(No Model.)

C. O. LINDROTH.

CONDENSER.

No. 588,585. Patented Aug. 24, 1897.

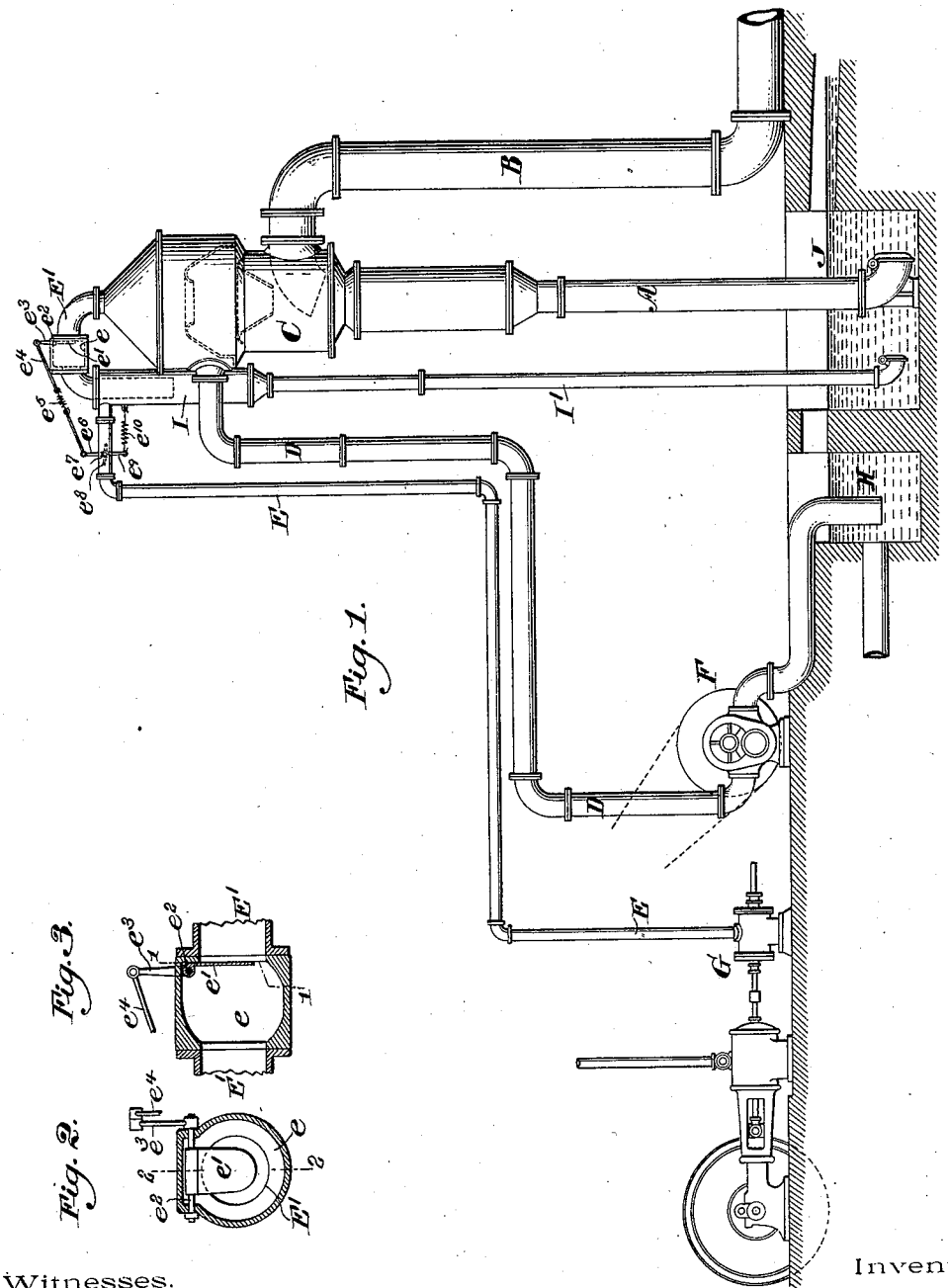


Fig. 1.

Fig. 3.

Fig. 2.

Witnesses.

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CONDENSER.

SPECIFICATION forming part of Letters Patent No. 588,585, dated August 24, 1897.

Application filed August 21, 1896. Serial No. 603,556. (No model.)

To all whom it may concern:

Be it known that I, CARL O. LINDROTH, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Condensers, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction and mode of operation of condensers normally operating as counter-current condensers, but adapted also to operate at intervals as parallel-current condensers, such condensers, in fact, as are described in the patent to F. J. Weiss, dated May 2, 1893, No. 496,761.

The principal object of my invention is to provide means for breaking or lowering the vacuum in the body of the condenser and for the purpose of checking the operation of the condenser as a parallel-current condenser and restoring it to operation as a counter-current condenser, which said means shall not involve the admission of air to the condenser and preferably will leave the exhaust-pipe, or the greater part of the exhaust-pipe, with as high or a higher vacuum than is normally present therein, and I accomplish this result by the simple expedient of providing a throttle by which the communication of the condenser-body with the air-pump can be wholly or partly cut off and with the result of course of immediately lowering the vacuum in the body of the condenser and without flooding the exhaust-pipe and the air-pump with air or vapor at or near atmospheric pressure. The operation of the throttle in the exhaust-pipe may be made automatic—as, for instance, by connecting the throttle with and operating it by the bucket device described in the Weiss patent aforesaid, or the same results may be accomplished by a special mechanical device which I have devised for the purpose.

