

(No Model.)

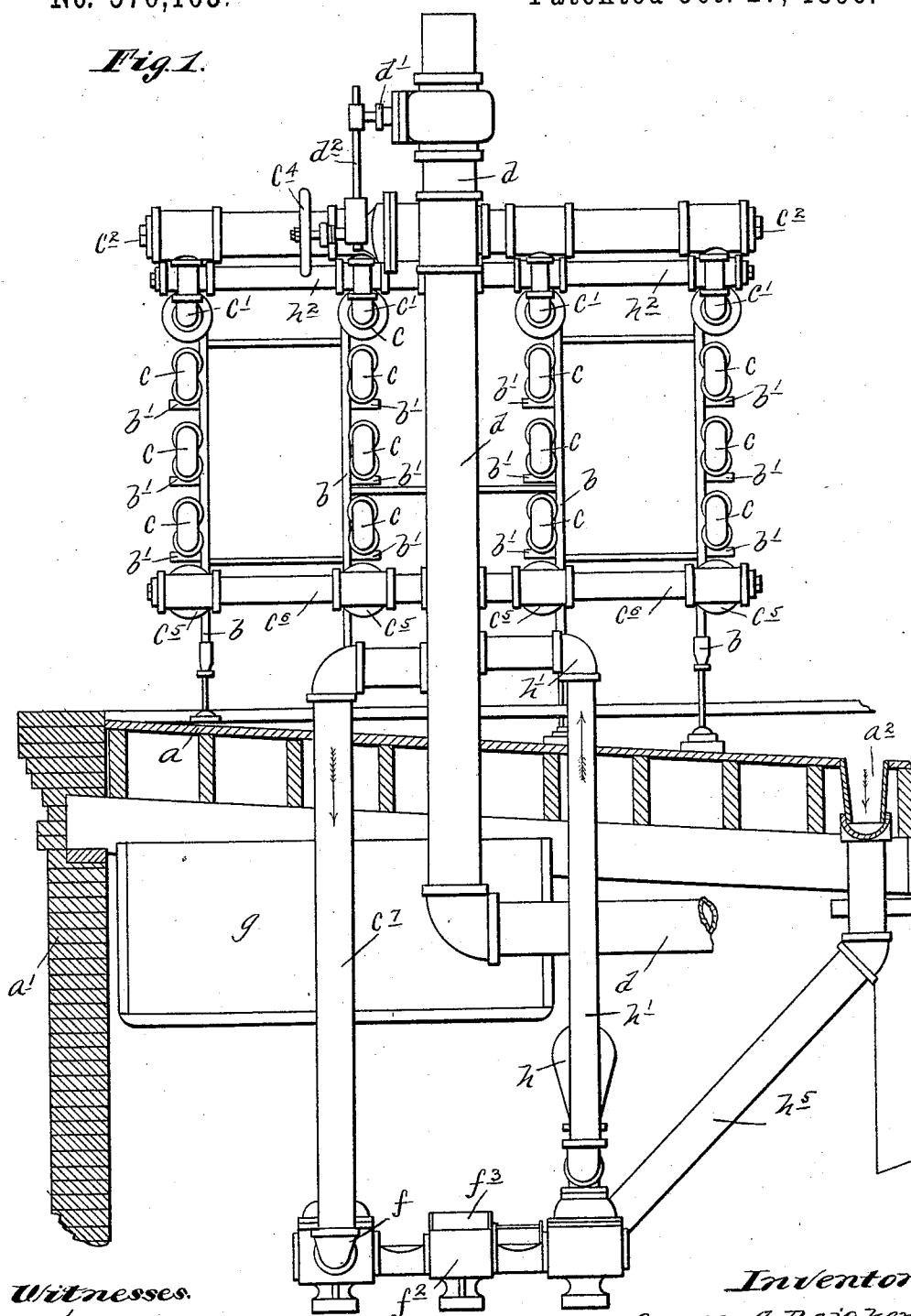
2 Sheets—Sheet 1.

G. A. REICHARD.
CONDENSER.

No. 570,103.

Patented Oct. 27, 1896.

Fig. 1.



Witnesses.

Harry Kilgore.

R. D. Merchant.

Inventor.

George A. Reichard.

By his Attorney.

