No. 749,491. PATENTED JAN. 12, 1904.

J. D. LEE.

WATER MOTOR.

APPLICATION FILED MAR. 24, 1903.

NO MODEL.

Fig. 1.

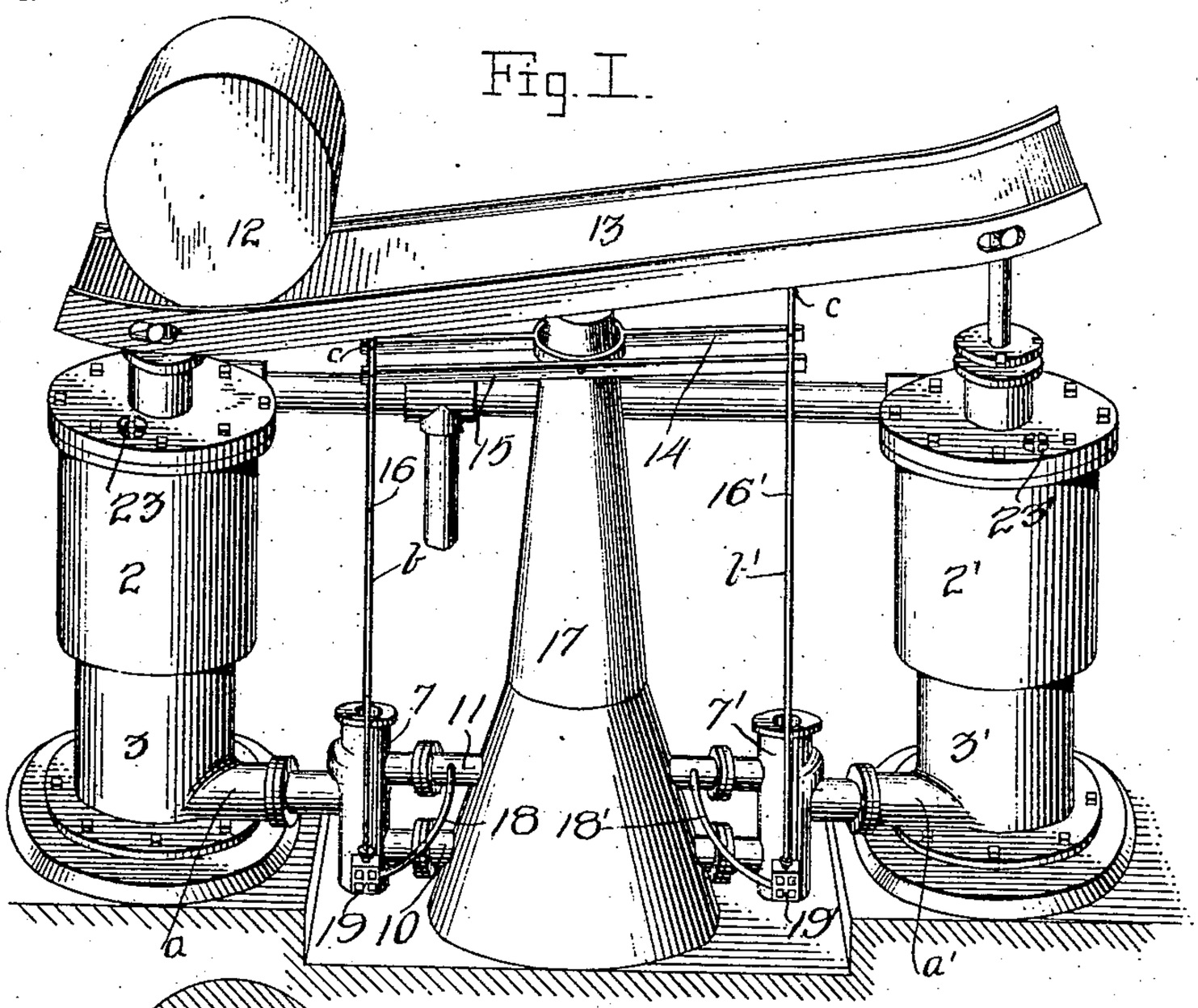
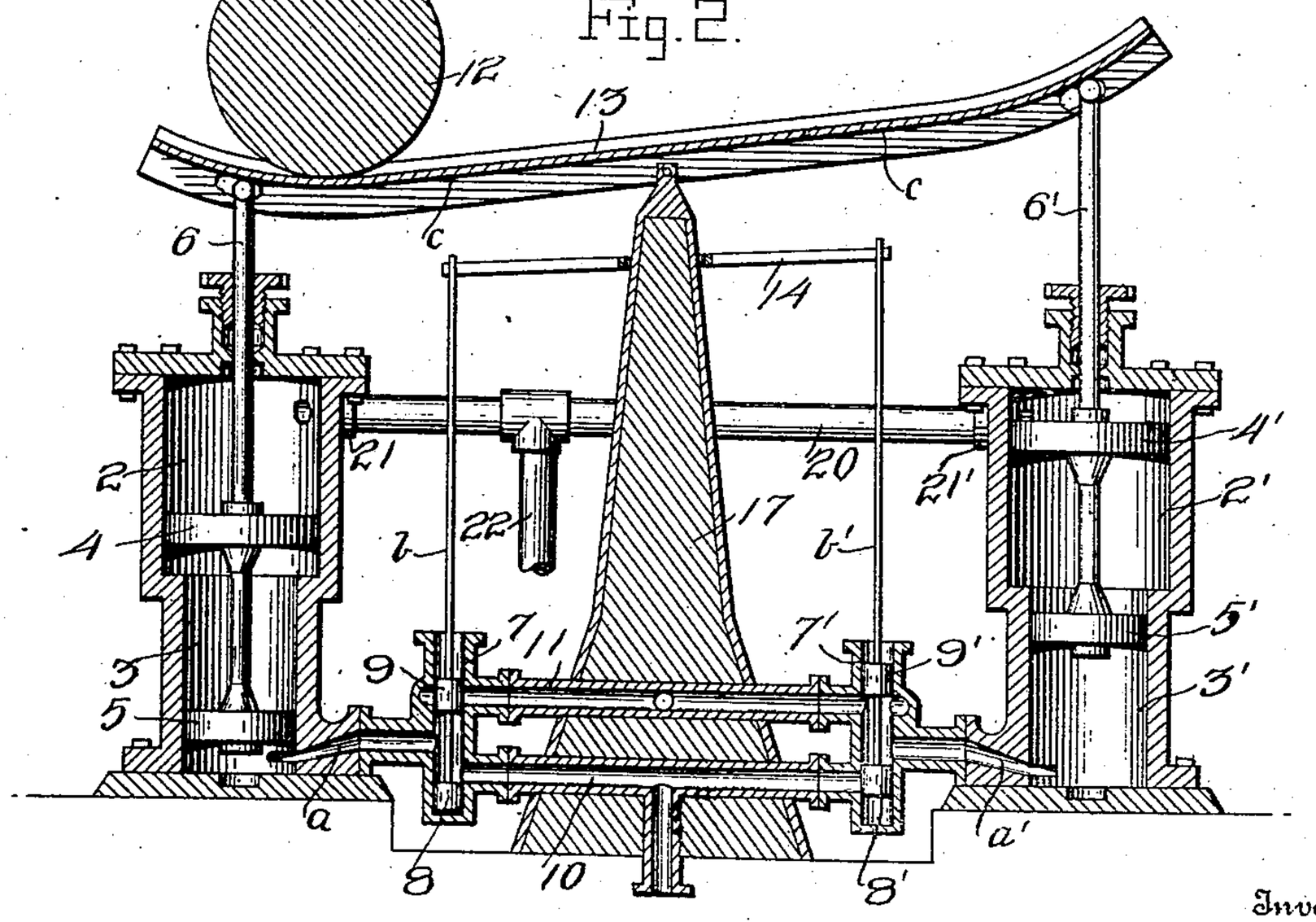


