(No Model.) 2 Sheets—Sheet 1.

J. MOREHEAD.

AUTOMATIC AIR PUMP.

No. 538,267. Patented Apr. 30, 1895.

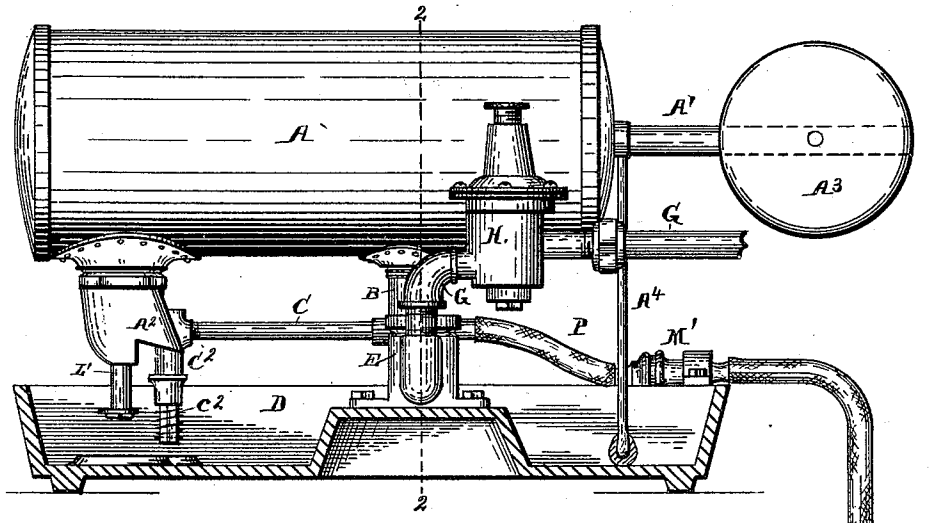


Fig. 1.

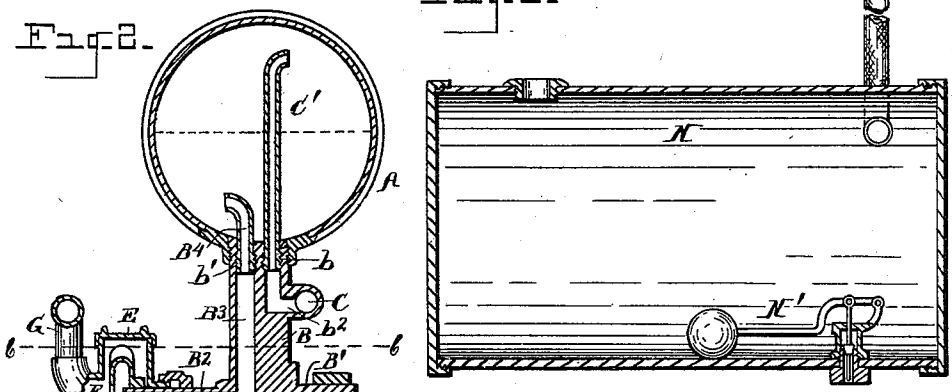


Fig. 2.

Fig. 3.

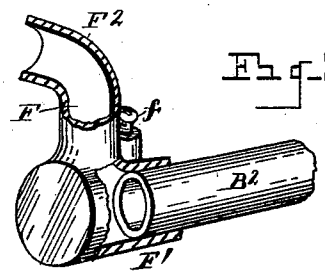
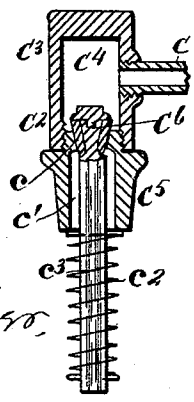


