

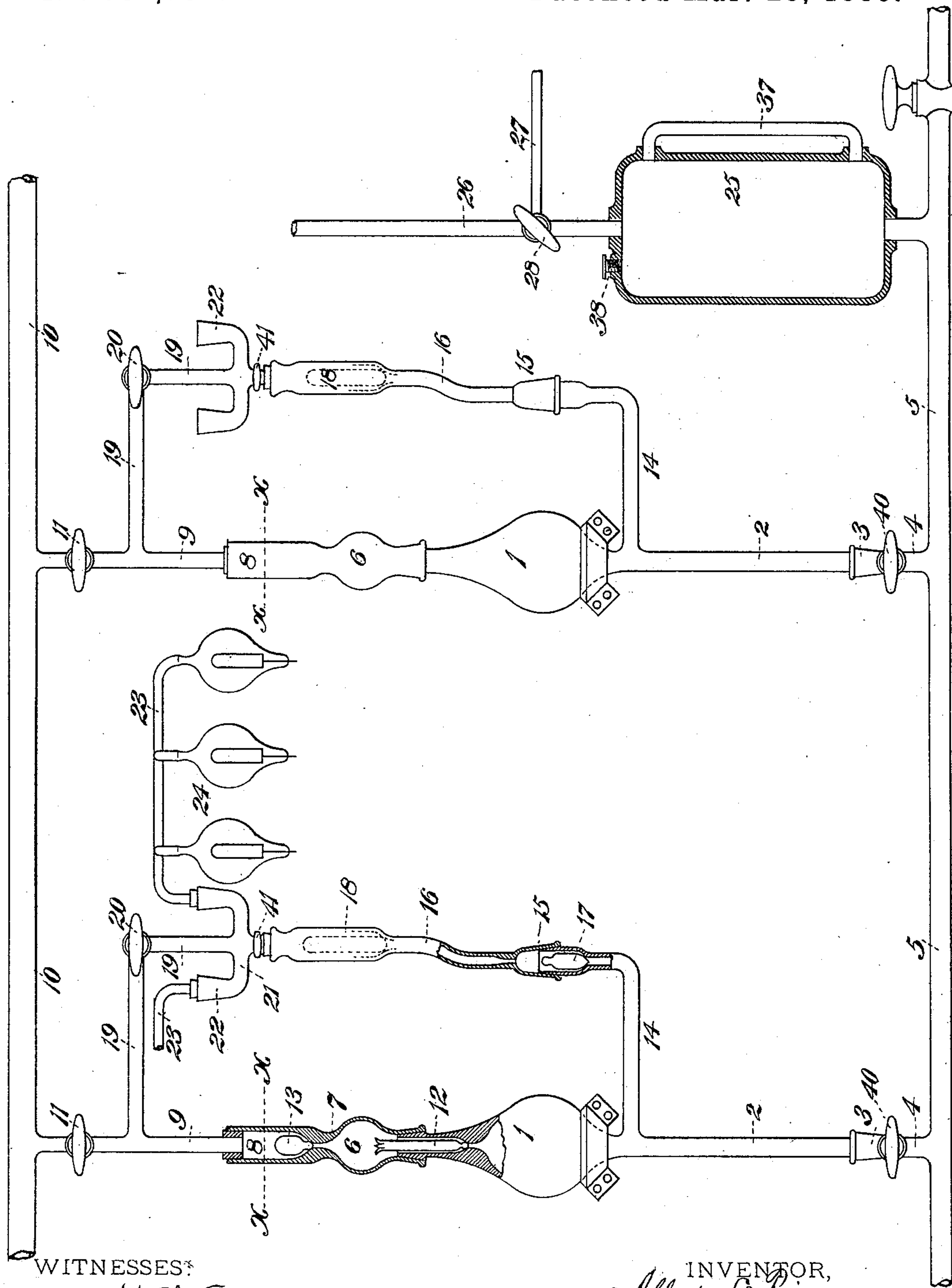
(No Model.)

A. L. & C. F. REINMANN.

APPARATUS FOR THE PRODUCTION OF HIGH VACUUMS.

No. 338,551.

Patented Mar. 23, 1886.



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APPARATUS FOR THE PRODUCTION OF HIGH VACUUMS.

SPECIFICATION forming part of Letters Patent No. 338,551, dated March 23, 1886.

Application filed October 8, 1885. Serial No. 179,328. (No model.)

To all whom it may concern:

Be it known we, ALBERT L. REINMANN and CHARLES F. REINMANN, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented or discovered certain new and useful Improvements in Apparatus for the Production of High Vacuums, of which improvements the following is a specification.

10 In the accompanying drawing, which makes part of this specification, the figure is a view in side elevation of our improved apparatus or plant for the production of high vacuums, certain parts being shown in section.

15 The invention herein relates to certain improvements in that class of pumps employed in producing high vacuums, commonly known as "Geissler" or "mercury" pumps, said invention having for its object such a construction and arrangement of the parts of the apparatus that a series of vacuum-pumps may be operated simultaneously, successively, or independently by the to-and-fro movement of the mercury between such pumps and a single reservoir; and to this end the invention consists in the construction and combination of parts, substantially in the manner hereinafter described and claimed.

