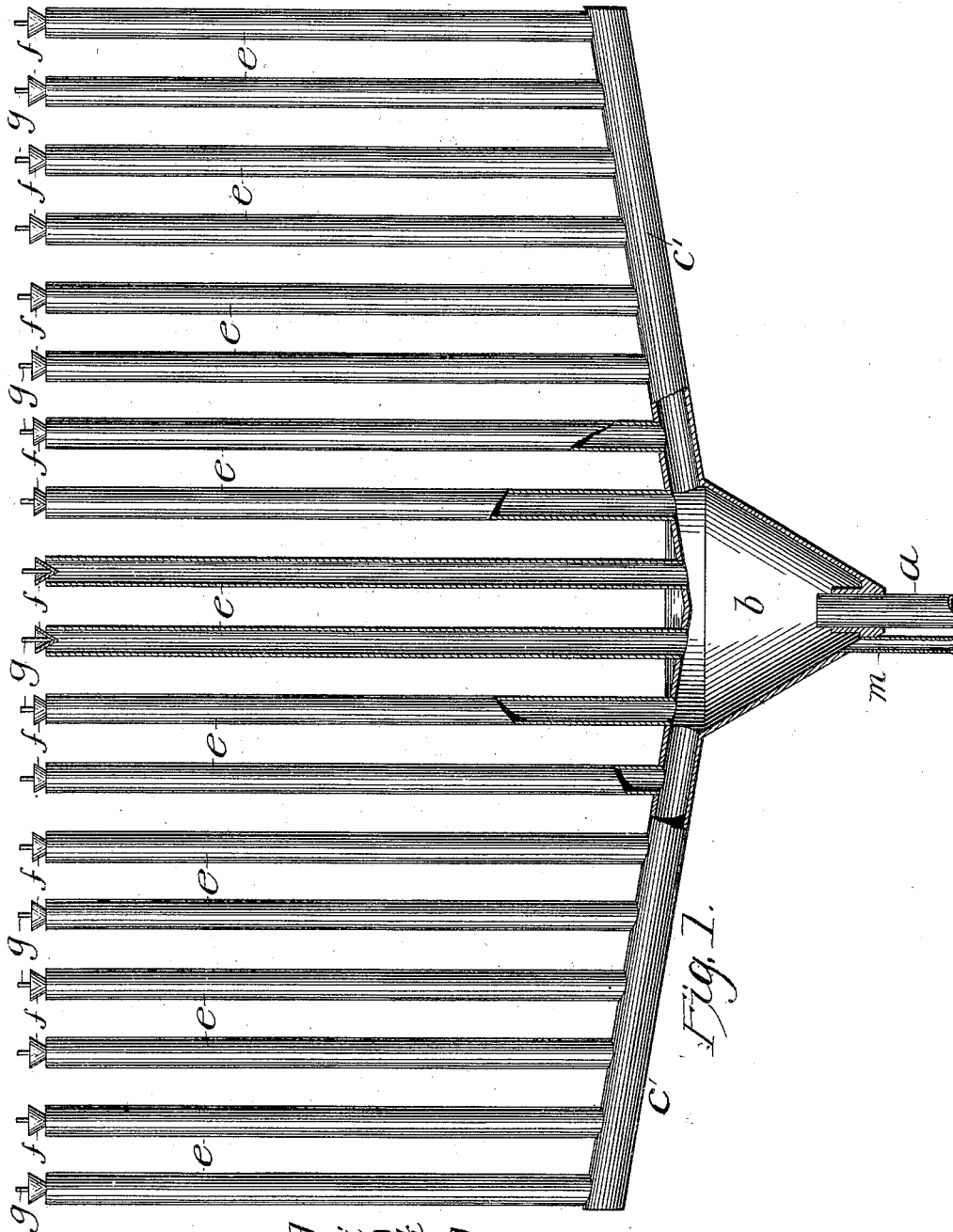


(No Model.)

H. A. WHEELER.
STEAM CONDENSER.

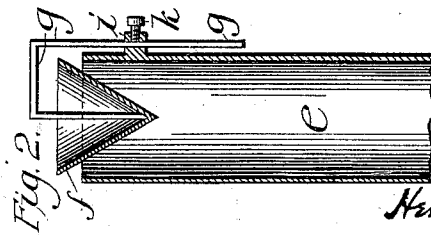
No. 554,384.

Patented Feb. 11, 1896.



Witnesses.

R. D. Shumway
J. Robertson



Inventor.

