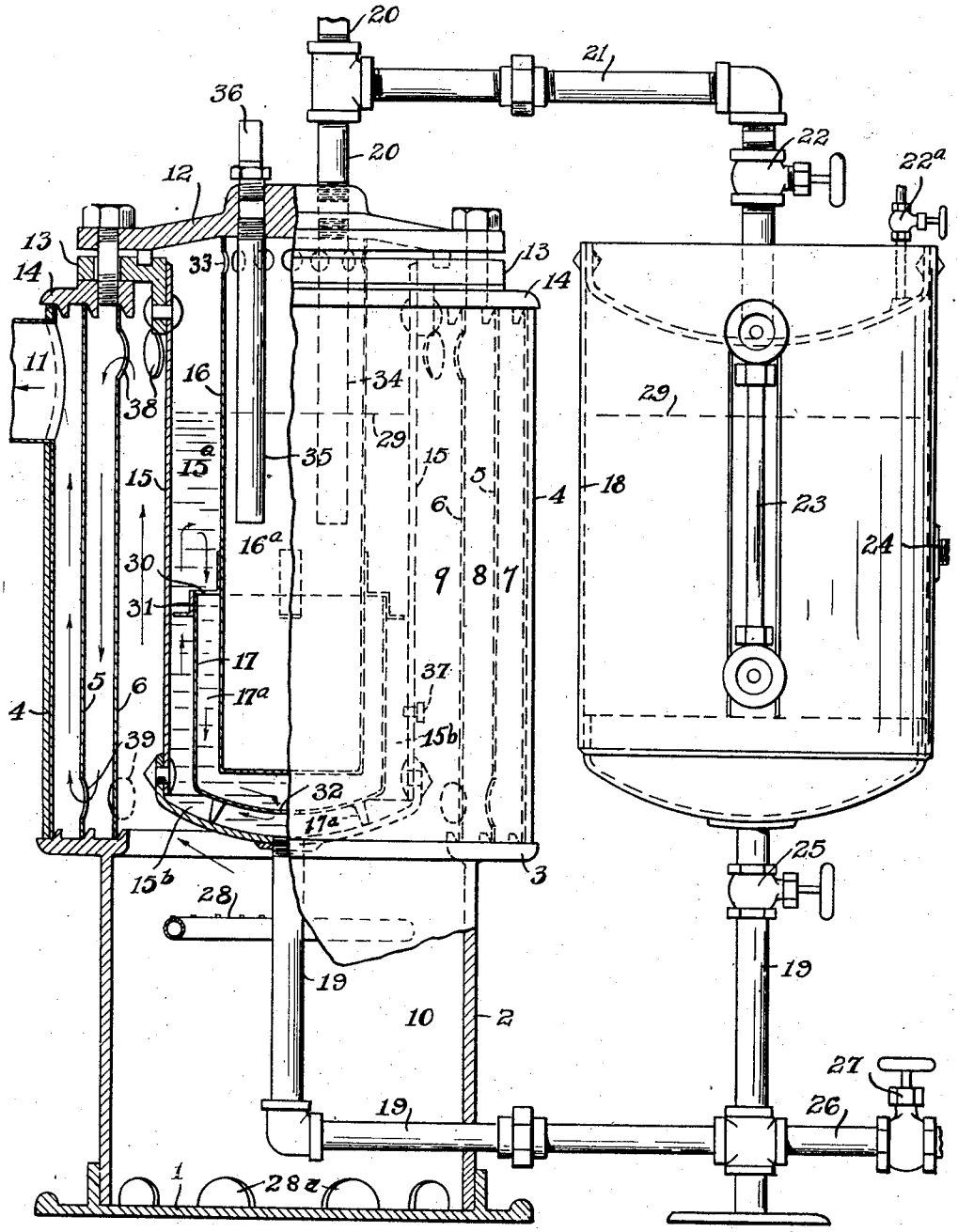
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STEAM BOILER

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STEAM BOILER.

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This invention relates to improvements in steam boilers, having particular reference to flueless, vertical boilers.

The figure in the accompanying drawing serves for illustrating the invention in a preferred construction.

As here shown the boiler structure consists of a built up casing comprising a base 1, fire chamber section 2 including a base flange 3 for supporting triple heat chamber casings 4—5—6 disposed telescopically and spaced laterally one relative to another for effecting three narrow cylindrical heat chambers 7—8—9 communicating with the fire chamber 10 and smoke pipe 11, and serving to conduct the gases of combustion through a circuitous path from the boiler, and to conserve the heat in the boiler and minimize the waste of heat carried off through the smoke pipe. The described structure is covered with a cast steel removable head 12 which affords convenient access to the interior structure for cleaning, etc.

Depending from a head flange ring 13, interposed between part 12 and a head cover ring 14, is a water casing 15, and extended upward in casing 15 and butted against or terminating near the head plate 12 is a steam casing 16, and depending from the lower end of casing 16 is a secondary water casing 17, the structure 16—17 as a whole being supported on legs 17^a resting on the bottom of casing 15.

Coacting with the boiler, as here shown, is a pressure feed water tank 18 which is connected to the lower end of the water casing 15 by a feed line 19 and to the steam chamber 16 by a branch 21 of the steam outlet line 20 of the boiler, the branch 21 being provided with a valve 22 for regulating the pressure of the steam in the tank, the tank being provided with a vent valve 22^a and with a gauge 23 for indicating the level of the water, the water supply line connection being indicated at 24. The water feed line 19 to the boiler is provided with a valve 25 for regulating the feed, a branch 26 provided with a valve 27 being connected to the line for blowing-off the boiler.

The boiler is adapted to be fired with any suitable fuel, as gas, oil, coal, etc., 28 serving to indicate the position of a gas or oil burner of any suitable construction, suitable air vents 28^a being provided in base 1 for the burner.