20 The pumps A B, &c., are similar in construction, and each consists of a vacuum-chamber, 1, provided with a downwardly-extending tube or pipe, 2, the lower end of such pipe fitting by a ground joint into the socket 3 of branch 4 of the main-line pipe 5, as shown. The upper end of the vacuum-chamber is suitably constructed, as shown at the left of the figure, to form the lower portion of the valve-chamber 6, the upper portion of such chamber being formed by the irregularly-shaped section of pipe 7, fitting by a ground joint onto the upper end of the vacuum-chamber 1. The upper end of the pipe-section 7 is suitably shaped to form a valve-chamber, 8, the upper end of such chamber being partially closed by the lower end of the branch 9, depending from the main exhaust-pipe 10, said branch pipe being provided with a cock, 11, near its junction with the exhaust-pipe 10.

45 In the valve-chambers 6 and 8 are placed the valves 12 and 13, the valve 12 seating downwardly in a seating in that portion of the valve-chamber formed in the upper end

of the vacuum-chamber 1. The valve 13 is suitably constructed to close alternately the upper and lower exits of the valve-chamber 8. Just below the vacuum-chamber the pipe 2 is provided with a branch pipe, 14, having an upturned outer end, in which is formed part of a valve-chamber, 15, the upper portion thereof being formed by the lower end of the pipe-section 16, the two parts of the chamber fitting together by a ground joint. In this chamber 15 is placed the valve 17, adapted to close the upper end of the chamber, thereby preventing the flow of the mercury beyond that point.

In the upper end of the pipe-section 16 is formed a chamber, 18, for the reception of some anhydrous substance—*e. g.*, chloride of calcium—which is preferably inclosed in a perforated-paper shell. In the upper end of this chamber 18 is fitted one end of the pipe 19, the opposite end of said pipe being connected to the branch pipe 9 at some point below the cock 11, and being provided with the cock or valve-plug 20. The pipe 19 is provided with arms or lateral branches 21, having sockets 22 at their outer ends for the reception of one end of pipe 23, to which the lamp-bulbs 24 are attached.

Any desired number of pumps A B, &c., constructed substantially as above described, may be attached to the pipes 5 and 10, the pipe 10 being connected in any suitable manner to a continuously-operating mechanical exhaust-pump. (Not shown.) A mercurial reservoir, 25, is connected to the pipe 5 at any suitable point along its length, the capacity of such reservoir being proportioned to the combined capacities of the vacuum-chambers attached to the pipe 5 and their pipe-connections therewith. This mercurial reservoir is connected by the pipe 26 to a continuously-operating mechanical exhaust-pump (not shown) of any suitable construction, and also with the open air by the branch pipe 27, which, by preference, should be provided with a suitable receptacle for holding some anhydrous material for drying the air before its admission into the reservoir 25.

At the junction of the pipes 26 and 27 is located a three-way cock, 28, for connecting the reservoir with the mechanical exhaust-pump and open air alternately.

The reservoir 25 is provided with a gage-tube, 37, connecting at its end with the upper and lower parts of the reservoir, thereby enabling the operator to ascertain the height of the mercury in the reservoir, which is preferably made of steel.

The reservoir 25 shown in the figure is provided with a filling orifice or opening, 38, closed by a screw cap or plug; but the reservoir is filled through the pipe 39, which is left open. The bulbs 24 being connected to the branches 22 in the usual manner, the mechanical exhaust-pump connected to the pipe 10 is operated. The cocks 4, 11, and 20 being opened, mercury is then forced into the vacuum-chamber 1, either by so turning the cock 28, so as to admit air into the reservoir 25 to a height sufficient to cause the mercury to rise in the vacuum-chambers of these several pumps to at least the line *xx*. Any upward movement of the mercury beyond this point will be prevented by the valve 13, and the valve 17 will prevent too great a rise of the mercury in the branch pipe 14. This upward movement of the mercury in the pumps A and B will force the air therefrom past the valves 12 and 13. After the first rise or upward pulsation of the mercury in the vacuum-pumps, the cock 20 is closed and the mercury is returned to the reservoir through the action of gravity, such action being permitted either by exhausting the air from the reservoir or by lowering the same. As soon as the mercury in the vacuum-pumps drops below the point where the branch 14 joins the pipe 2, the

air in the bulbs 24 will expand and fill the vacuum-chambers 1, then the mercury is again forced up into the vacuum-chambers, as before described, forcing the air therefrom. This operation is continued until the desired vacuum or amount of rarefaction in the bulbs is obtained.

In the branches 4 are arranged cocks 40, by which and the cocks 11 in the pipes 9 any one of the pumps may be cut out of the system without interfering with the operation of any of the pumps.

The pipe 19 is provided just below the branches 21 with a cock, 41. By means of the cocks 20 and 41 the vacuum may be maintained in the main part of the pump while an exchange of bulbs is being made.

We claim herein as our invention—

In an apparatus for the production of high vacuums, the combination of a series of vacuum-chambers, each having suitable outlets for the escape of air therefrom, a single mercurial reservoir connected to all of the vacuum-chambers, the mercurial reservoir being provided with suitable connections, with a mechanical exhaust-pump, and with the open air, substantially as set forth.

In testimony whereof we have hereunto set our hands.

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Witnesses:

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