L. D'AURIA.

ROTARY ENGINE.

No. 187,602. Patented Feb. 20, 1877

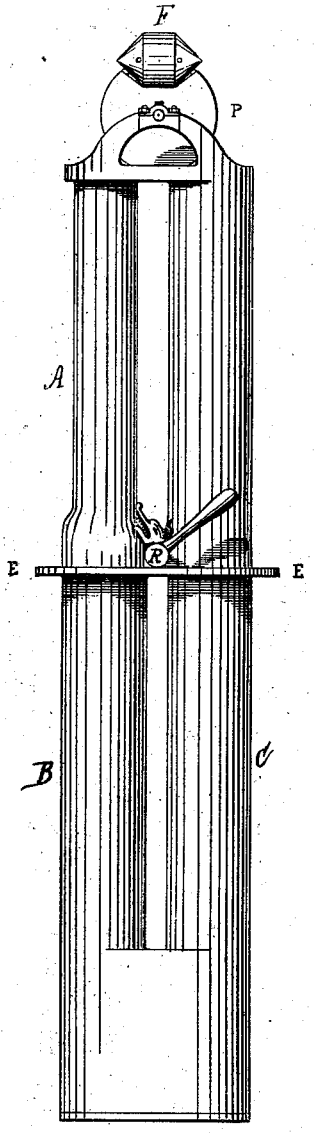

Fig. 1.

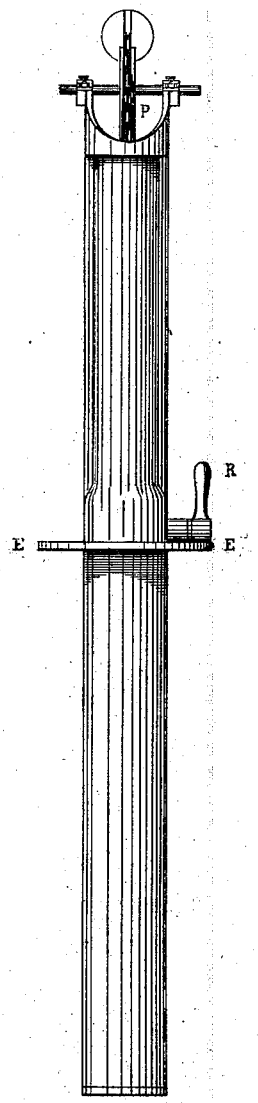

Fig. 2.

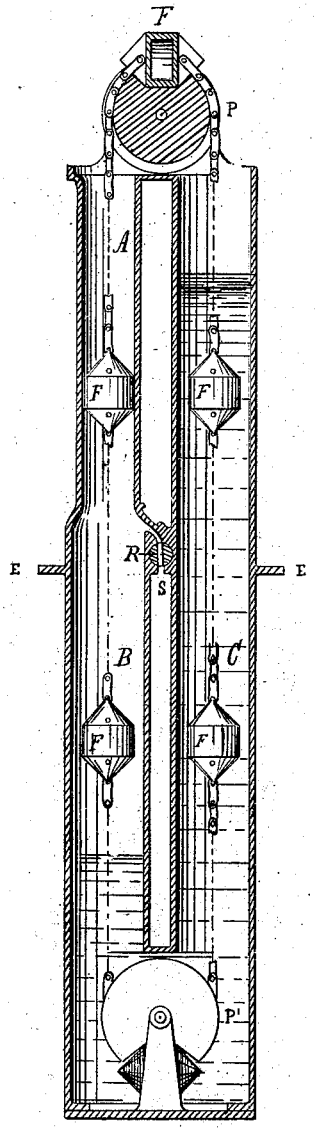

Fig. 3.

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LUIGI D'AURIA, OF GAETANO, ITALY.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **187,602**, dated February 20, 1877; application filed December 16, 1876.

To all whom it may concern:

Be it known that I, LUIGI D'AURIA, of Gaetano, in the county of Castellamare di Stabia, near Naples, in the Kingdom of Italy, have invented a new and useful Improvement in Motive-Power Engines; and do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation. Fig. 2 is a side elevation, and Fig. 3 is a vertical section.

This invention consists in a new motive-power engine, consisting of an endless chain or belt of pistons, running around and transmitting motion to two pulleys, and through two chambers, one of which forms a working-cylinder, and the other is used to contain a liquid abutment, to prevent the escape of the motive power, in the manner hereinafter set forth; and it further consists in the combination of the working-cylinder and piston of a steam or other analogous engine with a liquid abutment so arranged that it cannot enter the cylinder while the engine is in operation.

