No. 649,396. Patented May 8, 1900.

P. O. E. BOUDREAUX.

ENGINE.

(Application filed Nov. 1, 1899.)

(No Model.) 2 Sheets—Sheet 1.

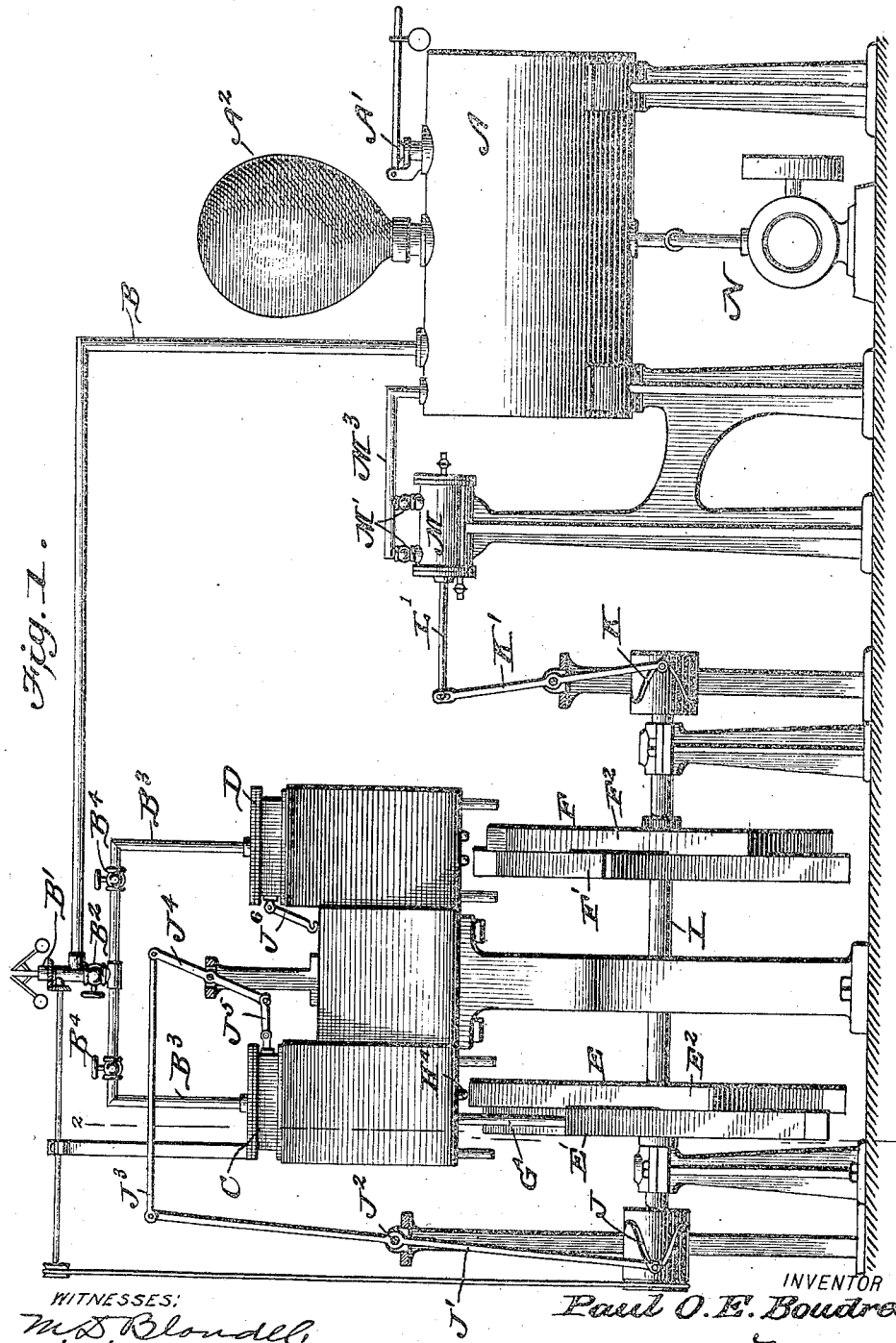


Fig. 1.

WITNESSES:
M. D. Blondell
Percy B. Turpin

INVENTOR
Paul O. E. Boudreaux.
BY Munn & Co.
ATTORNEYS

No. 649,396. Patented May 8, 1900.

P. O. E. BOUDREAUX.

ENGINE.

