(No Model.)

C. O. LINDROTH.

CONDENSER.

No. 588,586. Patented Aug. 24, 1897.

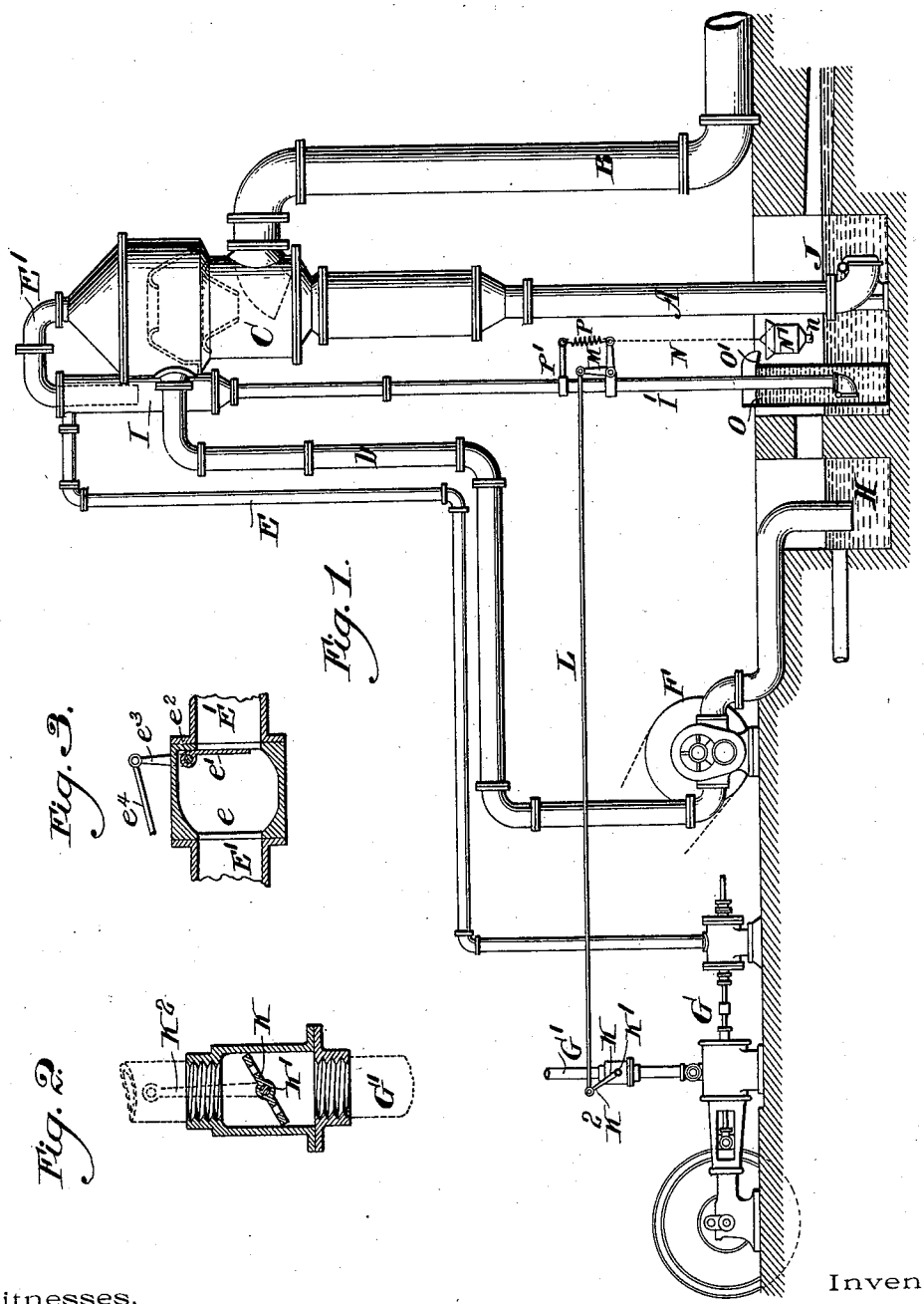


Fig. 1.

Fig. 3.

Fig. 2.

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CONDENSER.

SPECIFICATION forming part of Letters Patent No. 588,586, dated August 24, 1897.

Application filed August 21, 1896. Serial No. 603,557. (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 certain new and useful Improvements 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 which normally operate as counter-current condensers, but are also adapted 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.

In the Weiss condenser the tendency of counter-current condensers when working near the point of greatest efficiency to suddenly change to a parallel-current condensation is taken into consideration and provision made, in the first place, to prevent the flooding of the air-pump, which is liable to occur by reason of the flow of water into the exhaust-pipe, and, in the second place, Mr. Weiss provides for automatically causing the flow of water into the exhaust-pipe to effect such changes in the vacuum as would result in the prompt return to normal condensation by counter-currents.

