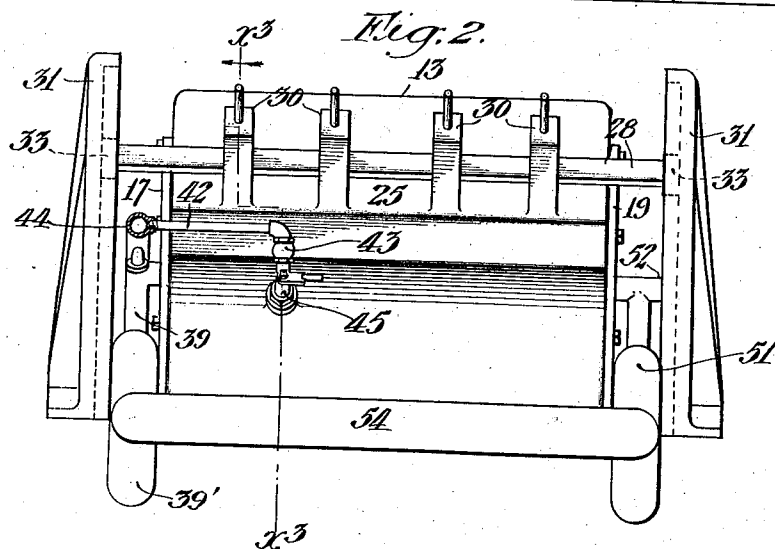
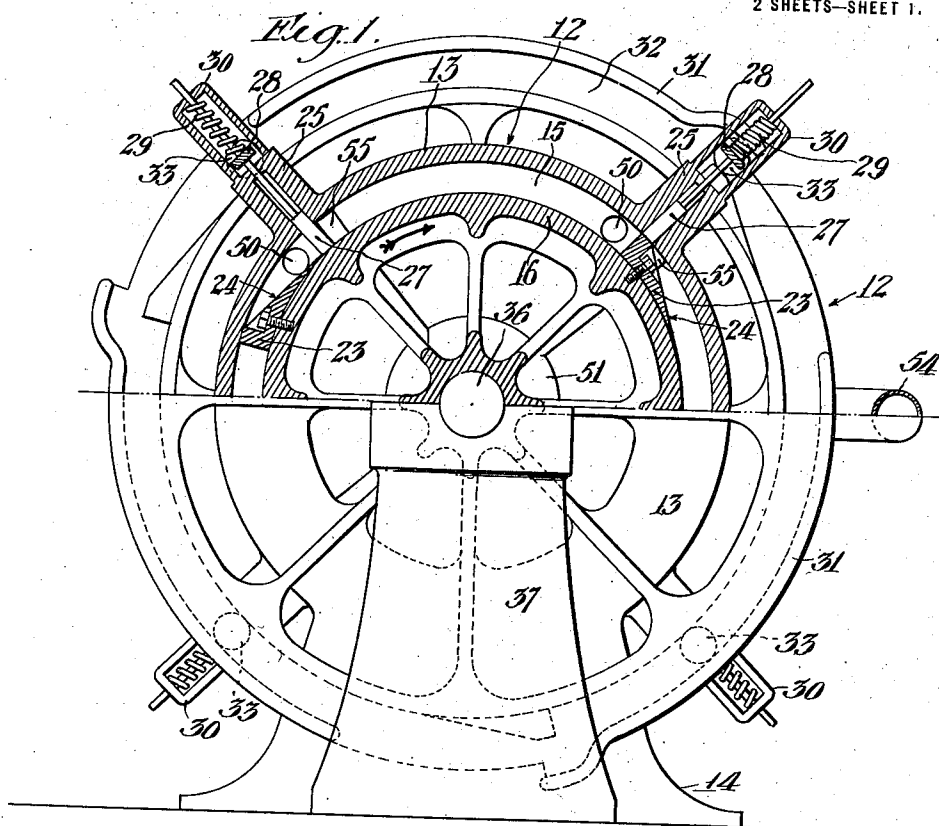


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J. A. FLEMING.
 ROTARY MACHINE.
 APPLICATION FILED JUNE 27, 1916.

Patented Aug. 7, 1917.
 2 SHEETS—SHEET 1.



