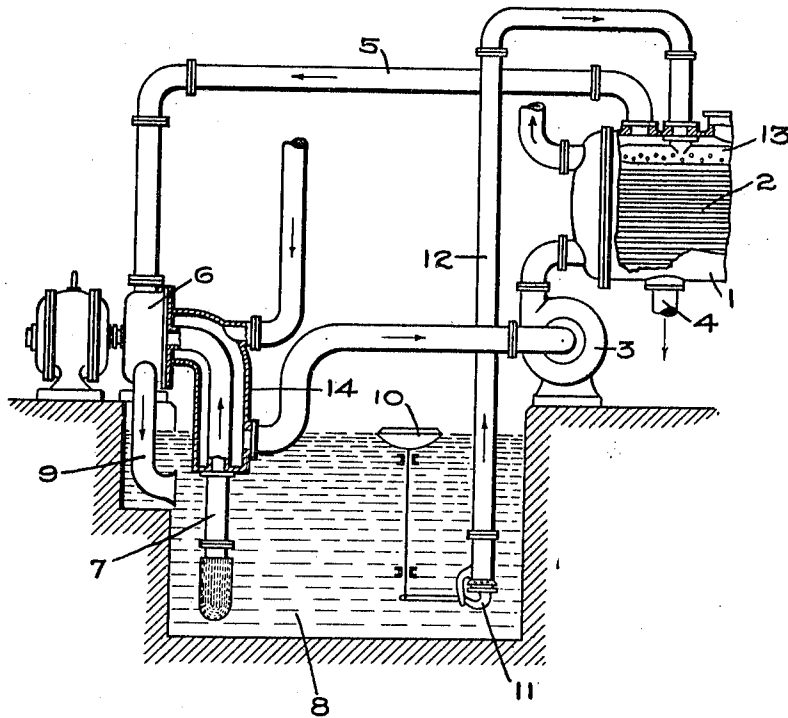


W. KIESER.
SURFACE CONDENSER.
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1,020,702.

Patented Mar. 19, 1912.



Witnesses:

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Inventor,
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UNITED STATES PATENT OFFICE.

WALTER KIESER, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY,
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SURFACE CONDENSER.

1,020,702.

Specification of Letters Patent. Patented Mar. 19, 1912.

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To all whom it may concern:

Be it known that I, WALTER KIESER, a citizen of Switzerland, residing at Berlin, Germany, have invented certain new and useful Improvements in Surface Condensers, of which the following is a specification.

This invention relates to apparatus for condensing steam, and its object is to return to the boiler the water removed from the condenser by the air pump.

In drawing off the uncondensed gases from a condenser by means of a centrifugal air pump of the water-throwing type, more or less steam is unavoidably carried into the pump where it is condensed by the throwing water and passes off therewith to the tank from which the pump draws its supply. The boiler is thus robbed steadily of its water, while the throwing water is heated by the hot water of condensation.

Both of these results are objectionable, and the present invention aims to return this excess of water to the boiler and maintain a constant level in the throwing-water tank. Means are provided also for keeping down the temperature of the throwing water.

The invention comprises a pipe entering the upper part of the condenser and also dipping below the surface of the water in the throwing-water tank, with a valve controlled by a float in said tank, so that when the water rises above a predetermined level said valve will be opened and the vacuum in the condenser will draw up the water until its level in the tank has lowered to normal again.

The accompanying drawing illustrates diagrammatically a system embodying my invention.

The condenser 1 is a closed receptacle into which the steam to be condensed is admitted. It is traversed by tubes 2 through which cooling water is circulated by a pump 3. The water of condensation passes off through the pipe 4. The uncondensable gases are drawn off through a pipe 5 by the centrifugal air pump 6, which is of the water-throwing type and sucks up its water through a pipe 7 from a tank 8. The steam which happens to be drawn out of the condenser at the same time with the uncondensable gases is condensed in the centrifugal air pump by means of the throwing water, and flows out of the pump with the throw-

ing water through the pipe 9 into the tank 8. By reason of this the water level rises in the tank and gradually lifts a float 10 attached to a valve 11 at the lower end of a pipe 12 which leads from the tank into the upper part of the condenser, where it is preferably provided with a perforated distributor 13. When the valve opens, the vacuum in the condenser sucks up water from the tank until its level sinks to normal again, and the valve closes. The amount of water so drawn off thus corresponds very closely to the amount of steam condensed in the air pump. This operation is repeated continuously at intervals, so that the loss of boiler water is automatically made up.

