Oct. 20, 1953 G. A. REHM 2,655,905

STEAM PURIFIER

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Fig. 1

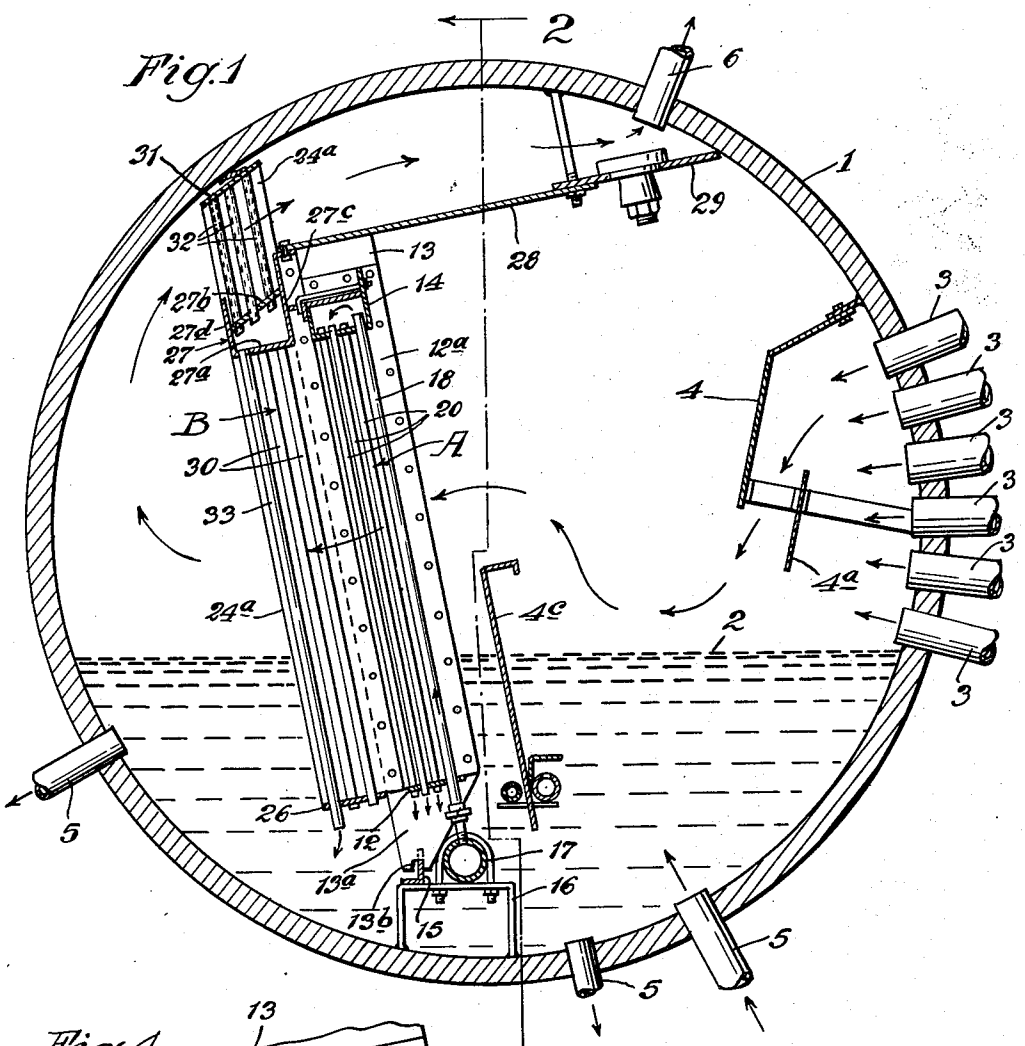
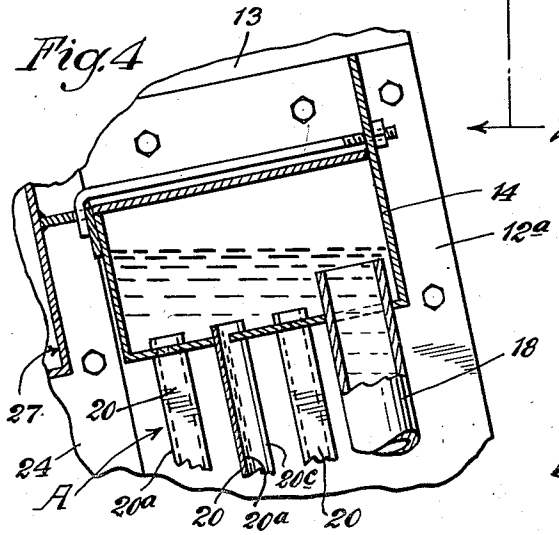