(Application filed Nov. 1, 1899.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

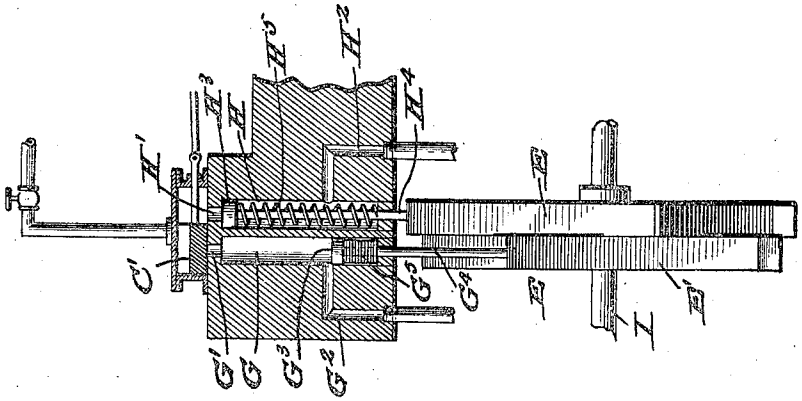


Fig. 4.

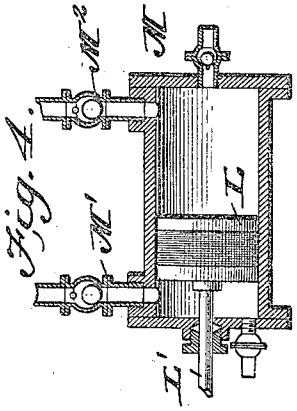
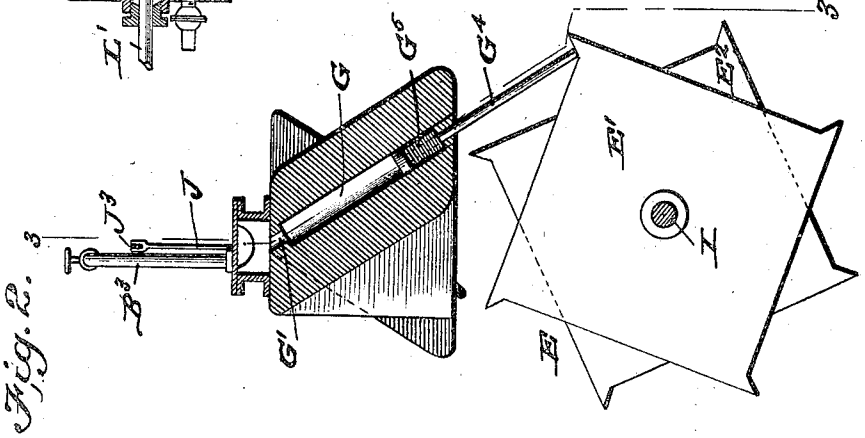


Fig. 2.



WITNESSES:

M. S. Blondel

Percy B. Turpin

INVENTOR

Paul O. E. Boudreaux.

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

PAUL O. E. BOUDREAUX, OF THERIOT, LOUISIANA, ASSIGNOR OF ONE-HALF TO LUKE BOUDREAUX AND THOMAS A. PREVOST, OF SAME PLACE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 649,396, dated May 8, 1900.

Application filed November 1, 1899. Serial No. 735,490. (No model.)

To all whom it may concern:

Be it known that I, PAUL O. E. BOUDREAUX, residing at Theriot, in the parish of Terre Bonne and State of Louisiana, have made certain new and useful Improvements in Engines, of which the following is a specification.

My invention is an improvement in steam and air engines; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a side view of an engine embodying my invention and connected and adapted for use as a compressed-air engine. Fig. 2 is a detail section on about line 2 2 of Fig. 1. Fig. 3 is a detail section on about line 3 3 of Fig. 2, and Fig. 4 is a detail view of the pump for recharging the storage-cylinder.

In the construction shown in Fig. 1 the several parts are constructed, adapted, and arranged for operation as a compressed-air engine. In the said construction I employ a storage-cylinder A, which may correspond to the steam-boiler when the invention is embodied in a steam-engine, suitable heating means being employed. This cylinder A is provided with a safety-valve A', a storage-chamber A^2 which is composed of india-rubber or other suitable elastic material, and the feed-pipe B which leads from the boiler to a pipe B', having a throttle B^3 and connected at the pipes B^3, having throttles B^4. The pipes B^3 lead to the valve-casings C and D, in which operate the valves C', which control the passage of the air, steam, or other motive force to the cylinders for operating the wheels E and F. One of these sets of cylinders is shown in Fig. 3, and it includes cylinders G and H, arranged alongside each other and having feed-ports G' and H', communicating with the valve-chest, and exhaust-ports G^2 and H^2. Pistons G^3 and H^3 operate in the cylinders G and H and carry the stems G^4 and H^4, which operate upon the wheels E and F, as presently described. The pistons G^3 H^3 and their stems G^4 H^4 are forced outward by the steam or air until the pistons pass their exhaust-ports, as will be understood from Fig. 3, when the springs G^5 and H^5 will operate to return the pistons to the starting-point, as shown by the piston H^3 in Fig. 3. In the operation of this construction it will be seen the valve admits steam alternately through the ports G' and H', and thus the pistons G^3 and H^3 will be reciprocated alternately, being forced outward by the air or steam and returned by the springs. The passage of steam or air to the valve-casings C and D may be regulated and controlled by the throttle-valves before described.