Jas. F. Williamson

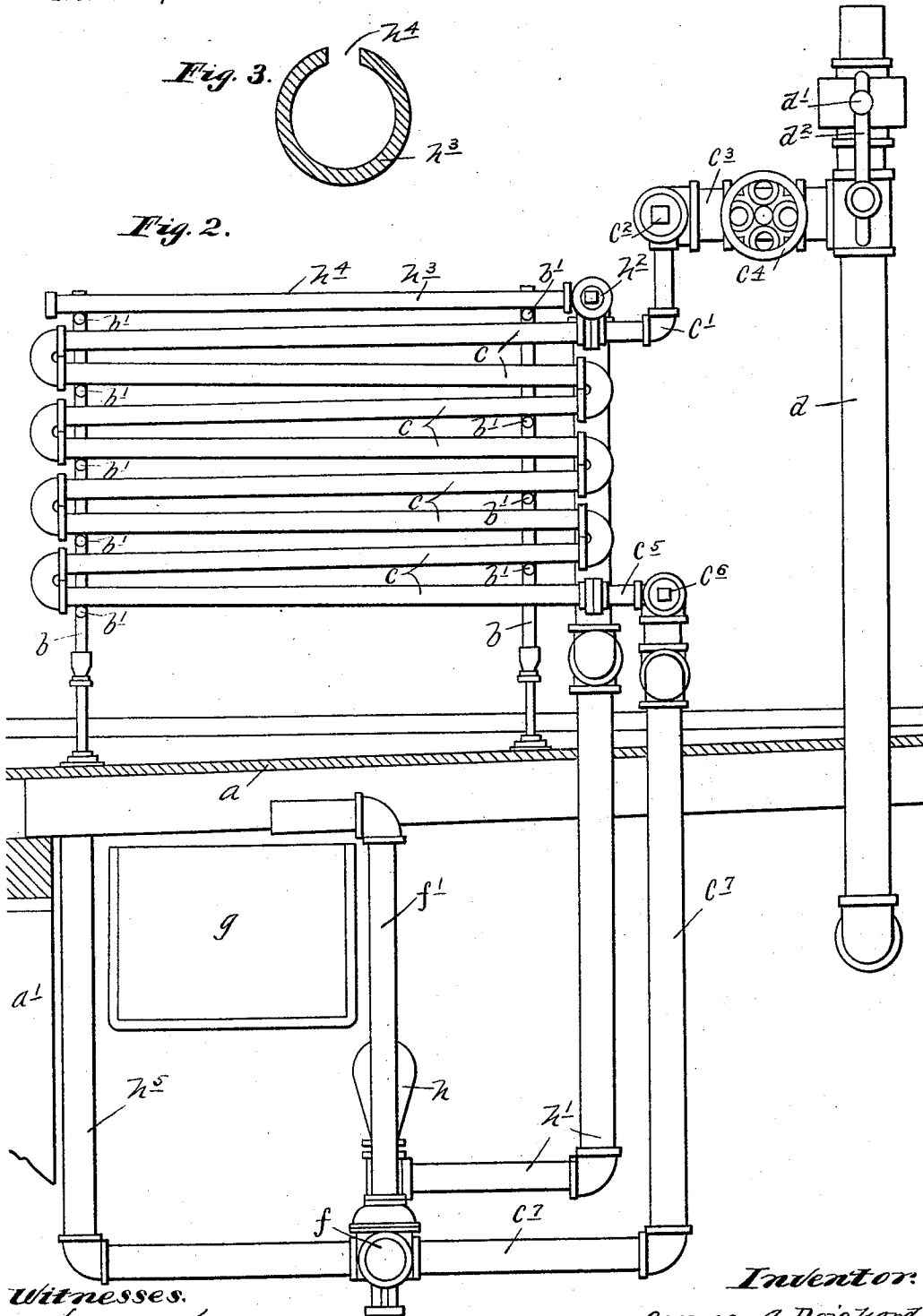
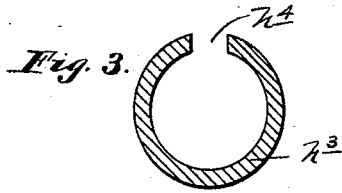
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UNITED STATES PATENT OFFICE.

GEORGE A. REICHARD, OF MINNEAPOLIS, MINNESOTA.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 570,103, dated October 27, 1896.

Application filed October 6, 1894. Serial No. 525,075. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. REICHARD, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Evaporative Condensers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide an improved evaporative condenser for steam-engines.

To this end my invention consists of the novel features of construction hereinafter fully described, and defined in the claim.

To persons skilled in the art the principle on which evaporative condensers operate and the resulting advantages of the same in comparison with other forms of condensers may be assumed to be well known. They enable the condensation of the exhaust-steam from the engine to be effected with a comparatively small amount of cooling-water in comparison with closed-vessel surface condensers, in virtue of the fact that the condensing-surfaces are exposed to the action of air and the air-exposed surfaces are at the same time subjected to a drip-bath of cooling-water. This produces more or less evaporation on the air-exposed surfaces of the condensing-coils or conductors, which, as is well known, takes up for every pound of water evaporated the same amount of heat which is required to condense the equivalent of steam in the condenser into one pound of water. In practice, therefore, the quantity of cooling-water required will be less than the feed to the boiler on account of the additional heat taken up from the condensing steam by conduction and radiation from the condenser into the moving currents of air and into the water itself flowing over the air-exposed surfaces.