Fig. 4



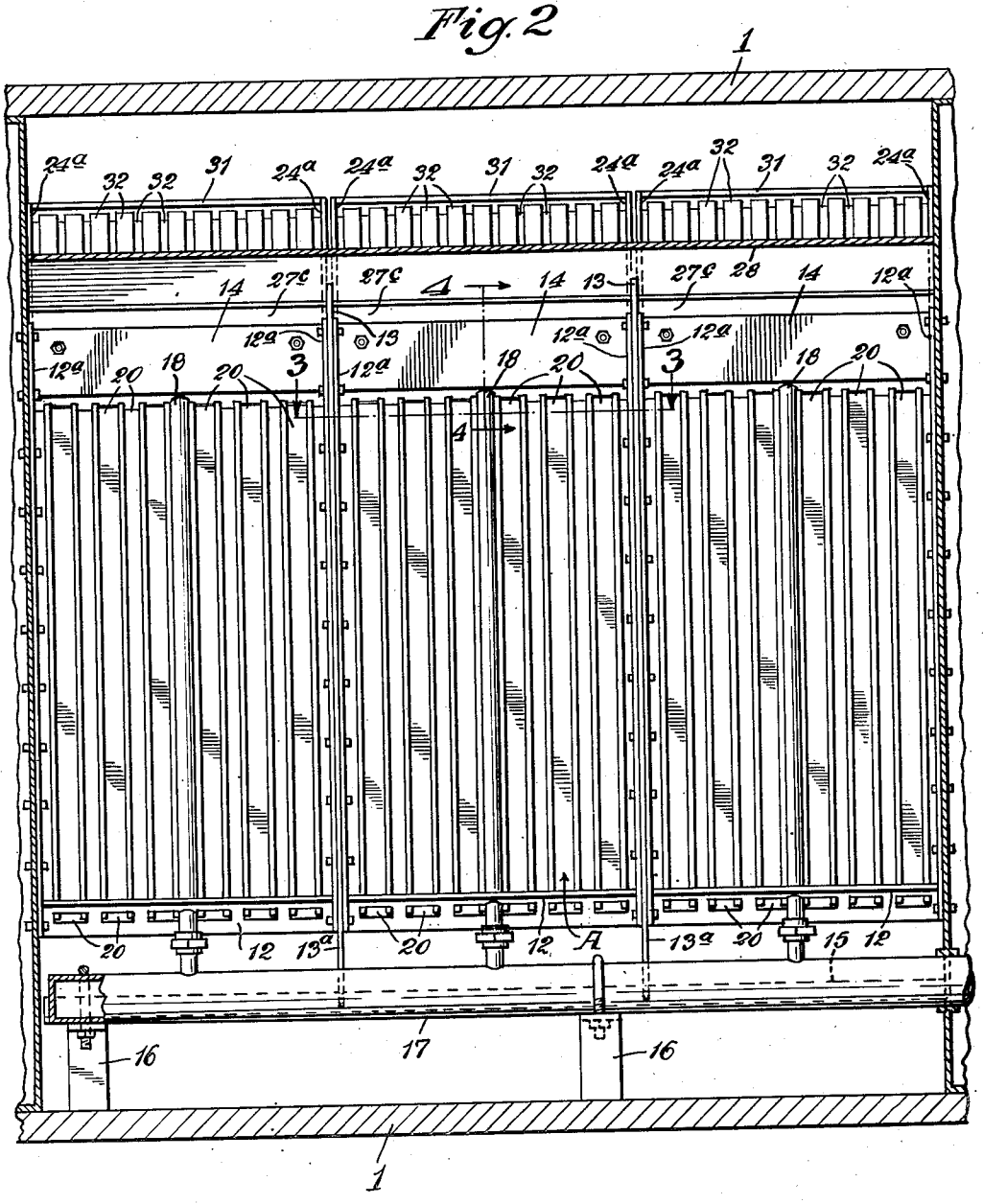
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Fig. 2