Inventor
 James A. Fleming
 by Graham & Davis
 his Attorneys

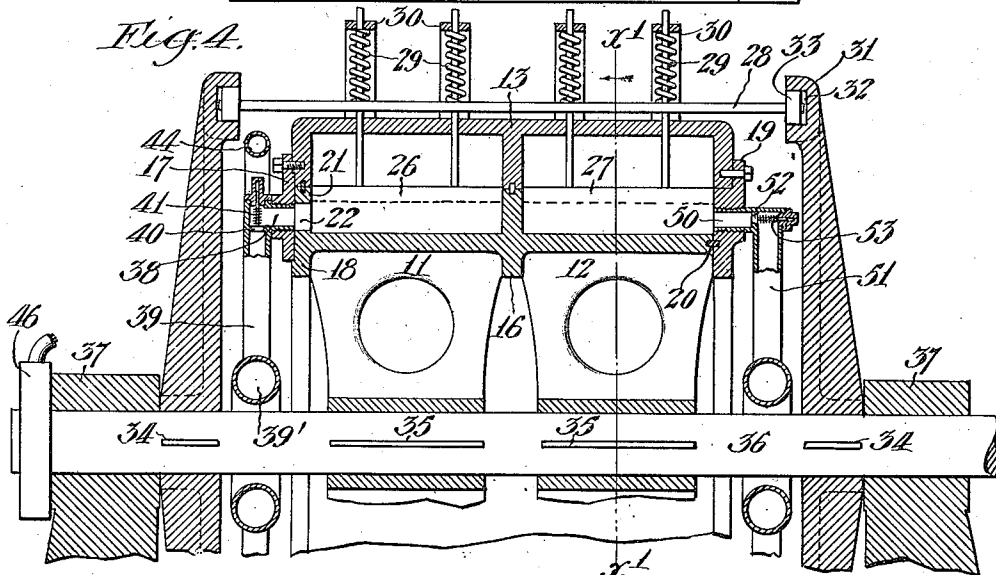
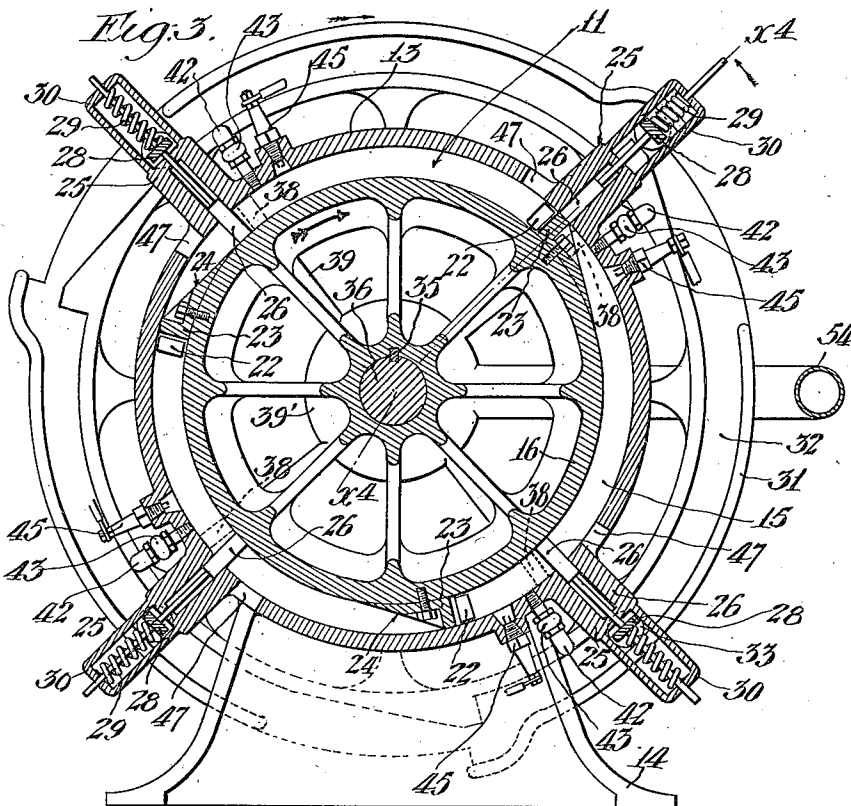
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UNITED STATES PATENT OFFICE.

JAMES A. FLEMING, OF LOS ANGELES, CALIFORNIA.

ROTARY MACHINE.

1,235,786.

Specification of Letters Patent.

Patented Aug. 7, 1917.

Application filed June 27, 1916. Serial No. 106,259.

To all whom it may concern:

Be it known that I, JAMES A. FLEMING, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Rotary Machine, of which the following is a specification.

My invention relates to rotary machines which are used to pump or compress fluids, or which are adapted to utilize the expansive force of steam, air, or internal explosions, as a prime mover.

In the following specification and the drawing, I have described and illustrated a particular form of rotary machine, namely, an internal combustion engine in combination with an air compressor.

