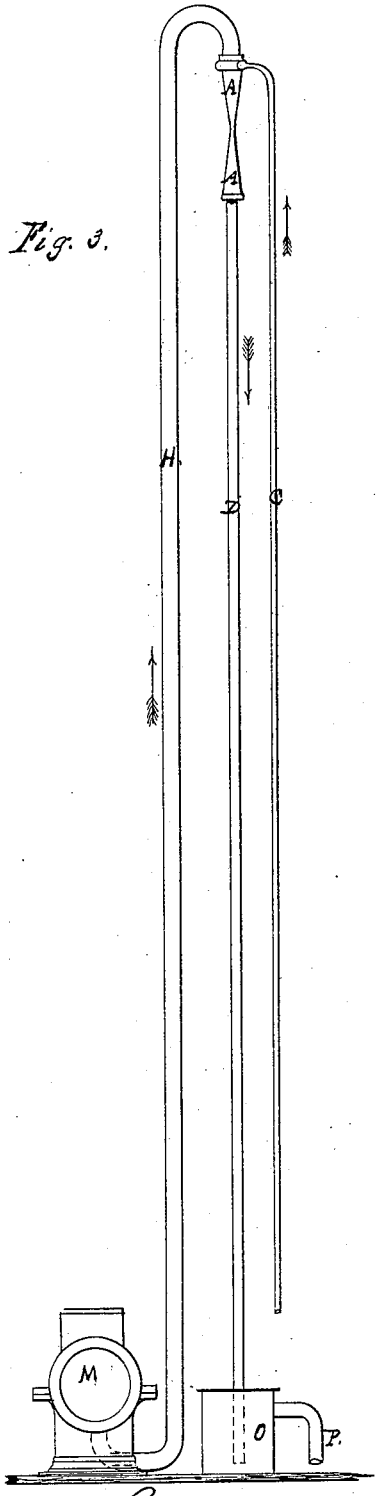
H. W. BULKLEY.

Condenser.

No. 167,642. Patented Sept. 14, 1875.

Fig. 3.



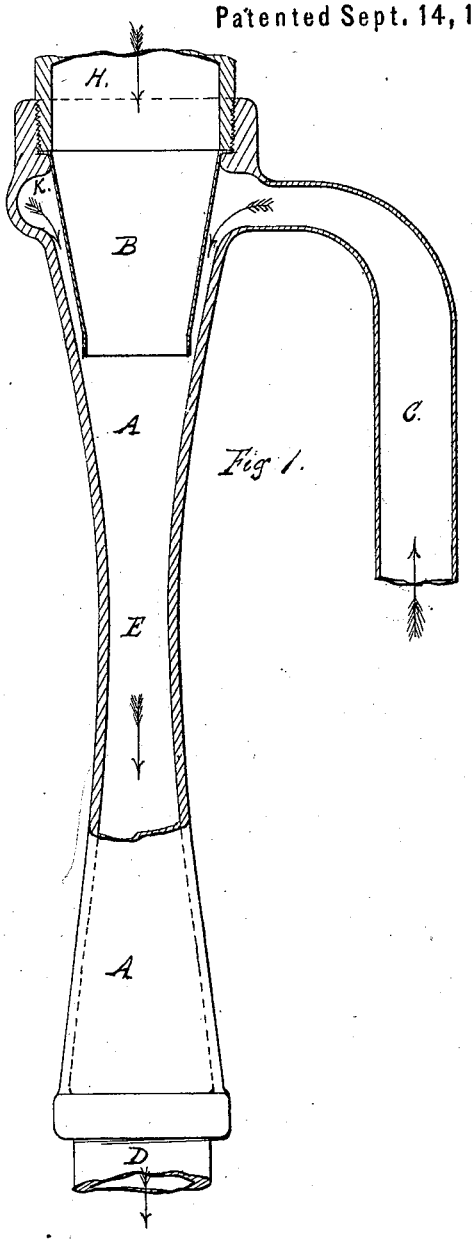


Fig 1.