Fig. 4.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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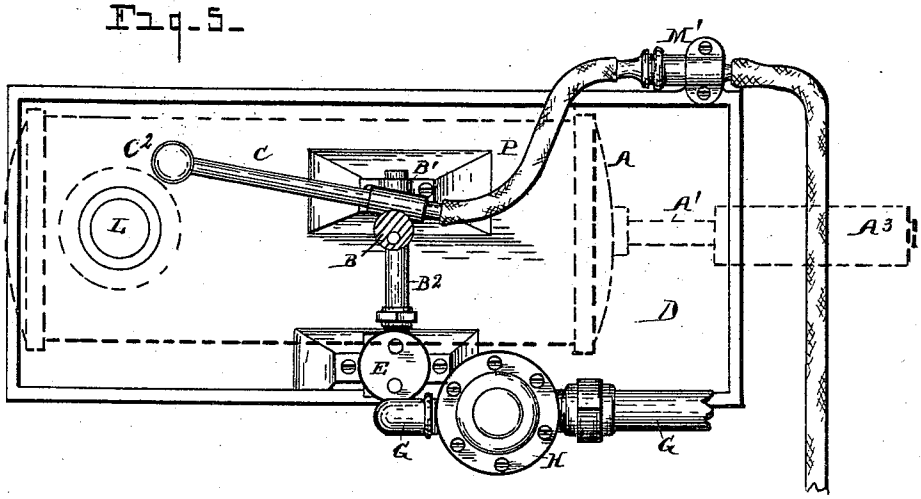
Fig. 5.



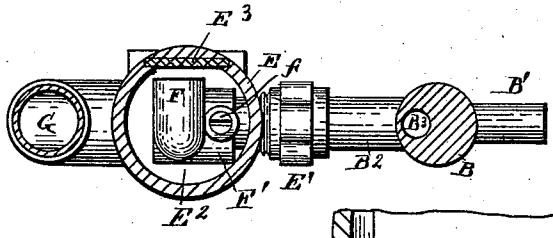
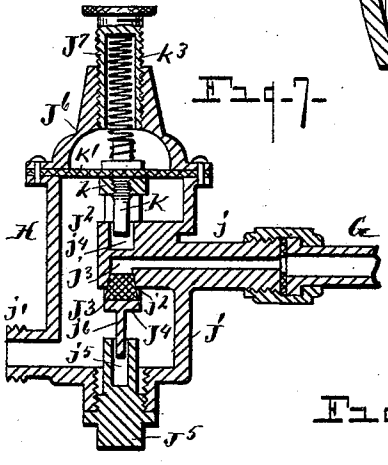


Fig. 6.

Fig. 7.



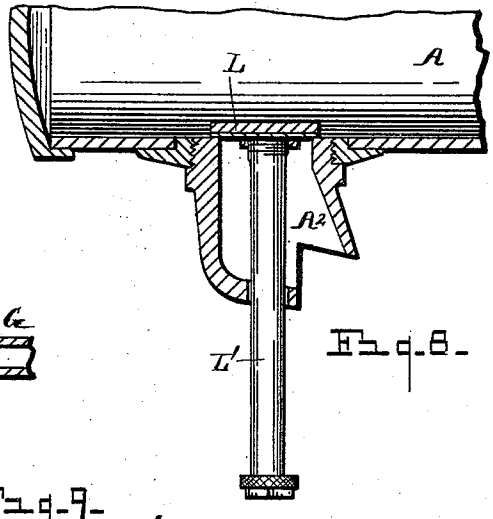
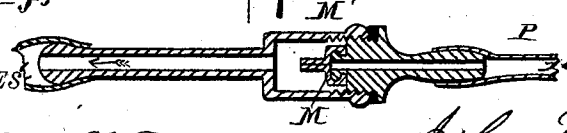


Fig. 8.

Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN MOREHEAD, OF DETROIT, MICHIGAN.

AUTOMATIC AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 538,267, dated April 30, 1895.

Application filed September 4, 1894. Serial No. 522,027. (No model.)

To all whom it may concern:

Be it known that I, JOHN MOREHEAD, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented certain new and useful Improvements in Automatic Air-Pumps; and I 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, which form a part of this specification.

The object of my invention is to provide a novel automatic air pump or air compressor of simple and economical construction and of superior efficiency in its operation, the device being adapted for a variety of uses, as a beer pump for example, or to compress air in a storage tank, my invention embracing all the uses to which the device is found adapted.

To these ends my invention consists in the construction, combinations and arrangements of devices and appliances hereinafter specified and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation showing the supporting basin or pan in vertical section, together with a storage tank in vertical section. Fig. 2 is a vertical cross section on the line 2 2, Fig. 1. Fig. 3 is a detail view in perspective and section illustrating the construction of the rocking valve. Fig. 4 is a detail view in section illustrating the construction of the air valve. Fig. 5 is a plan view showing the receiving tank in dotted lines. Fig. 6 is a detail view in horizontal section on the line 6 6, Fig. 2. Fig. 7 is a vertical section illustrating the construction of the regulator. Fig. 8 is a detail view in vertical section illustrating the construction and arrangement of the water discharge valve. Fig. 9 is a sectional view of a portion of the air discharge pipe showing the check valve therein.