Other applications of my invention will be obvious to one skilled in the art to which the invention pertains.

The principal object of the invention is to provide a rotary machine involving new principles of construction, and producing certain new and useful results in a better manner than has heretofore been considered possible, as will hereinafter be set forth more in detail.

Referring to the drawings, which are for illustrative purposes only:

Figure 1 is an end elevation of my invention, the compressor being shown in section on a plane represented by the line x^1-x^1 of Fig. 4, and viewed in the direction of the arrows.

Fig. 2 is a side view of a portion of the same machine.

Fig. 3 is a section on a plane represented by a line x^2-x^2 of Fig. 2, viewed in the direction of the arrows.

Fig. 4 is a section on a plane represented by the line x^3-x^3 of Fig. 3, this plane being viewed in the direction of the arrows.

Broadly considered, the invention consists of a prime mover 11 and a pump 12. A casing 13 is common to both the prime mover 11 and the compressor 12, this casing being provided with feet 14 upon which it rests and having a central cylindrical opening 15 formed therein. Located in the cylindrical opening 15 is a rotor 16, this rotor also being common to both the prime mover and the compressor.

Secured to the casing 13 on the intake end of the engine is an end plate 17, best shown in Fig. 4, this end plate extending down and making a gas tight joint with an end

flange 18 formed on the rotor 16. Secured to the casing 13 on the pressure end of the compressor 12 is an end plate 19, this end plate 19 extending down and making a gas tight joint with the rotor 16 by means of a pressure ring 20. The rotor 16 consists of a cylindrical portion having an upwardly turned flange 21 at one end, this flange being provided with three intake ports 22 equally spaced around the circumference thereof.

Secured to the rotor 16 are three pistons 23, these pistons having their forward ends inclined as shown at 24 and being of such a size that they make a tight closure with the inner surface of the cylindrical opening 15. The three pistons 23 are equally spaced around the circumference of the rotor and are immediately in advance of the intake ports 22.

Sliding in slots formed in projections 25 of the casing 13 are gate valves, there being eight of these gate valves arranged in two sets of four each, one set 26 serving as gate valves for the prime mover 11 and one set 27 serving as gate valves for the compressor 12. These gate valves are adapted to form a tight closure with the rotor 16, and they are moved in and out by means of roller bars 28, these roller bars being forced downwardly by means of compression springs 29 carried in brackets 30 formed on the top of the projections 25, the roller bars 28 being moved in and out by means of cams 31, these cams having grooves 32 therein in which rollers 33 are free to roll, the rollers 33 being carried on suitable bearings on either end of the roller bars 28. The cams 31 and the rotor 16 are secured by means of keys 34 and 35 to a shaft 36, the shaft 36 turning freely in bearings 37 which are carried on extensions of the feet 14 and are therefore secured in fixed relation to the casing 13. Formed in the plates 17 at four points equally distant about the circumference thereof, are fixed intake ports 38, each of these intake ports being connected by means of a nipple 39 with an intake manifold 39'. Seated in each of the nipples 39 is an intake valve 40, this valve being normally held on its seat by means of a compression spring 41 and serving to prevent any transmission of pressure from the intake port 38 to the manifold 39'. The fixed intake ports 38 are so located that they are close to and ahead of the gate valves 26 and

27 when the gate valves are in engagement with the rotor 16. Opening into the space inside the cylindrical opening 15, immediately adjacent or in front of the ports 38, are fuel injection pipes 42, each of these fuel injection pipes being provided with a check valve 43 to prevent any flow of pressure outwardly from the cylindrical opening 15, all of the check valves 43 being connected to a common fuel supply pipe 44. Located in the walls of the casing 13, close to the fuel injection pipes 42, are spark plugs 45, these spark plugs being connected through suitable wiring with a distributor 46 and with a source of electric current not shown, the distributor being similar to that commonly employed in internal combustion engines, and serving to supply a spark to the terminal of the spark plug 45 at the proper moment to ignite the explosive mixture, as will be hereinafter explained.

Exhaust openings 47 are cut in the outer walls of the casing 13 close to the projections 25 and on the opposite sides from the ports 38. Located in the end plate 19 of the compressor 12 are pressure ports 50, these ports communicating with a pressure manifold 51 which is provided with a check valve 52 held in place by a compression spring 53, the check valve being so arranged as to prevent any transmission of pressure from the manifold 51 to the interior of the cylindrical opening 15. The manifolds 51 and 39 may be connected directly by a crossover manifold 54, this manifold having a considerable internal area so as to provide a space for the storage of the compressed air. Auxiliary compressed air storage means may, of course, be supplied if desired. Intake ports 55 are provided in the end plates 19, ports 55 and the ports 50 being located on opposite sides of the gate valves 27.