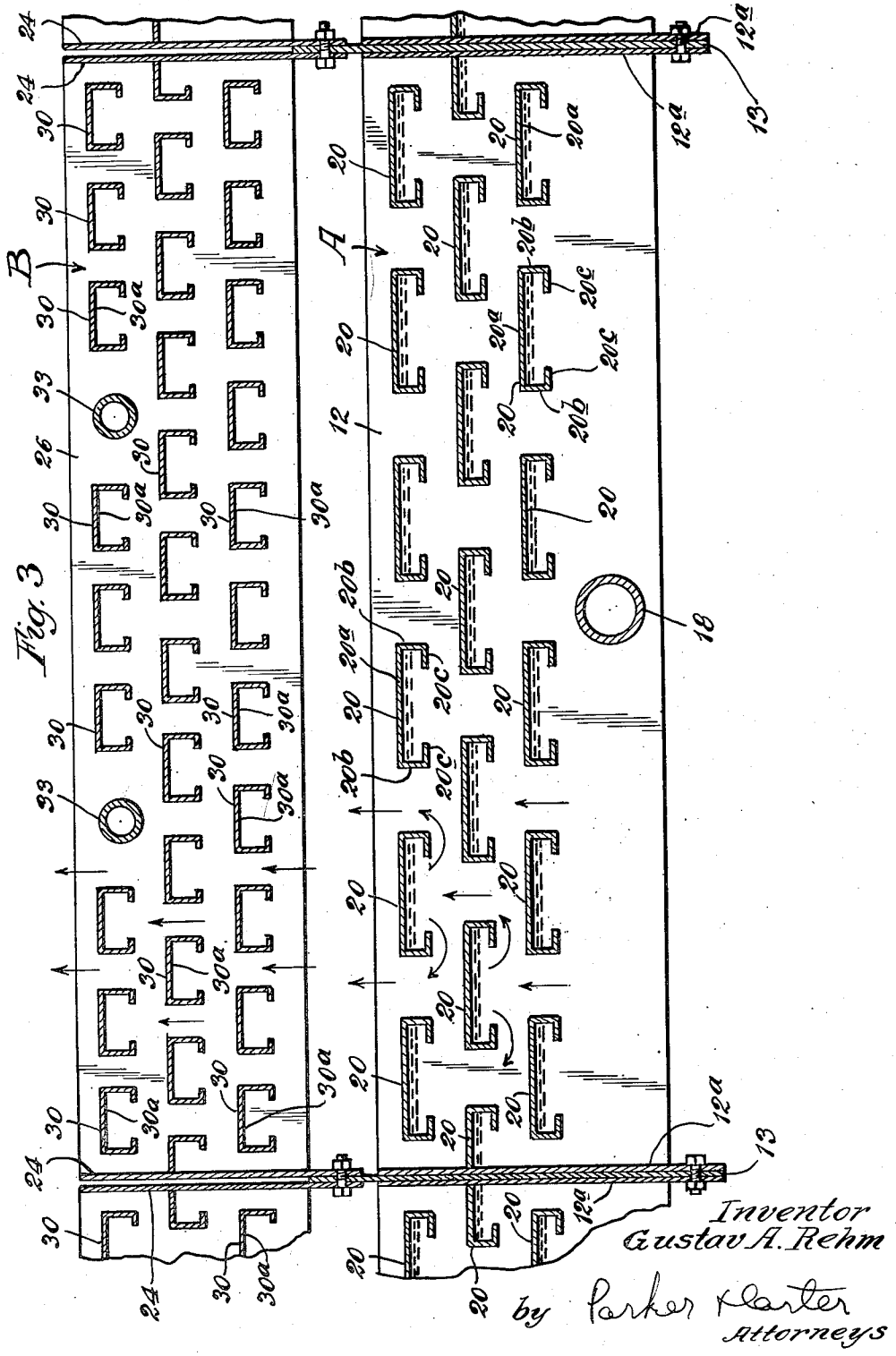
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2,655,905

STEAM PURIFIER

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7 Claims. (Cl. 122—459)

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My invention relates to an improvement in steam purifiers, and has for one purpose to provide means for purifying the steam as it flows through the steam drum of a boiler.

