Oct. 25, 1932. R. W. ANDREWS ET AL 1,884,501

FLUID SEPARATOR

Filed June 28, 1929

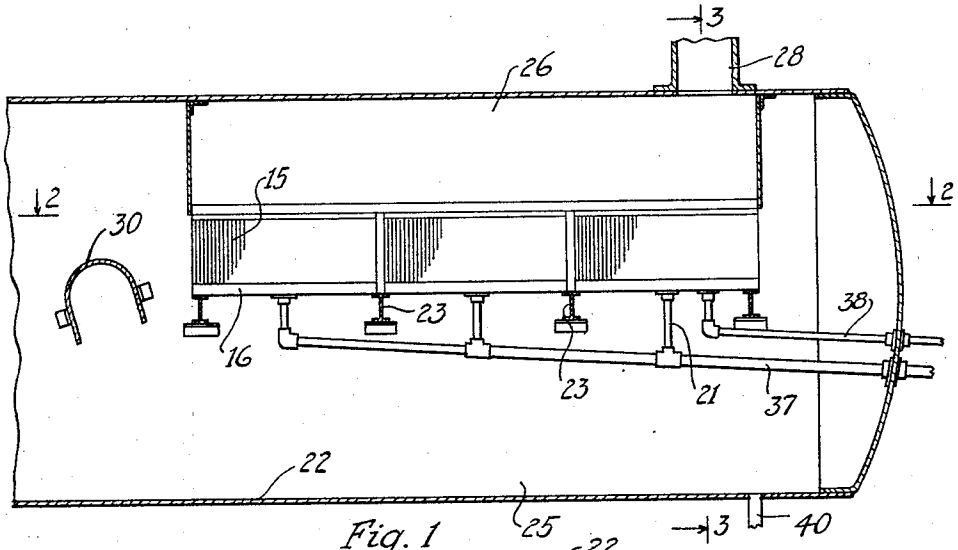


Fig. 1

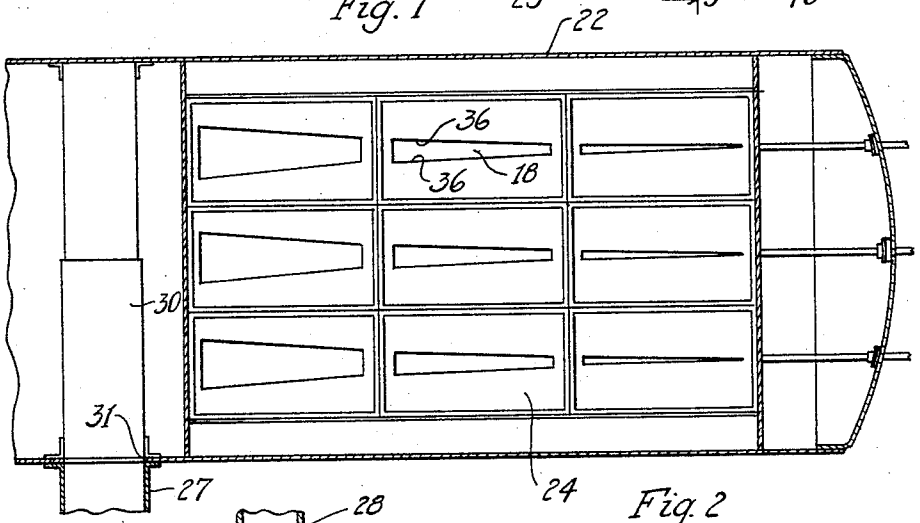


Fig. 2

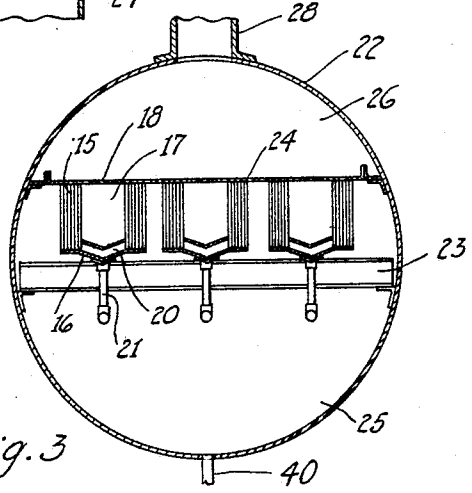


Fig. 3

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UNITED STATES PATENT OFFICE

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FLUID SEPARATOR

Application filed June 28, 1929. Serial No. 374,344.

This invention relates to fluid separators, such as steam or gas purifiers, and it has for its object providing a system for purifying steam or other gases as the gas flows from one point to another of the generating and distributing system. It has for its special object installing and arranging separators, more particularly for purifying steam, in a pipe line steam drum; and a particular object with reference to such a system is to uniformly distribute the flow of gas through the purifying baffles of the purifiers. Another object of the invention is to suitably dispose of the moisture or liquid separated from the gas.

While the invention is applicable to purifying various gases, this application, as an illustration of the invention, is directed towards the purifying of steam in its passage from the steam boiler to the point where it is to be used.

Of the drawing, Fig. 1 is a vertical, central, sectional view of a purifying system which embodies some of the features of my invention; Fig. 2 is a sectional, plan view along the line 2—2 of Fig. 1; and Fig. 3 is a vertical, sectional view along the line 3—3 of Fig. 1.

While it is common to purify steam by inserting steam purifiers in the boilers and arranging for the passage of the steam through the purifiers as it passes from the boiler to the outlet thereof, yet, in this instance, the purpose has been to purify the steam by the use of purifier systems outside of the boiler. This arrangement provides for more conveniently installing the system and for greater access to the system after it has been installed, and it provides other advantages which will be apparent from a consideration of the following discussion.

