No. 694,885. Patented Mar. 4, 1902.

D. O'CONNELL.

AIR COMPRESSOR.

(Application filed Sept. 13, 1901.)

(No Model.)

Fig. 1.

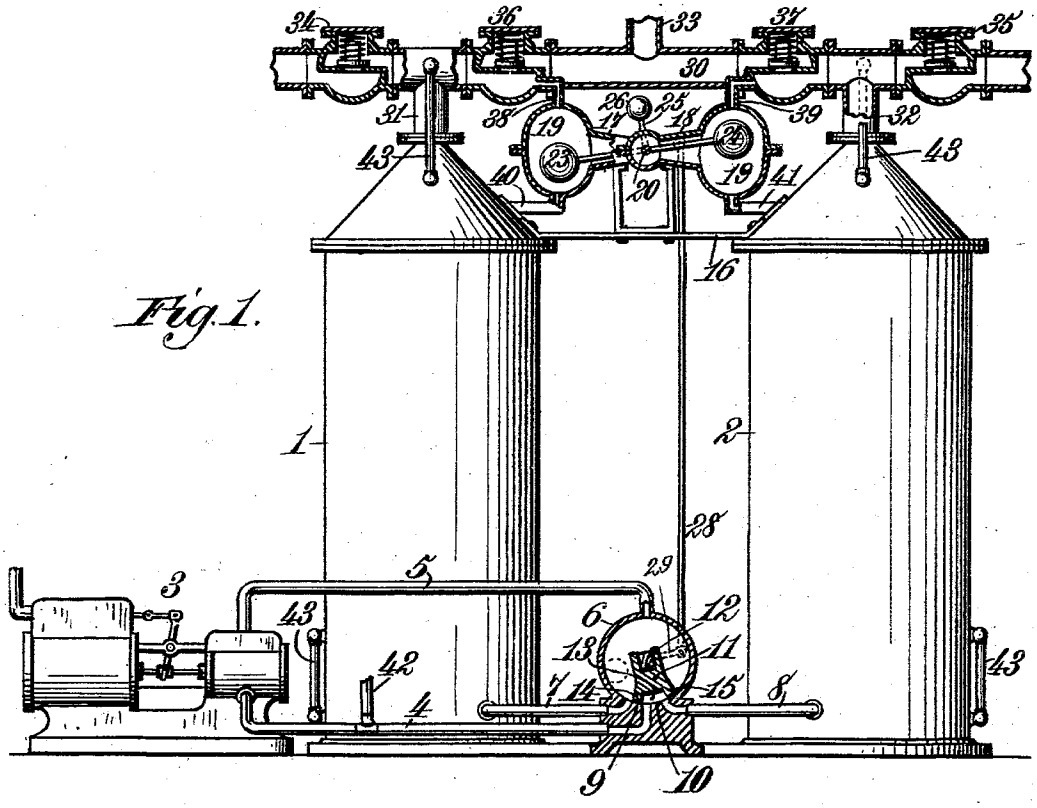


Fig. 2.

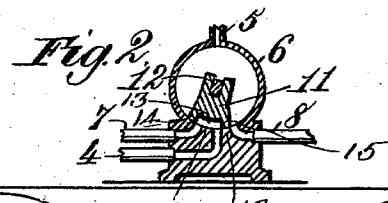
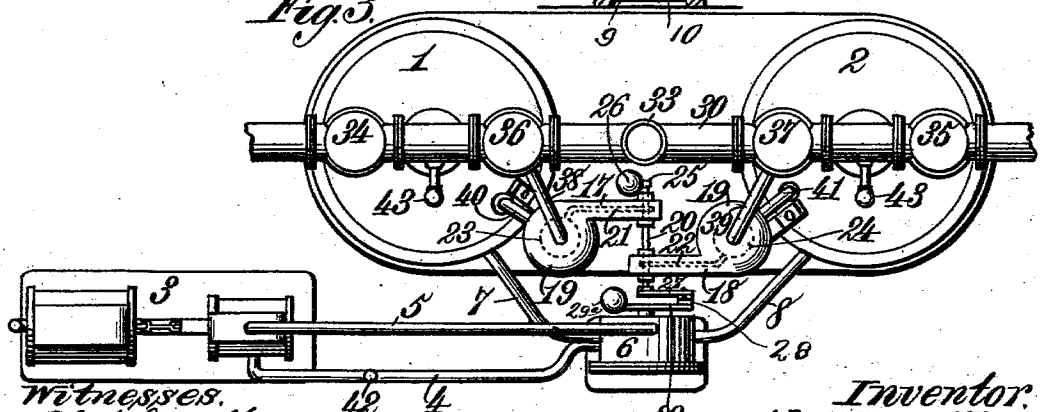


