

No. 838,209.

PATENTED DEC. 11, 1906.

C. G. PATTERSON.
VACUUM CONTROL SYSTEM.
APPLICATION FILED APR. 5, 1906.

2 SHEETS—SHEET 1.

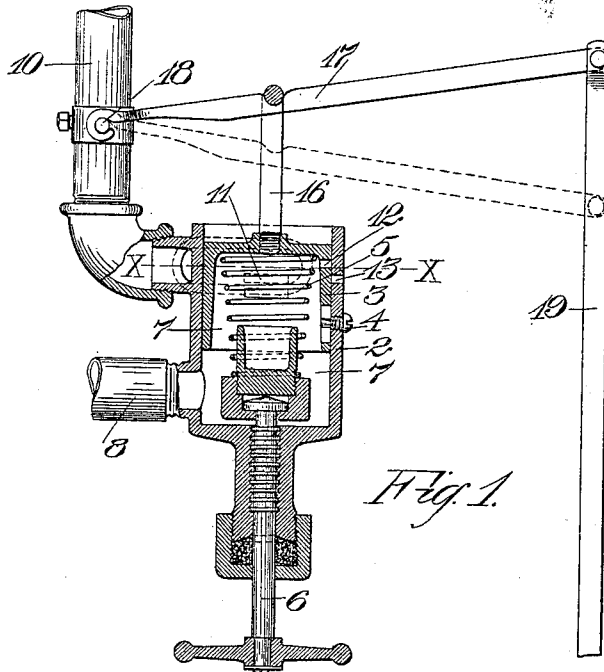


Fig. 1.

Fig. 2.

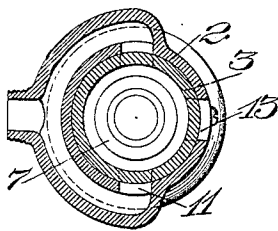
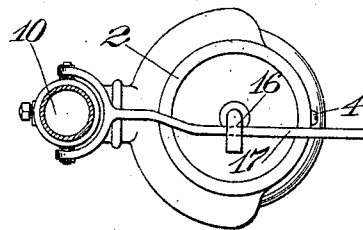


Fig. 3.



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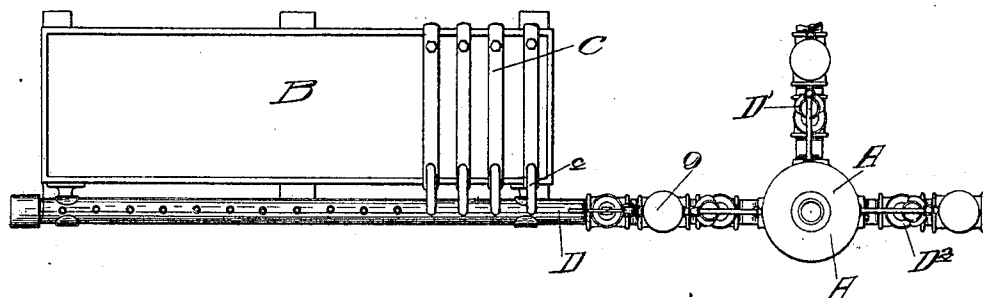
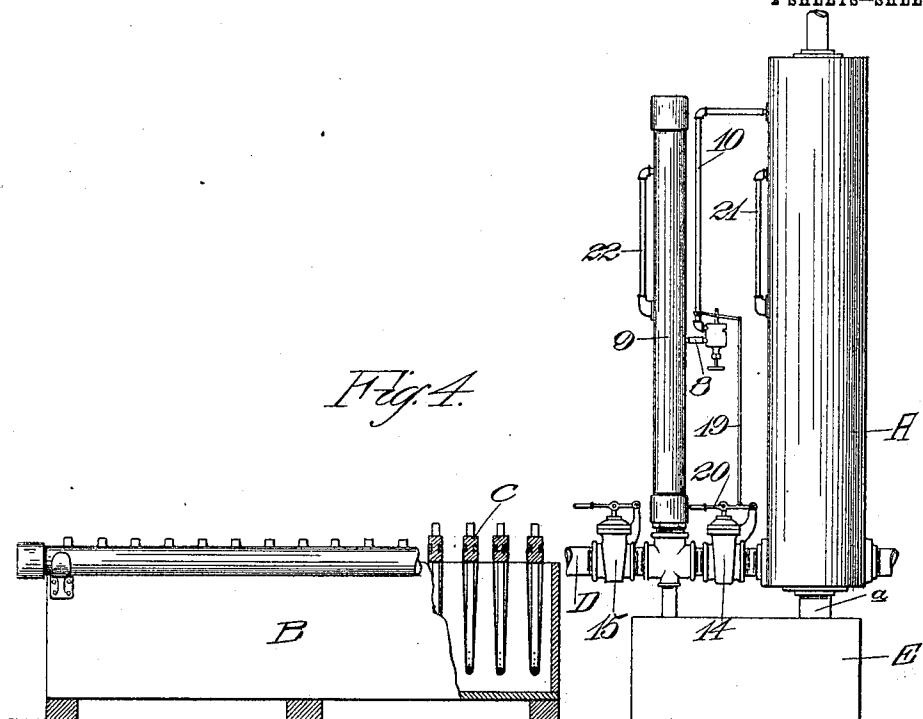
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CLARENCE G. PATTERSON, OF SOUTH BERKELEY, CALIFORNIA.

