J. ROGERS.

AUTOMATIC AIR COMPRESSOR.

APPLICATION FILED OCT. 13, 1908.

955,437.

Patented Apr. 19, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

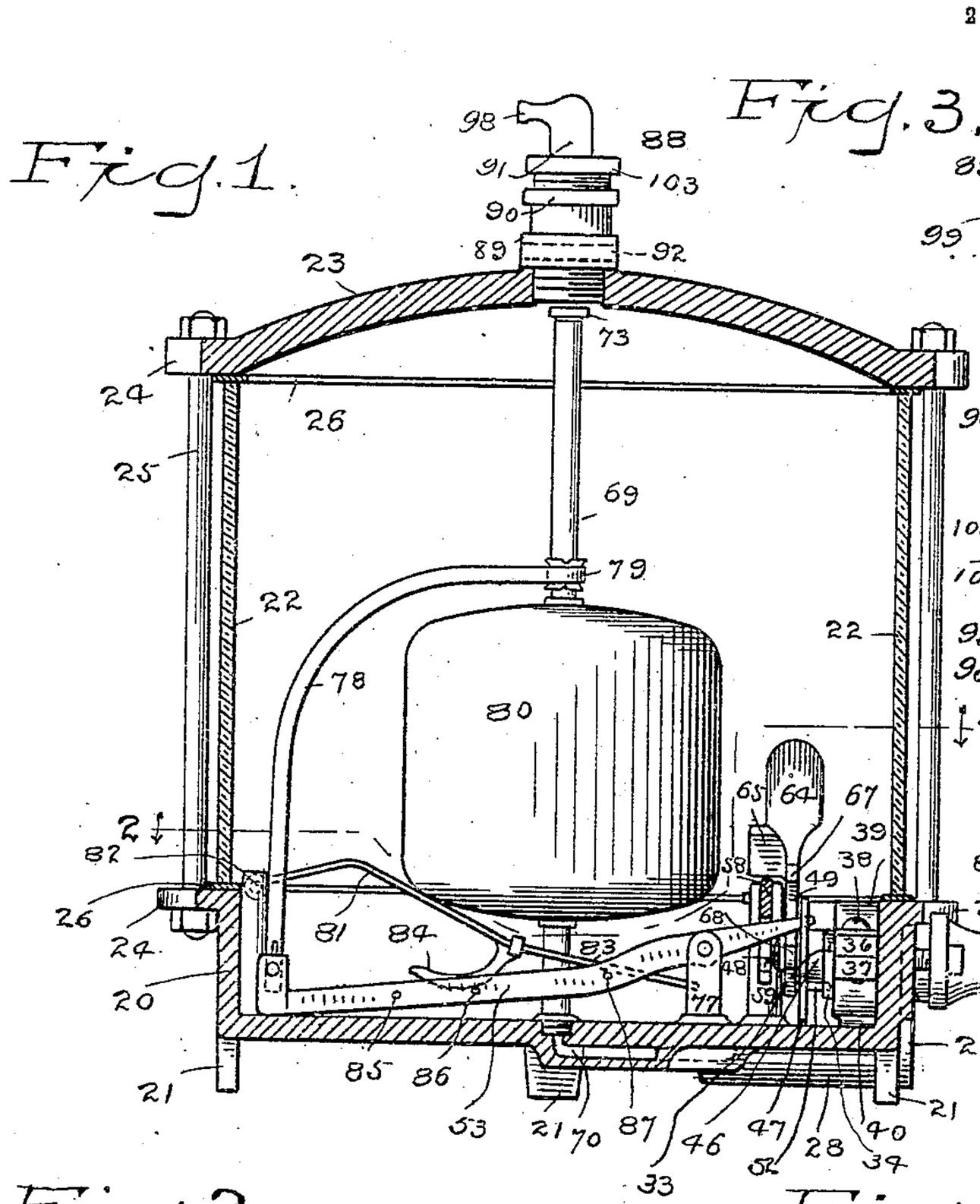


Fig. 3.

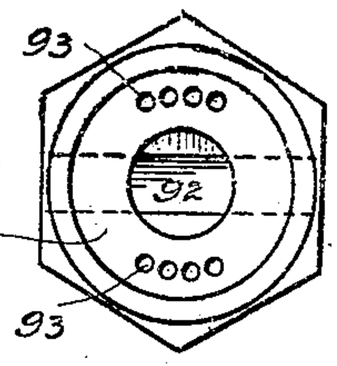


Fig. 4.