Another purpose is to provide improved means for collecting impurities and condensed moisture from steam.

Another purpose is to provide an improved assembly in which such a purifier is used.

Another purpose is to provide an improved unitary structure which may readily be applied to and removed from a boiler.

Another purpose is to provide a multi-unit steam dryer, including an upper unit or group of units and a lower unit or group of units, through which the steam progressively passes.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a vertical transverse section through a steam drum to which my invention has been applied;

Figure 2 is a section along the line 2—2 of Figure 1, on an enlarged scale;

Figure 3 is a section on the line 3—3 of Figure 2, on an enlarged scale; and

Figure 4 is a section on the line 4—4 of Figure 2, on an enlarged scale.

Referring to the drawings, 1 generally indicates the wall of a steam drum partially filled with a body of water 2. Steam delivery tubes or ducts 3 extend to the drum 1 and deliver steam to its interior, above and below the water level. If desired, a baffle 4 may be employed to divert the steam downwardly toward the surface of the water. 5 illustrates any suitable water tubes or ducts. 6 illustrates a duct or ducts extending from the drum 1. It may extend, for example, to a super-heater. 12 is a bottom structural element to which vertical frame elements 12a may be connected. 14 is a top tank or duct shown as formed of sheet metal side, bottom and top walls.

Frame supporting members 13 project downwardly, as at 13a, and are shown as notched at 13b to rest upon and be positioned by an angle member 15 mounted on any suitable support 16. The support 16 is also shown as carrying a duct or pipe 17 suitably connected to supply water by the upwardly extending pipe 18 to the interior of the water supply tank 14. The angle member is notched.

Extending downwardly from the tank 14 to the transverse member or members 12 are a plurality of troughs 20. Each such trough 20 may have, for example, a rear wall 20a, forwardly projecting side walls 20b, and inwardly extending front

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walls 20c, separated by a substantial space. It will be understood, however, that the form of the troughs may be widely varied, and they do not, of themselves, form part of the present invention. Various types of troughs which I may employ are illustrated, for example, in my copending application Serial No. 30,371, filed in the United States Patent Office on June 1, 1948, now U. S. Patent No. 2,527,450, issued October 24, 1950.

It will be understood that water in the tank 14, supplied, for example, through the pipe 18, is effective to flow downwardly through the troughs 20. The troughs 20 have their open faces opposed to the inflow of steam from the pipes or tubes 3. The baffle structure 4 may have a supplemental baffle 4a. The inflowing steam is thereby directed downwardly toward or against the upper surface of the body of water 2. An intermediate baffle 4c may also be employed, as shown in Figure 1. The result is that after the steam has impinged upon the surface of the water 2 it then flows against and between the troughs 20 which constitute a washer assembly.

It will be noted, as shown, for example, in Figure 3, that a plurality of troughs are arranged in staggered relation. As the steam passes against and between the troughs it impinges against the downwardly flowing water in the troughs. The troughs are so inclined that water gravitally flows down the rear surface 20a. The side walls 20b and the front walls 20c are effective to prevent the water from being blown away or dispersed by the impingement of the steam. Impurities in the steam are collected and removed by the downwardly flowing water, and carried downwardly into the main mass of the body of water 2.

The initially washed steam, after it has flowed through the above described washer assembly, indicated generally at A in Figure 3, enters the first or lower dryer assembly, generally indicated at B in Figure 3. As will be clear from a comparison of Figures 2 and 3, these assemblies may be arranged in units which can be connected to each other for assembly, and which can be disengaged for removal. For example, the side frame members 13 of the adjacent units in the assembly A may be bolted to corresponding side frame members 24 of the dryer assembly B. The dryer units have bottom structural members 26 and top tanks 27. It will be understood that the tanks 27 have bottom walls 27a, top walls 27b, a front wall 27c, and a rear wall 27d. The front wall 27c may be secured, for example, to the top guiding baffle or partition 28, one end or edge of which connects with the hand-hole plate 29.

Connecting the bottom plate 27a of each such tank 27, and extending downwardly to and through the bottom structural members 26, are a

plurality of troughs **30** which may be generally similar in shape to the troughs **20** of the washer unit, but which may be advantageously somewhat narrower. They are preferably in the staggered relation in which they are shown in Figure 3. It will be understood that the impingement of steam against the troughs **30** results in a gathering of moisture which flows gravitally down the rear faces or walls **30***a* of the troughs **30**, and is thereby delivered to the water **2**.

