

Aug. 15, 1939.

H. VORKAUF

2,169,934

FORCED CIRCULATION VAPOR GENERATOR

Filed Feb. 14, 1939

Fig. 1.

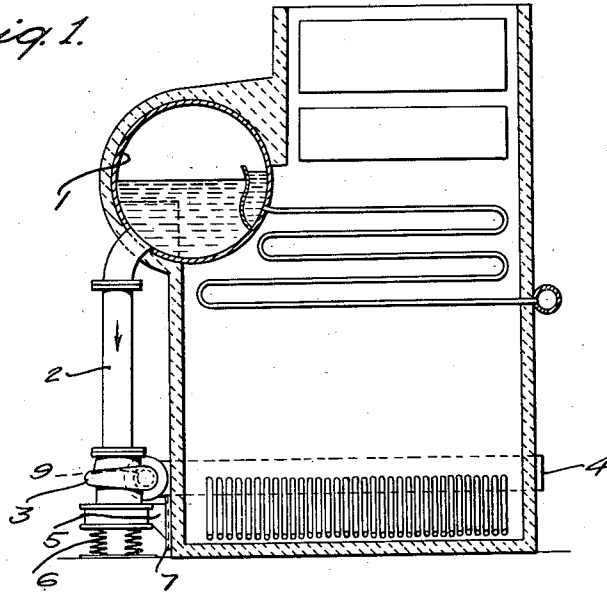
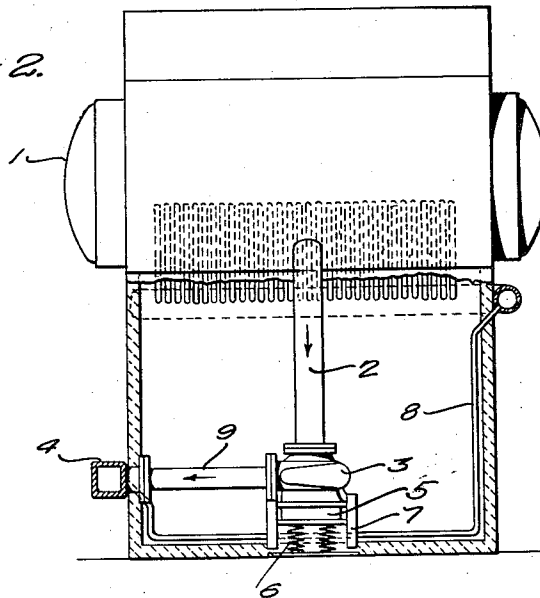


Fig. 2.



INVENTOR
Heinrich Vorlauf
BY
Hansel & Spencer, Dafford
ATTORNEYS

UNITED STATES PATENT OFFICE

2,169,934

FORCED CIRCULATION VAPOR GENERATOR

Heinrich Vorkauf, Berlin, Germany, assignor to
La Mont Corporation, New York, N. Y., a corporation of New York

Application February 14, 1939, Serial No. 256,333
In Germany July 1, 1936

2 Claims. (Cl. 122-411)

This invention relates to heat exchangers and particularly to vapor generators having forced liquid circulation, and a general object of the invention is to insure the constancy of the liquid circulation.

Generally in steam generators having forced water circulation the water to be circulated flows from a drum in which separation of steam and water takes place, or in which the water separated elsewhere is collected, to the circulating pump. With this arrangement, if there be not between the drum and the circulating pump a sufficient difference in height, for example because of lack of space in the building in which the steam generator is located, then it may happen that with the dropping of the steam pressure in the generator the conduit to the circulating pump may carry a steam and water mixture and thereby either stop the propelling action of the circulating pump or at least considerably disturb it.

The present invention aims so to construct and arrange the connections between the circulating pump and the drum from which the pump receives the water to be circulated in steam generators having forced circulation that the hot water to be circulated enters the propelling mechanism of the circulating pump with a downwardly directed flow. By such a construction and arrangement not only are the flow relations in the entire tube system most favorable, but provision is made for the escape of any steam bubbles that might otherwise attach themselves in front of the entrance to the pump and which might result in an unfavorable and insufficient water input.

Among the advantages of the invention are that it makes possible the construction of forced circulation steam generators with relatively small elevation of the boiler water in respect to the circulating pump and, moreover, it permits the utilization of circulating pumps operating with a higher number of revolutions per minute, which pumps are usually both lighter and less expensive.

One of the advantages of employing lighter and faster pumps, which contributes also to the carrying out of the invention, is that such pumps may be suspended immediately from the conduit thereto coming down from the drum. The pump housing can then be slidably connected with the boiler support or scaffolding. For relieving the weight thus hung upon the drum, load-relieving means, such, for example, as springs under the pump housing, may be provided.

Other objects and important features of the invention will appear from the following description and claims when considered in connection with the accompanying drawing in which—

Figure 1 is an end elevation of a forced circulation steam generator, somewhat diagrammatically shown, embodying the present invention, and

Figure 2 is a side view thereof.

In the illustrative embodiment of the invention the water to be circulated runs from the drum 1, fastened to the boiler scaffolding or support 7, through the conduit 2 to the circulating pump 3 and is forced by this pump into the distributor 4. From the distributor 4 the water goes in a known manner into the different tube coils 8 and the steam and water mixture produced is then discharged back into the drum 1.

Figure 1 particularly shows how extraordinarily simple is the tube system for a steam generator embodying the present invention. The circulating pump 3 is preferably a centrifugal pump, with its axis arranged vertically, and it is suspended from the conduit 2 which in turn is suspended from the drum 1. The pump housing can be slidably connected with the boiler scaffolding or support 7 through a slide bar 5 and, to relieve the weight upon the connections to the drum, compression springs 6 may be provided. It is also obvious that the pump housing could likewise have its weight counterbalanced by tension springs.

Advantageously the suction conduit 2 and the pressure conduit 9, which runs from the pump 3 to the distributor 4, stand as nearly as possible at right angles to each other.

From the foregoing description it will be apparent that the intake conduit 2 of the present invention, thus constructed and arranged so that it is vertical, short and without essential curves, permits any steam bubbles appearing in the water or other working medium to rise up into the drum 1, thus insuring a constant solid water head on the propelling means of the pump 3 whereby a constant uniform propulsion of the water or other working medium is assured.

What is claimed as new is:

1. A forced circulation vapor generator comprising, in combination, a drum in which the liquid separated from the vapor is collected, a centrifugal circulating pump connected to the liquid storage space of the drum and arranged to turn about a vertical axis, said connection comprising an intake conduit so arranged that the entire flow of the liquid from the drum is downwardly directed to the center of the propelling mechanism of the pump and along the

axis thereof, a pressure conduit from said pump running at substantially right angles to the direction of the intake conduit, said pump being suspended from the lower end of said intake conduit and through said conduit from the drum, and means for yieldingly counterbalancing at least a portion of the weight of said suspended pump.

2. A forced circulation vapor generator comprising, in combination, a drum in which the liquid separated from the vapor is collected, a support for said drum, a centrifugal circulating

pump turning about a vertical axis and connected to the liquid storage space of the drum, said connection comprising an intake conduit so arranged that the entire flow of the liquid from the drum is downwardly directed to the center of the propelling mechanism of the pump and along the axis thereof, said pump being suspended from said conduit and through said conduit from the drum and having means forming a sliding connection with said support.

HEINRICH VORKAUF.