VACUUM-CONTROL SYSTEM.

No. 838,209.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed April 5, 1906. Serial No. 310,046.

To all whom it may concern:

Be it known that I, CLARENCE G. PATTERSON, a citizen of the United States, residing at South Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Vacuum-Control Systems, of which the following is a specification.

My invention relates to vacuum-producing apparatus, and pertains especially to means for reducing and controlling vacuums in subchambers without altering the vacuum-pressure of the high-vacuum chamber or initial-vacuum producer.

While I have here illustrated my invention and shall describe it in conjunction with a filtering system such as is commonly employed in mining and cyaniding operations, where I have successfully employed it, I do not wish to be understood as necessarily limiting myself by any means to such narrow application, for it will be manifest that the same principle is applicable in many other arts, as in refrigeration, for instance.

The invention consists of the parts and the construction and the combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is an elevation in partial section of my control-valve. Fig. 2 is a section on line X X, Fig. 1. Fig. 3 is a plan view of same. Fig. 4 is an elevation in partial section of an apparatus to which my invention is applied. Fig. 5 is a plan view of same.

A represents an ordinary so-called "high-vacuum drum," in which a constant high vacuum is maintained by any suitable well-known means.

B represents a solution-tank into which are set any number of so-called "filter-leaves" C. These leaves are shown as comprising a top cross-bar supporting a U-frame of piping, over which is stretched canvas or other suitable fabric to inclose a suitable filter-chamber. The space included by the canvas walls is stuffed with cocoa-mat or the like to keep the walls from collapsing. The bottom rail of the U-frame is perforated on its upper surface, and one end of the pipe is closed, while the other end is adapted to be connected, as shown at c, with the main pipe D, leading to the vacuum-drum. When the tank B is filled with solution to be filtered, the filter-leaves submerged and connected to drum A, and a suitable vacuum produced in

A, the liquid in the solution will be drawn through the canvas walls of the filter-leaves C and out through pipe D to be discharged through pipe a into a tank E, which constitutes a water seal against the vacuum-pressure in drum A. All this is old in the art, but is necessarily described, since my invention begins at this point and is in combination with such a system of constant high initial vacuum means and a plurality of subchambers wherein a variable or different vacuum-pressure is desired at times, or from which chambers it may be desired to cut off the vacuum entirely for the purpose of cleaning up or recharging, or for any other reason. Thus, for example, the vacuum-pressure in A may be assumed to be twenty-four inches. During exhausting of the solution in tank B it is desired to maintain the same high pressure in the chambers of the filter-leaves C. After a certain period it is usual to shut down this vacuum-pressure in the subchambers inclosed by the filter-leaves to, say, five inches. At the same time exhaustion may be going on in number of other tanks connected in a similar manner with the drum A through the pipes D' D².

My invention resides in interposing a bypass with a regulator-valve between the high-pressure drum A and the subchamber or groups of subchambers from which exhaustion is to take place and providing a suitable means for throwing this regulator-valve into self-regulating operative position whenever direct connection with the drum is cut off through either of the main pipes D D' D², &c. This regulator-valve is shown in Fig. 1 as comprising a casing 2, open at one end and having a free-moving piston 3, with its reciprocating movement limited by suitable means, as the screw 4, engaging a slot in the piston 3. The chamber inclosed by the piston and casing contains a spring 5, acting normally to push the piston outward. This spring is adjustable by suitable means, as the screw 6, to allow the regulator to be set for any desired pressure, as will be explained shortly.

The valve-chamber 7 communicates through a pipe 8 and smaller drum 9, with the main pipe D. It will be manifest that the drum 9 could be omitted.

The chamber 7 is adapted to communicate with the drum A through a pipe 10 whenever the piston 3 is moved into position to uncover a port 11. The valve-chamber 7 is also

adapted to communicate with the atmosphere whenever the piston is moved to bring the post 12 into register with the port 13 in the casing. The port 11, however, is never open or uncovered at the same time that the ports 12 13 are in register. Whenever ports 12 13 register to let in air at atmospheric pressure to the valve-chamber, pipe D, and subchambers C, the port 11 is closed to cut off all communication with the high-pressure drum A, and vice versa.

A quick-opening valve 14 is placed between drum A and the connection of drum 9 with pipe D, and another valve or gate 15 is placed in pipe D on the other side of the drum 9. The valve 15 remains open during both the high-vacuum and low-vacuum periods of exhaust. Valve 14 remains open only during the high-vacuum period. As soon as valve 14 is closed and it being desired to continue exhaustion at low vacuum the piston 3 of the regulator-valve is automatically thrown into operative position by the following means: As here shown, the piston 3, which, it should be stated, has its outer end exposed to the atmosphere, carries a projection 16, which is adapted to hook over a lever 17, fulcrumed at 18. This lever is here shown as of the second class and has its free end connected by a link 19 with the operating-handle 20 of valve 14.