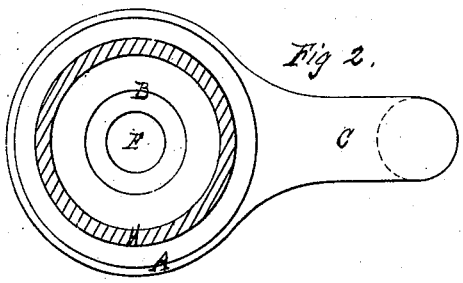


Fig 2.

Witnesses,
J. H. Young
W. Edward Woodruff

Inventor.
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UNITED STATES PATENT OFFICE.

HENRY W. BULKLEY, OF NEW YORK, N. Y.

IMPROVEMENT IN CONDENSERS.

Specification forming part of Letters Patent No. **167,642**, dated September 14, 1875; application filed October 7, 1874.

To all whom it may concern:

Be it known that I, HENRY W. BULKLEY, of the city of New York, in the county and State of New York, have invented certain Improvements in Steam-Condensers, of which the the following is a specification:

My invention relates to that class of steam-condensers which are elevated at least thirty-three feet above their hot-wells; and it consists in a combination of nozzles, pipes, and passage-ways, by means of which the air and uncondensed vapor are expelled, and a partial vacuum maintained in the cylinder of the engine, without the use of an air-pump.

Figure 1 is a sectional view of my invention. Fig. 2 is a plan view of the same. Fig. 3 is an elevation of my condenser with all connections shown, drawn on a smaller scale.

A is the condenser proper, formed of a pair of conoidal nozzles, joined by the contracted neck E. These nozzles should be parabolic in shape to allow an easy flow of the water. B is the exhaust-nozzle with an opening equal to the exhaust-pipe H from the engine, but contracted at the end, so as to increase the velocity of the discharge. H is the exhaust-pipe from the engine M, with which it is connected by a return bend and pipe, as shown in Fig. 3. C is the injection-pipe opening into the hollow ring K, and conveying water to the annular space between the condenser A and nozzle B. D is the delivery-pipe, at least thirty-three feet long, opening into the hot-well O, shown in Fig. 3. P is the overflow from the hot-well. The direction of the steam and water currents is shown by the arrows. The annular water-space around the end of the exhaust-nozzle B, must be proportioned to the amount of water required for condensation, so that the latter may enter in a uniform film around the exhaust steam. The discharge-neck E must also be so shaped as to be entirely filled by the outgoing water, air, and vapor, and thus prevent all return of the latter from below.

A flow of water being supplied through pipe C by a natural or artificial head, (or from a pump,) and the engine started, the exhaust steam is instantly condensed, forming a partial vacuum, into which the following exhaust steam rushes with greatly-increased velocity, expelling the air and uncondensed vapor with the water through the neck E into the enlarged portion of the condenser below, where its velocity is reduced, and it is thus prevented from returning, being drawn out by the outflow through the pipe D. By this action a vacuum of at least twenty-four inches of mercury is continuously maintained in the cylinder of the engine, during its operation, without the use of an air-pump, thus making a considerable saving in power and expense, besides avoiding the danger of flooding the condenser, and thereby damaging the engine, a common fault with ordinary jet-condensers.

Should the supply of condensing-water fail, the engine will then exhaust, without stopping, through the condenser, into the hot-well against the pressure of the atmosphere.

The discharge-water from the hot-well may be used to feed the boiler, or may be led away for any other purpose required.

My invention may be used in connection with a vacuum-pan, steam-pump, or any other steam apparatus requiring a vacuum.

I desire to disclaim using a jet of steam to exhaust the condenser, as in Absterdam's patent, or streams of water forced intermittently or continuously into the condenser, to overcome by their momentum in entering the vacuum, the pressure of the atmosphere, as in Houpt's and other ejector-condensers, nor do I employ the back pressure of the exhaust steam with or without valves. I also disclaim extracting the air and water from the condenser solely by a discharge-pipe thirty-three feet, or more, in height; but

I claim as my invention—

The conical or paraboloidal nozzles and straight connecting neck, as described, in combination with a annular water-opening, when the action is independent of any valve or valves, steam-jets, or streams of water under pressure, but is effected solely by a descending column of discharge-water, sufficiently high to overcome the pressure of the atmosphere, the whole arranged substantially as described.

HENRY W. BULKLEY.

Witnesses:

JOHN H. YOUNG,

A. EDWARD WOODRUFF.