March 23, 1937. J. GOLDSTEIN 2,074,505

STEAM PURIFYING DEVICE

Filed Oct. 12, 1935

Fig. 1.

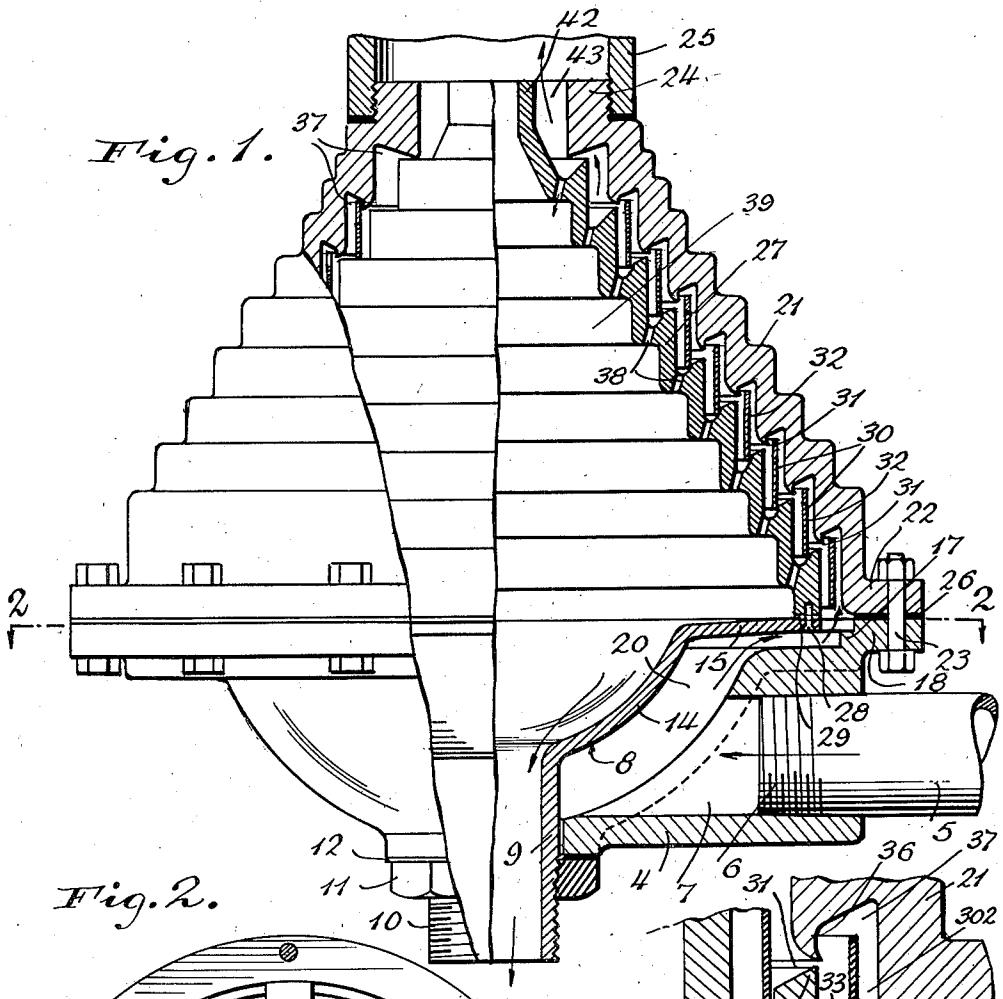


Fig. 2.

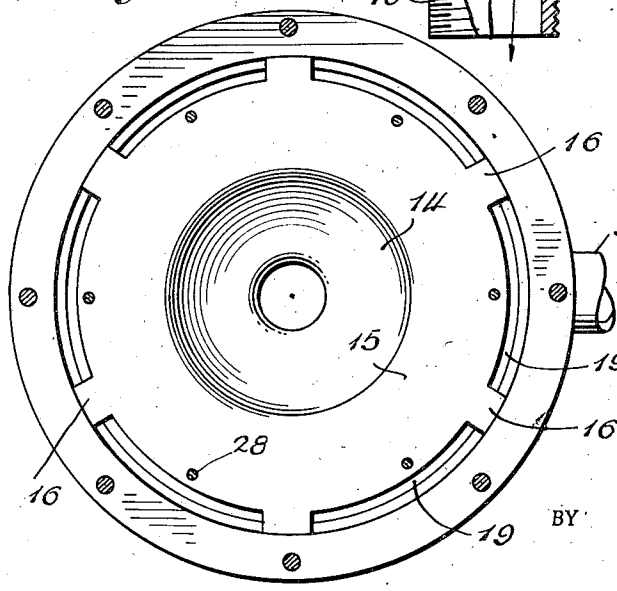


Fig. 3.

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Patented Mar. 23, 1937

2,074,505

UNITED STATES PATENT OFFICE

2,074,505

STEAM PURIFYING DEVICE

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Application October 12, 1935, Serial No. 44,659

4 Claims. (Cl. 183—79)

This invention relates to a steam treating device and refers more particularly to a muffler for steam, which is adapted to separate water particles from pure steam.

An object of the present invention is the provision of a muffler which is adapted for use in connection with steam boilers and similar engines and by means of which steam may be separated from water particles and purified to a very large extent.

Another object is the provision of a steam purifying device of efficient construction, by means of which pure steam of the desired pressure is transmitted to any suitable engine wherein such device may be advantageously employed.