Fig. 3.



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UNITED STATES PATENT OFFICE.

DAVID O'CONNELL, OF BROOKLYN, NEW YORK.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 694,885, dated March 4, 1902.

Application filed September 13, 1901. Serial No. 75,334. (No model.)

To all whom it may concern:

Be it known that I, DAVID O'CONNELL, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Air-Compressors, of which the following is a specification.

My invention relates to air-compressors of the type in which a body of water under pressure is caused to enter a tank, and thereby displace the air therein and force it into a suitable pressure-receiver, and has for its broad object to provide an apparatus which will in a given time compress a larger volume of air with less friction than can be done with devices of this character as now commonly used.

The specific objects of the invention are to provide a novel construction and arrangement of parts whereby a volume of water is alternately drawn from one and forced into the other of two connected tanks, to provide novel valve mechanism operated automatically by the water to shift the connections between the tanks and the suction and discharge pipes of a steam or other pump, and, generally, to provide novel details of construction hereinafter to be indicated, whereby the stated objects of the invention are more readily attained.

With these ends in view the invention resides in the parts and combinations of parts hereinafter described, and particularly pointed out in the claims.

In order that my invention may be more clearly understood, I have illustrated the same in the accompanying drawings, wherein—

Figure 1 is a view, partially in elevation and partially in section, of my improved apparatus, the tanks being shown in elevation and the other parts, excepting the pump, being shown in section. Fig. 2 is a broken sectional elevation showing the position of the valve reversed from that shown in Fig. 1, and Fig. 3 is a plan view of the apparatus.

Referring to these drawings, the numerals 1 and 2 indicate, respectively, two tanks which are operatively connected through the medium of valve mechanism, hereinafter to be described.

The numeral 3 indicates a steam or other pump shown conventionally, from the pump-cylinder of which leads a suction-pipe 4 and a discharge-pipe 5. These pipes, as shown, communicate with a valve-casing 6 and at opposite sides of said casing, although the precise point of connection of said pipes with said casing is not important. Leading from the tank 1 is a pipe 7, which communicates with the valve-casing 6 at a point to one side of that at which the pipe 4 communicates with said casing. Leading from the tank 2 is a similar pipe 8, which communicates with the valve-casing 6 at a point to one side of that at which the pipe 4 communicates with said casing and on the opposite side of the pipe 4 from that at which the pipe 7 communicates with said casing. By this means a portion 9 of the casing forming a valve-seat, as hereinafter described, is left between the opening of the pipe 7 and of the pipe 9, and a similar portion 10 of the casing, providing also a valve-seat, is left between the opening of the pipe 4 and the pipe 8.

The numeral 11 indicates a valve which is mounted at its upper end centrally of the casing 6, as indicated at 12, and is adapted to be rocked back and forth within the casing 6 on the point or pivot 12 as a center. The under side of said valve is provided with a recess 13, on opposite sides of which are valve-sections 14 15. The recess 13 is of a size to cover the openings of the pipes 4 and 8 or of the pipes 4 and 7. In the position shown in Fig. 1 of the drawings the valve is shown with its section or leg 14 resting upon the valve-seat or portion 9 of the casing, the recess 13 covering the openings of the pipes 4 and 8, and thereby establishing communication from the tank 2 through the pipe 8 and recess 13 to the suction-pipe 4. In this position the opening of the pipe 7 is uncovered, so that said pipe affords communication from the tank 1 through the valve-casing 6 to the discharge-pipe 5. In this position of the parts as the pump operates water will be drawn from the tank 2 through the pipe 8, recess 13, pipe 4 and be discharged through the pipe 5, valve-casing 6, pipe 7 into the tank 1. In the position of the parts shown in Fig. 2, wherein the position of the valve 11 has been changed through the medium of the mechanism hereinafter to be described,