Water is supplied to the boiler from tank 18 through line 19, regulated as desired by valve 25, the water rising in chamber 15^a to a level coinciding with the level of the water in the tank, as shown by the gauge 23, the level of the water being indicated in the drawing by lines 29—29. A series of apertures 30 in the annular shoulder 31 of chamber 17^a, and a single port 32 in the bottom of chamber 17 are interposed between chambers 15^a—17^a for effecting circulation of the water through and between the chambers, the course of the water being indicated by the arrows.

Due to the interposition of casing 17 between water chambers 15^a—17^a, the lower portion 15^b of chamber 15^a presents a very shallow (laterally) body of water to the relatively large heating area 9, there being direct action of heat also on the upper portion of the water chamber 15^a. Thus very rapid generation of steam in the boiler results, the steam passing from chamber 15^a through a series of ports 33 into a steam storage chamber 16^a, and thence through a depending pipe 34 to the steam service line 20, a second depending pipe 35 in chamber 16^a having a pop or safety valve 36 applied thereto. A fuse plug 37 is applied to the water chamber casing 15 as a further safeguard in the operation of the boiler if the water should fall to an abnormal level.

The rapid circulation of water through chambers 15^a—17^a, due to the rapid conversion to steam and the constant movement of the water due to uneven temperatures in the inner and outer water chambers, has the beneficial effect of minimizing scale formation on the casings 15—17. The water feed line 19 being extended through the fire chamber results in preheating of the water before it discharges into the outer water chamber 15^a which has the effect of materially influencing the rapid generation of steam.

The triple heat chamber casings 4—5—6 are in effect compound manifolds which act to conserve the heat in the boiler and to minimize the waste of heat through the smoke pipe. The course of the outwardly moving, unconsumed gases of combustion is indicated by the arrows, a series of upper and lower ports 38—39 arranged alternately in casings 5—6 serve for conducting the gases to the outer chamber 7 and thence to the smoke pipe. The outer casing 4 is preferably lined with an asbestos covering for further conserving the heat by minimizing radiation through the outer casing.

The removable head 12 and head flange and ring 13—14 serve for making the interior structure of the boiler conveniently and fully accessible for cleaning. With the removal of these parts—12—13—14, the entire structure can be taken down, if desired, with slight cost in time and labor.

The objects attained generally in the improved boiler consist in relatively large and rapid steam generating capacity, in producing a service or storage head of dry steam, in the production of steam at low fuel cost, in the elimination of coil and tube troubles due to the entire absence of these elements in the boiler structure, in the elimination of feed water heating and the use of injectors or pumps, due to the arrangement for heating the feed water by extending the feed water line through the fire chamber, in convenient access to the interior structure of the boiler, and generally in the quality and character of construction for low cost production and maintenance, and long life service of the boiler.

Having described our invention, we claim:

1. A boiler including in combination with a heating chamber, a primary water chamber extended upward in the heating chamber, a secondary water chamber confined within the primary chamber, openings between said chambers for effecting circulation of water therethrough, a steam chamber extended upward in the water chambers and acting to effect a laterally shallow area for water therein, a series of ports in the steam chamber casing substantially above the water level in the boiler for the steam to enter the steam chamber, and a steam service line connected to the steam chamber.

2. A boiler including in combination with a heating chamber, a primary water chamber extended upward in the heating chamber, a secondary water chamber confined in the lower portion of the primary chamber and acting to reduce the body of water therein directly adjacent the heating chamber, openings in said chambers for effecting circulation of water therethrough, a steam chamber extended upward in the water chambers and acting to effect a laterally shallow area for water therein, openings in the steam chamber casing substantially above the water level in the boiler for the steam to enter the steam chamber, and a steam service line connected to the steam chamber.

3. A boiler including in combination with a heating chamber, a water chamber extended upward therein, a plurality of telescopically disposed, laterally spaced casings with alternate upper and lower passages in adjacent casings and a smoke pipe connection to the outer casing arranged in the heating chamber for effecting alternate ascending and descending annular channels around the water chamber for conducting the gases of combustion from the heating chamber, a flange ring supporting the water chamber and covering the heating chamber, and a removable head secured to the flange ring and covering the water chamber.

4. A boiler including in combination with a heating chamber, a water chamber extended upward therein, a plurality of telescopically disposed, laterally spaced casings, with alternate upper and lower passages in adjacent casings and a smoke pipe connection to the outer casing arranged in the heating chamber for effecting alternate ascending and descending annular channels around the water chamber for conducting the gases of combustion through the heating chamber, a retaining ring placed over the telescopically arranged casings, a flange ring resting on the retaining ring and supporting the water chamber, and a boiler head supported removably on the flange ring.

5. A boiler including in combination with a heating chamber, a primary water chamber casing removably supported in the heating chamber, a steam chamber casing removably supported in the primary water chamber casing, a secondary removable water chamber casing supported in the primary water chamber casing and surrounding the lower portion of the steam chamber casing, and a removable head for the boiler affording access to said casings.

6. A boiler including in combination with a heating chamber, a primary water chamber casing removably supported in the heating chamber, a steam chamber casing removably supported in the primary water chamber casing, a secondary removable water chamber casing supported in the primary water chamber casing and surrounding the lower portion of the steam chamber casing and serving to support the same, and a removable head for the boiler affording access to said casings.

7. A boiler including in combination with a plurality of separately removable telescopically arranged heating chamber casings, a primary water chamber casing removably supported in the inner heating chamber casing, a steam chamber casing removably supported in the primary water chamber casing, and a removable head for the boiler and means combined therewith for effecting the spacing of the heating and water chamber casings one relative to another.

In testimony whereof we affix our signatures.

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