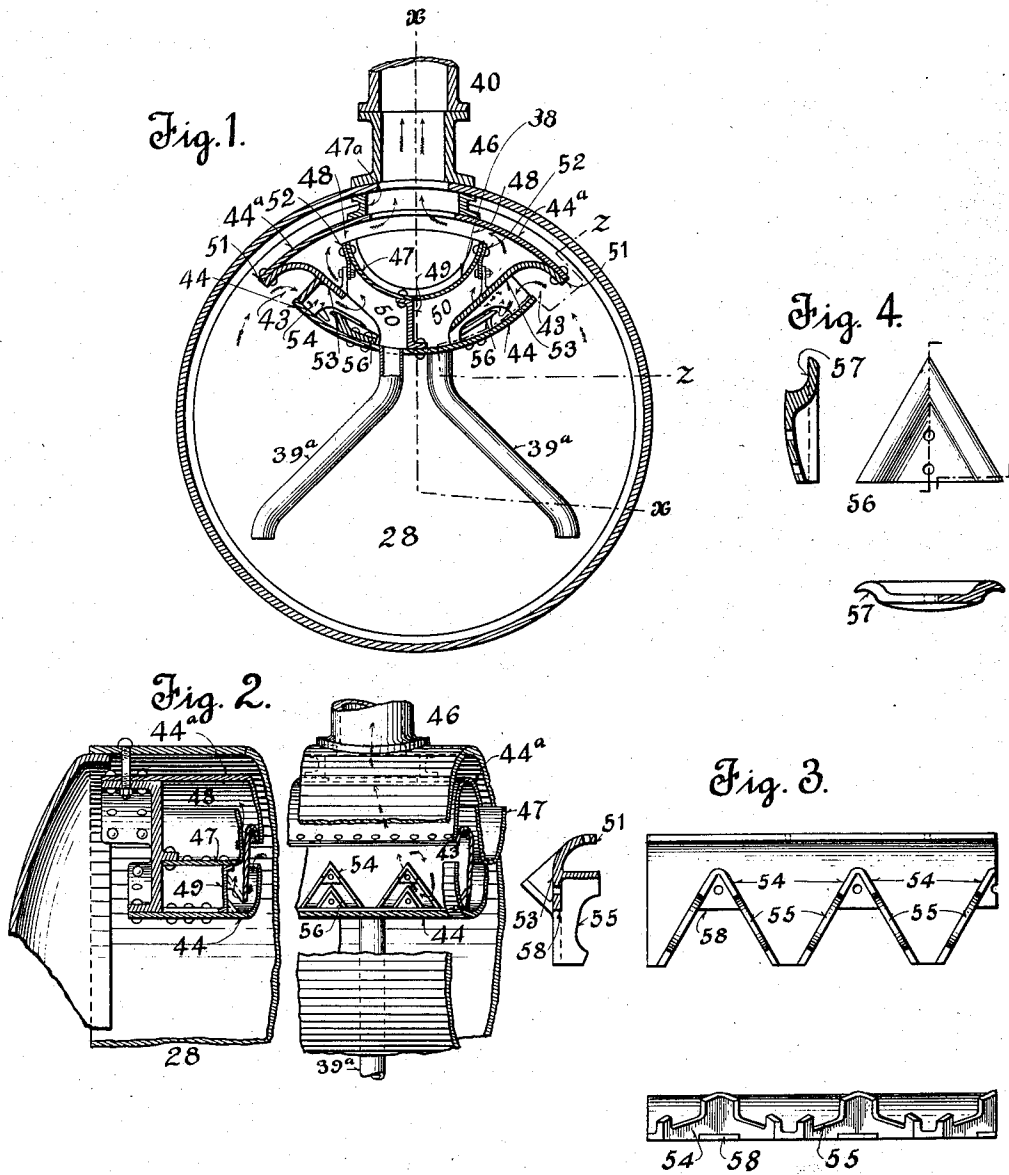


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STEAM SEPARATOR.
APPLICATION FILED SEPT. 13, 1911.

1,012,755.

Patented Dec. 26, 1911.



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HAYDEN HOMER TRACY, OF BERKELEY, AND HARRY EUGENE BOYRIE, OF SAN FRANCISCO, CALIFORNIA.

STEAM-SEPARATOR.

1,012,755.

Specification of Letters Patent.

Patented Dec. 26, 1911.

Application filed September 13, 1911. Serial No. 649,211.