As will be clear from Figure 1, I provide an upper or second dryer, having a top structural member or members **31** from which extend downwardly a second group or tier of troughs **32**. The lower ends of these troughs extend downwardly through the wall **27***b* and deliver their gathered moisture to the interior of the tank or receiver **27**. This moisture is carried downwardly to the liquid **2** and through drain pipes **33**. The dried steam then flows upwardly across the plate **28** for escape through the pipes or ducts **6**. It will be understood that the troughs in the upper dryer unit face toward the flowing steam, the direction of flow of the steam being indicated, for example, by arrows in Figure 1.

It will be realized that, whereas, I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing. It will be understood, for example, that, if desired, some of the delivery tubes **3** may reach the drum **1** at below the level of the water **2**.

I claim:

1. A steam purifying assembly for boilers, including a housing forming a purifying chamber and having a body of water disposed in the lower portion thereof, duct means for admitting steam to and for discharging steam from said housing, and a purifying unit disposed within said housing and in the line of flow of steam between said respective duct means, said purifying unit including a steam washer having a pair of spaced, parallel, upstanding support plates having lower ends positioned in said body of water and upper ends disposed adjacent the upper portion of said housing and connected to a relatively fixed portion of said housing, a feedwater supply member between and connected to the upper portions of said plates, a supporting member extending between and connected to the lower portions of said plates, a plurality of spaced parallel feedwater guide members connected between said supply member and support member to form with said support plates, support member and supply member, a substantially rigid structure, each guide member being formed to convey feedwater from said member to said body of water, and a steam drier unit positioned closely adjacent to said feedwater guide members, said drier including a plurality of upstanding drying members disposed in said line of flow of steam downstream of the feedwater guide members, means for supporting said drier including upstanding end members connected to said upstanding supporting plates, whereby said purifying unit may be unitarily inserted and removed from said housing.

2. A steam purifying assembly as recited in claim 1, wherein said washer is formed with a plurality of vertically aligned sections, each of the

said sections including a plurality of feedwater guide members.

3. A steam purifying assembly as recited in claim 1 wherein said washer is formed with a plurality of vertically aligned sections, and said drier is formed with a plurality of vertically aligned sections corresponding to said washer sections and each washer section has supporting plates connected to corresponding supporting plates for a drier unit section.

4. A steam purifying assembly as recited in claim 1 wherein said washer structure and said drier structure each include a plurality of rows of channel-shaped guide members, the individual channel-shaped members of each row being staggered with relation to one another.

5. The structure of claim 1 wherein an upper drier portion is located above the drier positioned adjacent the washer, separating means between the two drier portions formed and adapted to constrain the steam from the washer to flow through the lower drier portion, said separating means including a tank adapted to receive liquid separated in the upper drier portion, and a drain pipe therefor extending downwardly through the lower drier portion.

6. A steam purifying attachment for a steam purifying housing having a purifying chamber and a body of water in the lower portion thereof and provided with steam inlets and steam exit ducts for permitting the flow of steam through said chamber, including a steam washer unit having a pair of spaced, parallel, generally elongated supporting plates having lower portions thereof adapted to be disposed in said body of water and upper portions adapted to be positioned adjacent and connected to an upper portion of said housing, a plurality of steam washing members adapted to convey feedwater to said body of water, said members being supported by generally horizontally extending members connected to the upper ends and to the lower ends of said plates, respectively, the member connected to the upper ends of said plates being formed and adapted to deliver feedwater to said steam washing members, a drier unit positioned adjacent to said washer unit and disposed rearwardly of said washer unit with respect to the flow of steam within said housing, said drier unit including a pair of spaced, parallel supporting plates having connections with the first-mentioned supporting plates, to form a substantially rigid structure therewith, whereby said attachment may be unitarily removed from and inserted in said housing.

7. An attachment as recited in claim 6 wherein said washer is formed with a plurality of vertically aligned sections, and said drier is formed with a plurality of vertically aligned sections corresponding to said washer sections and each washer section has supporting plates connected to corresponding supporting plates for a drier unit section.

GUSTAV A. REHM.

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