The method of operation of my invention is as follows:

Power being applied to the shaft 36 by any convenient means, the rotor 16 is turned in the direction of the arrows shown in the various figures, the pistons 23 of the engine 11 and the compressor 12 moving in the annular space between the rotor 16 and the inner surface of the casing 13, the pistons 23 making a tight joint inside the casing. Air is taken into the compressor 12 through the intake ports 55, this air being compressed between the pistons 23 and the gate valves 27 of the compressor, the compressed air being ejected through the pressure ports 50 into the crossover manifold 54, the check valves 52 serving to prevent any return of the compressed air from the pressure manifold 51 to the space inside the casing 13. The gate valves 26 and 27 are lifted and lowered by means of the cams 31, a tight closure being maintained with the outer surface of the rotor 16. The gate valves

26 and 27 are so actuated by the cams that the gate valves are lifted out of the path of the pistons at the proper instant so that the piston passes freely by and beneath the gate valves. Compressed air from the crossover manifold 54 is conducted through the intake valves 40 to the nipple 38. This nipple is fixed in the end plate 17 which is rigidly secured to the casing 13, inside of which the rotor 16 revolves. Compressed air from the nipple 38 is admitted to the space between the piston 23 and the gate valve 26 through one of the intake ports 22, this intake port being formed in the end of the rotor and registering with the intake port 37 which is after the piston 23 has passed the gate valve 26 and the gate valve 26 has been lowered to its seat. This compressed air fills the space between the piston 23 and the gate valve 26 during the instant that the ports 22 and 37 register with each other, and a further movement of the rotor 16 throws these ports out of alinement so that the supply of compressed air is cut off. Fuel is then injected into the compressed air through a fuel injection pipe 42, so that an explosive mixture is formed between the gate valve 26 and the piston 23. This explosive mixture may be arranged to burn slowly, due to the compressed air being quite hot and under heavy compression, or the explosive mixture may be ignited in the proper instant by means of a high tension electrical discharge supplied to the spark plugs 45 by the distributor 46.

It will be noted that there are four gate valves 26 and three pistons 23 in the engine 11, and that there are a similar number of pistons and gate valves in the compressor 12. The result is that there are twelve explosions for each revolution of the rotor 16, and that there are twelve separate compressions for each rotation.

I claim as my invention:—

1. A rotary machine comprising a casing having a cylindrical opening therein; bearings rigidly secured to said casing and concentric with the axis thereof; a shaft turning freely in said bearings; a cylindrical rotor rigidly mounted on said shaft, the periphery of said rotor being concentric with the inner surface of said cylindrical opening; end plates rigidly secured to said casing and forming a sliding gas tight joint with said rotor; pistons fixed on said rotor, each piston making a gas tight joint with said end plates and the inner surface of said cylindrical opening; gate valves sliding radially in said casing, each gate valve making a gas tight joint with the periphery of said rotor and said end plates when said gate valve is lowered; means for exerting fluid pressure between each of said pistons and a corresponding gate valve; two cams, each cam being secured to said shaft out-

side said end plates, rollers rolling in grooves in said cams; roller bars connecting each roller in one cam with a corresponding roller in the other cam; spring means for forcing said rollers toward said shaft; and rods connecting each of said gate valves with one of said rollers.

2. A rotary machine comprising a casing having a cylindrical opening therein; bearings rigidly secured to said casing and concentric with the axis thereof; a shaft turning freely in said bearings; a cylindrical rotor rigidly mounted on said shaft, the periphery of said rotor being concentric with the inner surface of said cylindrical opening; end plates rigidly secured to said casing and forming a sliding gas tight joint with said rotor; pistons fixed on said rotor, each piston making a gas tight joint with said end plates and the inner surface of said cylindrical opening; gate valves sliding radially in said casing, each gate valve

making a gas tight joint with the periphery of said rotor and said end plates when said gate valve is lowered; means for forcing compressed air into the working space between said rotor and said casing between a piston and its corresponding gate valve; valve means for shutting off the supply of compressed air before said piston has arrived at a point below the next gate valve; two cams, each cam being secured to said shaft outside said end plates, rollers rolling in grooves in said cams; roller bars connecting each roller in one cam with a corresponding roller in the other cam; spring means for forcing said rollers toward said shaft; and rods connecting each of said gate valves with one of said rollers.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 20th day of June, 1916.

JAMES A. FLEMING.