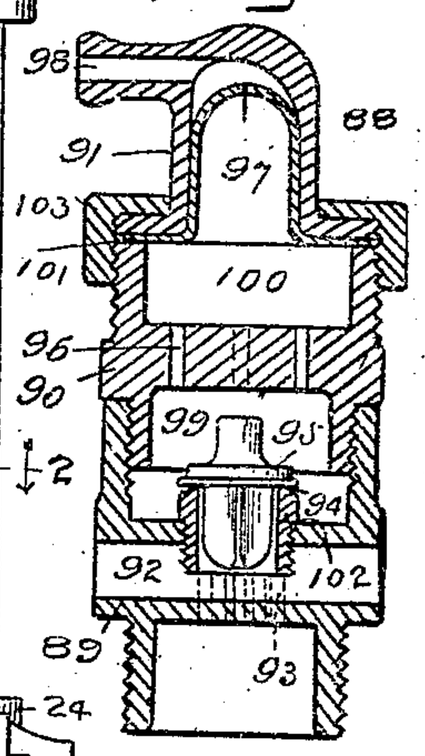


Fig. 2.

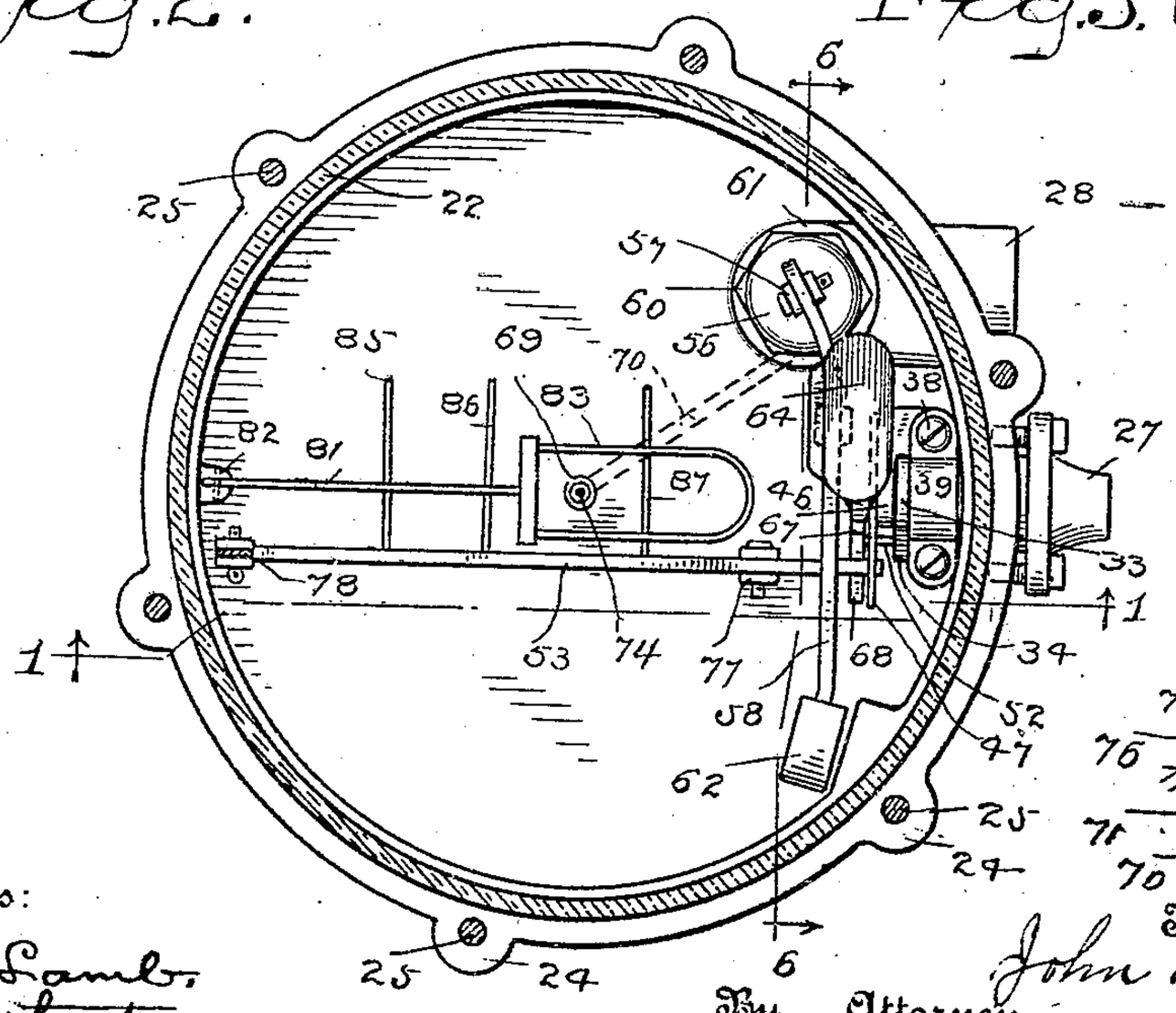
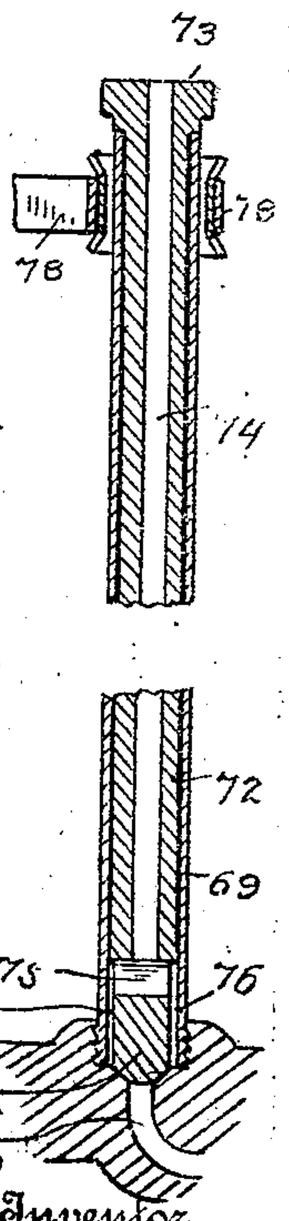


Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 6.

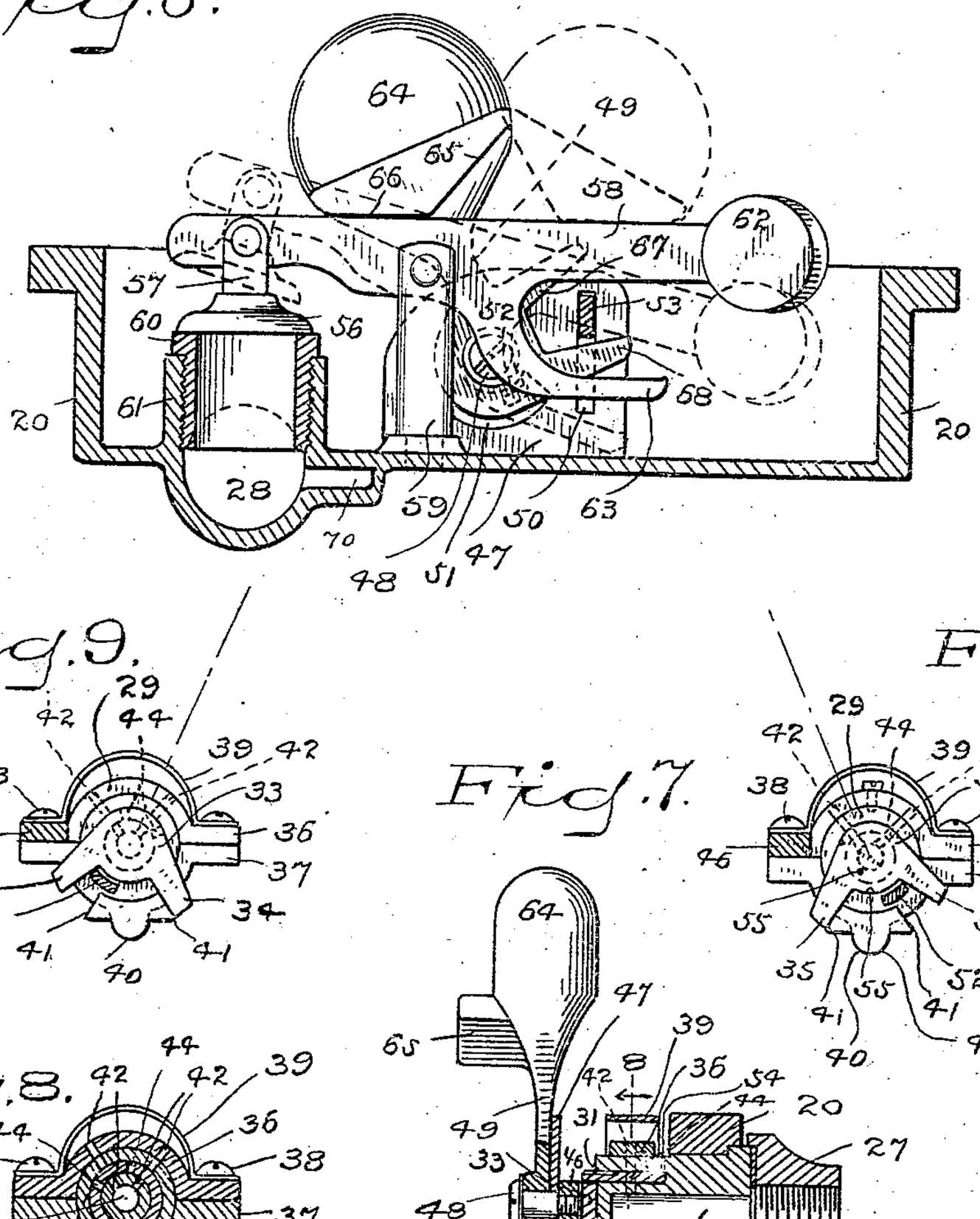


Fig. 9.

