No. 731,136. PATENTED JUNE 16, 1903.

R. G. SPEER.

AIR PUMP FOR CARBURETERS.

APPLICATION FILED DEC. 8, 1902.

NO MODEL.

Fig. 1.

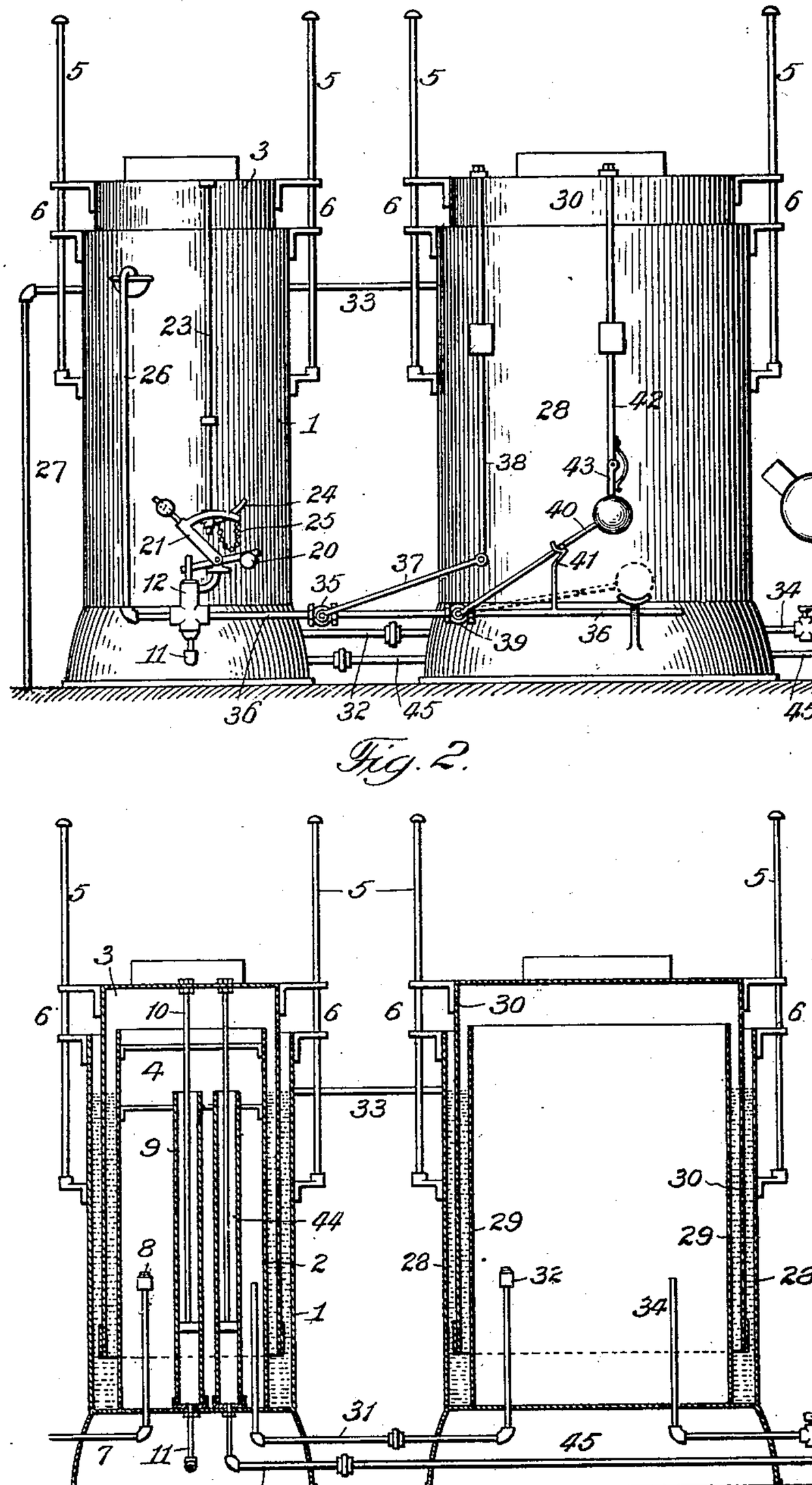


Fig. 2.

Fig. 3.