The purpose of my invention is to simplify the construction and operation of devices of this class, to reduce the number of parts required in their construction and operation and at the same time to secure superior results. Accordingly I carry out my invention as follows:

A denotes a receiving chamber arranged to receive water from a water system. The receiving chamber is pivotally mounted at one side of the center of gravity, and to this end my present invention contemplates supporting said chamber upon a standard B provided at its base with a journal B′ extending at right angles to the body of the standard, the journal B′ being blank or solid. Opposite the journal B′ the standard is provided with a tubular inlet arm or pipe B^2, the body of the standard B being formed with a vertical channel B^3 communicating with the tubular arm B^2 and also with the interior of the receiving chamber A. I prefer to engage with the upper end of said standard a pipe B^4 projecting upward a desired distance from the base of the receiving chamber and communicating therewith and with the channel B^3. The upper end of the standard B may have a screw threaded engagement with the base of the receiving chamber as shown at *b*. The pipe B^4 may have a screw threaded engagement into the upper end of the standard B, as shown at *b*′. The arm B^2 may be made integral with the standard B or otherwise engaged therewith.

I do not limit myself to any special manner of engaging the above mentioned parts one with another.

C is an air outlet pipe connected with the standard B and communicating also with the interior of the receiving chamber, as through a channel b^2 in the standard B. A pipe C′ communicates at its lower end with the channel b^2 of the standard B, the pipe C′ extending above the water received into the chamber A.

The pipe of arm B^2 constitutes not only a water inlet pipe but also a journal opposite the journal B′ upon which the receiving chamber A rocks, the arms B′ and B^2 being provided with suitable bearings.

Underneath the receiving chamber A I prefer to locate a receiving pan or basin D provided with a bearing D′ for the journal arm B′. The tubular arm B^2, as contemplated in my present invention, has its bearing in a case or housing E provided on the side adjacent to the standard B with a suitable stuffing box E′, the arm B^2 projecting into and communicable with an interior chamber E^2 formed by the housing or case E. Upon the outer end of the tubular arm B^2, and within

the chamber E^2, I engage a valve F consisting essentially of a hollow casting constructed with an arm F′ engaging the extremity of the tubular arm B^2, and with an upwardly extended curved or bent arm F^2. The arm F′ has preferably an adjustable engagement upon the tubular arm B^2 and is held in any required position thereupon by means of a set screw *f*. The upper outer edge of the arm F^2 is arranged to seat against the inner adjacent face of the case E. Upon the adjacent inner surface of the case E I prefer to engage suitable packing, as a rubber packing for example, E^3, against which the upper edge of the arm F^2 may firmly seat.

Water is admitted into the chamber E^2 through an inlet pipe G. When the arm F^2 is unseated, which is its normal position, it will be readily perceived that the water entering the chamber E^2 also enters the open arm F^2 and passes thence through the tubular arm B^2 into the receiving chamber A. The valve F is so adjusted and arranged upon the tubular arm B^2 that when the chamber A tilts, the edge of the valve F will seat against said packing on the inner surface of the case E and effectually cut off the admission of water through the valve F into the receiving chamber, while the valve is closed against its seat upon the adjacent inner wall of the chamber E. In adjusting the parts, the valve F is so arranged as to have the desired throw when the arm B^2 rocks and the set screw *f* is then tightened in place to hold the valve in proper position. The valve F is thus, it will be seen, automatically operated by the rocking of the receiving chamber, while the construction and operation is very simple requiring but few parts, the arrangement and construction being such that they are not likely to get out of order. By this construction and arrangement the device is more self-contained, the valve F seating within the case E dispensing with a variety of valves and levers heretofore commonly employed in devices of this class to accomplish similar results.

Into the inlet pipe G is interposed a regulator H to control the pressure of the water supply. The pressure regulator herewith shown is essentially the same as that shown in a patent issued to me December 29, 1891, No. 465,943. While I do not limit myself solely to a regulator of any particular construction, that shown herewith is provided with a case J′—having tubular arms *j* and *j′* connected with the supply pipe G, the case J′ forming an interior chamber J^2 into which the supply pipe G admits the water and from which chamber the water is discharged. The arm *j* is preferably located above the arm *j′* and is provided with a valve seat j^2 at the point of the outlet orifice j^3 through which the water passes from the arm *j* into the chamber J^2.

