

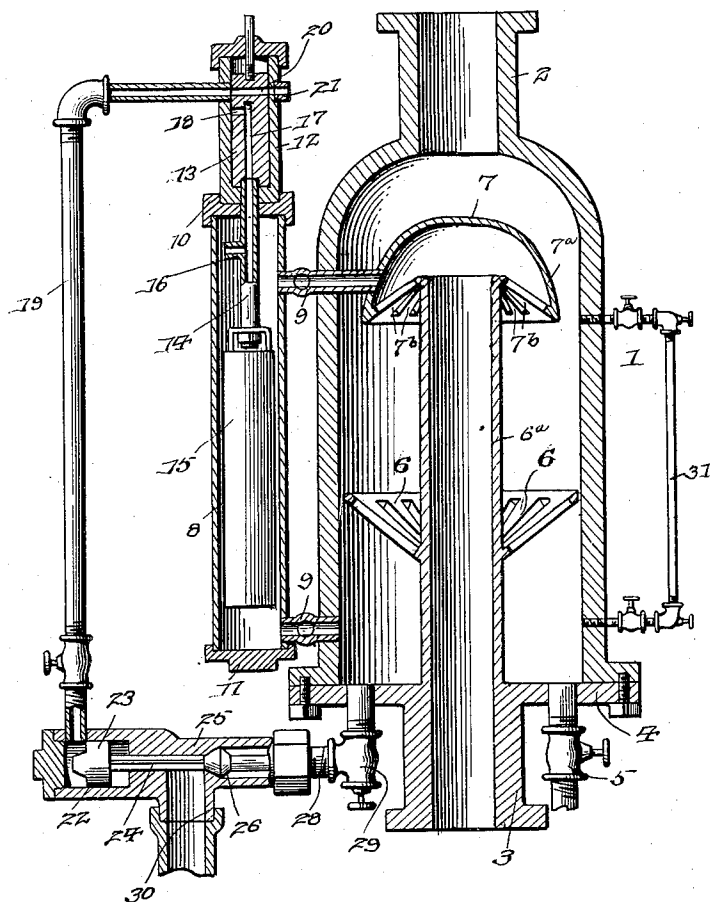
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Patented Dec. 4, 1900.

W. H. REYNOLDS.
STEAM AND WATER SEPARATOR.

(Application filed June 18, 1900.)

(No Model.)



Witnesses
F. E. Alden
Chas. S. Hoyer.

W. H. Reynolds Inventor
by C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM H. REYNOLDS, OF GALVESTON, TEXAS.

STEAM AND WATER SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 663,099, dated December 4, 1900.

Application filed June 18, 1900. Serial No. 20,743. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. REYNOLDS, a citizen of the United States, residing at Galveston, in the county of Galveston and State of Texas, have invented a new and useful Steam and Water Separator, of which the following is a specification.

This invention relates to an improved steam and water separator or eliminator for obtaining a supply of dry steam to an engine or like machinery, and has for its object to provide an apparatus of this character having simple and efficient means for eliminating water, entrained moisture, grease, or other impurities from steam at any pressure and automatically discharge the water of condensation and other impurities from the trap and permit the steam to pass in a thoroughly-dry condition to the point of use.

To this end the invention primarily contemplates improvements in the construction of the steam and water separators disclosed in application filed August 4, 1898, Serial No. 676,420, and in Patents No. 634,659, dated October 10, 1899, and No. 651,012, dated June 5, 1900, and has in view improved means for collecting the water of condensation in the separator-casing and controlling and preventing splashing of the same.

With this and other objects in view the invention consists in the construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In the drawing, the figure represents a vertical sectional view of a steam and water separator embodying the features of the improvement.

The numeral 1 designates an upright casing having upper and lower inlet and outlet necks 2 and 3, the lower neck 3 being formed with a base-flange 4, bolted to the lower extremity of the casing. The base-flange has a drain-cock 5 depending from one portion thereof, and to an opposite point mechanism, which will be hereinafter set forth, is connected. The necks 2 and 3 are coupled to a line of piping carrying the supply of steam to be subjected to the separating action of the separator and flowing off from the latter after treatment. The interior of the casing at an intermediate point is provided with downwardly-directed ribs 6 to prevent the water

