No. 745,924. PATENTED DEC. 1, 1903.

H. STORMER.

STEAM SEPARATOR.

APPLICATION FILED AUG. 27, 1903.

NO MODEL.

Fig. 1.

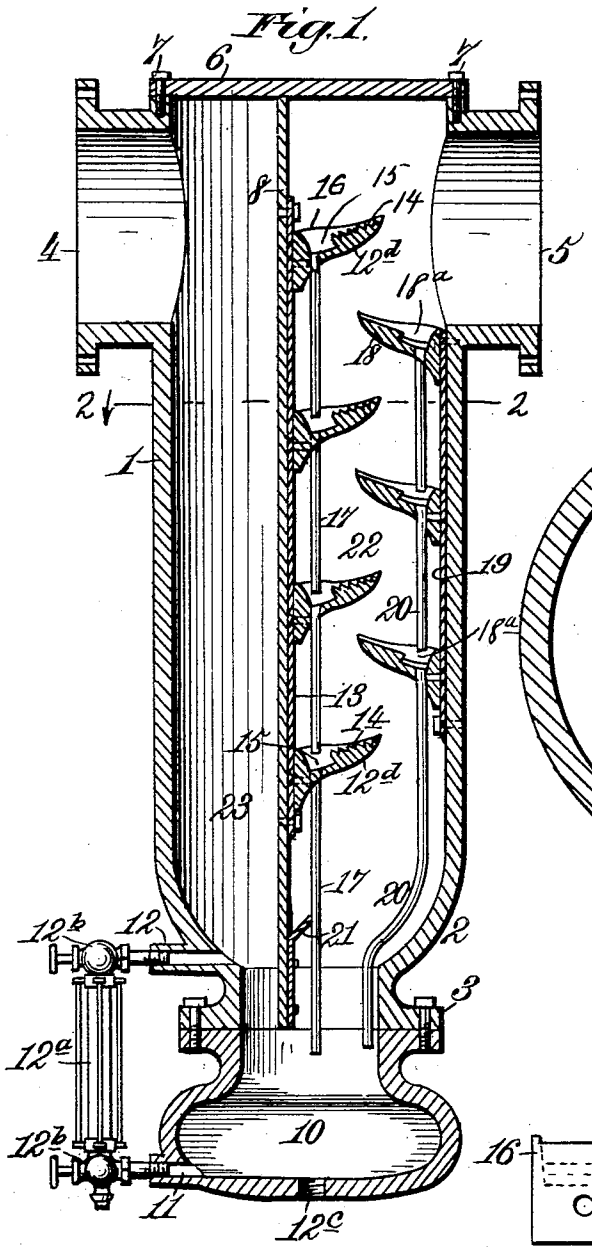


Fig. 2.

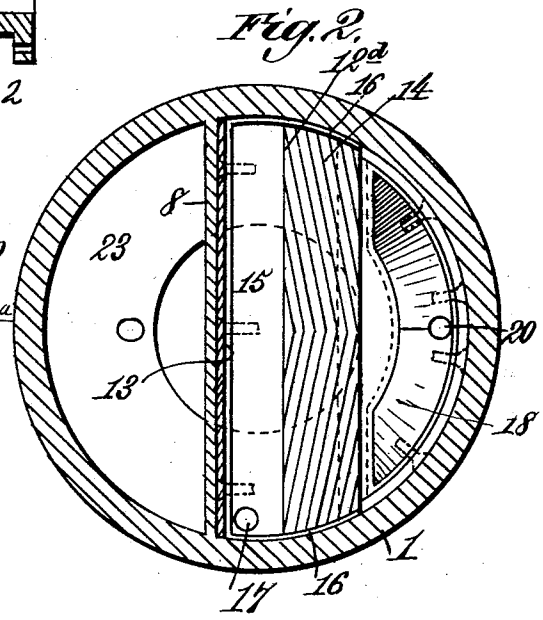
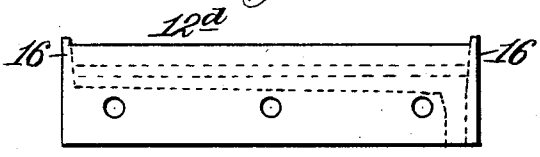


Fig. 3.



Witnesses.
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 745,924. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

HARRY STORMER, OF JOHNSTOWN, PENNSYLVANIA.