Fig. 8.

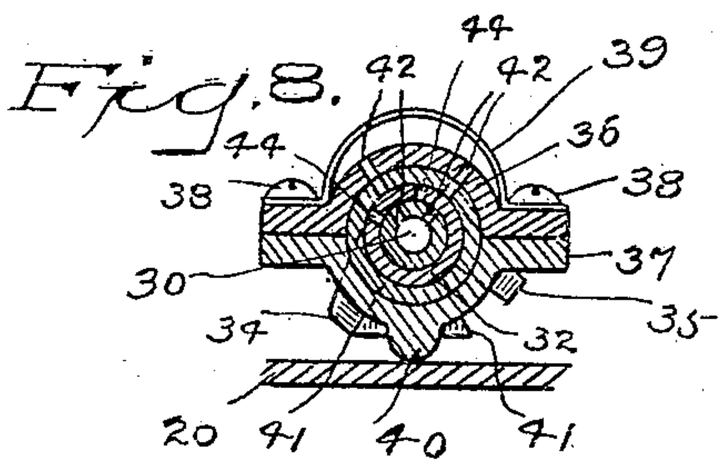
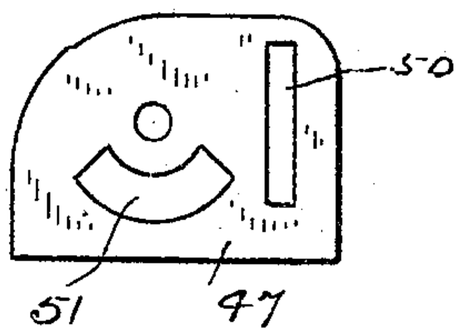


Fig. 7.

Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC AIR-COMPRESSOR.

955,437. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed October 13, 1908. Serial No. 457,476.

To all whom it may concern:

Be it known that I, JOHN ROGERS, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented a new and useful Automatic Air-Compressor, of which the following is a specification.

This invention relates to the class of automatic air compressors illustrated and described in Letters Patent Number 835,291, granted to me November 6, 1906, and has for its object to simplify, cheapen and to generally improve the construction and operation of the machine and especially to provide means for mechanically opening and closing the eduction valve.

With these and other objects in view I have made the changes and improvements in the details of construction which I will now describe, referring to the accompanying drawings forming a part of this specification and using reference characters to indicate the several parts.

Figure 1 is a vertical section of my novel air compressor on the line 1—1 in Fig. 2, looking in the direction of the arrows, a portion of the base at the center being broken out to show the air passage, and certain of the parts being in elevation, showing the position after the emptying of the cylinder, the eduction valve being closed and the induction valve open; Fig. 2 a horizontal section on the line 2—2 in Fig. 1, looking in the direction of the arrows, the operating mechanism appearing in plan; Fig. 3 an inverted plan view on an enlarged scale of the head at the top of the cylinder with the valve seat and valve removed; Fig. 4 a longitudinal section of the entire head; Fig. 5 a detail sectional view on an enlarged scale of the central tube, valve and valve stem; Fig. 6 a section of the base on an enlarged scale on the line 6—6 in Fig. 2, looking in the direction of the arrows, the operative parts being in elevation, the full line position showing the eduction valve closed and the induction valve open and the reverse position of the parts being indicated by dotted lines; Fig. 7 a central section of the induction valve in the open position, corresponding with Figs. 1, 2, 6 and 10; Fig. 8 a section of the induction valve on the line 8—8 in Fig. 7, looking in the direction of the arrows, the valve being in the closed position; Fig. 9 an elevation of the induction valve in the closed position; Fig. 10 an elevation of the induction valve in the open position; and Fig. 11 is an elevation of the guide plate detached.

The reservoir of my novel air compressor comprises a base 20 provided with legs 21 upon which it rests, a cylinder 22 which may be of glass and a top 23. The base and top are provided with ears 24 through which rods 25 pass by which the parts are held together, packing rings 26 being interposed between the ends of the cylinder and the base and the top.

27 denotes a connection for an induction pipe (not shown) and 28 a connection for an eduction pipe (not shown).

29 denotes a plug which engages a hole in a thickened portion of the side of the base with a drive fit and extends within the reservoir. A passage 30 in alinement with connection 27 and closed at its inner end leads into said plug from its outer end. Concentric with said passage but in the inner end of the plug is a circular recess 31 which receives induction valve 32. This valve is cylindrical and fits the recess closely but is free to oscillate therein and is provided with a head 33 having arms 34 and 35.