of condensation from splashing upwardly after it once goes down in the lower part of the separator, and thereby avoid affecting the steam in the upper portion of the latter. The said ribs are in the form of an inverted conical grate integrally formed with a vertically-arranged pipe or tube 6^a, centrally and removably positioned in the trap, and rises from and is integral with the lower neck 3, and at its upper extremity, directly under the inlet-neck 2, the said pipe or tube is provided with a baffle-cap 7, which has a depending periphery 7^a overhanging the upper portion of the pipe or tube to prevent the water of condensation from running under the cap into the pipe or tube 6^a and also to form practical means of communication of the pipe or tube with the interior of the casing, and which is accomplished by openings between a surrounding plurality of ribs 7^b, extending from the lower edge of the cap to the upper portion of the tube or pipe. The ribs 7^b serve as a secondary means for taking moisture from the steam, and this deposit will be caused to flow down toward the edge of the cap, in view of the inclination of the ribs in said direction. The incoming steam first striking the cap 7 will deposit the greater portion of the moisture carried thereby, as well as grease or other impurities, and after passing the ribs 7^b the steam will have become dried and will flow down through the pipe or tube 6^a in such condition into the outlet-piping.

In the use of the separator the lower or bottom portion of the casing 1, which constitutes the water-chamber of the apparatus, is designed to hold sufficient water to operate the improved mechanism, and at any time should it be desired to draw off the water from the casing at the lower portion and blow out the accumulated sediment it can be accomplished by any suitable mechanism for this purpose or either of the mechanisms disclosed in the patents heretofore referred to, and to illustrate a practical separator the one attachment set forth in Patent No. 651,012 is shown in the present instance and comprises a float-cylinder 8, connected to the lower portion of the water-chamber of the trap and to an upper portion of the same by short lengths of pipe 9, the lower pipe being above the bottom of the casing and the upper pipe ex-

tended through the side of the latter and establishing communication with the cap 7. The said cylinder 8 is otherwise tightly sealed and is supplied with upper and lower heads 10 and 11, and, as shown, is disposed vertically, and fixed in the upper head 10 is a valve-chamber 12, having a vertically-reciprocating valve 13 mounted therein and provided with a depending tubular stem 14, movable through the lower end of the valve-chamber and the head 10 and attached at its lower extremity to a closed float 15 of elongated form, which is freely movable in the cylinder 8. The lower extremity of the said valve-stem is closed, and above said extremity said stem is provided with an ingress-port 16 to afford means of communication between the cylinder and the stem and between the latter and the valve 13, by means of a tubular channel 17, formed in said valve and in communication with a port 18. To the upper portion of the valve-chamber 12 the upper end of a steam-pipe 19 is attached, and the port 18 of the valve 13 is adapted to coincide with the entrance-opening of the said steam-pipe into the valve-chamber, or said steam-pipe may communicate with a transverse port 20 in the upper portion of the valve 13, by means of which direct communication may be set up with an exhaust-pipe 21 for use in relieving back pressure from a cylinder 22, with which the lower extremity of the steam-pipe 19 is connected. The said cylinder 22 is disposed horizontally and below the plane of the bottom of the water-chamber of the separator and has therein a piston 23, with a winged stem 24, working through the valve-casing 25 and operating to control or open the main trap-valve 26. This trap-valve regulates the communication between a pipe 28, having a valve 29, and connected to the base-flange 4 and to a discharge-pipe 30 to provide means for running off the water of condensation or other accumulated matter in the water-chamber. The area of the piston 23 is greater than that of the trap-valve 26 for a purpose which will be presently set forth, and at a point opposite the position and connection of the cylinder 8 with the separator the latter has a gage 31 connected thereto for obvious reasons.

The operation of the improvement is very simple and is as follows: When the reservoir is relieved of water, the valve 13 is down in the position shown and the upper extremity of the pipe 19 is arranged in communication with the exhaust-pipe 21 by the transverse port 20 of the said valve, and whereby the steam is exhausted from the cylinder 22 subsequent to an operation of a nature that will now be particularly described. As the water of condensation is slowly relieved or drawn from the water-chamber or lower portion of the separator, the float 15 is slowly lowered in the cylinder 8 and pulls down the valve 13 to the position shown. This position of the valve permits the steam to be ex-

hausted from the cylinder 22, as before stated; and at a proper time the valve 26 is closed. As the water of condensation again rises in the chamber, by running off the baffle-cap it enters the cylinder 8 through the lower pipe 9, and when it has risen in the said cylinder about two-thirds of the height of the float 15, or until said portion of the float is submerged, the float will commence to rise with the water and through the medium of the stem 14 gradually raise the valve 13, and thereby close the exhaust-pipe 21 and the communicating opening of the steam-pipe 19, and said upward movement of the valve 13 will continue until the port 18 comes in line with the ingress-opening of the steam-pipe 19 of the valve-chamber to thereby admit steam to the cylinder 22. The steam passes through the upper pipe 9 from the baffle-cap and through the port 16 of the hollow stem 14 into the channel 17 of the valve 13 and out the port 18 to the said steam-pipe. The steam entering the cylinder 22 acts against the piston 23 and forces it over toward the right, and by means of the stem 24 the said piston opens the valve 26 and permits the water of condensation to be drained from the water-chamber.