STEAM-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 745,924, dated December 1, 1903.

Application filed August 27, 1903. Serial No. 171,008. (No model.)

To all whom it may concern:

Be it known that I, HARRY STORMER, a citizen of the United States, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented new and useful Improvements in Steam-Separators, of which the following is a specification.

This invention relates to steam-separators.

The object of the invention is in a ready, simple, thoroughly feasible and practical manner to separate water or oil from steam and to prevent remixture by entrainment; furthermore, to permit of inspection of the interior of the separator without disturbing the steam-pipes and without the necessity of employment of cranes or derricks, such as are necessary with steam-separators of the ordinary construction.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of a steam-separator, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated one form of embodiment of the invention capable of carrying the same into operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in elevation, partly in section, of a steam-separator embodying the essential features of the present invention. Fig. 2 is a horizontal sectional view taken on the line 2 2 of Fig. 1. Fig. 3 is a detail view of one of the baffle-plates or deflectors.

Referring to the drawings, 1 designates the shell or casing of the separator, which may be of any approved shape, in this instance shown as a cylinder having a constricted lower end 2, terminating in a flange 3. The upper portion of the casing is provided on opposite sides with flanged couplings 4 and 5, respectively, to which the feed and offtake steam-pipes are secured in the usual or any preferred manner. The casing, the flange 3, and couplings 4 and 5 may be cast integral or may be made in sections and suitably assembled. The upper end of the casing is normally closed by a cap 6, which is held in position by bolts 7. The provision of this cap is of importance, inasmuch as when removed access to the interior of the separator is afforded without necessity of disconnecting the steam-pipes, and, further, the arrangement shown will avoid the necessity of employment of derricks or cranes for lifting the separator, such as are usually employed. Extending from the cap to the flange 3 is a partition 8, which may be cast integral with the casing or be held in place therein in any preferred manner and is disposed nearer to the outtake-coupling than to the intake-coupling in order to provide suitable space for the baffle or deflector plates presently to be described. The lower end of the casing is closed by a water-trap 10, which is furnished with a hollow teat 11, and the lower portion of the casing is provided with a similar teat 12, and connecting these teats is a water-gage 12^a of the usual or any preferred construction, the gage being provided with the ordinary valves 12^b. The bottom of the trap is provided with an opening 12^c to receive a water-escape pipe. The provision of the water-trap is of importance, inasmuch as the water caught therein is maintained below the plane of the path of travel of the steam, so that there will be no danger of trapped water or impurities being carried over by the steam.

The baffle or deflector plates, which constitute one of the important features of the present invention, are arranged in two series, one series of which constitute scrubbers and collectors and the other series of which constitute deflectors and collectors. The series of baffle-plates 12^d, which constitute the scrubbers, are secured in any suitable manner to a plate 13, bolted to the partition. Each of these baffles extend across the casing from side to side and is provided on its upper surface with a series of corrugations or channels 14, the rear portion of the plate, or that adjacent to the partition, being formed into a trough 15, provided with side walls 16, which will prevent the escape of any liquid, the bottom of the trough being disposed on an incline and leading to an escape-pipe 17, which discharges into the trough 15 of the

next succeeding baffle-plate, this order being maintained throughout, the escape-pipe connecting with the lowermost baffle-plate having its discharge end disposed in the trap 10. By the provision of the corrugations in the series of baffle-plates 12^d the steam is thoroughly scrubbed and the water is caught by the trough 15 and is conveyed by the escape-pipe 17 to the water-trap. The series of baffle-plates 18, which constitute the collectors, are curved to correspond to the curvature of the casing and are secured to a plate 19, bolted to the interior of the casing. Each of the baffles 18 has its bottom inclined toward its center, forming thereby a trough 18^a, and at the center of the trough there is arranged an escape-pipe 20, which discharges into the trough of the next succeeding baffle-plate in the same manner as the escape-pipes of the baffle-plates 12^d, the escape-pipe from the lowest baffle-plate being projected into the water-trap in the same manner as the lowest discharge-pipe 17. In this instance there are shown four of the scrubbers 12^d and three of the collectors 18; but it is to be understood that this number may be increased or diminished, if found necessary or desirable. The two series of baffle-plates overlap each other, as shown in Fig. 1, thus to present a tortuous passage for the steam, and the opposed ends or edges of the baffle-plates are straight, thus causing a positive breaking up and retardation of the steam, which will effect positive separation thereof of the contained water or any foreign matter.