There is a special necessity for condensers in localities where the water obtainable for feed is bad in point of materials contained therein, which if uneliminated before the feed to the boiler produce large quantities of scale in the boiler. By the use of an evaporative condenser, such as herein described, substantially all of these foreign materials may be

separated out from the water by the process of distillation in the condenser and the water of condensation be delivered pure into the boiler. The boiler may thereby be maintained at full efficiency for a comparatively long time, with a resulting large economy in fuel and in the cost of maintenance. My condenser was especially designed to meet such adverse conditions in respect to obtainable water as is found in the alkaline districts of the Northwest.

My invention is illustrated in the accompanying drawings, wherein like letters refer to like parts.

Figure 1 is a view of my condenser, chiefly in end elevation, but partly in vertical section, with some parts broken away. Fig. 2 is a left side elevation of the same with some parts in section. Fig. 3 is a cross-section of one of the discharge-pipes of the water-distributor.

Referring to Figs. 1, 2, and 3, it may be noted that I have shown the condenser as mounted with the condensing-coils, &c., on the top of a building wherein the engine (not shown) is supposed to be located. A part of the sloping roof *a* of the building *a'*, being provided with a collecting-trough *a²*, is made to serve as the drainage-deck for collecting the cooling-water, which is passed over the condensing-coil, the upwardly-extended portions of the building-walls *a'* above the roof serving to prevent the cooling-water from passing otherwise than into the trough *a²*. On the said roof or deck are fixed a suitable number of standards *b*, provided with rest-lugs *b'* for supporting the condensing-coils *c*. The said condensing-coils are horizontal return-bend coils and are arranged in stacks on the said supporting-standards *b*. A series of these stacks of coils are provided sufficient in number or extent to afford the requisite amount of surface, and all of the same are connected by suitable unions *c'* at their upper or receiving ends with a steam-header *c²*, which connects by pipe *c³* with the exhaust-pipe *d*, leading from the engine. The pipe *c³* is provided with a stop-cock *c⁴*, and the exhaust-pipe *d* is extended above the pipe *c³* and is provided in its extended part with an automatic relief-valve *d'* *d²* of any suitable construction.

The lower or discharge ends of the coils c are connected by unions c^5 to a return or discharge header c^6 , which in turn is connected by pipe c^7 with the inlet of an air-pump f , which discharges by pipe f' into the hot-well g .

The air-pump f is on a common bed or supporting-frame f^2 , having a water-pump h at its other end and an engine f^3 central of the bed for operating the two pumps, all of which parts relating to the pumps are of well-known standard constructions, not requiring further notice for the purposes of this case. The discharge-pipe h' of the water-pump leads to a water-head h^2 at one end of the series of stacks of condensing-coils c , and the said water-head h^2 has connected thereto a series of discharge-pipes h^3 , located one directly over each stack of the condensing-coils c . The said water-discharge pipes h^3 are top-slotted, as shown at h^4 in Fig. 3. The said parts $h^2 h^3 h^4$ form a water-distributor, which is supplied from the water-pump h , which distributor delivers a continuous drip-bath of cooling-water over the exterior or air-exposed surfaces of the condensing-coils c . Such portions of this cooling-water as are not evaporated are collected on the roof or deck a , whereon the condenser is supported, as hereinbefore noted, and passed through the collecting-trough a^3 into the return-water circulating-pipe h^5 , leading to the inlet of the water-pump. The inlet of the pump will also be connected by a pipe (not shown) with a well or other original source of supply for the addition of the necessary fresh or unused water to replace the loss in the volume of circulating water caused by evaporation at the condenser.

With this system it is obvious that cooling-water will be kept constantly circulating over the air-exposed surfaces of the condenser, and that the exhaust-steam admitted from the engine to the condensing-coils will be condensed into water, and the water of condensation, together with the air contained in the coils, will be exhausted by the air-pump f and delivered through the discharge-pipe f' into the hot-well g , where it will be available for supplying the boiler.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

The combination with the exhaust-pipe d from the engine, of the steam-header c^2 , receiving therefrom, the series of stacks of condensing-coils $c c'$, receiving from said header c^2 , the return or discharge header c^6 receiving from said coils c, c' , the air-pump exhausting from said coils through pipe f , and delivering the condensed water to the hot-well g , or other receptacle, through pipe f' , the water-header h^2 receiving from pipe h' , the slotted discharge-pipe $h^3 h^4$ leading from header h^2 , directly over the stack of coils $c c'$, the water-pump, supplying water to said header h^2 , and the drainage or collecting deck, under the stack of coils, and delivering to the inlet of the water-pump, all substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. REICHARD.

Witnesses:

JAS. F. WILLIAMSON,
E. F. ELMORE.