36 and 37 denote respectively upper and lower cap pieces which inclose the inner end of the plug and are secured together by screws 38 which also retain a guard 39 which may or may not be placed over the upper cap piece at a slight distance therefrom and for a purpose that will presently be explained. The lower cap piece is shown as provided with a lug 40 which rests upon the base and with stop shoulders 41 which are adapted to be engaged by arms 34 and 35 to limit the oscillation of the valve in opening and closing. The plug and the upper cap piece are provided with radial openings 42 leading from passage 30 and the induction valve is provided with radial openings 44 which are adapted to register with the openings in the plug and cap piece. Upper cap piece 36 is provided with an arm 46 which extends in front of the head of the induction valve and retains said valve in place.

47 denotes a guide plate which rests upon the base and is secured to arm 46 by means of a shouldered screw 48 on which the induction valve lever 49 is pivoted. The guide plate is provided with a vertical slot 50

through which the operating lever, indicated by 53, passes, as will be more fully explained, and with a curved slot 51 through which an arm 52, which extends inward from lever 49 and engages arms 34 and 35, passes.

54 denotes drainage openings in the plug and 55 drainage openings in the induction valve. The function of these openings is to drain the valve perfectly and render it impossible for the valve to become set in use.

56 denotes the eduction valve whose shank 57 is pivoted to the eduction valve lever 58, which in turn is pivoted to a standard 59 extending upward from the base.

60 denotes a thimble the upper end of which serves as a seat for the eduction valve and which is threaded to engage a hub 61 on the bottom of the base which opens into eduction connection 28.

The eduction valve lever is provided on its under side with an arm 63, the purpose of which will presently be explained, and is shown as provided with a counter-weight 62.

Induction valve lever 49 is provided with a weight 64, having a projection formed with faces 65 and 66 which are at an obtuse angle to each other and are adapted to alternately engage and bear on the top of eduction valve lever 58, as will be more fully explained, and with arms 67 and 68 which are engaged by operating lever 53.

Owing to the fact that the axis of oscillation of the eduction valve lever 58 is above the plane of the axis of oscillation of the induction valve lever 49, as best shown in Fig. 6, the projections 65 and 66 of the lever 49 act quietly upon the lever 58 when contacting therewith. This is because said projections do not descend from a considerable elevation above the lever 58 but simply shifts from side to side on the pivot of said lever 58.

69 denotes a central tube which extends upward from the base and communicates with a passage 70, which in turn communicates with eduction valve connection 28.

71 denotes an air valve which is adapted to close passage 70 and is provided with a stem 72 which extends upward in the tube and is provided with a head 73 above the top of the tube. The stem is provided with a longitudinal passage 74 which extends into a transverse opening 75 from which passages 76 extend to the edge of the valve (see Fig. 5).

Operating lever 53 has its fulcrum on a standard 77 extending upward from the base.

78 denotes an operating rod which is pivoted to the long arm of the operating lever and extends upward and inward and is provided at its upper end with an eye 79 which slides freely on the central tube.

80 denotes a float which also slides freely on the central tube and is adapted to engage operating rod 78 to lift said rod and the long arm of the operating lever when the float is raised by the inflow of water.

81 denotes an engaging lever which is pivoted to the base as at 82. This lever is provided with an eye 83 which loosely receives the central tube and with a downwardly extending arm 84.

85, 86 and 87 denote pins which extend laterally from operating lever 53. When the float moves downward with the outflow of water, it engages lever 81 which in turn engages pin 85 and transmits the pressure of the float to the long arm of the operating lever at quite a distance from the fulcrum of the operating lever. The purpose is to apply the greatest power to said lever just when it is required, that is at the starting of the lifting of weight 64 to move said weight from the dotted position in Fig. 6 to the full line position in said figure to close the eduction valve and open the induction valve, as will be more fully explained. An instant later, as the float descends, arm 84 of the engaging lever will engage pin 86 extending from the operating lever and will continue the downward movement of the long arm of said lever, and an instant later the engaging lever will engage pin 87 upon the operating lever and complete the downward movement of the long arm of the operating lever.

88 denotes a head at the upper end of the cylinder. This head, for convenience in construction, is made in three parts, viz: a lower part indicated by 89, an intermediate part indicated by 90, and an upper part indicated by 91. Part 89 is connected to top 23 and the parts are shown as connected to each other by male and female threads. Within the head are chambers indicated respectively by 99 and 100. Openings 93 lead from the reservoir into chamber 99, and openings 96 lead from chamber 99 into chamber 100.

95 denotes an air inlet valve in chamber 99 which engages a valve seat 94 on a hub 102 which opens into an air inlet passage 92.

97 denotes a back pressure valve in chamber 100, which permits air to pass outward freely through an air pipe connection indicated by 98 but prevents air from passing backward into the reservoir from a beer keg, atomizer, tank or other receptacle into which air may be forced from the reservoir. I have shown air valve 97 as provided with a flange 101 which is gripped between parts 90 and 91, said parts being secured together by a nut 103.