The pistons operate upon their wheels E or F. Each of these wheels is composed of sections E' F' and E^2 and F^2, as will be understood from Figs. 1 and 2, the teeth of the sections alternating with each other and being arranged in the path of the valve-stems G^4 and H^4, so the alternate reciprocating movement of the stems G^4 and H^4 will tend to rotate the shaft I, to which the wheel E is secured.

The wheel F, like the wheel E, is secured to the shaft I; but its teeth face in the opposite direction from those of the wheel E, the purpose being to provide a reversing mechanism, so the shaft I can be turned in one direction by operating upon the wheel E and in the opposite direction by operating upon the wheel F, it being understood that the cylinders for the pistons which operate upon the wheel F are arranged at an angle to those which operate upon the wheel E. This is indicated in Fig. 2 of the drawings.

The shaft I is provided with a cam-groove J, in which operates one end of a lever J', which is pivoted centrally at J^2 and has its other end connected by a link J^3 with a lever J^4, which is connected with the valves in casings C or D. Thus, as shown in Fig. 1, the valve in casing C is connected by its link J^5 with the lever J^4, so the steam or air will be supplied to the casing C, the casing D being detached. When so adjusted, the piston-rods will act upon the wheel E to turn the shaft in one direction. To turn the shaft in the other direction, the link J^5 should be detached and the link J^6 of the valve in the casing D be coupled with the lever J^4, when the steam or air will be fed to the casing D and the wheel F will be operated to turn the shaft I in the other direction, as desired.

In the use of the invention as a compressed-

air engine I provide the shaft I with a cam-groove K, in which operates one end of a lever K′, which is pivoted between its ends and whose other end is connected with the piston-rod L′ of the pump-piston L, operating in cylinder of the pump M, which is a double-action pump, having its discharges M′ and M^2 connected by a pipe M^3 with the cylinder A to recharge the same. In this use of the apparatus it may be desirable to provide at N a pump for charging the cylinder A and for renewing the pressure therein when desired.

In the use of my invention as a steam-engine the parts K′, L L′, M M′, and M^2 and M^3 may be disconnected or omitted, and the part A^2 may likewise be omitted.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus substantially as described comprising the shaft having a wheel provided with sets of alternating teeth, the cylinders corresponding to said alternating teeth, the pistons operating in said cylinders and having stems or rods engaging with the alternating teeth, and valve devices controlling the admission of the operating medium to the said cylinders substantially as set forth.

2. The combination in an apparatus substantially as described of the wheel having alternating teeth, the cylinders corresponding to the alternating teeth and having inlet and exhaust ports, the pistons operating in said cylinders and having stems or rods engaging the alternating teeth, and the springs for returning the pistons substantially as set forth.

3. In an apparatus substantially as described the combination of the shaft, the wheels thereon having alternating sets of teeth, the two pair of cylinders overlying the shaft and arranged at reverse inclines and practically fixed in such reversely-inclined relation, the pistons operating in said cylinders and having stems or rods engaging the teeth of their respective wheels, and valve devices substantially as set forth.

4. The combination in an apparatus substantially as described of the wheels E and F having alternating teeth and the teeth of the wheel E being reversed with respect to those of the wheel F, the cylinders arranged in pairs, one pair corresponding to each wheel, the pistons in said cylinders and having stems or rods engaging the teeth of the wheel, the valve-gear, the valves controlling the passage of power to the two pairs of cylinders, and detachable connections between such valves and the valve-gear substantially as set forth.

5. In an apparatus substantially as described the combination of the engine, the storage-cylinder, pipe connections for feeding the engine from the cylinder and an elastic storage-chamber connected with the cylinder, and a pump arranged for operation by the engine and adapted to recharge the cylinder substantially as set forth.

6. In an apparatus substantially as described the combination with the shaft I having a cam-groove J, the wheels E and F secured to said shaft, the cylinders, the pistons in said cylinders and having the alternately-reciprocating rods or stems, the valves, and the valve-gear including a lever J′, a link J^3, a lever J^4, and links connected with the valves and adapted for detachable connection with the lever J^4.

PAUL O. E. BOUDREAUX.

Witnesses:
HENRY M. BOURG,
C. V. AYCOCK.