Herbert Allen Wheeler

UNITED STATES PATENT OFFICE.

HERBERT ALLEN WHEELER, OF ST. LOUIS, MISSOURI.

STEAM-CONDENSER.

SPECIFICATION forming part of Letters Patent No. 554,384, dated February 11, 1896.

Application filed March 21, 1895. Serial No. 542,705. (No model.)

To all whom it may concern:

Be it known that I, HERBERT ALLEN WHEELER, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented new and useful Improvements in Steam-Condensers, of which the following is a specification.

My invention relates to the condensation of exhaust or waste steam from engines and other steam-using devices and the collection of the water resulting therefrom for reuse, and with that object in view my invention consists of the novel devices and combinations hereinafter described and specifically claimed.

In the accompanying drawings, Figure 1 is a longitudinal vertical elevation, partly in section, through one set of condensing-tubes; and Fig. 2 is an enlarged vertical section through one of the throttling dampers or valves.

Similar letters refer to similar parts in both drawings.

The condenser is intended to be attached to the mouth of the exhaust-pipe of engines and other steam-using devices, and the condensation is to be performed by the wind or other cooling-currents. It is therefore preferably located in an exposed position, as above the roof, and the condensation will be more or less complete, according to the size of the condenser, temperature of the cooling-current, and similar modifying conditions.

The condenser consists of the mouth of the exhaust-steam pipe *a*, which opens into a conical or expanding steam-chamber *b*, to which are attached two or more large distributing-pipes *c* and *c'*, and these distributing-pipes connect with a series of cooling-tubes *e*. Fig. 1 shows one such set of distributing-pipes and cooling-tubes symmetrically arranged with reference to the steam-chamber, but another such set, at right angles to the plane of the first series, would usually be used in practice, while a larger number of distributing-pipes, with their respective series of cooling-tubes, can be connected to the one central steam-chamber.

On the top of the cooling-tubes *e* are conical regulating-dampers *f*, which can be so adjusted by the rod *g* and set-screw *h*, working in the slotted stud *i*, as to throttle the size

of the opening of the cooling-tubes to any extent desired. By this means an equal distribution of the steam can be secured in all the tubes, as without such a regulating device most of the steam would pass through the central cooling-tubes immediately over the steam-chamber *b*, and very little would pass out through the distributing-pipes and outer cooling-tubes, with consequent unsatisfactory results.

A drain-pipe *m* connects with the lower part of the steam-chamber *b* to carry off the water of condensation, and the rise or pitch given to the distributing-pipes *c* and *c'* not only facilitates the distribution of the steam, but also the draining of the condensed steam back to *b* and the drain-pipe *m*.

Ample space is left between the cooling-tubes *e* to permit the ready passage of the wind or other cooling-currents between the cooling-pipes, and when there is no wind the vertical position of the cooling-tubes will, on account of their heat, induce rising currents of air, and so maintain effective conditions for condensation in times of calms.

To increase the efficiency of the device, it is made of a good conductor of heat, like sheet-copper, to carry the heat from the steam to the surface of the condenser. To further increase the efficiency of the condenser by accelerating the loss of heat from the surface, the surface is coated with lampblack, white lead, or some other good heat-radiator, to facilitate the loss of heat by radiation.

The distributing-pipes *c* can be of any size, shape or number, and have any pitch or slope.

The cooling-tubes *e* can be vertical or inclined, and cylindrical, corrugated, fluted or have any shape, and be of any length, diameter or number.

The working of the condenser is as follows: The exhaust or waste steam rising through the exhaust-pipe *a* enters the expanding steam-chamber *b*, the shape of which promotes its distribution through the radiating distributing-pipes *c*, of which there can be any number, and these carry the steam to the numerous vertical cooling-tubes *e*, which are of such size and number as to expand the steam down to practically atmospheric pressure and condense nearly or quite all of the steam. An equable distribution of the steam

throughout all the cooling-tubes is secured by adjusting the throttling dampers or valves *f* on the top of each cooling-tube. The water of condensation trickles down the sides of the cooling-tubes *e* into the distributing-pipes *c*, and flows along the bottom of the same to the conical chamber *b*, and thence to the drain-pipe *m*.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination, in a steam-condenser, of

a steam-pipe entering a central steam-chamber, distributing and drain pipes leading from said steam-chamber, series of cooling-tubes leading from said distributing-pipes that open to the air, and a throttling-valve or adjustable damper on each cooling-tube.

HERBERT ALLEN WHEELER.

Witnesses:

F. HENDERSON,

F. CLARK.