 16 thereof into the position assumed by the previous one when the locking mechanism again operates to hold the rotary wheel in stationary position until the piston nearly completes its next revolution.

The locking means comprises a longitudinally movable locking pin comprising a cylindrical body 31, which works in a tubular extension 32 projecting from one of the cover plates 5, and a reduced engaging portion 33, which extends through the cover plate and is adapted to engage any one of the recesses or sockets 34 formed in the front faces of the arms or blades of the rotary wheel 12. The locking pin is intermittently released from the sockets or recesses at the proper time in the operation of the engine by a pin releasing member comprising a stem 35 which extends through the slots 36 of the tubular extension 32 and the body 31 of the locking pin, and a cylindrical head 37 at one end of said stem which fits in the cam groove 38 of the cam wheel 39 which is keyed to the power shaft. The inner edge of the cam wheel is suitably notched, as at 41, so that when first applied in position the head of the pin releasing member is permitted to slip in the groove 38 thereof. It will be evident that this notch or recess also provides for the removal of the cam wheel should this be found necessary. The coil spring 42 may be arranged in the outer end of the tubular extension 32 to bear against the body of the locking pin to compensate for any lost motion due to wear between the head of the pin releasing member and the walls of the groove 38 of the cam wheel.

It will be understood that while the piston is provided with but one piston head, the same may be provided with two heads, if necessary.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claims. For instance, while I have described the invention as an engine for generating power, it is obvious that if power is transmitted to the device by a separate engine or motor, said device may be used as a rotary pump or blower.

I claim as my invention:

1. In a device of the class described, a casing formed with main and secondary chambers, a piston provided with a piston head rotatably mounted in the main chamber of the casing, a rotary wheel provided with a series of rotary arms or blades rotatably mounted in the secondary chamber of the casing, each of said blades being provided in one face with a socket, and adapted, in its turn, to fit against the body of the piston and form an abutment, means for supplying a motive fluid to the piston chamber at a point between the piston head and the arm or blade which is in abutment forming position, a locking device comprising an endwise movable locking pin adapted to engage the socket in the blade of the rotary wheel which is in abutment forming position, a releasing device for said pin, and a cam wheel keyed to the power shaft and having a cam groove to receive the head of the pin releasing member.

2. In a device of the class described, a casing formed with main and secondary chambers, a piston provided with a piston head rotatably mounted in the main chamber of the casing, a rotary wheel provided with a series of rotary arms or blades rotatably mounted in the secondary chamber of the casing, each of said blades being provided in one face with a socket, and adapted, in its turn, to fit against the body of the piston and form an abutment, means for sup-

plying a motive fluid to the piston chamber at a point between the piston head and the arm or blade which is in abutment forming position, a locking device comprising a longitudinally movable locking pin adapted to engage the socket in the blade of the rotary wheel which is in abutment forming position, a pin releasing device comprising a stem extending through the pin and a head at one end of said stem, and a cam wheel keyed to the power shaft and having a cam groove to receive the head of the pin releasing member.

3. In a device of the class described, a casing formed with main and secondary chambers, a piston provided with a piston head rotatably mounted in the main chamber of the casing, a rotary wheel provided with a series of rotary arms or blades rotatably mounted in the secondary chamber of the casing, each of said blades being provided in one face with a socket, and adapted, in its turn, to fit against the body of the piston and form an abutment, means for supplying a motive fluid to the piston chamber at a point between the piston head and the arm or blade which is in abutment forming position, a tubular extension projecting from one side of the casing, a locking pin having a cylindrical body mounted in said extension and a reduced portion adapted to engage the socket in the blade of the rotary wheel which is in abutment forming position, a pin releasing device comprising a stem extending through said tubular extension and the body of the locking pin, and a head at one end of said stem, and a cam wheel keyed to the power shaft and having a cam groove to receive the head of the pin releasing member.

4. In a device of the class described, a casing formed with main and secondary chambers, a piston provided with a piston head rotatably mounted in the main chamber of the casing, a rotary wheel provided with a series of rotary arms or blades rotatably mounted in the secondary chamber of the casing, each of said blades being provided in one face with a socket, and adapted, in its turn, to fit against the body of the piston and form an abutment, means for supplying a motive fluid to the piston chamber at a point between the piston head and the arm or blade which is in abutment forming position, a tubular extension projecting from one side of the casing, a locking pin having a cylindrical body mounted in said extension and a reduced portion adapted to engage the socket in the blade of the rotary wheel which is in abutment forming position, a pin releasing device comprising a stem extending through the pin and a head at one end of said stem, a cam wheel keyed to the power shaft and having a cam groove to receive the head of the pin releasing member, and a spring arranged in the tubular extension to bear against the body of the locking pin, said spring adapted to compensate for any lost motion due to wear between the head of the pin and the walls of the cam groove.

5. In a rotary engine, a casing comprising main and secondary chambers, a piston having a piston head mounted in the main chamber of the casing, a rotary wheel provided with a series of outwardly tapering radial blades mounted in the secondary chamber of the casing, each of said blades having straight sides and rounded outer corners, and the piston head having convex sides whereby both sides of the piston head are caused to closely fit the opposed faces of an adjacent pair of blades when the rotary wheel is turned.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SAMUEL A. MILES. [L. S.]

Witnesses:

WILLIAM J. THOMAS,

EDWARD B. GANN.