A. CARR & J. ARTHUR.

CONDENSING PUMPING ENGINE.

No. 184,339. Patented Nov. 14, 1876.

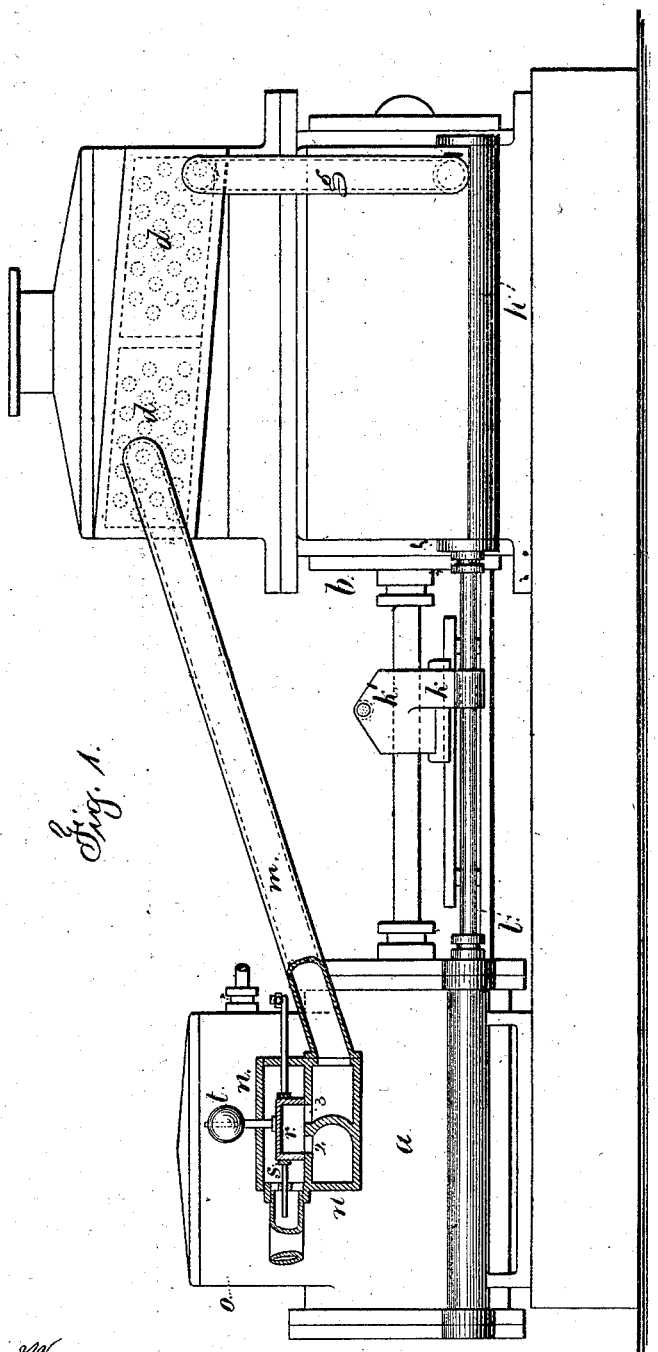

Fig. 1.

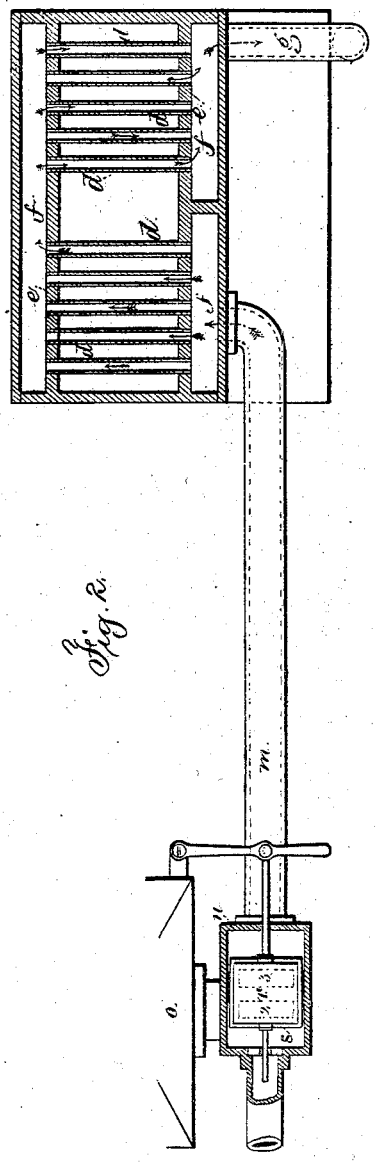

Fig. 2.