The operation is as follows: When the parts are in the position shown in Figs. 6, 7 and 10, the induction valve is open and water is passing freely into the reservoir, the control of the water supply being wholly in-

dependent of the present invention, any ordinary water valve in the supply pipe (not shown) meeting the requirements. As the water rises in the reservoir it raises the float, compresses the air in the reservoir and forces it out through the head, air valve 97 and air pipe connection 98, air inlet valve 95 closing and preventing escape of air through air inlet 92. The passage of air from the reservoir continues until the float causes eye 79 on the operating rod to engage head 73 and open valve 71. As soon as this valve is opened the pressure in the cylinder is relieved and air passes out through the valve stem and passage 70. Simultaneously with the opening of valve 71, air valve 97 closes and prevents back pressure of air through air valve connection 98. It will be understood of course that in Fig. 1 the float is at its lowered position. When the induction valve is open and the float is rising from the position shown in Fig. 1, the long arm of operating lever 53 will be moving upward and the short arm of said lever will be moving downward from the position shown in Fig. 6. As the short arm moves downward, it engages arm 68 of induction valve lever 49 and swings said lever and weight 64 from the full line position in Fig. 6 toward the dotted position in said figure. As the float reaches the extreme of its upward movement, lever 49 will have been swung up to and slightly past the vertical position so that the weight will cause it to drop downward toward the right, as seen in dotted lines in Fig. 6. When the weight drops down, the bearing face 65 on said weight will engage eduction valve lever 58 and will tilt said lever from the full line position in Fig. 6 to the dotted position, which raises the eduction valve from its seat and causes the reservoir to drain through eduction connection 28. As soon as the float commences to descend with the outflow of water, it will engage lever 81 and cause said lever to engage pins 85, 86 and 87 on the long arm of the operating lever successively tilting said lever, and at the end of the downward movement of the float the parts will be in the full line position in Fig. 6, which corresponds with Figs. 1, 2, 7 and 10. The instant this movement of the operating lever commences, it will draw down the operating rod and release the stem 72 of valve 71, permitting said valve to close which prevents the escape of any more air from the reservoir. Air inlet valve 95 now opens and air passes into the reservoir through air inlet 92, hub 102 and openings 93 filling the reservoir with air as the water passes out.

The operation of the induction valve will be readily understood from Figs. 8, 9 and 10. When radial openings 44 in the valve are in alinement with radial openings 42 in plug 29 and upper cap piece 36, as in Fig. 10, water from passage 30 will pass freely through said openings and into the reservoir, the streams of water from the openings striking against guard 39, the function of which is simply to prevent the water from spurting upward against the walls of the reservoir. The jets of water, in fact, strike against the guard and the water flows into the reservoir from under the guard. When the reservoir has become filled, weight 64 on the induction valve lever will throw said lever to the dotted position in Fig. 6 and will close the induction valve and open the eduction valve, as already explained. The opening and closing of the induction valve is effected by means of arm 52 which extends from the induction valve lever. As weight 64 has dropped to the full line position in Fig. 6, it will have swung arm 52 from the position shown in Fig. 9 to the position shown in Fig. 10, said arm having engaged arm 34 extending from the head of the induction valve and swung said arm from the position shown in Fig. 9 to the position shown in Fig. 10, thereby opening the valve. The oscillation of the valve in either direction is limited by the engagement of one of the arms with one of the stop shoulders 41. As soon as the eduction valve has been opened and the float commences to descend, operating lever 53 will swing from its position with the short arm depressed toward the position shown in Figs. 1 and 6. The short arm of the operating lever will now engage arm 67 of the induction valve lever and will commence to raise said lever and the weight from the dotted position in Fig. 6 toward and slightly past the vertical position. As soon as this position is reached, the weight will swing the induction valve lever to the full line position in Fig. 6, which will open the induction valve in the manner already explained and the bearing face 66 on the weight will engage the eduction valve lever and close said valve, the opening of the induction valve and the closing of the eduction valve, and vice versa, taking place simultaneously and both acts being performed through the action of the induction valve lever and weight 64, which are controlled by operating lever 53. The function of arm 63 which extends from the eduction valve lever is to engage the short arm of the operating lever when it is at its depressed position, corresponding with the dotted position of the parts in Fig. 6, lifting pressure upon the short arm of the operating lever acting to swing the long arm of said lever downward and to positively draw down operating rod 78 and the float.

Having thus described my invention, I claim:

1. An air compressor, including in its construction a reservoir having induction and

eduction valves, an induction valve lever provided with a weight and bearing faces, operating connections intermediate said lever and the induction valve, and an eduction valve lever adapted to be engaged by the bearing faces on the induction valve lever to open and close the eduction valve.

2. An air compressor including in its construction a reservoir having induction and eduction valves, an induction valve lever engaging the induction valve and having a weight and a pair of arms and bearing faces, an operating lever extending between the arms of said pair, and an eduction valve lever which is engaged by the bearing faces on the induction valve lever to open and close the eduction valve.

