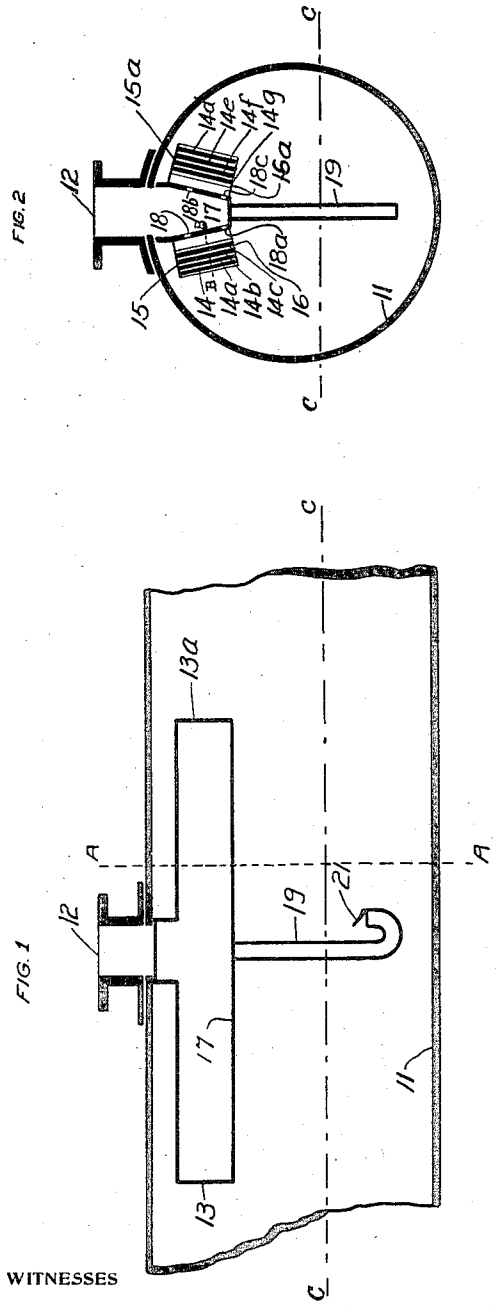
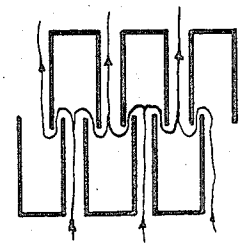
H. H. TRACY.

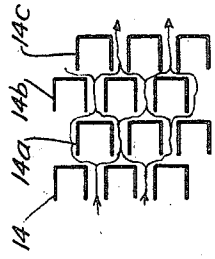
STEAM SEPARATOR.

APPLICATION FILED FEB. 3, 1914.

1,124,556. Patented Jan. 12, 1915.







WITNESSES

INVENTOR

Hayden H. Tracy

UNITED STATES PATENT OFFICE.

HAYDEN H. TRACY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO HARRY E. BOYRIE, OF SAN FRANCISCO, CALIFORNIA.

STEAM-SEPARATOR.

1,124,556. Specification of Letters Patent. Patented Jan. 12, 1915.

Application filed February 3, 1914. Serial No. 816,226.

To all whom it may concern:

Be it known that I, HAYDEN H. TRACY, 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 invented certain new and useful Improvements in Steam-Separators, of which the following is a specification.

This invention relates to steam separators of the internal type, for use within the boiler proper and is suitable for all types of water tube and fire tube boilers.

The main object of the invention is to obtain dry and clean steam at all times, even during those periods when the boiler is "foaming."

In order to more easily understand the need for and performance of the apparatus, the condition known as foaming may be described as a mass of bubbles entirely filling the steam space of the boiler and so durable that they remain a considerable time without breaking. Therefore, instead of only steam leaving the boiler, the discharge is composed of foam which becomes broken up in its journey to the engine and the envelops of the bubbles enter the cylinder as water, reducing the efficiency of the engine and sometimes causing serious damage. Another difficulty is that "scum" or earthy matter rides out on the bubbles—or possibly inside them—and deposits as a soft scale in superheaters, steam piping and on the blades of steam turbines, thereby interfering with their proper and efficient performance.

To the useful end therefore of obviating these troubles and attaining the beneficial effects due to both dry and clean steam at all times, my invention consists in means whereby the steam passes among a series of vertical gutter shaped baffles staggered in relation to each other and having communication with a steam conduit leading to the main outlet of the boiler.