A B C forms the case or frame of the engine, and consists of two cylinders, one of which is smallest at its upper part A, and of such an internal diameter as to fit the pistons and form the working-cylinder of the engine. Below A the size of the cylinder is increased, so as to equal that of C, in order that the pistons may pass freely through without friction. Mounted in suitable bearings above the center of the space between the two cylinders is the main shaft, carrying the pulley P, and another pulley, P′, is journaled in bearings in a passage connecting the interior of the two cylinders. Around these pulleys runs a series of pistons, F, connected by short chains, belts, ropes, or other equivalent devices, or an endless chain, belt, rope, or its equivalent, having a series of pistons formed on or attached to it in any convenient manner, and at equal distances apart. Any convenient number of pistons may be employed; but the piston-connections and pulleys should be so proportioned and arranged with respect to each other that the distance from center to center of the pistons shall equal the circumference of the pulleys, or a multiple or equal subdivision thereof, so that the pistons will, in turn, lie in recesses formed to receive them in each pulley.

At S is a steam-port, provided with a valve, R, by which the admission of steam to the engine is regulated; but before admitting it, enough liquid should be poured into the cylinder C to fill both cylinders up to the base of the working-cylinder A. When steam is admitted through the valve R, the pressure of the steam, acting on the liquid, will drive it down the chamber B up into the chamber C, thus forming an abutment to prevent the escape of steam through the open end of said cylinder C, and compelling it to act on the piston in the working-cylinder A, and driving it upward until another piston enters said working-cylinder and receives the pressure of the steam in its turn. By this means each of the pistons, in succession, is acted on by the steam, and a continuous steady rotary movement is imparted to the pulley P, and to the shaft on which it is secured.

As each piston rises out of the working-cylinder, the steam confined between it and the next following escapes into the air. It is obvious, however, that the upper part of the case may be inclosed, and the steam passed into a condenser, if desired; but, as now shown, the engine is worked without either condenser or cut-off, although either or both of these may be used, if preferred, by making the proper connections, in the usual manner; but I prefer to dispense with these devices, in order to make the engine as simple as possible.

For the same reason, I have shown but one working-cylinder; but it is also obvious that by reducing the upper part of the chamber C, so as to make it of the same shape as the working-cylinder A, and so arranging the valve R that it can turn the steam into the working-cylinder on chamber C, and cut it off from cylinder A, (as is usually done in most forms of reversing rotary engines,) a reversible engine may be made; but when made in this manner there must not be enough liquid used to enter the working-cylinders, and valves must be employed at the base of each cylinder, to allow of the escape of air from the cylinder in which the pistons are at that time descending.

Any liquid not injurious to the metal of which the engine is made may be employed as

an abutment; yet I prefer machinery-oil, as it serves to lubricate the pistons, &c.; but to produce the most power with a small engine, mercury should be used. As the liquid is driven up in the cylinder C until an equilibrium is formed between the steam-pressure and the weight of the column of liquid, plus atmospheric pressure, the height of the liquid in the cylinder C is constantly varying with the pressure of steam, and by means of an ordinary glass gage, which may be set in the side of the cylinder, the pressure of the steam may be as easily known as by the pressure-gage usually employed on steam-boilers, because the height of the liquid, as shown by the gage, will indicate the pressure of the steam in the boiler when the valve R is open, so that the liquid in the chamber C not only serves as an abutment, but also as a pressure-gage. In the absence of a water-gage the steam-pressure may be approximately ascertained by looking down the chamber C and noting the height of the liquid therein.

To prevent loss of heat by radiation the engine may be set in the boiler, and secured thereto by the flange E, formed on the casing for this purpose.

I do not intend to limit myself to the employment of steam, as water, hot air, gas, or other motive power may be used, if the appropriate liquid abutment be employed for each power; nor to the use of the liquid abutment only in the precise form of engine here shown, as it may be advantageously employed in other than rotary engines by connecting the piston direct to a crank.

I am aware that patents have been granted for engines showing wheels immersed in liquids; but in these cases the liquids offer resistance to the passage of the motive power nearly equal in all directions, and can hardly be said to act as an abutment. Should steam be used in such engines the liquid becomes, practically, a condenser, and so prevents the full action of the steam being obtained.

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

1. The combination, with a series of connected pistons and the pulleys P P′, of a working cylinder, A, and liquid-chamber B C, substantially as described.

2. The combination of the cylinder and piston of a steam or other analogous engine with a liquid abutment, when the cylinder is so arranged that the liquid abutment is prevented from entering the same, substantially as and for the purpose set forth.

LUIGI D'AURIA.

Witnesses:
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