The above and other objects of the present invention may be realized through the provision of a device comprising two superposed pyramid-like structures arranged in such manner that they form a zig-zag passage for the steam, said passage comprising wider vertical portions and narrower horizontal portions and being provided with suitable outlets for the water; separation plates provided in the vertical portions of the zig-zag passage are used for the purpose of enhancing the effect of the zig-zag passage upon the steam which passes therethrough.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing showing the inventive idea in a preferred embodiment.

In the drawing:

Figure 1 shows partly in side elevation and partly in section a device constructed in accordance with the principles of the present invention.

Figure 2 is a section along the line 2—2 of Figure 1.

Figure 3 shows on a larger scale and in section a portion of the zig-zag passage.

The device shown in the drawing comprises a base casing 4 carrying an inlet pipe 5 which may be provided with screw threads 6 and screwed into a suitable opening 7 formed in the casing 4. A container 8 situated within the casing 4 comprises a central portion 9 having the form of a pipe and adapted to pass through a central opening formed in the casing 4. The pipe 9 is provided with screw-threads 10 and carries a nut 11 which is separated by a packing 12 from the adjacent walls of the casing 4.

The middle portion 14 of the container 8 has the shape of a bowl, while its upper flanges 15 have the form of an annular plate. As shown more clearly in Figure 2 of the drawing, the plate 15 is provided with a number of peripheral segments 16 adapted to rest upon shoulders 17 (Fig. 1) formed in the flanges 18 of the casing 4. Due to this arrangement, suitable passages 19 are formed between the segments 18 and between the adjacent surfaces of the plate 15 and the flange 18.

As shown in Figure 1, the walls of the container 8 are situated at a certain distance from the walls of the casing 4, so that a chamber 20 is formed between these walls.

An outer stepped pyramid-like structure 21 is provided with flanges 22 which are connected with the flanges 18 by means of the bolts 23. The upper portion of the outer pyramid-like structure 21 has the form of a threaded pipe 24. An outlet pipe 25 may be screwed upon the pipe 24. A packing 26 is situated between the flange 22 and the flange 18.

An inner stepped pyramid-like structure 27 is situated within the outer pyramid 21 and is preferably attached by the bolts 28 to the flange 15 of the container 8. A packing 29 is provided between the lower surface of the inner pyramid 27 and the adjacent surface of the flange 15.

As shown more clearly in Figure 3 of the drawing, the zig-zag passage formed between the outer pyramid 21 and the inner pyramid 27 consists of a number of vertical passages 30 and horizontal passages 31. Each horizontal passage 31 joins the top of one of the vertical passages 30 with the bottom of an adjacent vertical passage 30.

Separating plates 32 are provided in the vertical passages 30. Each of the plates 32 has the form of a hollow cylinder and is carried by bolts 33 which are screwed into the walls of the inner pyramid 27. Distancing pieces 34 maintain the cylindrical plates 32 at a suitable distance from the adjacent walls of the inner pyramid 27. Due to this arrangement, each of the vertical passages 30 is separated into a vertical passage 301 extending between an outer surface of the inner pyramid 27 and the adjacent surface of the plate 32, and a vertical passage 302 extending between a surface of the plate 32 and the adjacent surface of the outer pyramid 21.

As shown in Figure 3, each vertical passage 302 is wider than the horizontal passage 31 formed by an angular edge 35 of the inner pyramid 27 and a curved bent over edge 36 of the outer pyramid 21. Each vertical passage 30 is provided with an upper chamber 37 which is situated somewhat above the horizontal passage 31.

Openings 38 extend from the lower ends of the

vertical passages **30** to the chamber **39** formed within the hollow inner pyramid **27**. The adjacent projecting edges **40** of the inner pyramid **27** form spills **41** which end in the openings **38**.

The top of the inner pyramid **27** is preferably hollow and has the form of a tube **42** separated by an annular chamber **43** from the adjacent surfaces of the pipe **24**.

Steam penetrating into the chamber **7** through the inlet pipe **5**, passes through the chamber **20** and the passages **19** into the zig-zag passage, leaving it through the chamber **43** and the pipe **25**. I have found that the described features of the zig-zag passage, particularly the chambers **37** and the relative width of the passages **302** and **31**, as well as the plates **32** are exceptionally effective in separating water from steam during the passing of the steam through the zig-zag passage.

The separated water flows through the passages **301**, the spills **41**, and the openings **38** into the chamber **39**, leaving the device through the pipe **9**.

What is claimed is:

1. A steam purifying device, comprising means forming a zig-zag passage extending slantingly upward, means connected with the bottom of said passage for causing steam to flow upward through said zig-zag passage, plates situated within said zig-zag passage to separate water particles from the steam, and means connected with the first-mentioned means for removing the water particles.

2. A steam purifying device, comprising a hollow stepped pyramid-like structure, another hollow stepped pyramid-like structure situated over the first-mentioned structure, a zig-zag passage being formed between said structures which comprises a plurality of vertical passages and horizontal passages, a plurality of separation plates, means supporting said plates in said vertical passages at a distance from the walls thereof, and means connected with said structures for supplying steam to said zig-zag passage, openings being formed in the first-mentioned structure, which extend from the bottom of the vertical passages to the interior of the first-mentioned structure.

3. A steam purifying device in accordance with claim 2, wherein the width of the horizontal passages is substantially smaller than the width of the passage formed between each of said plates and the adjacent wall of the second-mentioned structure, and wherein a chamber is formed in the upper end of each of the vertical passages above the adjacent horizontal passage.

4. A steam purifying device, comprising means forming a zig-zag passage extending slantingly upward, and plates situated within said zig-zag passage, outlet openings being formed in said means adjacent said plates to remove a fluid passing through said zig-zag passage.

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