3. An air compressor comprising a reservoir having induction and eduction valves, an induction valve lever having bearing faces at an obtuse angle to each other, an eduction valve lever having its axis of oscillation above that of the induction valve lever and having its upper edge in position to be acted on alternately by the bearing faces of the induction valve lever, and means whereby actuation of the induction valve lever will close either valve simultaneously with the opening of the other.

4. An air compressor comprising a reservoir having induction and eduction valves, an induction valve lever having bearing faces at an obtuse angle to each other, an eduction valve lever having its axis of oscillation above that of the induction valve lever and having its upper edge in position to be acted on alternately by the bearing faces of the induction valve lever, and a float and intermediate connections whereby when the cylinder is filled the induction valve is closed and the eduction valve is opened, and when the cylinder is emptied the induction valve is opened and the eduction valve is closed.

5. An air compressor comprising a reservoir having independent induction and eduction valves, an induction valve lever, an eduction valve lever, engaging connections between said levers, an operating lever, an operating rod pivoted thereto, a central tube, an air passage connecting therewith, a valve for closing said passage and having a stem extending the length of the tube and provided with a longitudinal passage and a head above the tube adapted to be engaged by the operating rod and a float adapted to raise the operating rod and to open and close the induction and eduction valves respectively.

6. In an air compressor, the combination with a reservoir, induction and eduction valves, an induction valve lever adapted to engage the induction valve and having a weight and projections and an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by the projections on the induction valve lever, of a central tube, an air passage connecting therewith, a valve adapted to close said passage and having a stem extending the length of the tube and provided with a longitudinal passage and a head above the tube, an operating lever adapted to engage the induction valve lever, an operating rod pivoted thereto and having an eye sliding over the central tube and a float adapted to engage said eye to raise the valve stem and actuate the operating lever, substantially as described, for the purpose specified.

7. In an air compressor, the combination with induction and eduction valves, an induction valve lever adapted to engage the induction valve and having a weight and projections and an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by said projections, of an operating lever adapted to engage the induction valve lever and having pins extending therefrom, an operating rod pivoted to the operating lever, an engaging lever adapted to engage the pins on the operating lever and a float adapted to engage the operating rod as it rises and to engage the engaging lever as it descends, substantially as described, for the purpose specified.

8. In an air compressor, the combination with induction and eduction valves, an induction valve lever adapted to engage the induction valve and having a weight and projections and an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by said projections, of an operating lever adapted to engage the induction valve lever, an operating rod pivoted to the operating lever, a float by which the operating lever and operating rod are controlled and means for relieving the air pressure in the reservoir when filled with water.

9. In an air compressor, the combination with a reservoir, induction and eduction valves, an induction valve lever adapted to engage the induction valve and having a weight and projections, and an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by said projections, of a float and intermediate connections whereby the induction valve lever is oscillated to close either of said valves simultaneously with the opening of the other.

10. In an air compressor, the combination with a reservoir, induction and eduction valves, an induction valve lever adapted to engage the induction valve and having a weight and projections, and an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by said projections, of a float and intermediate connections whereby the induction

valve lever is oscillated to close either of said valves simultaneously with the opening of the other, and an air valve which permits air to pass from the reservoir when water rises therein and prevents back pressure of the air.

11. In an air compressor, the combination with a reservoir, induction and eduction valves, an induction valve lever adapted to engage the induction valve and having a weight and projections, and an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by said projections, of a float and intermediate connections whereby the induction valve lever is oscillated to close either of said valves simultaneously with the opening of the other, and an air inlet valve which permits air to enter the reservoir when the water falls therein and prevents the escape of air from the reservoir.

12. In an air compressor, the combination with an induction valve comprising a plug having a passage closed at its inner end, radial openings leading from the passage and a circular recess and a cylindrical valve adapted to oscillate in said recess and having radial openings adapted to register with the openings in the plug, of an induction valve lever adapted to engage the induction valve, an eduction valve, a lever by which the eduction valve is carried and which is engaged by the induction valve lever, a float and intermediate connections whereby the induction valve lever is oscillated to alternately admit water and to drain the reservoir.

13. In an air compressor, the combination with a plug having a passage closed at its inner end, radial openings leading from the passage and a circular recess and upper and lower cap pieces, said upper cap piece having corresponding radial openings, of a cylindrical valve adapted to oscillate in said recess and having radial openings adapted to register with the openings in the plug and upper cap piece, a head and arms extending therefrom, a lever having an arm 52 adapted to engage the arms of the valve and arms 67 and 68 and an operating lever adapted to engage arms 67 and 68.

