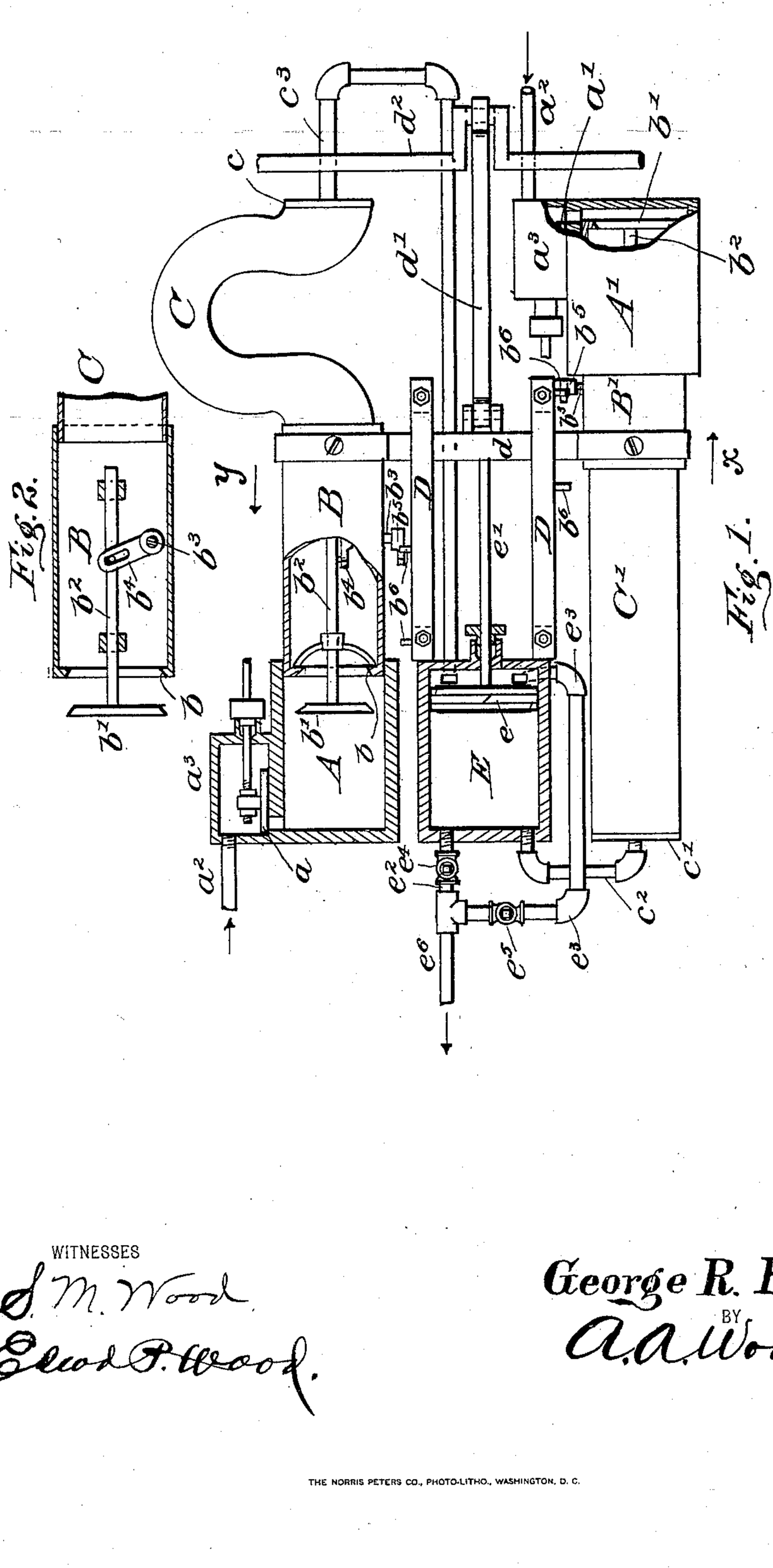
No. 624,163. Patented May 2, 1899.

G. R. BOND.

FLUID MOTOR.

(Application filed May 23, 1898.)

(No Model.)



WITNESSES

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GEORGE R. BOND, OF LITHONIA, GEORGIA.

FLUID-MOTOR.

SPECIFICATION forming part of Letters Patent No. 624,163, dated May 2, 1899.

Application filed May 23, 1898. Serial No. 681,525. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. BOND, a citizen of the United States of America, and a resident of Lithonia, in the county of De Kalb and State of Georgia, have invented certain new and useful Improvements in Fluid-Motors; and I do hereby 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to motors, and more especially to that class of motors in which a reciprocable movement is produced and converted to a rotary motion.

To this end the invention consists of the device hereinafter set forth.

In the accompanying drawings, Figure 1 is a plan of the device, partially in section. Fig. 2 is a vertical section of the hollow pistons, showing the valve-operating mechanism therein.

In the figures like reference-marks indicate corresponding parts in both views.

A and A′ are cylinders, being duplicates and situated diagonally opposite each other on a suitable frame and opening inwardly. On the side of each of these cylinders A and A′ are valves a and a', which control the steam-supply and are connected in any desired manner, so as to open alternately, admitting steam to one cylinder and shut it off from the other. Pipes a^2 supply the fluid under pressure through the chest a^3, whence it passes to the interior of the cylinder A and A′ as soon as the valve a and a', respectively, is open.

