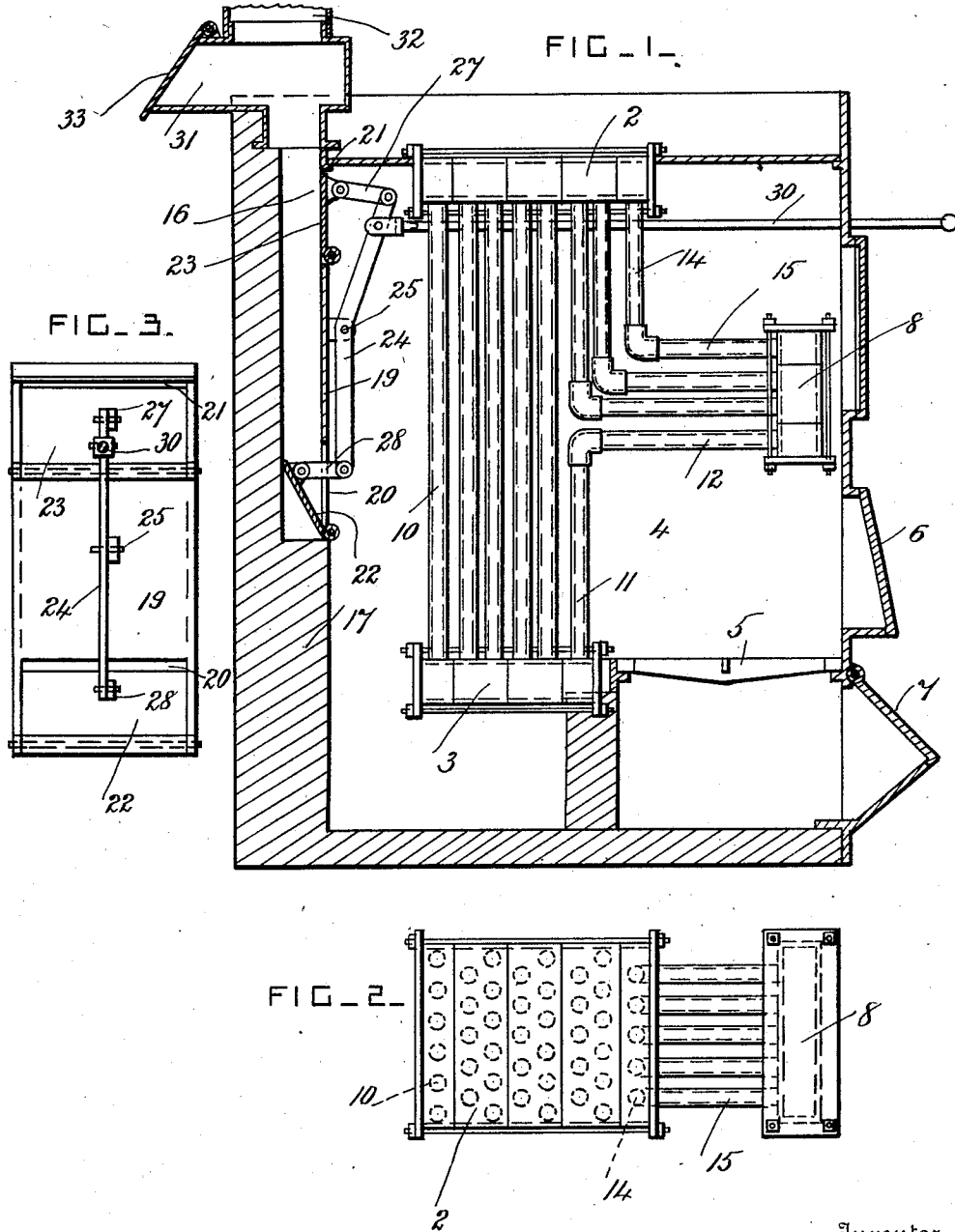


E. W. WISE.
BOILER.

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BOILER.

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To all whom it may concern:

Be it known that I, EDWARD W. WISE, a citizen of the United States, residing at Centralia, in the county of Lewis and State of Washington, have invented certain new and useful Improvements in Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to water tube boilers for heating plants; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a vertical section through a boiler constructed according to this invention. Fig. 2 is a plan view of the headers and water tubes. Fig. 3 is a front view of the dampers behind the water tubes.