At a point adjacent to the water-trap there is arranged a baffle-plate 21, which operates as a final separator and also causes the steam before it passes around the partition 8 on its way to its exit to be thrown against the side of the casing, where any remaining water is caught and conveyed to the trap 10. The form of separator herein shown has been described as particularly adapted for separating water from steam; but it will be understood that the same may be used for an oil-extractor, in which case it will be made smaller and lighter than when used for steam.

The operation of the separator is as follows: The steam entering the casing is forced against the partition and contacts with the first baffle-plate 12^b, where it is scrubbed and a percentage of the liquid is removed, thence passes around the outer edge of the plate and downward and against the first of the series of baffle-plates 18, where a further percentage of the liquid is removed, and so on throughout the series, final separation being effected by the baffle-plate 21. As rapidly as the water is removed from the steam it escapes to the trap through the pipes 17 and 20 in the manner described, so that any danger of water being carried over by the steam will be positively obviated.

The internal area or cross-section of the separating-chamber 22—that is to say, the portion of the casing containing the baffle-plates—is greater than the steam-pipe, thereby allowing the steam to expand, and thus reduce its velocity, which will assist in the more complete separation of the water from the steam; but as soon as the steam passes around the partition and enters the discharge-chamber 23, which is approximately the same cross-sectional area as the exit-pipe, the steam resumes its normal velocity.

By having one side of each of the baffle-plates of the two series secured against an imperforate support any passage of the steam except between the opposed ends of the baffle-plates is positively precluded, so that all of the water separated from the steam will be caught and conveyed to the trap, thereby in a positive manner obviating any possibility of water being carried over by steam.

All of the parts of the separator are made with a view to simplicity of construction and of withstanding long-continued use without danger of derangement or breakage; but in the event of any of the internal parts of the separator becoming deranged repairs may be readily effected by removing the cap 6 in the manner already described.

Having thus described the invention, what I claim is—

1. A steam-separator comprising a casing having interiorly an imperforate vertical partition extending from the top thereof and dividing the interior of the casing into chambers of unequal cross-sectional area, the chamber of greater cross-sectional area having upward-inclined baffle-plates therein, said casing having an inlet leading into the chamber of greater cross-sectional area, and an outlet leading from the other chamber, and a trap connected with the lower end of the casing into which the water is discharged from the steam, said partition extending short of the bottom of said trap.

2. In a steam-separator, a casing, an imperforate partition dividing the same into a separating and a discharge chamber, corrugated baffle-plates carried by the partition and provided each with a trough, an escape-pipe connected with each baffle-plate and discharging into the trough of the next succeeding baffle-plate, baffle-plates secured to the wall of the casing and having each a trough in its upper side, an escape-pipe connecting with each trough and discharging in the trough of the baffle-plate below it, and a trap secured to the lower end of the casing into which the water is discharged.

3. In a steam-separator, a casing, an imperforate partition dividing the same into a separating-chamber and a discharge-chamber, baffle-plates carried by the partition and extending entirely across the casing and having their upper sides provided with corrugations and with a trough, baffle-plates having one side curved and secured to one wall of the casing and projecting beyond the first-named baffle-plates and provided on their upper sides with troughs, an escape connected with

each baffle-plate and discharging in the one below it, and a trap secured to the lower end of the casing into which the escape-pipes discharge.

4. A steam-separator comprising a casing having its upper end inclosed by a removable cap and at its lower end by a water-trap, the upper end of the casing being provided with a steam-intake and a steam-outtake arranged opposite each other, a partition dividing the casing into a separating-chamber and a discharge-chamber, the former being of greater area in cross-section than the steam-intake, and the latter of approximately the same area in cross-section as the steam-outtake, baffle-plates carried by the partition and having their operative faces corrugated and provided with a trough, baffle-plates secured to the casing and alternating with those on the partition and having their operative faces provided with troughs having double inclined bottoms, an escape-pipe connecting with each of the baffle-plates and discharging in the one immediately below it, the lower escape-pipe being projected into the trap, and a baffle-plate arranged adjacent to the lower end of the partition.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HARRY STORMER.

Witnesses:
B. J. PICKING,
D. J. JONES.