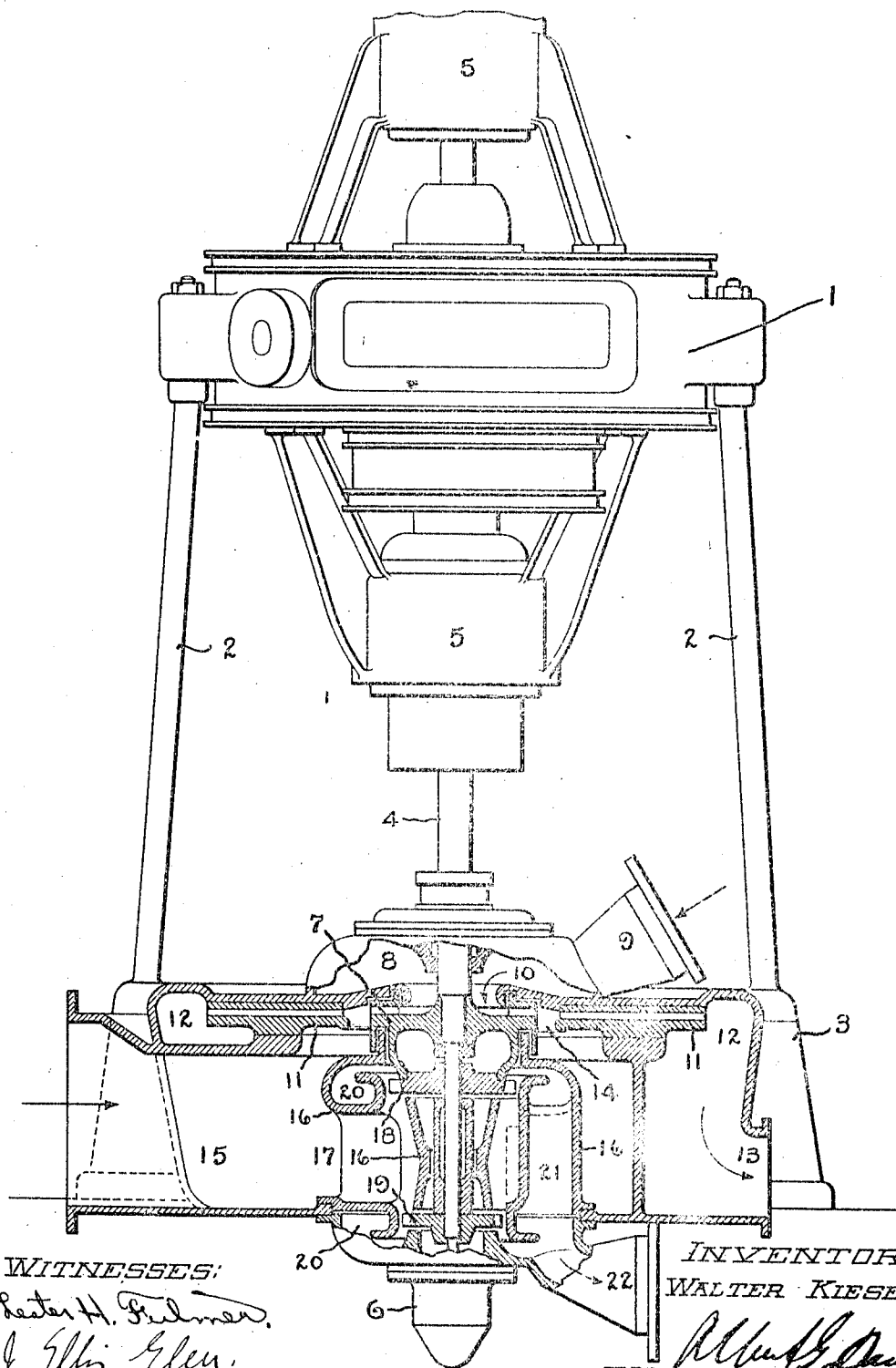


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CENTRIFUGAL PUMP FOR ABSTRACTING AIR AND WATER FROM SURFACE CONDENSERS.
APPLICATION FILED SEPT. 2, 1909.

1,020,701.

Patented Mar. 19, 1912.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL PUMP FOR ABSTRACTING AIR AND WATER FROM SURFACE CONDENSERS.

1,020,701.

Specification of Letters Patent.

Patented Mar. 19, 1912.

Application filed September 2, 1909. Serial No. 515,905.

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 Centrifugal Pumps for Abstracting Air and Water from Surface Condensers, of which the following is a specification.

This invention relates to centrifugal pumps, and especially to those used in connection with surface condensers in steam plants.

The object of the invention is to abstract effectually from the condenser the water of condensation and the air. This is accomplished in the present instance by two centrifugal pumps, one for the water and the other for the air, arranged upon a common vertical shaft and supplied by a single conduit which conveys both the water and the air. The air-pump is located above the water pump, and is of the "throwing" type, that is, one in which water ejected by centrifugal force from the periphery of a rapidly rotating runner, crosses an air gap between said runner and a stationary concentric guide ring having outwardly-extending passages through which said water moves in the form of pistons, with short columns of air pocketed between them. The air-gap opens downwardly in order to communicate with the upper part of the horizontal conduit through which the air and water flow from the condenser. The conduit is large enough to permit the air to rise to its top where it will readily enter the gap in the air-pump and be trapped by the water pistons. The water pump is below the air pump and receives the water flowing through the lower part of the conduit. This pump is preferably of the ordinary rotary or centrifugal type, with radial or curved vanes on the periphery of a wheel or wheels. There may be a plurality of such wheels, one above the other, to handle successively greater quantities of water. The air and water pumps have independent delivery pipes. The pump is driven in any suitable manner, preferably by an electric motor sup-

ported above said pump and having its rotor 50 mounted on the shaft of the pump.