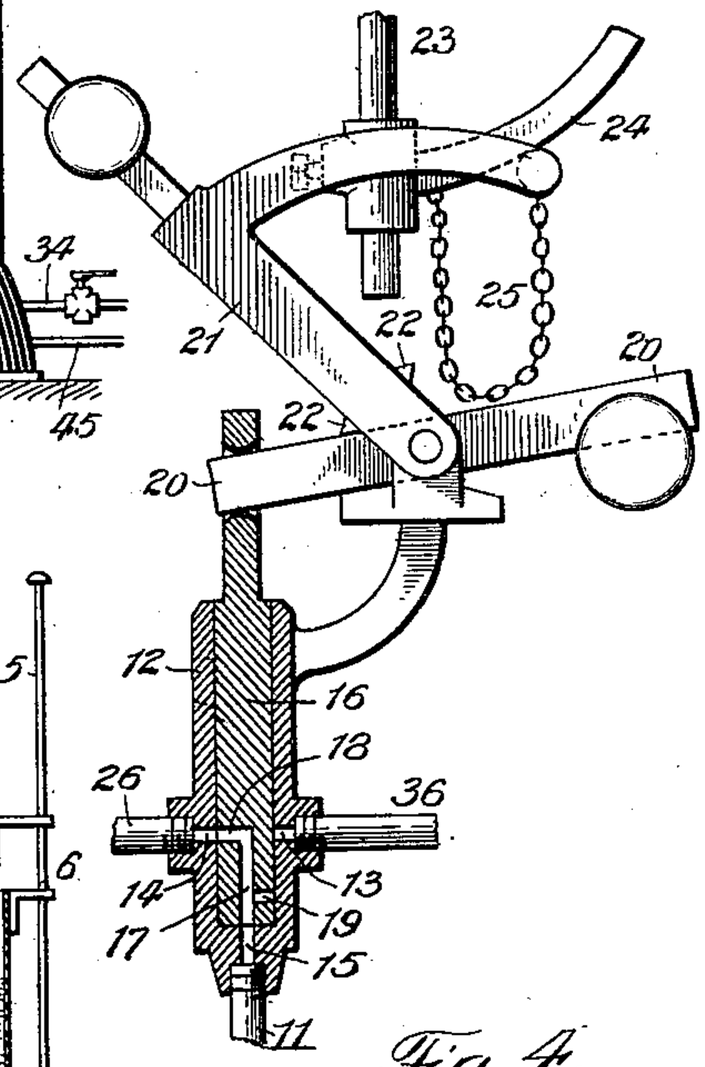
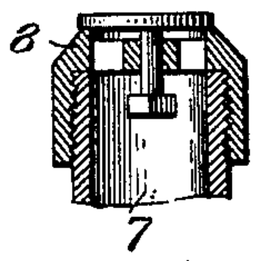


Fig. 4.



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UNITED STATES PATENT OFFICE.

ROBERT G. SPEER, OF ST. LOUIS, MISSOURI.

AIR-PUMP FOR CARBURETERS.

SPECIFICATION forming part of Letters Patent No. 731,136, dated June 16, 1903.

Application filed December 8, 1902. Serial No. 134,252. (No model.)

To all whom it may concern:

Be it known that I, ROBERT G. SPEER, a citizen of the United States of America, and a resident of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Air-Pumps for Carbureters, of which the following is a specification.

The present invention relates to automatic pumps for supplying air at a moderate pressure to carbureters, and has for its object to provide a simple and efficient air-pumping apparatus operated by water-pressure from a city water-main or other like source of water-pressure supply and in which the operation is controlled and regulated in an automatic manner by the amount of compressed air contained in the storage-tank or aerometer, all as will hereinafter more fully appear and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of the present invention, Figure 1 is a side elevation of an air pump or compressor embodying the present improvements. Fig. 2 is a vertical sectional elevation of the same. Fig. 3 is a detail elevation of the automatic trip mechanism by which the reversing-valve of the water or motor engine of the pump is operated, the reversing-valve being shown in vertical section. Fig. 4 is a detail section of the check-valve of the air inlet and outlet pipes of the present air compressor or pump.

Similar numerals of reference indicate like parts in the several views.

Referring to the drawings, 1 represents a stationary open-topped tank or casing provided with an annular inner wall 2 to form an annular chamber or water seal for the movable piston hereinafter described.

3 is an inverted-bell piston, the annular depending skirt of which dips into the annular chamber or water seal aforesaid.