Two headers 2 and 3, each formed of a series of header chambers secured side by side, are arranged one above the other in a furnace chamber 4. A fire-grate 5 of any approved construction is arranged in front of the lower header 3 and about on the same level. The chamber 4 is provided with a front plate, having a fire-door 6 and an ash-door 7 arranged respectively above and below the level of the grate. A front header 8 is arranged in the front part of the furnace chamber 4 adjacent to the front plate. This front header is formed of a series of header chambers similar to the headers 2 and 3, but the chambers or sections of the front header are arranged vertically one above the other instead of being arranged horizontally side by side. Water tubes 10 are arranged vertically between the upper and lower headers, and their end portions are secured to the header chambers in watertight relation by any approved means. As many of the tubes 10 as desired are used, and they are arranged in rows, and in staggered relation, between the rear and middle chambers or sections of the headers. Vertical water tubes 11 are secured to the front header chamber of the lower header, close behind the fire-grate, and 12 are horizontal or longitudinal water tubes which are connected to the upper ends of the tubes 11 and to the lower header of the front header 8. Vertical water tubes 14 are also connected to the front header cham-

ber of the upper header, at their upper ends, and have their lower ends connected by horizontal or longitudinal water tubes 15 to the upper and middle header chambers of the front header 8. The water tubes 12 and 15 are arranged in rows and in staggered relation, and more than one row of tubes 11 and 12 may be provided, if desired. The water tubes 12 and 15 extend longitudinally across the grate, at a suitable distance above it, so that they are exposed to the heat of the fire to the best advantage. The water tubes 11 and 12, and 14 and 15, form angle-shaped tubes, and they may be continuous tubes bent to angle-shaped form, or they may be united at their angles by junction-pieces.

A smoke pipe or flue 16 is formed vertically in the rear wall 17 of the furnace chamber 4, and a damper plate or cover plate 19 is secured at the front of this flue and is provided with draft openings 20 and 21, arranged respectively above and below the level of the horizontal water tubes 12 and 15. A damper 22 is pivoted to the damper plate to control the opening 20, and a damper 23 is pivoted to the damper plate to control the opening 21. A lever 24 is pivoted at its middle part by a pin 25 to the middle part of the damper plate between the draft openings. The upper end of the lever 24 is pivotally connected with the upper damper by a link 27, and its lower end portion is pivotally connected by a link 28 with the lower damper. A rod 30 is also pivoted to the lever 24 and slides in a hole in the front plate of the furnace.

A smoke bonnet 31 is connected to the top of the smoke flue 16, and an uptake or chimney 32 projects from the bonnet. The bonnet 31 is provided with a check damper 33 for the purpose of admitting air to the chimney to check the draft.

The hot water or steam from the water tubes is piped through the building to be heated. The rod 30 is moved so as to open one damper and close the other, or so as to open both dampers to a limited extent, and this action regulates the action of the fire upon the water tubes in the furnace, and enables the furnace to be operated in a very economical and satisfactory manner. A better circulation is obtained by arranging the rear tubes vertically and providing an upper header to which most of the front tubes are connected at one end. The upper

header also affords a very satisfactory steam space, and the boiler can be used for steam heating or for hot water heating as preferred. There is also an advantage in
 5 arranging the lower header substantially level with the boiler fire-grate, and in arranging the two smoke outlets at the levels shown, as it enables the flame and hot air
 10 from the fire-grate to be better distributed over the tubes, and permits fine ashes to settle below the lower header, where they can be cleared away periodically as they accumulate, and where they never obstruct the draft in any way.

15 What I claim is:

1. In a boiler, the combination, with a furnace chamber, of an upper header, a lower header and a front header, all arranged in the said chamber, a series of water
 20 tubes extending between the upper and lower headers, a series of angle-shaped water tubes extending between the upper header and the front header, a series of
 25 angle-shaped water tubes extending between the lower header and the front header, and a fire-grate arranged under the front header and the longitudinal portions of the water tubes connected to it and wholly in
 30 front of all the vertical tubes connected to the lower header.

2. In a boiler, the combination, with a furnace chamber, and a grate arranged therein; of a lower header arranged behind
 35 the said grate, an upper header arranged over the lower header, a front header ar-

ranged over the front end portion of the said grate below the level of the upper header, straight water tubes connecting the rear and middle portions of the upper and
 40 lower headers, angle-shaped water tubes connecting the front portion of the lower header with the lower portion of the front header, and angle-shaped water tubes connecting the upper portion of the front
 45 header with the front portion of the upper header.

3. In a boiler, the combination, with a furnace chamber, of an upper header, a lower header and a front header, all arranged in the said chamber; a series of water
 50 tubes extending between the upper and lower headers, a series of angle-shaped water tubes extending between the upper header and the front header, a series of angle-shaped water tubes extending between the
 55 lower header and the front header, a fire-grate arranged under the front header and the longitudinal portions of the tubes connected to it, substantially on a level with the lower header and wholly in front of all the
 60 vertical tubes connected to the lower header, and a draft outlet or flue arranged above the level of the grate and on the opposite side of the lower header from the grate.

In testimony whereof I have affixed my
 65 signature in the presence of two witnesses.

EDWARD W. WISE.

Witnesses:

JAMES McCOURT,
 F. W. THOMAS.