Fig. 2.



Witnesses
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No. 749,491. Patented January 12, 1904.

UNITED STATES PATENT OFFICE.

JOSEPH DANIEL LEE, OF SALEM, OREGON.

WATER-MOTOR.

SPECIFICATION forming part of Letters Patent No. 749,491, dated January 12, 1904.

Application filed March 24, 1903. Serial No. 149,386. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DANIEL LEE, a citizen of the United States, residing at Salem, in the county of Marion and State of Oregon, have invented certain new and useful Improvements in Water-Motors; 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.

My invention relates to improvements in water-motors, and more particularly that kind of motor for compressing air by direct action of the water.

To this end the invention consists in the construction, combination, and arrangement of devices substantially as described, and pointed out in the claims.

The accompanying drawings show my invention in the best form now known to me; but many changes in the details might be made without departing from the spirit of my invention, as set forth in the claims at the end of this specification.

The reference characters in both views indicate like parts in the drawings, in which—

Figure 1 is a perspective view of my invention, and Fig. 2 is a sectional view of the same.

2 2′ denote air-cylinders.

3 3′ denote water-cylinders.

4 4′ denote pistons in the air-cylinders, and 5 5′ denote pistons in the water-cylinders.

6 6′ denote piston-rods connecting the pistons of the water and air cylinders, passing upward through the heads of the air-cylinders and joined to the beam 13.