J^3 is a valve located in a yoke J^4 engaged at its upper end upon a stem K of a diaphragm K′ located over the top of the chamber J^2. To this end said stem and yoke may have a screw threaded engagement the one with the other, as shown at *k*. The stem K is seated at its lower end in a socket j^4 on the arm *j*, the socket forming a guide for said stem.

J^5 is a plug engaged in the base of the case J′. This plug is preferably provided with a socket j^5 to receive the lower end of a stem j^6 upon the yoke J^4 and serving as a guide for the stem j^6. Thus the valve is guided by the stems K and j^6 in the socket j^4 and j^5 and is thus caused to seat accurately. As described in my said patent, the surface of the valve J^3 has a small area while the surface of the diaphragm K′ has a relatively large area.

J^6 is a cap engaged upon the case J′. Upon the upper end of the stem K is located a spring k^3, the tension of which may be regulated by a screw J^7 having a threaded engagement in the cap J^6. The diaphragm K′ may consist of any suitable material, as of a flexible piece of rubber for example. The action of the pressure regulator will be understood. The tension of the spring k^3 is adjusted according to the air pressure desired. When the pressure in the chamber A is lower than the pressure of the spring, the spring will force the diaphragm downward carrying with it the yoke J^4 opening the valve J^3, allowing the water to enter the chamber J^2 and pass from thence into the chamber A. When, however, the pressure in the chamber A is greater than that exerted by the spring k^3, the back pressure upon the diaphagm K′ will lift it, seating the valve J^3 and cutting off the admission of water into the chamber J^2 until the pressure in the chamber J^2 is diminished. As the water pressure in a water system is liable to be greater than the pressure of air desired, a regulating device like that above described is found desirable.

The chamber A is provided with a weighted arm A′ at one end and with a discharge passage A^2 toward the opposite end. The discharge of water entering into the chamber A is governed by a valve L of any suitable description, preferably provided with a stem L′ projecting beneath the outlet passage. When the weight of water in the chamber A has accumulated sufficiently to tilt said chamber, the stem L′ will strike upon the base of the pan therebeneath, if such a pan be used, and therefore lift the valve L permitting the water to discharge from the chamber A. The air outlet pipe C is provided with an air valve C^2 of any suitable construction, that shown herewith, more particularly in Fig. 4, consisting of a casing C^3 forming an interior chamber C^4 into which the pipe C enters. Into the base of the casing C^3 is engaged a nipple C^5 constructed with a valve seat at its upper end, as shown at *c* and with a channel *c′*.

C^6 denotes a valve seating upon the seat *c* and constructed with a stem c^2 projecting through the passage *c′* and arranged to strike on the underlying pan or reservoir support when the chamber A is tilted, thereby unseat-

ing the valve C^6 and allowing the chamber A to vent itself through the passage c'. A spring c^3 aids in restoring the valve C^6 to its seat when the chamber A tilts back into normal position. The opposite end of the pipe C is arranged to carry the air compressed within the chamber A wherever desired. Into said pipe C, I introduce a check valve, shown more particularly in Fig. 9 as at M, arranged to prevent any back pressure through the pipe C. The outlet air pipe C is shown in Fig. 1 communicating with a storage reservoir or compressed air reservoir N, the pipe C entering said storage reservoir toward the top thereof.

I provide the tank N with a float valve N' of ordinary construction, whereby, should any water enter the tank N the float will be lifted and open the valve discharging the water from the storage tank, the pipe C always communicating with the storage tank above any possible accumulation of water therein. With the air outlet pipe C may be connected a flexible pipe P into which the valve M is interposed, the valve M being located in a suitable housing M'. The weighted arm A' is preferably provided with a depending standard A^4 to limit the tilting of the chamber A when it returns to normal position. The pan or basin D, if employed, may discharge into a sewer or otherwise as may be required, but I do not limit myself to the employment of said pan or basin.