recess 13 will cover the openings of the pipes 4 and 7, and the opening of the pipe 8 will be uncovered. In this position as the pump operates water will be drawn from the tank 1 through the pipe 7, recess 13, and pipe 4 and will be discharged through the pipe 5, casing 6, and pipe 8 into the tank 2.

Connecting the tanks 1 and 2 at their upper ends is a plate or beam 16, upon which are mounted in any suitable manner two casings, (indicated, respectively, by the numerals 17 and 18.) Each of these casings has an enlarged outer end 19 to allow for the movement of a float, as hereinafter described. The inner ends of these casings extend inward in parallel lines each beyond the other, and extending through these portions of the two casings and mounted in suitable stuffing-boxes therein is a rod 20. Fixed to this rod are arms 21 22, located, respectively, in the two casings 17 18 and each of which has at its outer end a float, said floats being respectively indicated by the numerals 23 and 24. Extending upward from the rod 20 at a point between the two casings 17 and 18 is an arm 25, having on its outer end a weight 26. An arm 27 also extends outward at right angles to the rod 20 and at its outer end is pivotally attached to a connecting-rod 28, the lower end of which is pivotally connected to one end of lever 29, which is fixed intermediate its ends to the stem of the valve 11, a weight 29^a being fixed on the opposite end of said lever and operating to counterbalance the weight of the rod 28.

The numeral 30 indicates a longitudinally-disposed pipe located at the tops of the tanks 1 and 2 and communicating with said tanks near opposite ends, as indicated at 31 32, respectively. Said pipe 30 also has a connection 33 leading to a suitable pressure-tank. (Not shown.) At opposite ends of the pipe 30 are located two clack-valves 34 35, which are arranged to permit air to enter from the atmosphere into the respective tanks 1 2. Located between these two valves are two clack-valves 36 37, which are arranged to permit the air as it is compressed in the tanks 1 2 to pass to the pressure-tank and to prevent back-passage of said air. Valves 34 35 will also prevent the air pressed in the tanks 1 and 2 from passing to the atmosphere, as will be understood. The casing 17 communicates with the casing of the valve 36 by means of a short pipe-section 38, and the casing 18 communicates with the casing of the valve 37 by means of a short pipe-section 39. Said casings also communicate, respectively, with the tanks 1 and 2 by means of short pipe-sections 40 41, which enter said tanks near the top thereof. A pipe 42 may be connected with the suction-pipe 4 for supplying water to the apparatus. On each tank 1 and 2 I also provide gage-glasses 43 for ascertaining the water-level therein.

The operation is as follows: The parts being in the position shown in Fig. 1, water will be drawn from the tank 2 and forced into the tank 1. As the water rises in said tank the air will be displaced and forced outward through the opening 31 and through the valve 36 into the pipe 30, and thence through the connection 33, communicating with said pipe, to the pressure-receiver. While this is occuring air will be drawn in through the valve 35 into the tank 2 to replace the water drawn therefrom. This operation continues until the water rises above the level of the pipe 40, when it will enter through said pipe the casing 17 and raise the float 23, the pipes 40 and 38 serving to equalize the pressure in said casing, as will be understood. As the float 23 rises the weight 26 will be moved toward and then beyond a vertical position, when it will overbalance and carry the weight 23 suddenly upward and the weight 24 suddenly downward, also pressing downward the connecting-rod 28, and thereby turning the valve 11 to the position shown in Fig. 2. Immediately this occurs the water will be drawn out of tank 1 and forced into tank 2, as previously explained, and as the water continues to rise in tank 2 the air in said tank will be forced through the opening 32 and through valve 37 to the pressure-receiver, while as the water lowers in tank 1 air will enter through the valve 34 and replace the water drawn from said tank.