7 7′ are valve-chests communicating with the water-cylinders at *a a′* on the one side and with the water-pipes 10 and 11 on the other side. 8 8′ and 9 9′ are pistons operating in said valve-chests and are connected by the rods *b b′* and the beam 14, so that when forced up on one side the corresponding pistons will be forced down on the other side, and so on.

11 denotes a head-water pipe.

10 denotes a waste-water pipe.

12 is a rolling weight mounted upon the beam 13, which is mounted upon the standard 17 with a rocking joint and is attached to the piston-rods 6 6′ by a sliding joint.

18 18′ denote lateral pipes communicating with valve-chests 19 19′.

16 16′ denote rods connecting valves at 19 19′ with the beam 15.

20 denotes air-pipe connecting cylinders 2 2′. 21 21′ denote check-valves in said air-pipe.

22 denotes a lead pipe broken off.

23 23′ denote intake air-valves in the heads of the air-compressing cylinders.

The air-cylinders 2 2′, water-cylinders 3 3′, and the pistons which operate respectively between them and are connected together for simultaneous reverse operation constitute reversely-acting fluid-pressure-operated compressing mechanism.

The valves 8, 8′, 9, and 9′ are controllers which cause water under the pressure of its head to be alternately admitted to and exhausted from the cylinders 3 3′ under the pistons 5 5′. The valves 19 19′ are auxiliary valves and with their operating connections constitute means for operating the controllers.

The beam 13 and rolling weight 12 constitute a shiftable counterpoise element connecting the air-compressing mechanisms for synchronous reverse operation.

In the operation of my invention when the water is turned onto the pipe 11 it will flow into the water-cylinder 3′, as will be seen at Fig. 2, and will lift the pistons 4′ and 5′, forcing the air out of the cylinder 2′ into the pipe 20 through the check-valve 21′ and at the same time depressing the pistons 4 and 5, drawing into the cylinder 2 a fresh supply of air through the valve 23. At or about the end of the upward stroke of the rod 6′ the beam 13 will be brought into contact with the valve-rod 16 at *c*, moving it slightly downward, thereby opening the feed-water passage through the valve at 19 into the valve-chest 7 underneath the piston 8, causing it, with piston 9, to be forced upward and the pistons 8′ and 9′ to be moved downwardly into the position formerly occupied by 8 and 9, thereby reversing the flow of the head-water from cylinder 3′ to cylinder 3 and allowing the cylinder 3′ to be discharged

through the waste-pipe 10. It is obvious that at the beginning of the upward stroke of the piston-rods 6 6′ the pressure in the air-cylinders is normal and that it will be increased throughout the stroke until the maximum pressure has been reached. To overcome this difference, I have mounted upon the beam 13 the weight 12, which is adapted to roll by gravity to the lowest point of the beam and is always directly above the piston-rod when fully depressed, thereby exerting its full weight against the water-pressure at the beginning of the upward stroke and decreasing as the pressure increases until the piston has reached about the middle of its travel, when the weight crosses the center of the beam over the standard 17 and begins to act in a downward direction to assist the water in completing its action against the air-pressure.

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 this invention.

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

1. In apparatus of the class described, the combination of reversely-acting fluid-pressure-operated compressing mechanisms, motive-fluid valve-chests therefor, each having a channel leading thereto and inlet and exhaust channels spaced from and on opposite sides of said channel, simultaneously-acting valves in the said chests for controlling the inlet and exhaust channels, auxiliary valves to successively admit fluid under pressure to operate the said respective controlling-valves, a movable connection between the fluid-pressure-operated compressing mechanisms, means operated by said movable connection to resist the movement of each compressing mechanism, and progressively diminish the resistance as the pressure caused by said compressing mechanism increases, and means intermittently actuated by said movable connection to reversely actuate the auxiliary valves, substantially as described.

2. In apparatus of the class described, the combination of reversely-acting fluid-pressure-operated compressing mechanisms, motive-fluid valve-chests therefor, each having a channel leading thereto and inlet and exhaust channels spaced from and on opposite sides of said channel, simultaneously-acting valves in the said chests for controlling the inlet and exhaust channels, auxiliary valves to successively admit fluid under pressure to operate the said respective controlling-valves, an oscillating connection between the fluid-pressure-operated compressing mechanisms, a rolling weight operated by said oscillating connection to resist the movement of each compressing mechanism and progressively diminish the resistance as the pressure caused by said compressing mechanism increases, and means intermittently actuated by said movable connection to reversely actuate the auxiliary valves, substantially as described.

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

JOSEPH DANIEL LEE.

Witnesses:
EARL RACE,
LYMAN M. LEE.