In the operation of the device, water will be admitted through the water inlet pipe G into the chamber A. The weight A^3 upon the arm A' having been adjusted as required, the water will continue to accumulate in the chamber A until the weight of water therein counterbalances the weighted arm, when the end of the chamber A opposite said weighted arm will tilt downward. The valve stem c^2 of the air valve C^2 is made to project normally below the stem L' so that it will strike first when the chamber is tilted and thereby open in advance of the opening of the valve L, by this means venting the chamber A above the water so as to relieve the pressure upon the valve L and allow air to escape and the water to be discharged. When the water discharges, air will re-enter the chamber A and will be compressed by the incoming water accumulating in the chamber A the force of compression driving the air through the pipe C, any back pressure being prevented by means of the check valve M. It will be perceived that when the chamber A tilts, all pressure therein is relieved by the air exhausting through the valve C^2. The valve L is also opened and when the pressure has thus been relieved the air will re-enter the chamber A through the valves C^2 and L. It will be obvious that water entering the chamber A at the end toward the weighted arm will exert a counterbalance pressure against a like amount of water in the opposite end of the chamber A, and that when the counterbalance is overcome by the weight of water at the discharge end of the chamber A, the water in the end toward the weighted arm will flow down toward the opposite end of the chamber A as said chamber is tilted, thereby aiding in tilting said chamber.

It is obvious that the check valve M, when the chamber A tilts downward to discharge its water, prevents the air passed to the storage tank, or otherwise, from escaping, while the pressure is relieved in the tilting chamber.

The arrows in Fig. 9 indicate the normal direction for the passage of the air.

What I claim as my invention is—

1. In an automatic air pump or air compressor, the combination of a tilting chamber, a rocking standard supporting said chamber provided with a hollow inlet arm, and a valve case, said arm provided with a valve seating within said case when said chamber tilts, substantially as and for the purpose described.

2. In an automatic air pump or air compressor, the combination of a tilting receiving chamber, a rocking standard supporting said chamber provided with a hollow inlet arm, a valve casing receiving the end of said inlet arm, a water inlet pipe leading into said valve casing, and a valve adjustably engaged upon said inlet arm within said valve casing, substantially as set forth.

3. In an automatic air pump or air compressor, the combination of a receiving chamber pivotally mounted at one side the center of gravity upon a hollow rocking arm communicating with said chamber and upon a solid rocking arm, a valve casing receiving one end of said hollow arm, a water inlet pipe communicating with said casing, a regulator interposed in said water inlet pipe, the end of said hollow arm within said valve casing provided with a valve to open and close the communication through said arm into said receiving chamber, substantially as set forth.

4. In an automatic air pump or air compressor, the combination of a tilting receiving chamber, a rocking standard provided with a water inlet arm communicating with said chamber and with an air outlet passage communicating with said chamber, a valve casing communicating with the water inlet arm, a water inlet pipe communicating with said valve casing, a valve within said casing to control the communication through said casing into said receiving chamber, and a valve to control the communication through the air outlet passage, substantially as set forth.

5. In an automatic air pump or air compressor, the combination of a counterbalanced tilting receiving chamber, a standard B supporting said chamber provided with a hollow rocking arm communicating with the interior of said chamber and with an air outlet passage communicating with said chamber, an air outlet pipe C communicating with said outlet passage, a check valve M located in said air outlet pipe, an additional valve engaged with said air outlet pipe to vent said chamber when it tilts, a water discharge valve

engaged with said chamber to open when the chamber tilts, the valve to vent said chamber opening in advance of said discharge valve when the chamber tilts, a water inlet pipe communicating with said chamber, and a valve controlling its communication with said chamber, substantially as set forth.

6. In an automatic air pump or air compressor, the combination of a tilting receiving chamber, a rocking standard supporting said chamber at one side the center of gravity provided with a hollow water inlet arm communicating with said chamber, a counterbalanced weight engaged with said chamber, a water inlet pipe communicating with the chamber through said hollow arm, a valve to control said communication, an air outlet passage communicating with said chamber provided with an air vent valve and with a check valve, a water discharge valve arranged to open when the chamber tilts, the construction being such that the water at the weighted end of the chamber, when the chamber is in normal position, will aid to counterbalance the chamber, and when the chamber is tilted the water will aid in overcoming the counterbalance, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses.

JOHN MOREHEAD.

Witnesses:
N. S. WRIGHT,
O. B. BAENZIGER.