It will be understood, of course, that the action of the pump is continuous, and by reason of the position of the weight 26 the throw of the floats 23 24, operating the valve 11, is made very rapid, and hence the operation of compressing the air is practically continuous. It will be seen that I dispense with the use of pistons in the apparatus, and thereby do away with the friction incident to the use of pistons and also with the necessity of lubricating said pistons. Also it will be observed that the same volume of water may be used over and over again, so that there will be very little waste of water, that my device is simple in operation, and that there is no complicated mechanism to get out of order, and that my device also possesses great advantages by reason of economy in operation, all of which will be apparent to those skilled in the art to which my invention relates.

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

1. In an air-compressor, the combination with two tanks each having a valve connection with a pressure-receiver and the outer air, respectively, one of said tanks containing water, a pump operatively connected with said tanks, a valve controlling the connections between the pump and said tanks and adapted to be turned to cause the water to be withdrawn by said pump from each of the tanks, in turn, and forced into the other, chambers communicating respectively with the upper end of each tank, a float in each chamber, a rock-shaft on which both of said floats are

mounted and means actuating said rock-shaft for alternately shifting the said valve as the water rises in each of said tanks successively, substantially as described.

2. In an air-compressor, the combination with two tanks each having a valve connection with a pressure-receiver and the outer air, respectively, and one of said tanks containing water, of a pump operatively connected with said tanks, a valve controlling the connections between the pump and said tanks, and adapted to be turned to cause the water to be withdrawn by said pump from each of the tanks, in turn and forced into the other, chambers communicating respectively with the upper end of each tank, a float in each chamber, a rock-shaft on which both of said floats are mounted, a weighted arm fixed on said rock-shaft and arranged when shifted by one of said floats beyond a vertical position to rock said rock-shaft, and means actuated by said rock-shaft for alternately shifting the said valve as the water rises in each of said tanks, successively, substantially as described.

3. In an air-compressor, in combination with two tanks having each an outlet and valved communication with the outer air, and one of said tanks containing water, a pump operatively connected with said tanks, a valve controlling the communications between the pump and said tanks and adapted to be turned to cause the water to be withdrawn by the pump from each of said tanks, in turn, and forced into the other, chambers communicating, respectively, with the upper end of each tank, a float in each of said chambers having an arm connected to a common shaft, means operatively connecting said shaft and valve, and an arm extending vertically upward from said shaft and having at its outer end a weight, the combination operating as described.

4. In an air-pump, the combination with two tanks each having a valve communication with a pressure-receiver and the outer air, respectively, and one of said tanks containing water, of a pump operatively connected with said tanks, a valve controlling the communications between the pump and said tanks and adapted by turning to cause the water to be withdrawn by said pump from each of the tanks, in turn, and forced into the other, chambers communicating respectively with the upper end of each tank and with the air-outlet from the latter, a float in each chamber, a rock-shaft on which both of said floats are mounted, and means actuated by said rock-shaft for alternately shifting the said valve as the water rises in each of said tanks successively, substantially as described.

5. In an air-compressor, the combination with two tanks each having a valve communication with a pressure-receiver and the outer air, respectively, and one of said tanks containing water, of a pump operatively connected with said tanks, a valve controlling the communications between the pump and said tanks, and adapted to be turned to cause the water to be withdrawn by the pump from each of said tanks, in turn, and forced into the other, chambers communicating, respectively, with the upper end of each tank, a float in each of said chambers having an arm connected to a common shaft, means operatively connecting such shaft and valve, an arm extending vertically upward from said shaft, and having at its outer end a weight, and a weighted arm fixed to the stem of the said valve, substantially as described.

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

DAVID O'CONNELL.

Witnesses:
JOHN O'NEILL,
JOHN HALPIN.