14. In an air compressor, the combination with an induction valve comprising a plug having a passage, radial openings leading from the passage and a circular recess and a cylindrical valve adapted to oscillate in said recess and having radial openings adapted to register with the openings in the plug, a head and arms extending therefrom, of an induction valve lever having an arm 52 adapted to engage the arms of the induction valve, a weight and projections, an eduction valve, an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by the eduction valve lever, and an operating lever adapted to engage the arms of the valve head, substantially as shown, for the purpose specified.

15. In an air compressor, the combination with an induction valve comprising a plug having a passage, radial openings leading from the passage and a circular recess and a cylindrical valve adapted to oscillate in said recess and having radial openings adapted to register with the openings in the plug, a head and arms extending therefrom, of an induction valve lever having an arm 52 adapted to engage the arms of the induction valve, arms 34 and 35, a weight and projections, an eduction valve, an eduction valve lever by which the eduction valve is carried and which is adapted to be engaged by the eduction valve lever, an operating lever adapted to engage arms 34 and 35, a float by which the operating lever is controlled and means controlled by the float for relieving the air pressure in the reservoir when the float has reached the extreme of its upward movement.

16. In an air compressor of the class described the combination with a reservoir, of an oscillatory inlet valve and a flat seating form of outlet valve, a lever to which the flat seated valve is hung, a pivotal lever to operate the oscillatory valve and bearing a weight and lug to engage the said valve lever, a third lever and means for operating the same whereby the weighted lever is thrown to and fro against the valve lever to open and close the valves.

17. In an air compressor, the combination with a reservoir, of an oscillatory inlet valve and a flat seating outlet valve, a pivoted lever to which said flat seated valve is hung, a vertically disposed lever pivoted to operate the oscillatory valve and having an upper weighted end portion adapted to be moved backward and forward in a way to strike the lever for the flat seating valve and to hold the same in an open or closed position, and a float for operating said levers and valves.

18. In an air compressor of the class described, the combination of an inlet valve comprising a cylindrical body having ports therethrough and an annular recess in its end portion, an oscillatory valve fitted in the annular recess having ports to register with those of the body and bearing depending lugs, a strap upon the body having a stop projecting in between the said lugs to limit the movement of the oscillatory valve, a lever bearing an arm extended intermediate of the said lugs, and means for operating the lever and oscillatory valve to open and close the latter.

19. An inlet valve for an air compressor comprising in part a ported cylindrical body having an annular recess therein, an oscillatory valve mounted in the said recess and

having ports to register with those of the body and bearing a pair of lugs, a stop against which the lugs are designed to strike to limit the movement of the oscillatory valve, a lever pivoted to engage the said lugs to operate the valve and having a pair of extended fingers, a second lever mounted at an angle to the first named lever with its end extended between the said fingers for the purpose of operating the lever, and means for operating the said second named lever to open and close the valve.

20. In an air compressor of the class described, the combination with a reservoir, of an inlet valve and a flat seating form of outlet valve, a lever to which the flat seated valve is hung and having a counter-balancing weight upon its free end, a second lever for operating the inlet valve, a third lever arranged at a right angle to the first named lever adapted to operate the same, and a float with suitable connections for operating the said levers and valves.

21. In an air compressor, the combination with a reservoir, of an oscillatory inlet and a flat seating form of outlet valve, a stand pipe mounted in the reservoir having a valve seat therein and connected with the outlet, a valve fitted to the seat and having an engaging head on its upper end, a float mounted upon the stand pipe adapted to engage the head and raise the valve from its seat when the said float is in its extreme upper position to allow an escape of air in the upper portion of the reservoir through the stand pipe to the outlet, and levers connected with the float to oscillate the inlet valve and to raise and lower the outlet valve.

22. In an air compressor, the combination with a reservoir, of an inlet valve comprising in part an oscillatory controlling valve member, a guide plate secured to the said valve body having slots therein, a lever pivotally connected to the plate and bearing an arm extended through one of the said slots for engaging the oscillatory valve member to operate the same by the movement of the said lever, an outlet valve, and a lever for operating the outlet valve, and a float lever movably mounted in the second slot of said plate to engage and operate both of the valve levers.

23. In an air compressor, the combination with a reservoir, of an inlet valve, comprising in part a fixed and movable member, a strap secured to the fixed member and bearing a bracket, a plate secured to the said bracket, a lever pivoted to the said plate and connected to operate the valve, an outlet valve, a lever for operating the same, a third lever for operating both the lever for the inlet and the outlet valve, and a float for manipulating the said third lever.

24. An air compressor comprising a reservoir, a stand pipe secured to the bottom part thereof and extended through to the upper portion provided with a valve seat and having an outlet therefrom, a second pipe loosely mounted in the stand pipe and forming a release valve at its lower end to close the seat and having ports through the lower end portion, a float mounted upon the stand pipe adapted to engage the inner pipe when in an extreme upper position to open and close the release valve to relieve the pressure in the reservoir.

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

JOHN ROGERS.

Witnesses:

A. M. WOOSTER,

S. W. ATHERTON.