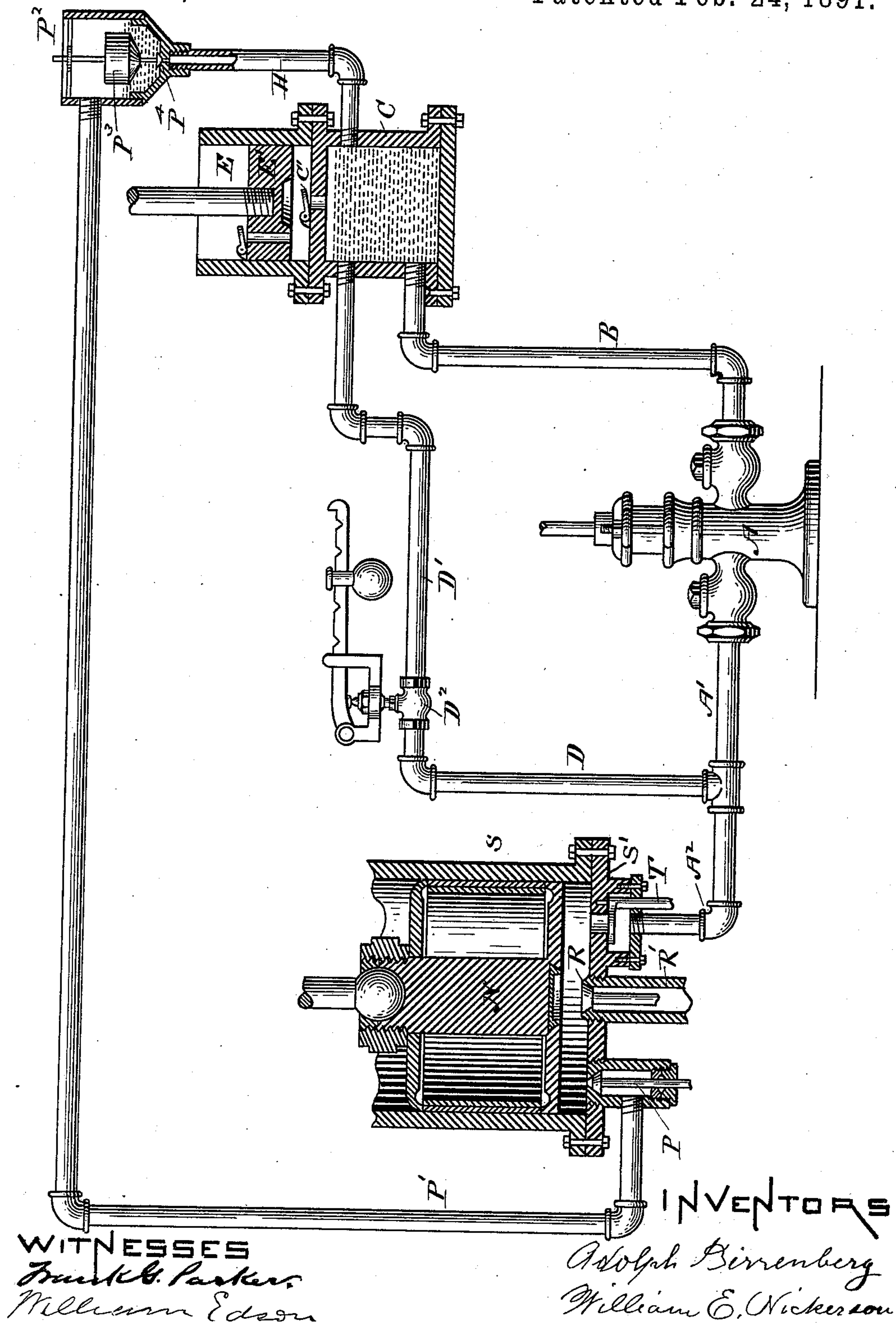


(No Model.)

A. BERRENBURG & W. E. NICKERSON.
VACUUM PUMP.

No. 447,274.

Patented Feb. 24, 1891.



UNITED STATES PATENT OFFICE.

ADOLPH BERRENBURG, OF SOMERVILLE, AND WILLIAM E. NICKERSON, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNORS TO THE BEACON VACUUM PUMP AND ELECTRICAL COMPANY, OF PORTLAND, MAINE.

VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 447,274, dated February 24, 1891.

Application filed May 10, 1890. Serial No. 351,359. (No model.)

To all whom it may concern:

Be it known that we, ADOLPH BERRENBURG, of Somerville, and WILLIAM E. NICKERSON, of Cambridge, both in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Vacuum-Pumps, of which the following, taken in connection with the accompanying drawing, is a specification.

10 This invention consists in forcing at each upward stroke of the piston a quantity of oil from which the air has been drawn into the cylinder, said oil to serve to fill all of the unoccupied space under and about the piston
15 when it is at its lowest point, thus expelling all air. During the downward stroke of the piston all excess of oil is forced out of the cylinder into a vacuum-tank, in which tank the air that has been taken up by the oil during the descent of the piston will be withdrawn and the oil will be ready to be again forced (in its deaerated condition) back into the cylinder, from which its excess is again expelled, and returned to the deaerating-tank,
25 this circulation and deaeration taking place at each stroke of the piston.

An apparatus for putting this invention in practice is shown in the accompanying drawing, which is partly in section and partly in elevation.

Let S represent the cylinder of an air-pump, and N the piston. One head S' only of the air-pump is shown. This head S' has three valves—namely, a valve T for the admission of deaerated oil, a valve R in the air-pipe R', which serves to draw air from the article to be exhausted, and the valve P, which furnishes an outlet for the excess of oil and also for the discharge of air drawn
40 from the articles being exhausted.

All of the above valves have mechanical connections, by means of which they are to be operated independently of any pressure of air or oil.

45 The oil circulation and deaerating device chosen for illustration may be described as follows:

C is an oil-tank, having a valve C' for the outlet of air that is drawn from the oil in the

process of deaeration. E is an air-pump, having a piston E', in which a valve is placed. Oil from the tank C flows to the force-pump A through the pipe B, and is forced through the pipe A' A² to the valve T, and thence into the cylinder S under the piston N. To maintain and also to limit the pressure of the oil in the pipes A' A² and the chamber of the valve T, a weighted valve is placed at D² and connected to the pipe A' by the pipe D and to the tank C by the pipe D'. The excess
60 of the oil that passes into the space at the lower end of the cylinder for the purpose of occupying all of the space that is left between the piston and the cylinder at the completion of the downward stroke is forced
65 out through the valve P, and with the air passes through the pipe P to the return-box P². The box P² has in it a valve P⁴, attached to the float P³. The float P³ is so large in comparison with the valve P⁴ that its displacement of oil is sufficient to lift the valve
70 off its seat whenever the oil accumulates in the box P² to a sufficient height. When the valve P⁴ is lifted, as above, the accumulated oil in the box P will pass through the pipe H
75 to the oil-tank C. The top of the box P² is open, so that the air from the pump can freely pass out.

In the above description and accompanying drawing parts not claimed in this application are described and shown that are also described and shown in an application of even date, Serial No. 351,358, filed by us in the United States Patent Office.

We claim—

85 The combination, in a vacuum-pump, of a piston and cylinder, with a filling of deaerated oil adapted to fill all the space under and about the piston within the cylinder at the completion of the stroke of the piston, and thus completely expel all air, substantially as and for the purpose set forth.

ADOLPH BERRENBURG.
WILLIAM E. NICKERSON.

Witnesses:

FRANK G. PARKER,
WILLIAM SEARS.