Reference being now had to the drawings which illustrate my invention, Figure 1 is an elevation of a condenser plant of the Weiss type embodying my invention, Fig. 2 being an enlarged cross-section on the line 1 1 of Fig. 3, and Fig. 3 a cross-section on the line 2 2 of Fig. 2.

C indicates the body of the condenser proper, having a barometric column A, opening into a water-tank J at its base, B being a steam-pipe leading to the lower part of the condenser-body and D a water-pipe leading to the upper part of the condenser-body.

F is the pump, by which water from the reservoir H is forced through the pipe D.

E is an air-exhaust pipe leading from an air-pump G to the top of the condenser-body C. As shown, the portion of the air-exhaust pipe immediately connected with the condenser-body is marked E′, this portion of the air-exhaust pipe extending down into a separator I, as shown in dotted lines, the portion E of the air-exhaust pipe being connected with the upper part of this separator, and I′ indicating a water-barometer waste-pipe at the bottom of the separator I.

In all the above-described features the separator shown in the drawings is substantially the same as the Weiss separator, and the mode of operation is also identical.

My invention consists in providing a throttling device—as, for instance, a damper-valve e^8—which is placed in the air-exhaust pipe, preferably close to the condenser, and preferably also close to but on the bottom side of the separator I, as is shown in the drawings. As shown, the damper-throttle e^8 is secured to a shaft e^7, the shaft and damper being turned through a lever e^6, fastened to the shaft. Obviously the throttling device could be worked by hand or automatically operated upon by a bucket device exactly similar to that shown in the Weiss patent. As shown in my drawings, however, I secure in the pipe E′ and close to the condenser a flap e', pivoted to a shaft e^2 and lying across the pipe E′. Preferably in an enlargement e of the pipe, ample space being provided for the free passage of air around the flap e' to the shaft e^2 of the flap, is secured a lever-arm e^3, and this lever-arm is connected with a lever-arm e^6 of the throttle in any convenient way—for instance, by a connecting-rod e^4, in which I have indicated the presence of a spring e^5.

When the condenser is working normally, the air and such vapor as it carries with it pass through the pipe E′ without moving the flap e', the gaseous nature of the fluids permitting them to escape freely around the sides of

the flap and without exercising any considerable pressure against the flap. In case, however, the condenser ceases to work as a counter-current condenser and begins to work as a parallel-current condenser the water then passes through the pipe E′ with the air. Then the heavy fluid, striking against the flap e', will push it upward, causing it and shaft e^2 to turn and, through the shaft and lever e^3, closing the damper e^8 either partially or wholly, and, obviously, this entire or partial cutting off of the condenser from the air-pump will promptly check the action of the condenser as a parallel-current condenser, and as soon as the water ceases to flow through the pipe E the flap will return to normal position and in doing so reopen the throttle in the exhaust-pipe and restore the normal working condition of the condenser.

It will be observed that the situation of the throttle e^8 at a point near the condenser and at a distance from the air-pump will when the throttle closes practically transform the exhaust-pipe E into an exhaust-receiver, and obviously the opening of the throttle by throwing this exhaust-receiver at once into active operation with the condenser-body will promote a prompt return to normal and proper working conditions.

My described device for operating the throttle may of course be used for operating a valve in any part of the condenser system.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of condensing steam and other vapors which consists in exhausting or rarefying the air in the condenser by the action of an air-pump, causing the condensing water and steam to pass through the condenser in counter-currents alternating with parallel currents, and temporarily decreasing the vacuum in the condenser when said condenser works by parallel currents and thus causing it to resume condensation by counter-currents by cutting off the free communication of the air-pump with the condenser without decreasing the action of the air-pump.

2. The method of condensing steam and other vapors which consists in exhausting or rarefying the air in the condenser by the action of an air-pump, causing the condensing water and steam to pass through the condenser in counter-currents alternating with parallel currents, temporarily decreasing the vacuum in the condenser and increasing the vacuum in the air-pump and connected parts when said condenser works by parallel currents thus causing it to resume condensation by counter-currents by cutting off the free communication of the air-pump with the condenser without decreasing the action of the air-pump and on resumption of condensation by counter-currents rapidly lowering the vacuum in the condenser by reopening its connection with the air-pump and connected parts in which a high vacuum has been temporarily created as aforesaid.

3. In combination with a counter-current condenser having an air-exhaust pipe leading therefrom, a throttle in said air-exhaust pipe and means for closing said throttle actuated by an excessive flow of water through the air-exhaust pipe from the condenser.

4. In combination with a counter-current condenser, an air-pump and an air-exhaust pipe leading from the condenser to said pump and adapted to serve as an exhausted receiver when closed, a throttle in said air-exhaust whereby the free communication of the condenser therewith can be cut off and means for temporarily closing said throttle when the condenser ceases to work by counter-currents and opening it when the condensers resume normal operation.

5. In a counter-current condenser having an air-exhaust pipe a hinged flap as e' situated in the air-exhaust pipe across the line of motion of fluid moving therein and means for transmitting motion actuated by said flap.

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