One of these advantages is to prevent the masses of water, which are frequently forced upwardly from the surface of the boiler, from passing into the purifying units, and this is accomplished by inserting these units in a drum connected in the steam main of the boiler system. In such a case, any masses of water which are forced out of the boiler into the steam main merely pass back into the boiler or pass on into the drum without entering the purifiers and are, thus, conveniently disposed of.

Although other types of purifier units may be used in carrying out our invention, yet, we prefer for the purpose the type which is ordinarily called in the trade the Tracyfier, as this type is particularly applicable to the purpose. This type of purifier comprises a system of purifying trough-shaped baffles 15, Fig. 1, ordinarily vertically mounted in rows, the individual baffles in each row being staggered with reference to those of the adjacent rows. The baffles are mounted in casings 16 which are enclosed at both ends and bottom and a portion of the top, the baffles being mounted in the sides of the casings 16.

The arrangement is such that the steam enters the casings around the baffles and passes into a steam chamber 17 and then through an outlet 18 in the top of the casing. The moisture that is separated from the steam by the baffles passes downwardly along the baffles and into a water chamber 20 and out of the separator by means of a drain pipe 21. This moisture is then disposed of in various manners, as is hereinafter described.

The purifier units are mounted in a steam drum 22, the drum being connected into the steam main of the boiler system; and various arrangements of the purifiers in the drum and in the manner of connecting the drum to the steam main are provided for, depending upon the particular conditions which surround the boiler system.

One manner of mounting the units in the drum is illustrated by Figs. 1 to 3, in which the unit casings 16 are mounted in rows extending longitudinally of the drum 22, in this particular case, with three units in each row and three rows in the drum. These units are supported in any suitable manner, such as by means of the bars 23 which are mounted under the ends of the units. The upper portion of the units comprises a plate 24 and, immediately above the steam chamber 17 of each unit, is the opening 18 through the plate 24 through which the purified steam flows. The plate 24, aside from these openings, completely separates the lower chamber 25 in the drum from the upper dry steam

chamber 26. The steam enters the chamber 25 through the pipe 27 of the steam main and passes away from the chamber 26 through the pipe 28 of the main. In this instance, a curved baffle 30 extends from the inlet 31 of the drum across the drum, so as to more properly distribute the steam and to direct it down under the battery of separators.

In case of a system of purifiers mounted in a drum in which the steam enters from the main and passes through the baffles and out of the drum into the main, there is a tendency for the steam to pass through the baffles of the purifiers unevenly. The baffles of those separator units, for instance, which are nearer the outlet will receive a greater amount of steam, and the baffles in the portions of the units which are nearer the outlet of the drum will receive more steam than the baffles of other portions of the units. In order to more properly distribute the steam through the baffles, we vary the openings 18 so as to force more steam through the baffles which are more remote from the drum outlet. For instance, the openings 18 in the baffles most remote from the drum outlet 28 are made wider than the others, and the ends of the openings in each case which are more remote from the outlet 28 are made wider than the other ends. In this manner, the steam is much more uniformly distributed throughout the baffles and the capacity and efficiency of the baffles is materially increased thereby. To further this object, the angle between the edges 36 of the opening in successive units is increased as the outlet of the drum is receded from, as we have found that this also assists in more properly distributing the steam through the baffles.

The moisture which enters the drum and also that which is separated from the steam by the steam purifiers may be disposed of in various manners. For instance, in the modification of the system illustrated by Figs. 1 to 3, the water from the steam chambers 20 of the purifiers passes through the drain pipes 21 to the manifold pipe 37 and, by means of this pipe, is passed to a steam trap or back to the boiler or otherwise disposed of. To facilitate this, a vent pipe 38 is provided which is connected to some portion of the system, so as to allow the entrained steam and air which is in the steam trap to pass back into the water chamber of one of the purifier units.

Also, the water which collects in the drum is disposed of by means of a drain pipe 40.

We claim as our invention:

1. A fluid purifier system comprising a steam main, a drum connected in said main, said drum having an inlet, and an outlet, a plurality of fluid purifiers mounted in a row in said drum between said inlet and said outlet, said outlet being adjacent one end of the row, each of said purifiers having a fluid outlet in its upper wall, means mounted in said drum for guiding to said purifiers fluids passing into said drum through said drum inlet, said purifier outlets being of unlike sizes and decreasing in relative size as said drum outlet is approached, whereby the fluid is more evenly distributed through the purifiers, and means mounted in said drum forming a restricted passageway from said purifier outlets to the drum outlet.

2. A fluid purifier system comprising a drum having an inlet and an outlet, a plurality of fluid purifiers mounted in said drum, each of said purifiers having an elongated outlet, means mounted in said drum forming an elongated narrow passageway leading from the outlets of the purifiers to the outlet of the drum, said purifier outlets decreasing in width as the drum outlet is approached, and that portion of each of said purifier outlets which is nearer the drum outlet being narrower than the more remote portions of the purifier outlet.

3. A fluid purifier system mounted in a drum, the drum having an outlet, said system comprising a plurality of fluid purifiers extending in a row in said drum, said drum outlet being positioned towards one end of said row, each of said purifiers having an elongated outlet, means mounted in said drum forming a restricted passageway for guiding fluids from said purifier outlets to said drum outlet, the outlets of said purifier opening into the passageway and decreasing in size as said drum outlet is approached, whereby the distribution of the fluid through the purifiers is made more uniform.

In testimony whereof we hereunto set our hands.

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