B and B′ are pistons which fit within the cylinders A and A′ and are themselves cylindrical in form, being provided at their inner ends with valve-seats b for a valve b', mounted upon a suitable plunger b^2, which is reciprocable longitudinally of the said piston B and is adapted to seat upon the aforesaid valve-seat and close the opening in the inner end of said piston. At its outer end each piston has an opening which is as large in diameter as the size of the piston will permit, and connected to and communicating internally with said pistons, respectively, at their outer ends are flexible tubes C and C′, the other end of said tubes being connected to stationary abutments c and c', which have pipes c^2 and c^3, leading therefrom, as will be hereinafter set forth.

D are guides, and d is a yoke which is secured to the outer ends of the pistons B and B′ and slides longitudinally of the guides D, a pitman d' connecting the said yoke with the crank-shaft d^2. The valves B′ are operated by means of a rock-shaft b^3, carrying arms b^4 and b^5 on its ends and being mounted in the piston, so that the arm b^4 loosely engages the plunger or stem b^2, while the arm b^5 engages pins b^6, set at each end of the stroke, whereby the valve b' is opened and closed at the proper time in the stroke of its correlative piston.

E is a supplementary cylinder, which is provided with a piston e, connected by a piston-rod e' with the yoke d, about the middle thereof, and opposite the point of connection of the pitman d'. The pipe c^2 leads into one end of this cylinder E and the pipe c^3 leads into the other end thereof, pipes e^2 and e^3, provided with check-valves e^4 and e^5, respectively, entering the correlative ends of the said cylinder and being connected to an exhaust-pipe e^6 to convey the exhaust from the entire motor to any desired place.

The operation of this device is as follows: The device has just completed a stroke in the direction of the arrow X, Fig. 1, and the valves a' and b' are open, and thereby fluid under pressure is passing from the chamber a^3 past the valve a' and into the cylinder A′, forcing forward the piston B′, while steam is passing from the cylinder A into piston B, thence along the flexible tube C and pipes C^3 to the correlative end of the cylinder E. Now as soon as the piston B has moved in the direction of the arrow Y to the limit of its movement the arm b^5 will strike the pin B^6 and by partially rotating the shaft b^3 will cause the stem b^2 to move in a direction to close the valve b', and the valve a will be opened simultaneously with which the valve a' will be closed and the valve b' of the piston B will be opened, whereby the steam entering the cylinder A will act upon the movable abutment formed by the valve b' and that end of the piston B, and so force the piston

B and the yoke *d* in the direction of the arrow X, steam passing from the cylinder A′ past the correlative valve *b′* and the piston B′ into a flexible tube C′, thence by way of the pipe c^2 to the end of the cylinder E, from which the piston *e* is then moving. During this time the steam which has partially exhausted into the cylinder B is being forced out through the pipe e^3 and the check-valve e^5 to the exhaust-pipe e^6.

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

1. In a fluid-motor, a pair of cylinders set diagonally opposite and axially parallel to each other, valves controlling fluid admission thereto, pistons therein consisting of cylinders fitting same and open at their outer ends, valves adapted to close their inner ends, a stationary abutment opposite the outer end of each piston, a flexible fluid-conductor connecting the open outer end of each piston to the correlative abutment, a yoke joining said pistons in operative relation, a supplementary cylinder, a piston therein connected to said yoke, pipes each opening at one end through one of said abutments its other end being connected into the correlative end of said supplementary cylinder and valve-controlled exhaust-pipes connected to said supplementary cylinder at each end.

2. In a fluid-motor, a pair of cylinders set diagonally opposite and axially parallel to each other, valves controlling fluid admission thereto, pistons therein consisting of cylinders fitting same and open at their outer ends, valves adapted to close their inner ends, a stationary abutment opposite the outer end of each piston, a flexible fluid-conductor connecting the open outer end of each piston to the correlative abutment, a yoke joining said pistons in operative relation, a supplementary cylinder larger in internal diameter than the first-named cylinders, a piston therein connected to said yoke, pipes each opening at one end through one of said abutments, its other end being connected into the correlative end of said supplementary cylinder and valve-controlled exhaust-pipes connected to said supplementary cylinder at each end.

3. In a fluid-motor, a pair of cylinders set diagonally opposite and axially parallel to each other, valves controlling fluid admission thereto, pistons consisting of cylinders fitting said cylinders, and open at their outer ends, valves adapted to close their inner ends, said valves being each mounted on a stem movable longitudinally in guides in said pistons, rock-shafts mounted in said pistons each having an interior arm engaging the correlative stem and an exterior arm, and pins set in the line of motion of said exterior arm at each end limit of its movement, a stationary abutment opposite the outer end of each piston, a flexible fluid-conductor connecting the open outer end of each piston to the correlative abutment, a yoke joining said pistons in operative relation, a supplementary cylinder, a piston therein connected to said yoke, pipes each opening at one end through one of said abutments its other end being connected into the correlative end of said supplementary cylinder and valve-controlled exhaust-pipes connected to said supplementary cylinder at each end.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

GEORGE R. BOND.

Witnesses:
A. P. WOOD,
ALBERT A. WOOD.