When valve 14 is in open position, the lever 17 is lifted to engage the projection 16 and move or hold the piston 3 in such position that communication between the valve-chamber 7 and the outer atmosphere is cut off through ports 12 13. The spring 5 is set to withstand a definite predetermined pressure on the piston 3.

Drums A and 9 may be provided with suitable respective gages 21 22, which will register the amount of vacuum in each drum. If after a certain period of high vacuum through pipe D it is desired to continue at a low vacuum—say five inches—the spring 5 is adjusted to withstand a corresponding low-vacuum pressure or pull on the piston 3.

When the valve 14 is closed, the piston 3 being left free to move and the high-vacuum pressure still being maintained in chamber 7, the spring 5 is compressed to bring ports 12 13 into register, port 11 being already closed. This results immediately in an inrush of air at atmospheric pressure, which passes through the valve and the connections with pipe D to the various subchambers and accordingly lowers the vacuum-pressure in these chambers. The moment, however, that the vacuum in chamber 7 is reduced to a point to allow spring 5 to act the piston is moved outward again to shut off communication with the outer atmosphere. As the vacuum still further diminishes port 11 will be uncovered, which will throw the subchambers into communication with the high-vacuum drum A

and again raise the vacuum until the piston moves in the opposite direction against the tension of spring 5, closes port 11, and, if necessary, opens up ports 12 13, the piston thus automatically moving back and forth through the combined action of the high vacuum in A and the regulated tension of spring 3 to maintain a substantially uniform and desired vacuum in the subchambers.

As the pipes D' and D² are provided with the similar vacuum-regulating means and as each connects with a similar system of sub-vacuum-chambers not necessarily here to be shown, it is manifest that the operations of exhaustion through any one or more of these branch pipes may continue or be discontinued independently of the operations going on through the others.

I am thus able to carry on exhaustion from any number of tanks at one and the same time and to charge or clean up one tank or vary the exhaustion operations as pertaining to this tank by means of a single source of vacuum-supply without affecting the operations going on in any of the other tanks.

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

1. A system of vacuum control comprising a source of high vacuum, a chamber to be exhausted, fluid connections between said chamber and source of high vacuum whereby a corresponding high vacuum may be maintained in said chamber, a valve in said connections, a regulator-valve having ports open to the atmosphere and to said source of vacuum and to said chamber, means for maintaining said regulator-valve in inoperative position while the first-named valve is open, and for placing said regulator-valve in operative position to successively cut off communication with the source of high vacuum and the chamber, and to open up the chamber to the atmosphere, when said first-named valve is closed.

2. The combination of a central source of high vacuum, subchambers having separate connections with said source of high vacuum, valves in said connections, and means for varying and controlling the vacuum-pressures in the several subchambers without altering the vacuum-pressure in said source of high vacuum.

3. The combination of a central source of high vacuum, subchambers having separate connections with said source of high vacuum, valves in said connections, and means for independently varying and controlling the vacuum-pressures in the several subchambers without altering the vacuum-pressure in said source of high vacuum.

4. In a system of vacuum control the combination with a high-vacuum reservoir or drum, of a pipe entering said drum, a valve in said pipe, a by-pass connection between

the drum and pipe, a regulator-valve in said by-pass, said regulator-valve having ports opening to the atmosphere and other ports opening to the drum and said pipe, said ports to the atmosphere being closed when the pipe is in communication with the drum through the regulator-valve and vice versa, said regulator-valve having a piston and variable-tension means operating to hold said piston normally in position with said ports to the atmosphere open and said port to the drum closed, means to hold said piston with said ports to the atmosphere closed, and means for releasing the piston to allow the regulator-valve to act on the closing of the first-named valve.

5. In a system of vacuum control, the combination with a high-vacuum reservoir or drum, of a pipe entering said drum, a valve in said pipe, a by-pass connection between the drum and pipe, a regulator-valve in said by-pass, said regulator-valve having ports opening to the atmosphere and other ports opening to the drum and said pipe, said ports to the atmosphere being closed when the pipe is in communication with the drum through the regulator-valve and vice versa, said regulator-valve having a piston and variable-tension means operating to hold said piston nor-

mally in position with said ports to the atmosphere open and said port to the drum closed, means to hold said piston with said ports to the atmosphere closed, and means operated by the first-mentioned valve for automatically releasing the piston to allow the regulator-valve to act.

6. The combination of a high-vacuum drum, a pipe communicating with the drum, a control-valve in the pipe, by-pass connections between the pipe and drum, and a regulator-valve in said by-pass, said regulator-valve comprising a casing, a piston movable in the casing, a variable-tension device acting on one side of the piston and against the vacuum within the valve, said regulator-valve having ports opening to the atmosphere, said piston operable to close said ports and open communication with the drum and vice versa, and means operable by the said control-valve to place the regulator-valve in operative and inoperative position.

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

CLARENCE G. PATTERSON.

Witnesses:

A. H. ARMSTRONG,
D. B. RICHARDS.