The described arrangement of the stationary tank 1 and the reciprocating piston 3 is quite common to the present type of air-pumps and provides a closed central air-compression chamber 4, the capacity of which is alternately increased and diminished by the alternate up-and-down strokes of the piston 3 to alternately draw in air from the outer atmosphere and to compress and force said air into the aerometer or storage-chamber.

5 and 6 are vertical guide rods and ears on the parts 1 and 3, by which vertical movement is imposed upon the piston 3 in the operation of the present apparatus.

7 is the air-inlet pipe to the central compression-chamber aforesaid, and such pipe will be provided with the usual inlet check-valve 8.

9 is a single-acting reciprocating water-engine, arranged within the air-compression chamber aforesaid, with its piston-rod 10 connected to the inverted bell piston 3 and adapted to impose reciprocating motion upon the same.

11 is the inlet-outlet pipe of the water-engine 9, connected at one end to the under side of the cylinder of said engine, at the other end to the casing of the reversing-valve of said engine.

12 is the casing of the reversing-valve of the water-engine, provided with a main central bore for the movement of a piston-valve hereinafter described, and provided with ports and passages as follows:

13 is a lateral passage, to which the pipe supplying water or other motive fluid under pressure is connected.

14 is a lateral passage at the opposite side of the valve-casing, to which the outlet or waste pipe is connected.

15 is a longitudinal passage, to which the inlet-outlet pipe 11 of the water-engine is connected.

16 is the piston-valve, adapted to have movement in the valve-casing 12 and provided with a central longitudinal port or passage 17 and with a pair of opposed radial ports 18 and 19, arranged at different planes, as shown. The arrangement is such that with the valve in its upper position the port 19 will register with the supply-passage 13, and motive fluid will pass to the water-engine through the same and through the ports or passages 17 and 15, while with the valve in its lower position the port 18 will register with the passage 14, and the motive fluid will exhaust from the water-engine through such ports or passages in connection with the ports or passages 15 and 18, as illustrated in Fig. 3.

20 is a trip-lever pivoted in a fixed bracket. One end of such lever is in operative engagement with the stem of the piston-valve 16,

while the other end is weighted to counterbalance the weight of said valve.

21 is a weighted overbalance-arm pivoted at its lower end on the bracket aforesaid in common with the trip-lever 20 and provided with counterpart lateral lugs 22 at opposite sides of its vertical member that are so positioned as to permit of a limited independent movement of such weighted overbalance-arm 21 with relation to the trip-lever 20. Such amount of independent movement will be in excess of that required to move the arm 21 from the position shown in Fig. 3 to a position past a vertical line, so that the said arm will fall by gravity into an opposite position, and the construction is such that as it nears the end of such fall one of its lugs 22 will engage the trip-lever 20 to cause a single reversal of the reversing-valve of the water-engine. A corresponding operation of parts will take place in the opposite direction in the next succeeding operation of the present automatic valve-operating mechanism.

23 is a vertical rod secured at its upper end to the bell-piston 3, and such rod is suitably guided on the exterior of the tank 1, so as to be confined to vertical movement.

24 is a projecting horn near the lower end of the rod 23, that in the final downward movement of the piston 3 is adapted to engage a laterally-projecting extension on overbalance-arm 21 and impart thereto the initial movement heretofore described, after which said arm will descend by gravity to operate the reversing-valve of the water-engine, as heretofore described.

25 is a slack connection or chain connecting the lower end of the rod 23 with overbalance-arm 21 and adapted in the final upward movement of the piston 3 to lift the overbalance-arm 21 upward and past a vertical line, so that it will drop by gravity in an opposite direction to that just described and in its descent again reverse the position of the reversing-valve of the water-engine to cause a fresh reciprocation of the same. At other times the chain hangs loose to permit of the first-mentioned operation taking place without hindrance.

26 is a pipe extending vertically up from the outlet or waste passage 14 of the valve-casing 12 and adapted to discharge the exhaust from the water-engine 9 into the annular chamber or water seal of the main tank 1 to preserve a predetermined height of water in the same.

27 is a drain-pipe connected to the upper end of the annular chamber or water seal aforesaid and adapted to carry away the excess of water discharged into the same by the pipe 26.

28 is a stationary open-topped tank provided with an annular inner wall 29 to form an annular chamber or water seal for the movable bell-receiver hereinafter described.

30 is an inverted bell-receiver, the annular depending skirt of which dips into the annular chamber or water seal aforesaid, the respective members 28 and 30 constituting an ordinary type of aerometers or storage-chambers.