The object of my invention is to accomplish the same automatic return from condensation by parallel currents to condensation by counter-currents which Mr. Weiss accomplishes, but to do so in a novel way—viz., by causing the flow of water in the air-exhaust pipe to effect an immediate slowing down of the action of the air-pump, which, by causing the vacuum in the condenser-body to fall, will result in the resumption of condensation by counter-currents, whereupon the air-pump will be promptly restored to normal action. The mechanical device by which the flow of water into and through the air-exhaust pipe is made to act upon and regulate the action of the air-pump may be of any convenient kind. That shown in Mr. Weiss's patent aforesaid will be found efficient and well adapted for the purpose, and it is illustrated in connection with the drawings showing my improvement, and I have also indicated another device for accomplishing the same result, which device forms in part the subject-matter of an application for Letters Patent filed August 21, 1896, Serial No. 603,556. Again, the device by which the speed of the air-pump is directly effected may be of any well-known and convenient character. I prefer, however, such a device as will result in slowing down the action of the pump rather than entirely stopping it, and have illustrated in my drawings perhaps the simplest form of regulating device—viz., a throttle-valve in the steam-supply of the air-pump.

Reference being now had to the drawings, Figure 1 is a side elevation of what may be properly termed a "Weiss condenser" provided with my improvement and adapted to work in accordance with my invention. Fig. 2 is a longitudinal sectional view through the steam-supply pipe of the air-pump, showing a throttle-valve such as I prefer to use, and Fig. 3 is a sectional view of another device which may be conveniently used to regulate the action of the air-pump.

A indicates the waste-water-barometer column of the condenser, B being the steam-supply pipe leading to the condenser, C the condenser-body, D the water-supply pipe leading to the condenser, E and E′ the air-exhaust pipes leading from the top of the condenser-body to the air-pump G, F indicating the water-pump, H the cold-water-supply tank, and J the waste-water tank. The pipe E′ instead of forming a direct continuation of the pipe E extends down into a separator I, from the top of which leads the pipe E and from the bottom of which extends a water-barometer column I′, opening, as shown in Fig. 1, into a tank O, from the top of which leads a spout O′, from which water runs into a suspended bucket N′, having a small-sized opening *n* in its bottom. As shown, the bucket N′ is supported by a chain M from one arm of the bell-crank lever N, which through a rod L connects with a lever-arm K^2, secured on a spindle K′ of a throttle-valve K in the steam-pipe G′. A spring or equivalent device P, which, as shown, is secured to a bracket P′ and to the lever N, holds the bucket N′ and the valve K in normal position, the tension

of the spring being such that when the bucket N′ fills with water it will yield, permitting the throttle-valve K to close.

When the condenser is working in normal manner—that is, by counter-currents—little or no water will pass into the pipe I′, and the amount of flow from the spout O′ of the tank O into the bucket N′ will pass freely out of the opening *n*. When, however, the condenser throws over, so to speak, to condensation by parallel currents, then substantially all the water entering the condenser through the pipe D passes through the pipe E′ into the separator I, and thence through the pipe I′ and out of the spout O′. This abnormal flow of water would not escape through the opening *n* of the bucket N′, but will immediately fill the bucket and through the connecting mechanism described result in slowing down the motion of the air-pump, which, as already stated, will, by decreasing the vacuum in the condenser-body, cause it to return to condensation by counter-currents.

As already stated, I do not, except where my claims specifically call for such limitations, intend to limit myself to the use of any particular device for obtaining motion from the flow of water into the air-exhaust pipe or any particular device for the slowing down of the air-pump. Many such devices will occur, as a matter of course, to a competent engineer or mechanic.

I have in Fig. 3 of my drawings shown a device which may be used alternately with the bucket device shown in Fig. 1. This consists of a plate e', set in an enlargement e of the pipe E′ and pivoted on a shaft e^2, so as to normally lie across the pipe E′, as shown. A lever-arm e^3, connected with the shaft e^2, connects in turn with a rod L, and, obviously, while ample room may be left for the passage of air and vapor around the plate e', a considerable body of water striking against it, which would occur when the condenser changed to condensation by parallel currents, would push it forward, turning the shaft e^2, and through it and the rod L effecting the desired slowing up in the action of the air-pump.

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 constant sucking action of an air-pump causing condensing water and steam to pass through the condenser in counter-currents alternating with parallel currents and temporarily decreasing the sucking or exhausting action of the air-pump when the condenser works by parallel currents in order to lower the vacuum in the condenser and cause it to resume condensing action by counter-currents, all substantially as specified.

2. In combination with a counter-current condenser an air-pump and an air-exhaust pipe connecting the condenser-body and pump, a device for checking the motion of the air-pump, a device arranged as described to be moved when the condenser works by parallel currents and means for transmitting motion from said device to the device for checking the motion of the air-pump, all as specified and so as to break the action of the condenser whenever it changes from counter to parallel current condensation.

3. In combination with a counter-current condenser an air-pump and an air-exhaust pipe connecting the condenser-body and pump, a throttle-valve in the steam-pipe of the air-pump, a device arranged as described to be moved when the condenser works by parallel currents and means for transmitting motion from said device to the throttle-valve all as specified and so as to break the action of the condenser whenever it changes from counter to parallel current condensation.

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