The accompanying drawing is an elevation, partly in section, of my improved pump.

The driving motor 1 is supported on standards 2 rising from a hollow base 3 in which are housed the air pump and the water pump. The vertical shaft 4 of the motor is journaled in bearings 5, and is extended down through the base to a suitable step bearing 6. The runner or impeller 7 of the air pump is secured to the shaft just below the top of the base, and receives its throwing water from a chamber 8 immediately above it, which is supplied through a pipe 9 and delivers through a mouth 10 concentric with the shaft. In the same plane as the impeller is the stationary guiding means 11 whose outwardly-extending passages open into an encircling chamber 12 which has an exit 13. Between the periphery of the impeller and the inner edge of the guiding means is an air gap 14 which opens downwardly into a large conduit 15 through which the air and the water of condensation flow from the condenser. The dimensions of this conduit are such that it serves as a separator for the air and the water, the air collecting at its top where it can readily enter the air gap 14 and be caught by the throwing water ejected by the runner or impeller and driven off through the chamber 12 to the exit 13.

Situated within the conduit 15 is the casing 16 of the rotary water pump, having a lateral opening 17 to admit the water thereto. This casing is concentric with the shaft and has at its upper and lower ends openings in which are located the pump wheels 18 and 19, each provided with propeller blades to urge the water through said openings. The lower opening is at or below the level of the bottom of the conduit, while the upper opening is near the top of the conduit. It follows that the lower wheel will always be in service, while the upper one will come into use automatically when the conduit runs nearly full of water. If desired, a

greater number of wheels may be used, but I prefer two. The upper wheel 18 is preferably larger than the lower to give it a greater peripheral speed, so that it may be able to handle all the water coming to it when the conduit fills up. Each wheel delivers into an annular chamber 20, the two chambers being connected by a duct 21 and discharging at 22.

The operation is obvious from the foregoing description, but may be briefly recapitulated as follows: The throwing water is supplied to the runner 7 from above through the pipe 9 and the mouth 10, while the air and water of condensation flow along the conduit 15 which is common to both pumps. The air rising to the top of the conduit passes up through the gap 14 in front of the delivery of the runner 7, so that said air is forced by the throwing water into the passages of the guide ring 11, where it is compressed and is carried off by the exit 13. The water of condensation flowing along the bottom of the conduit 15 is, according to the amount thereof, forced either through the lower opening of the casing 16 by the wheel 19, or through the upper opening also by the wheel 18, entering the chambers 20 and passing off by the pipes 21 and 22. The advantage of this construction is that only one supply conduit is needed, and moreover, either one or more water pump wheels are automatically brought into service according to the quantity of water to be handled.

The broad idea of a centrifugal air pump and a rotary water pump with a common conduit means of supplying air to the air pump and water to the water pump, is not claimed herein because it forms the subject matter of my application for Letters Patent, Serial No. 515,904, filed September 2, 1909.

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 centrifugal air pump, of a rotary water pump, said pumps having a common vertical axis, and a common horizontal conduit for supplying air to the air pump and water to the water pump, said air pump being located adjacent the upper portion of conduit and receiving air therefrom and the water pump being located

adjacent the lower portion of conduit and receiving water therefrom.

2. The combination with a centrifugal air-pump, of a rotary water pump located below the air-pump, and a common conduit supplying water to the lower pump and air to the upper pump.

3. The combination with a centrifugal water-throwing runner, of a guiding means concentric therewith, a rotary water pump below said runner, and a common conduit communicating at its upper part with the gap between the runner and the guiding means, and at its lower part with the water pump.

4. In combination, a horizontal conduit conveying air and water of condensation, said conduit serving to separate the air and water, the air collecting at the top of the conduit and the water at the lower portion of said conduit, a centrifugal air pump mounted on the top of the conduit to draw air therefrom, and a centrifugal water pump connected to the lower portion of the conduit for removing water therefrom.

5. In combination, a centrifugal air pump having its axis vertical, a centrifugal water pump in line with the air pump and arranged below it, and a horizontal conduit conveying air and water of condensation whose outlet end enters the region between said pumps, the conduit serving to separate the air and water and deliver air to the air pump and water to the water pump.

6. The combination with a conduit conveying air and water of condensation, of a centrifugal water-throwing air pump communicating with the upper part of said conduit, a rotary water pump communicating with the lower part thereof, and comprising a plurality of wheels, one above the other.

7. The combination with a conduit conveying air and water of condensation, of a vertical shaft, a centrifugal water-throwing air-pump runner on said shaft above said conduit and communicating therewith, and a rotary water pump having a wheel at or below the level of the bottom of said conduit and communicating therewith.

8. The combination with a conduit conveying air and water of condensation, of a vertical shaft, a centrifugal water-throwing air-pump runner on said shaft above said conduit and communicating therewith, a rotary water pump having a wheel at or below the level of the bottom of said conduit and communicating therewith, and a second wheel at or near the level of the upper part of said conduit.

9. The combination with a horizontal conduit conveying air and water of condensation, of a vertical shaft passing through the same, a centrifugal water-throwing air-

pump runner on said shaft above said conduit and communicating with the upper part thereof, a casing in said conduit communicating therewith, and two rotary water
5 pump wheels on said shaft within said casing, one near the bottom of said conduit and one near the upper part thereof.

In witness whereof, I have hereunto set my hand.

WALTER KIESER.

Witnesses:

OTTO GLÖWING,
FRIEDRICH SASS,