31 is a pipe connection between the air-compression chamber of the tank and piston 1 and 3, heretofore described, and the interior of the storage-chamber just described. 32 is a check-valve on said pipe for preventing a retrograde movement of the air through such pipe.

33 is an equalizing-pipe connecting the upper ends of the annular chambers or water seals of the respective tanks 1 and 28 together, so that a uniform level of water will prevail in both.

34 is an outlet-pipe from the storage-chamber just described, and such pipe is adapted to convey air to a suitable carbureter or for any other use to which the present invention may be applied.

35 is a cut-off valve in the supply-pipe 36, by which water or other motive fluid is supplied under pressure to the reversing-valve 12 and water-engine 9. 37 is an operating-lever for such valve, which is connected by a link connection 38 with the bell-receiver 30, as shown. The arrangement is such that with the said bell-receiver reaching a predetermined elevation motive fluid will be cut off from the water-supply engine 9, so as to cause a stoppage of the same and a further compression of air until by a withdrawal of air from the storage-tank, of which such bell-receiver constitutes a part, the said bell is allowed to descend from such point of predetermined elevation, when the valve 35 will be again opened to permit the air-compression mechanism to begin operations. 39 is a second cut-off valve arranged in said water-supply pipe 36 and which is provided with a weighted operating-arm 40, which is normally held in an elevated position and with the valve 39 open by engagement with a spring catch or support 41.

42 is a push-rod carried by the bell-receiver 30 and provided with a pivoted spring-toe 43, moving in vertical alinement with the weighted end of the operating-arm 40 and adapted in a downward movement of said push-rod to push such operating-arm from the supporting engagement of the spring catch or support 41 to enable such weighted arm to fall by gravity and effect a closing movement of the cut-off valve 39 and prevent any further operation of the water-engine 9. The arrangement of such parts is such that with a rapid evacuation of the air from the storage-tank due to a break in the outlet ramifications thereof the descent of the bell-receiver to its lowermost position will effect the described release of the weighted valve-operating arm 40 to automatically stop the further pumping of air into the storage-chamber.

44 is a single-acting reciprocating pump arranged within the air-compression chamber before described and in parallel relation with

the single-acting reciprocating water-engine 9. The piston-rod of such pump is connected to the inverted-bell piston 3 of the air-compressor to move in unison with the water-engine 9 and cause a circulation of gasolene when the present invention is applied to an automatic gas apparatus, such as is described in my companion application for Letters Patent.

45 is the inlet-outlet pipe of the pump 44.

With the present improved construction the water-engine 9 and the gasolene-pump are arranged within the compression-chamber of the air-compressor, so that any leakage from either engine or pump collects automatically in the bottom portion of main casing 1 of the air-compressor, to be removed as required by a suitable drain-pipe.

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

1. In an air-pump for carbureters of the type herein described, the combination of an open-topped casing provided with an annular water seal, an inverted-bell piston fitting the same and forming a central compression-chamber, a single-acting water-engine having its piston connected to said bell-piston, a reversing-valve for said engine, and means operatively connected with said bell-piston for automatically operating said reversing-valve, the same comprising a trip-lever operatively connected to the stem of said reversing-valve, an overbalance-arm engaging said trip-lever and adapted to have limited independent movement with relation to said trip-lever, and a vertically-moving rod carried by the bell-piston and provided with an operating-horn and a slack connection adapted to alternately operate the overbalance-arm in opposite directions.

2. In an air-pump for carbureters of the type herein described, the combination of an open-top casing provided with an annular water seal, an inverted-bell piston fitting the same and an aerometer connected to said pump and provided with a water seal and an inverted-bell receiver, a water-engine adapted to operate the bell-piston of the pump, a reversing-valve for said engine, means operatively connected to the bell-piston of the pump for automatically operating said reversing-valve, a water-supply pipe connected to said reversing-valve, a cut-off valve arranged in said supply-pipe, a weighted arm on said valve, a spring-catch engaging said arm and adapted to hold the same in a raised position with the valve open, and means on the aerometer to effect a disengagement of said arm and a closing of the valve when the bell-receiver of said aerometer descends below a normal point, substantially as set forth.

Signed at Chicago, Illinois, this 29th day of November, 1902.

ROBERT G. SPEER.

Witnesses:
ROBERT BURNS,
HENRY A. NOTT.