To all whom it may concern:

Be it known that we, HAYDEN HOMER TRACY, a citizen of the United States, and resident of the city of Berkeley, in the county of Alameda and State of California, and HARRY EUGENE BOYRIE, a citizen of the United States, and resident of the city of San Francisco, in the county of San Francisco and State of California, have jointly invented a certain new and useful Improvement in Steam-Separators, of which the following is a specification.

This invention relates to that class of separators which are specially adapted for employment interiorly of steam boilers, and in steam and water drums, of any of the well known or special water-tube, shell, or tubular types,—and we esteem it to be of particular value when used in connection with boilers embodying the Stirling, or Babcock and Wilcox characteristics, and in other classes in which a superheater is combined.

The general object of the improvement is to enhance the efficiency of the separator, while maintaining the qualities of simplicity in construction, durability, ease in assemblage and attachment, and economy in first cost and maintenance.

A more special and important purpose is to provide a separator of such convenient construction that it may be made to extend practically the entire length of the steam-space within the boiler shell, and consequently be enabled to receive and act upon the steam arising from the whole area at one time and continuously, while the communication between the separator and the steam outlet of the boiler need only be the usual pipe centrally or otherwise located between its ends. And further, by providing such a long separator, we are enabled to direct the wet steam thereinto through ports partaking of the nature of long narrow slots, with the resultant flattening or "thinning-out" of the volume of wet steam and rapid separation of the water and outward passage therefrom of the steam globules. Besides this, our construction is such that the steam is drawn from two sides of the boiler-steam-space and throughout practically the entire length of the boiler thus removing the tendency to "prime" as occurs so frequently in boilers where the steam is collected in one spot, so to speak.

Further, we can so proportion the steam ports or passages that there will be no danger of entraining water up through the passage provided for draining the separator.

The devices preferably employed by us in making up the improved separator, comprise certain external and internal shells having peculiar inlet ports and internal passes, primary and secondary diverting plates, and baffles, inclosed in a common casing which in turn is located within the upper portion of the main steam boiler or drum, in communication with its steam outlet and having water-drip connection with the water-space.

For full comprehension of the same, reference must be had to the accompanying drawings forming part of this specification, where:

Figure 1 is a cross-section of a boiler shell, or steam drum, fitted with the separator, which is shown in cross-sectional elevation. Fig. 2 is a longitudinal sectional-elevation, broken in two parts, one part being taken on line X, X, and the other on line Z, Z, Fig. 1. Fig. 3 consists of grouped detail views of the primary diverting-plate. Fig. 4 is a similar group showing the secondary diverting-plate detached.

Similar numerals of reference indicate like parts in the several views.

28 represents a boiler or drum shell, and 38 designates, generally, our separator located in the upper part thereof, suitably supported at the ends as indicated at the left of Fig. 2, and having central or intermediate communication with the steam outlet 46, and conveying pipe 40, through the medium of an open connector 47^a. The separator thus situated receives the moisture-laden steam from the boiler through long narrow ports 43, 43 located one at each side of a horizontally-disposed casing or shell 44, (preferably semi-circular in cross-section) having within it a second shell 47, approximately concentric therewith, the latter being open at its top preferably from end to end in the same manner as and coinciding with the ports 43, 43, but this primary shell having a top-plate 44^a covering its entire length and only perforated where it alines with the steam outlet 46. These shells 44 and 47 are held apart but connected by a centrally-located longitudinal web or diaphragm 49, so as to form two

equal and parallel compartments 50, 50, from the lowest level of each of which depends a drip-pipe 39^a for conveying the particles or globules of water separated from the stem back to the water-space of the boiler 28.

52, 52, are vertical baffles attached to the outer edges of the inner shell 47 and depending into the compartments 50, 50. Tangentially arranged within and connected to the outer shell 44, and its covering-plate 44^a, is what we term the primary diverting-plate 53, (one for each of the divisions 50), its upper edge being curved forward (as seen clearly in Figs. 1 and 3), to form a hood 54 serving, when in position, as a back wall for the port 43. Formed in one with, or fixed to this diverting-plate 53, are a plurality of partitions 54, 54, disposed in V-form and extending forward therefrom to free contact with the inner face of the shell 44, each sloping face of these partitions being cut away to form steam ports 55, 55, through which the steam entering the ports 43 in the shell, may turn and pass into the V-shaped spaces formed by such sloping walls 54. Secondary diverting-plates 56, 56, also of inverted V-shape, and of some such cross-section as shown particularly in Fig. 4, are affixed within the inverted V-spaces formed by the sloping walls 54, of the primary diverting-plate, as indicated in Figs. 1 and 2, and in dotted lines in Fig. 3,—the sloping edges of these secondary diverting-plates having curved faces 57, the more effectually to direct the flow of the steam and water discharged against them from the ports 55 in the sloping walls 54 of the primary diverting-plates 53.

