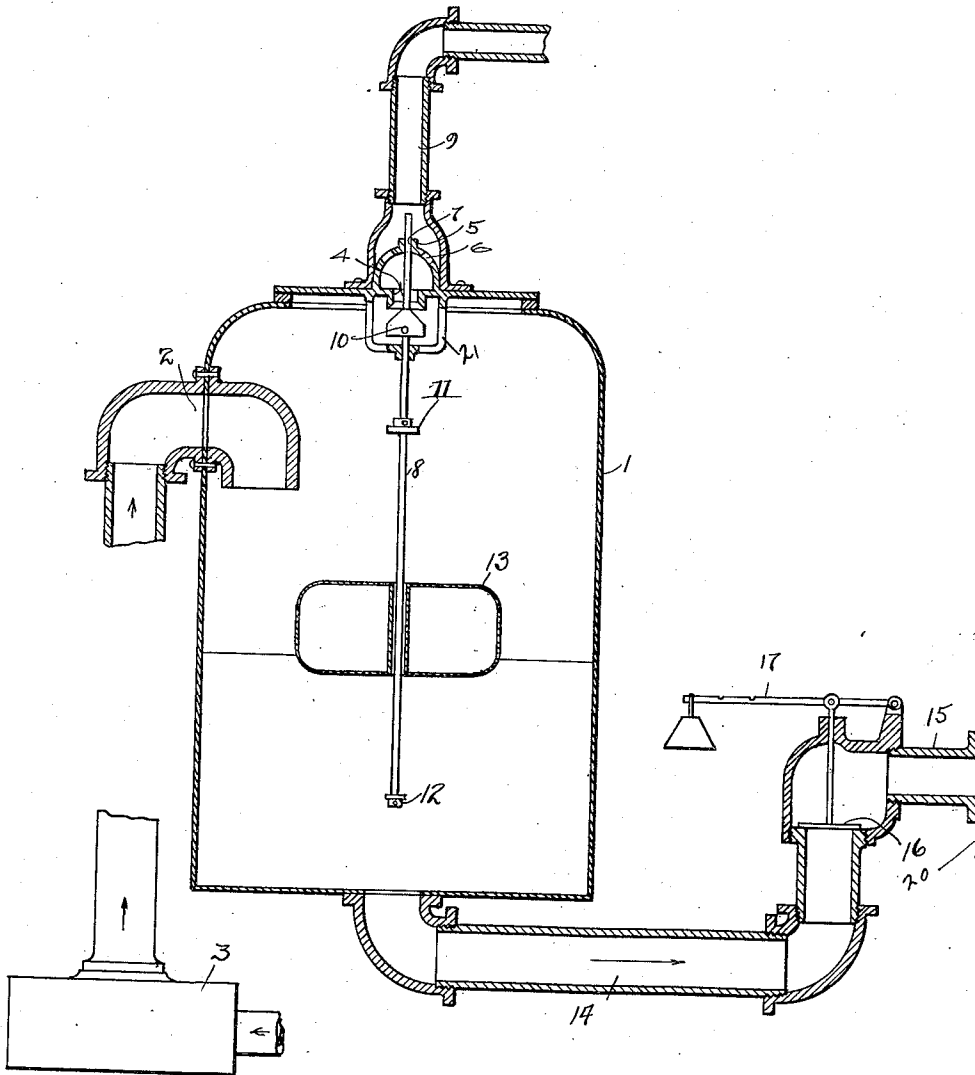


T. H. SCHUTT.
SEPARATING TANK.
APPLICATION FILED MAY 31, 1912.

1,116,931.

Patented Nov. 10, 1914.



WITNESSES =

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SEPARATING-TANK.

1,116,931.

Specification of Letters Patent.

Patented Nov. 10, 1914.

Application filed May 31, 1912. Serial No. 700,825.

To all whom it may concern:

Be it known that I, THEODORE H. SCHUTT, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Separating-Tanks, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relates to a liquid separating tank for use in a vacuum steam system. In such a system, the steam is introduced to the pipes and radiators at a pressure of less than fifteen pounds above the atmosphere, and is then returned to the boiler by means of a vacuum pump, which is connected with the return line at a point adjacent to the boiler. The steam is condensed while passing through the coils of the radiators, and the fluid which is returned to the boiler is composed, therefore, of air and water. The air in the return line must be separated from the water before it is sent to the boiler. It has been customary to separate the water from the air by means of a tank which was placed above the boiler, and which would fill with water and would then be emptied by means of mechanism which would equalize the pressure between the boiler and this tank, by admitting steam from the boiler. A valve was then opened, in a pipe connecting the two, thus permitting the water to drop into the boiler. The steam which would enter the tank was, however, lost, as it had to be expelled from this tank, to permit of the entrance of more water. Another system included a collecting tank and a boiler feed pump in addition to the vacuum pump. The boiler pressure is so low that a steam pump cannot be operated, and two electrical pumps were required, which was a considerable expense. The present invention does away with this loss of steam, or additional pump, thus increasing the efficiency to a considerable extent.

To the accomplishment of these and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail, certain mechanism embodying the invention, such dis-

closed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—the figure is a vertical central section through my device, showing its connection to an air pump, a drain, and the boiler.