Witnesses,
Chas. H. Smith
Harold Serrell

Inventors
Adam Carr.
James Arthur.
per L. M. Serrell

UNITED STATES PATENT OFFICE.

ADAM CARR, OF PATERSON, AND JAMES ARTHUR, OF JERSEY CITY, NEW JERSEY, ASSIGNORS TO SAID ADAM CARR.

IMPROVEMENT IN CONDENSING PUMPING-ENGINES.

Specification forming part of Letters Patent No. **184,339**, dated November 14, 1876; application filed January 17, 1876.

To all whom it may concern:

Be it known that we, ADAM CARR, of Paterson, in the county of Passaic, and JAMES ARTHUR, of Jersey City, in the county of Hudson, both in the State of New Jersey, have invented an Improvement in Condensing Pumping-Engines, of which the following is a specification:

Surface-condensers in which the steam passes through ranges of tubes in a water-space are well known, and condensing pumping-engines have also been made use of. In many instances, such as the water-works of cities, pumping-engines are employed, some of which are low-pressure condensing-engines.

Our present invention relates to the combination, with a pumping-engine, of a surface-condenser, placed in the water-way above the water-pump, an air-pump for removing the water of condensation, and a direct connection to the steam piston-rod, whereby the engine is rendered very compact, and the water passing through the pump in the ordinary manner is rendered operative in the condenser.

We provide a self-acting relief-valve that opens if the pressure from any cause becomes in excess of the atmosphere, and we arrange this valve in such a manner that it may be moved to allow the steam to discharge directly into the atmosphere.

In the drawing, Figure 1 is an elevation of the pumping-engine, with the exhaust-valve and chest in section; and Fig. 2 is a sectional plan of such condenser and valve-chest.

The steam-cylinder *a* and pumping-engine *b* are of any desired character, and we have shown these as direct-acting.

The condenser is made of the tubes *d*, passing through the heads *e*, and these are placed within the water-way of the pump, so that the water, in passing to or from the pump, circulates around these tubes *d* and between the said heads *e*, the passage-ways *f*, for steam and water of condensation, being at the outsides of these heads *e*. We have shown this condenser as placed above the pump, in order that the water of condensation, may run by the pipe *g* to the air-pump *h*, that is operated by an arm, *k*, from the cross-head *k'* of the steam-pump, and the feed-water plunger *l* is also connected to this same cross-head. The pipe *m* conveys the exhaust steam from the engine to the condenser, and by placing a valve-chest, *n*, at the side of the steam-chest *o*, and allowing the steam to pass through the ports 2 and 3 in reaching this pipe *m*, we are enabled to use a valve, *r*, over these ports 2 and 3. This valve *r* is in a frame, *s*, by means of which it can be moved to uncover the port 2 and allow the steam to pass away to the atmosphere; but while this valve is over the ports 2 and 3 it may be lifted in the yoke by surplus pressure, should the condenser not be sufficient to maintain a vacuum, thereby preventing undue back pressure upon the engine, and a weight, *t*, may be employed to keep the valve to its seat with any desired force.

We are aware that a condenser has been combined with two pumps, and that water has been supplied to the condenser by one pump and removed by the other, and that such condenser has been partially a surface-condenser. This construction is complicated and expensive, and the two pumps and the condenser have to be constructed with reference to joint action. In our improvement the pumping-engine is not changed in its character or action, but the water that is pumped goes through the surface-condenser without entering the steam-space thereof, and without any opening between the water-space and steam-space; hence the condenser cannot become filled with condensing-water, nor the vacuum of the condenser affected either one way or the other by the water-pump.

We claim as our invention—

1. The combination, with a pumping-engine, of a surface-condenser, placed in the water-way above the water-pump, an air-pump adjacent to the water-pump, and a connection to the steam piston-rod, substantially as specified.

2. The combination, with a pumping-engine and surface-condenser, of a valve placed in the exhaust passage-way, and arranged to lift automatically by surplus pressure, or to be moved to allow the steam to escape to the atmosphere, as set forth.

Signed by us this 15th day of January, A. D. 1876.

ADAM CARR.
JAS. ARTHUR.

Witnesses:
GEO. T. PINCKNEY,
CHAS. H. SMITH.