58, 58, represent portions of the primary diverting-plate 53 which project for some distance downward from the apex of the V-shaped partitions, forming not only bases of connection (as indicated by the rivet holes in Fig. 3 and rivets in Fig. 1), with the shell 44, but also serving as baffles underneath which the separated steam must pass upward (after encountering such separating action as may be presented by the sloping sides and curved edges of the secondary diverting-plates 56) into the compartments 50 of the separator, and from thence against the baffles 52 and around through the passes 48 into the internal shell 47 and thence through steam-outlets 46 and pipe 40 to a superheater, if such is used, or directly to the point where the steam is to be employed.

As first premised, the areas of the ports 43, 43, may be proportioned in width to accommodate the whole volume of steam collected in the boiler, it being remembered that these ports extend lengthwise from end to end of the separator, and that the separator bears a similar end-to-end relation to the boiler-shell; and further, the propor-

tional area of the combined internal steam-passes 48, 48, and that of the steam-outlet or delivery pipe 46, may be made the same, so that the collection of steam from end to end of the boiler is insured, and then again, the ratios of the steam-passes 48, 48, and 43, 43, will be such as to absolutely assure the closest approximation to equality in the pressure throughout the spaces 50, 50, and 28, and prevent siphonage of water, from the boiler through the drip-pipes 39^a.

Although we have described our invention in what we consider a preferred form as to detail of construction and arrangement of parts, we do not limit ourselves thereto, as various changes involving only judgment and mechanical skill may be made; for instance a single drip-pipe 39^a might be used instead of the two shown, in which case the orifice through which it would communicate with the space between the outer and inner shells would tap both of the compartments 50, 50, on either side of the diaphragm 49, or this latter may take the form of an open web, or have short brackets substituted therefor so as to throw the two compartments into one;—and other modifications may be adopted, all without departing from the principles or sacrificing the advantages of our invention.

What we claim and desire to secure by Letters Patent is as follows:

1. The combination with a steam boiler, or drum, having a steam outlet and a conveying-pipe leading therefrom,—of a separator located within the upper portion of the boiler and receiving moisture-laden steam therefrom,—such separator comprising an outer shell having a top-plate with an opening to the steam-outlet, and steam entrance-ports extending approximately its whole length on each side and communicating with the boiler,—diverting plates arranged within said shell adjacent to such entrance ports,—and an inner shell approximately concentric with and supported within the outer shell,—steam-passes between said inner and outer shells leading to the steam outlet of the boiler,—and a water-drip pipe depending from the outer shell.

2. The combination with a steam boiler, or drum, having a high-level steam outlet and a conveying-pipe leading therefrom,—of a separator located within the upper portion of such boiler or drum and receiving the moisture-laden steam therefrom,—such separator comprising an outer shell or casing having water drip-pipes,—and steam entrance-ports extending approximately from end to end and communicating with the boiler,—diverting plates supported within the shell and having hoods forming back-walls for the entrance-ports,—a plurality of V-shaped baffles fixed at right angles to said plates and having ports,—a longitudinal dia-

phragm dividing said shell into two compartments,—an inner shell approximately concentric with said outer shell in contact with said dividing-plate and having baffles depending from its rim into said compartments,—and steam-passes from said compartments to the steam-outlet,—such passes coinciding in length approximately with the entrance-ports.

3. The combination with a steam boiler, or drum, having a high-level steam-outlet and a conveying-pipe leading therefrom,—of a separator located within the upper portion of such drum and receiving the moisture-laden steam therefrom,—such separator comprising an outer shell or casing having water drip-pipes, and steam-entrance-ports extending approximately from end to end and communicating with the boiler,—primary diverting-plates supported within the shell and having hoods forming back-walls for the entrance-ports,—a plurality of V-shaped baffling-walls at right angles to said

plates and having ports,—secondary diverting plates attached to the outer shell and having V-shaped contour of less area than and arranged within the V-shaped baffling-walls of the primary diverting plates,—a longitudinal diaphragm dividing said shell into two compartments,—an inner shell approximately concentric with said outer shell in contact with said dividing-plate and having baffles depending from its rim into said compartments,—and steam passes from said compartments to the steam outlets,—such passes coinciding in length approximately with the entrance-ports.

In testimony whereof, we have signed in the presence of the two subscribing witnesses.

HAYDEN HOMER TRACY.
HARRY EUGENE BOYRIE.

Witnesses:

A. L. MENZIN,
O. W. JONES.