The bore of the pipe 9 being smaller than the connection with the valve 29 to the base-flange 4 provides for a slower fall of the water in the cylinder 8 than in the casing or separator, and by this means the valve 13 is caused to slowly descend with the depression of the float 15, so that the water will all be drained from the trap before exhaustion of the steam from the cylinder 22 and a consequent closing operation of the valve 26. At the time exhaustion of the steam from the cylinder 22 takes place the parts are arranged as before set forth and shown, and when the steam-pressure is relieved from the piston 23 the internal pressure from the casing will seat the valve 26. The valve 26 will remain in its closed position until the float 15 again rises to such a point as to move the valve 13 and establish steam communication with the cylinder 22, and in the proportions of the piston 23 and valve 26 care should always be exercised in making the piston of such area as to overcome the resistance set up by the valve or the pressure behind the same.

To the upper end of the valve 13 a rod or stem 32 is connected and extends any suitable distance above or away from the top of the casing 12 for operation by hand to raise the float and control the separator in this manner whenever desired or found necessary.

The pipes 9 are also provided with valves 33, one in each, for shutting off communication between the blow-out mechanism and the separator-casing in the event that it becomes necessary to correct any irregularity in said blow-out mechanism without disturbing the separator-casing and its parts. By disconnecting the flange 4 the tube 6^a, cap 7, and ribs 6 can be simultaneously withdrawn

or afterward reset in proper position. By introducing the grated ribs 6 in the manner set forth the separator can be practically used in steamships or on locomotive-engines, as the vibration of the same will not defeat the operation of the improved device in view of complete obstruction of upward splashing of the water of condensation therein.

The improved form of the device is compact and will take up less room than those set forth by the patents hereinbefore mentioned and is equally effective in operation, and it will be understood that changes in the form, size, proportions, and minor details may be resorted to without departing from the principle of the invention.

Having thus described the invention, what is claimed as new is—

1. In a steam and water separator, a casing having an upper and a lower steam inlet and outlet, a steam-conveying pipe or tube extending from the bottom upwardly into the casing and having a baffle-cap on the upper extremity thereof and an intermediate inverted conical grate, and means for relieving the casing of water of condensation.

2. In a steam and water separator, a casing having an upper and a lower steam inlet and outlet, a steam-conveying pipe or tube extending from the bottom upwardly into the casing and having a baffle device on the upper extremity thereof which permits communication with the upper part thereof and an intermediate open device to prevent upward splashing of the water of condensation, and means for relieving the casing of water of condensation automatically controlled by the rise of the water of condensation in the casing.

3. In a steam and water separator, a casing having a steam inlet and outlet and a pipe or tube extending centrally upward thereinto

from the bottom and terminating short of the top, an upper closed baffle-cap on the pipe or tube having a lower open portion below the upper terminal of the latter to permit communication with the said pipe or tube, and means controlled by the level of the water of condensation in the casing for automatically relieving the casing of said water and having communication with the upper closed portion of the cap and the lower portion of the casing.

4. In a steam and water separator, a casing having upper and lower steam inlet and outlet, a steam-conveying pipe or tube extending from the bottom upwardly into the casing and provided with a baffle-cap having a periphery overhanging the upper portion of said pipe or tube, ribs with openings between them connecting the under lower portion of the cap with the upper part of the pipe or tube, and means for relieving the casing of water of condensation.

5. In a steam and water separator, a casing having upper and lower steam inlet and outlet, a steam-conveying pipe or tube extending from the bottom upwardly into the casing and provided with a baffle-cap having a periphery overhanging the upper portion of said pipe or tube, ribs with openings between them connecting the under lower portion of the cap with the upper part of the pipe or tube, and an inverted conical ribbed grate, all integral with said pipe or tube, and means for relieving the casing of water of condensation.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM H. REYNOLDS.

Witnesses:

J. M. WALKER,
C. T. ROSE.