If it is deemed important to keep the throwing water as cool as possible, the suction opening of the pipe 12 must be located just below the surface of the water in the tank 8, because the warm water of condensation coming from the centrifugal air pump will rise to the upper part of the tank. If, on the other hand, it is desired to supply cool water to the condenser, the suction opening of the pipe 12 must be farther down: more as shown in the drawing.

It is desirable to keep the throwing water as cool as possible, and this may be accomplished by surrounding the intake pipe 7 with a jacket 14 through which flows the cooling water supplied to the condenser by the circulating pump 3. In passing through the air pump the temperature of the throwing water is raised about half a degree, but the withdrawal of the warm water from the upper part of the tank, together with the action of the water in the cooling jacket, results in maintaining an approximately constant temperature for the water supplied to the centrifugal pump.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

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

1. The combination with a surface condenser, of means for circulating cooling water through it, an outlet for condensation

water, a centrifugal water-throwing air-pump connected with the steam space therein, said pump acting to raise the pressure of air and gas received from the condenser to atmospheric pressure, and means for automatically returning to said steam space the water resulting from the condensation of steam drawn off by said pump with the air and other uncondensed gases.

2. The combination with a surface condenser, of means for circulating cooling water through it, an outlet for condensation water, a centrifugal water-throwing air-pump connected with the steam space therein, said pump acting to raise the pressure of the air and gases received from the condenser to atmospheric pressure, a tank from which said pump draws water and to which the discharge therefrom returns, and means for automatically returning water from said tank to the steam space of said condenser.

3. The combination with a surface condenser, of a centrifugal water-throwing air-pump connected therewith, a tank from which said pump draws water and to which its overflow returns, and means for automatically returning to said condenser from said tank a quantity of water approximately equal to that resulting from the condensation of the steam drawn off by said pump.

4. The combination with a surface condenser, of a centrifugal water-throwing air-pump connected therewith, a tank from which said pump draws water and to which its overflow returns, a pipe connecting the water in said tank with the condenser, a valve controlling said pipe, and means for automatically opening said valve when the level of the water rises above normal in said tank.

5. The combination with a surface condenser, of a centrifugal water-throwing air-pump connected therewith, a tank from

which said pump draws water and to which its overflow returns, a pipe connecting the water in said tank with the condenser, a valve controlling said pipe, and a float directly connected to said valve to open the same when the water level rises above normal.

6. The combination with a surface condenser, of a centrifugal water-throwing air-pump connected therewith, a tank from which said pump draws its water and to which its overflow returns, a circulating pump connected with said condenser, and means whereby the cooling water supplied to said circulating pump is caused to cool the water supplied to said centrifugal air-pump.

7. The combination with a surface condenser, of a centrifugal water-throwing air-pump connected therewith, a tank from which said pump draws water and to which its overflow returns, a jacket surrounding the intake pipe of said pump, and a circulating pump having its supply pipe connected with said jacket.

8. The combination with a surface condenser, of means for circulating water through it to condense the steam, an outlet for the condensation water, a centrifugal water-throwing air-pump connected with the steam space therein, said pump acting to condense a limited amount of steam and to raise the pressure of air and gas received from the condenser to atmospheric pressure, means permitting air and gas to separate from the discharge of said pump, and means for returning the water caused by the condensation of said limited amount of steam by the pump to the steam space of the condenser.

WALTER KIESER.

Witnesses:

OTTO GLÖWING,
FRIEDRICH SASS.