The liquid drain tank 1, is provided with an inlet conduit 2, which will be connected to a pump 3, of any suitable construction. This pump will be connected to the return line of the system, and will draw in the air and the water from this return line. The upper end of the inlet conduit 2 is bent downwardly in order to prevent the water from being carried into the air outlet passage by the draft of air. In the upper portion of the drain chamber there is an opening 4, about which is mounted a yoke 5 having apertures 6 for the passage of air, and an aperture 7 in which is slidably held a rod 8. To this yoke is attached a conduit 9, which will lead to a drain or sewer. A second yoke 21 is mounted on the under side of the top of this chamber, about the aperture 4, and is apertured like the yoke 5 to permit the passage of the air, and to guide the rod 8. Fixedly mounted on this rod 8, is a stopper 10, adapted in one position of the rod to close the opening in the top of the chamber, a suitable beveled seat being formed upon the under side of the cover. Two stops 11 and 12 are disposed at the points indicated upon this rod, and a float 13 will be slidably mounted upon the rod and will be operated by the level of the liquid in the drain chamber.

Connected to the bottom of the drain chamber is a liquid discharge conduit 14, which will be connected to the conduit 15 extending from the boiler 20. A normally closed valve 16 is mounted in this conduit, and it is a matter of indifference as to whether this valve is a weighted or spring-pressed valve.

The general construction of my device now having been described, the operation will be explained.

As the air and water enter the drain chamber through the conduit 2, the water will fall to the bottom, and will fill the conduit 14 as far as the valve 16. This valve is kept closed by the weight, and also by the pressure in the boiler, which will be about the usual pressure used in such a system.

As the water rises in the drain chamber, it will operate the float, forcing the same vertically up the rod 8, until it contacts the stop 11, and thus raises the rod, closing the opening in the top of the casing by means of the stopper 10. Up to this time, the air has been allowed to escape through the openings in the two yokes 5 and 21, and through the opening in the top of the chamber. The air outlet now having been closed, the pressure in the chamber will be built up until it is more than the pressure in the boiler, by reason of the air which is being pumped into the chamber by the pump 3. The pressure will build up to a point at which it is sufficient to overcome the boiler pressure, and also to overcome the pressure exerted by the weight 17 on the valve 16. If upon closing of the air outlet the pressure in the chamber does not quickly rise high enough to overcome the pressure on valve 16, the inlet opening will be sealed to further entrance of gas and the incoming liquid will compress the gas above it sufficiently to produce a pressure greater than that on valve 16. This valve will then be forced open, but the valve in the top of the chamber will still be closed, and the pressure will continue substantially constant until the water has drained out of the chamber into the boiler, by reason of the constant incoming supply of air and water from the pump. The float will, of course, follow the level of the liquid, and upon reaching the lower stop 12, its weight will force the rod 8 downward, thus opening the valve in the top of the chamber, and permitting the escape of the air. The operation will then be repeated, and is, of course, automatic at all times.

The advantages of the present construction are its simplicity and its ready attachment to the boiler and to the pump. There is nothing to get out of order, and no complicated valves have to be installed to permit the escape of either the air or the water.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. The combination of a liquid drain chamber, having an inlet opening directed downwardly and disposed intermediate the top and bottom of the casing and an outlet opening for liquids; valve means normally

closing said liquid outlet opening; a valve in said gas opening; a float operable by the liquid level in said chamber and adapted upon operation to close said gas opening valve, thereby causing an increase in pressure due to the incoming flow of mixed liquid and gaseous fluid, said liquid opening valve being adapted to operate at a predetermined pressure; said inlet opening being so disposed that it is sealed upon the rise in liquid level in said chamber, thereby preventing further admission of gaseous fluid.

2. The combination of a liquid drain chamber, having an inlet opening directed downwardly and disposed intermediate the top and bottom of the casing; an outlet opening for gas disposed in the top of said chamber and an outlet opening for liquids; valve means normally closing said liquid opening; a stopper having a rod attached thereto and adapted to close said gas opening; a float slidably mounted on said rod, two stops mounted one at the upper and one at the lower end of said rod; said float being adapted upon the rising of the liquid level in said chamber to contact said upper stop, thereby raising said rod; said gas opening being thereby closed and thus causing an increase in the pressure in said chamber due to the incoming liquid sufficient to open said liquid opening valve, said float being adapted upon being lowered to contact said lower stop, thereby opening said gas valve; said inlet opening being so disposed that it is sealed upon the rise in liquid level in said chamber, thereby preventing further admission of gaseous fluid thereto.

3. The combination of a liquid drain chamber, having an inlet opening for mixed, liquid and gaseous fluids, an outlet opening for gas and an outlet opening for liquids; valve means normally closing said liquid outlet opening; a valve in said gas opening; a float operable by the liquid level in said chamber and adapted upon operation to close said gas opening valve, thereby causing an increase of pressure in said chamber due to the incoming flow of mixed, liquid and gaseous fluid, said liquid opening valve being adapted to operate at a predetermined pressure; and means adapted to vary the operating pressure required for said last-named valve.

Signed by me this 29th day of May, 1912.

THEODORE H. SCHUTT.

Attested by—

HORACE B. FAY,
CHAS. S. QUAY.