I will describe and illustrate my improvement as applied to a plain cylindrical boiler, or it may also be considered as the elevated steam and water drum of a water tube boiler.

For more complete comprehension of my invention, reference must be had to the accompanying drawings forming part of this specification, in which similar reference numerals indicate like parts in the several figures.

In said drawings: Figure 1 is a longitudinal sectional elevation of a boiler showing the preferred location of the separator and for a better idea of the relative proportions it may be assumed it is drawn to a scale of 1″ to the foot. Fig. 2 is a cross sectional elevation through the line A—A and is intended to show the relative positions of the banks of baffles, steam conduit and water drainage devices. Fig. 3 is an enlarged sectional plan view on the line B—B showing the relative position of the baffles—and the gutters comprising them—wherein the ribbons of steam are formed and required to make many 90 degree bends before reaching the steam conduit. This drawing is full size. Fig. 4 is a sectional plan view of an alternative form of gutter baffle whereby the ribbons of steam are required to bend 180 degrees. This drawing is also full size.

In said drawings: The numeral 11 indicates the shell of the boiler.

12 is the main steam outlet.

13 and 13^a are the closed ends of the steam conduit.

14, 14^a, 14^b, 14^c, 14^d, 14^e, 14^f, 14^g, are series of gutter baffles among which the steam must pass in order to reach the steam conduit 17.

15 and 15^a are cover plates above the baffles.

16 and 16^a are floor plates below the baffles.

17 is the steam conduit connected to the outlet 11.

18, 18^a, 18^b, and 18^c are ports through which the purified steam must pass in order to reach the conduit 17.

19 is the water drain pipe.

21 is a check valve at the lowermost end of the pipe.

C—C is the water level.

Under working conditions the operation of the apparatus would be as follows: Steam entering the sides of the banks of baffles weaves its way sinuously among them toward the central conduit 17 and as the steam bends among the baffles its contained moisture is thrown into the gutters and thence falls by gravity to the floor plates 16

and 16[a]. From thence the water can emerge at baffles 14 and 14[a] and fall to the water level C—C; also part of it may be carried forward—as a liquid—through the ports 18[a] and 18[c] to the central conduit 17 thence through the drain pipe 19 to the water level. The steam, freed from moisture and dirt passes through the ports 18 and 18[b] to the central conduit 17, on its way to the main outlet 12.

Many experiments with different designs during the past two years have shown the necessity of dividing the steam into many small strips or ribbons and also providing recesses to catch the water and prevent it being picked up by the passing steam and carried forward with it to the steam conduit. This retreat for the separated moisture is fully provided in the gutters and is a very important part of the invention.

An important purpose of the narrow spaces between the backs and the fronts of the gutters, is that the steam bubbles in passing through these spaces become torn and broken against the first few rows of baffles whereupon the moisture, previously comprising the skins or envelops of the bubbles, is readily separated from the steam as the latter passes through the remaining rows of baffles.

Although the construction and arrangement of the separator as herein described is what I prefer to use, it must be understood that I do not limit myself thereto, as the same may be modified in various ways according to skill and judgment—as by placing the separator transversely of the boiler or providing baffles on one side only, of the steam conduit.

What I claim and desire to obtain by Letters Patent is as follows:

1. In a steam separator of the internal type, located within the upper portion of the boiler and receiving moisture laden steam therefrom,—the combination of a horizontal steam conduit with closed ends and a connection to the main steam outlet of the boiler; steam inlet ports in the side walls of the conduit; staggered rows of gutter baffles in connection with said inlet ports and adjacent to the side walls of the conduit; a steam tight casing inclosing the top, bottom and ends of the rows of baffles and attached to the side walls of the conduit.

2. In a steam separator of the internal type, located within the upper portion of the boiler and receiving moisture laden steam therefrom,—the combination of a horizontal steam conduit with closed ends and a connection to the main steam outlet of the boiler; steam inlet ports in the side walls of the conduit; staggered rows of gutter baffles in connection with said inlet ports and adjacent to the side walls of the conduit; a steam tight casing inclosing the top, bottom and ends of the rows of baffles and attached to the side walls of the conduit; a water drain pipe entering the bottom of the steam conduit and a check valve on the lowermost end of the drain pipe.

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

H. H. TRACY.

Witnesses:
R. S. PENNIMAN,
L. B. CHAPMAN.